



PROFESSIONAL DEVELOPMENT  
FOR QUALITY EDUCATION

GRADE

5

LESSON PLANS FOR TEACHERS

# MATHEMATICS

Based on  
Curriculum 2020



Directorate of Curriculum and Teacher Education (DCTE)  
Khyber Pakhtunkhwa, Abbottabad

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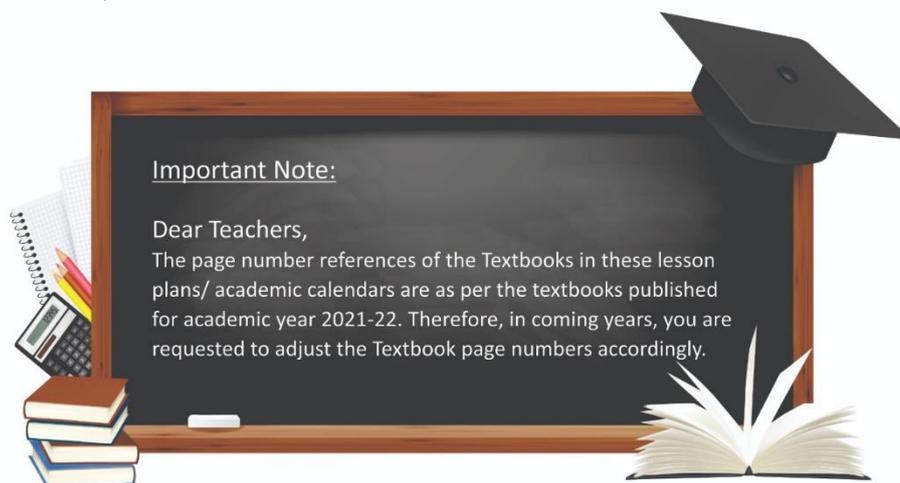
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**NOTIFICATION:**

**No.5073-5235/F.24/Vol-II/SLP/G-V/SS-M&E, dated: 30-08-2021** : Consequent upon its development and review by the respective development and review committees notified for the purpose, the Directorate of Curriculum and Teacher Education (DCTE), Khyber Pakhtunkhwa, Abbottabad, being the competent authority under the Khyber Pakhtunkhwa Supervision of Curricula, Textbooks and Maintenance of Standards of Education Act 2011, is pleased to notify the scripted lessons for Grade-V in the subjects of English, Urdu, Mathematics and Social Studies based on Curriculum 2020 and the textbooks aligned on it for all educational institutions in Khyber Pakhtunkhwa for the Academic year 2021-22 and onwards.

**DIRECTOR**

Copy forwarded for information and necessary action to the:

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2. Director, Elementary & Secondary Education Khyber Pakhtunkhwa.
3. Director, Professional Development, Khyber Pakhtunkhwa Landey Sarak Charsadda Road Larama, Peshawar.
4. All District Education Officers (M/F) in Khyber Pakhtunkhwa and Newly Merged Districts (NMDs).
5. PS to Minister, Elementary & Secondary Education Department Govt. of Khyber Pakhtunkhwa, Peshawar.
6. All Sub Divisional Education Officers (M/F) in Khyber Pakhtunkhwa and Newly Merged Districts (NMDs).
7. Team Leader ASI-KESP, at PC Peshawar.
8. PS to the Director Local Office.

**ADDITIONAL DIRECTOR (SS)**



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# INTRODUCTION

Teaching and learning process in the classroom can vary concerning the ability, experience, and training of the teacher, which is why to standardize instruction, every good and effective teacher requires a lesson plan. The preparation of a lesson plan is important for clarity and comprehension regarding how the entire learning process will be handled as well as how students can understand and store the knowledge that is being passed onto them.

Lesson plans are vital for helping students accomplish their goals within a learning environment on a short-term and long-term basis. Lesson plans based on clearly defined Student Learning Outcomes (SLOs) concerning the textbooks ensure students are taught the required curriculum most efficiently. These ensure the teacher is adequately prepared and has a clear sense of direction for their lessons. In the context of Khyber Pakhtunkhwa, Lesson Plans are designed to support teachers to implement new pedagogical methods and help provide direction to instruction in the classrooms.

## **Traditional teaching Style:**

Many teachers in Pakistan have come to rely on the textbook for teaching. They come into the classroom, ask students to open the textbook on a certain page, have students read a portion of the text, paraphrase the same and then ask students to answer questions that require them to reproduce material from the text. They teach every subject (the exception being mathematics) and every lesson in the same way. In some cases, the teacher is unable to complete the curriculum or impart the SLOs for a particular grade to the students effectively. Using lesson plans ensure standardization in teaching quality and provides a clear goal with relevant activities that can help students learn more effectively and achieve curriculum milestones.

## **What is a lesson Plan?**

A lesson plan is a description of the instructions for the purpose of teaching the contents of the textbook of a particular subject and achieving Student Learning Outcomes (SLOs).

A lesson plan is the road map for teachers for the achievement of SLOs effectively during class time. The teachers design appropriate learning activities and develop strategies to obtain feedback on students' learning. A carefully constructed lesson plan allows the teacher to enter the classroom with more confidence and maximizes the chance of having a meaningful learning experience with the students.

A successful lesson plan addresses and integrates three key components:

- ✧ Student Learning Outcomes (SLOs).
- ✧ Learning activities.
- ✧ Assessment to check for students' understanding.

## Benefits of Lesson Planning

Most important benefits of lesson planning are to:

- Improve the quality of teaching and learning.
- Establish clarity of purpose.
- Facilitate achievement of student learning outcomes.
- Use available time effectively.
- Develop appropriate materials and ensure their effective use.
- Develop the confidence of teachers.

## Development Process of a Lesson Plan

Lesson plan usually starts with a thinking process. This thinking process is basically completed in four parts.

- **First**, determine the SLO; that is, what the children will learn, what they will be able to do upon completing the activities or work of the lesson.
- **Second**, determine what the students already know, before beginning of the lesson that can lead into a new curriculum of the day.
- **Third**, determine at least one way to assist the students in learning the new curriculum.
- **Fourth**, determine a way to evaluate the learning outcomes of the students.

## Components of a Lesson Plan

Common elements of lesson plans are; unit of study, a title/topic/problem, identification of student learning outcomes (SLOs), a sequence of learning activities including introductory, developmental and concluding activities, list of materials to be used and assessment strategies.

- ❖ **Choosing the Topic.** You can choose any topic from the textbook of the designated grade, a skill such as information gathering, a value such as peace, a current affair topic or an area of special concern such as the environmental pollution etc.
- ❖ **Identifying Student Learning Outcomes (SLOs) from the Curriculum.** The Curriculum has identified the student learning outcomes to be achieved for each topic. Identifying the student learning outcomes will help you to clarify the knowledge, skills, attitudes and values to be developed. Choose only one to three SLOs to develop your lesson (many more for a unit plan).
- ❖ **Material Resources.** A key part of planning is to ensure the identification, adaptation and development of resources required for the lesson for both teachers and students.
- **Development:**
  - ❖ **Introductory Activities:** Introductory activities are designed to introduce the topic, a subtopic or establish connection with the previous lesson. They are designed to build readiness, create interest, raise questions and explore what children already know about the topic, recall relevant information, motivate students and focus their attention on the topic/ theme/problem to be studied. Introductory activities can include an

arrangement of pictures and other times that stimulate interest and questions. Others may be based on the teacher posing questions, reading a poem or story etc. A test, an inventory, or a quiz may be used to find out what students know in order to build on their existing knowledge.

- ✧ **Developmental Activities:** Developmental activities should emerge out of the introductory activities. There should be smooth transitions between the activities to provide a smooth learning sequence. These activities are designed to actualize the student learning outcomes. They introduce new concepts, skills and values or build on past learning and should be linked with each other. Applicative or demonstrative activities extend learning and develop the ability to use concepts and skills. Creative and expressive activities enrich learning and develop the ability to improvise and apply learning in original ways.
- ✧ **Concluding the lesson:** Conclusion includes activities that serve to consolidate, summarize, or facilitate application of knowledge and skills of students to a new situation. They are generally related to the main idea of the lesson. The concluding activities could bring together the different main ideas of the unit. In this case, the emphasis should be on the educational outcomes and not on “putting on a show”.
- ✧ **Assessment of Learning.** Assessment strategies can tell us how well or to what extent the student learning outcomes have been met. Assessment of learning is important in all phases of the lesson/unit from introduction to conclusion. A variety of tools can be used to assess the realization of the chosen learning out-comes. Some of these will be prepared as part of the learning activities. For example, the drawing and labeling of a map, the checklist for evaluating a discussion or simply asking questions relevant to the day’s topic. Other tools such as tests can be prepared ahead of time as well.
- ✧ **Follow up/homework task.** This component includes follow up activities or home assignments to be under-taken by students at home.

# PREFACE

The Government of Khyber Pakhtunkhwa, Elementary and Secondary Education Department, is committed to improve the quality of teaching and learning by taking a number of reforms and initiatives for the improvement of quality education in line with the national and international emerging trends. Providing quality education at primary level is the first imperative step towards achieving this goal.

For this purpose, the Directorate of Curriculum and Teacher Education Khyber Pakhtunkhwa, at Abbottabad, has been entrusted the responsibility of developing and reviewing teachers' in-service and pre-service training materials for the improvement of pedagogical skills of teachers.

These quality improving initiatives also include development of teacher's guides of scripted lesson plans at primary level that support teachers to implement new pedagogical methods. These teacher guides are intended to assist teachers with the provision of content, effective teaching methods and tools for measuring what learners have gained. These guides will ensure an effective and participative engagement of teachers with students as activities included in these lesson plans are student-centered.

These teachers' guides of Lesson Plans based on Student Learning Outcomes (SLOs) of Curriculum 2006 were developed for the first time in 2013. In 2018-2019, the Directorate of Curriculum & Teachers' Education Khyber Pakhtunkhwa undertook the task to revise and develop the Scripted Lesson Plans for Grade I-III according to the Academic Calendar on missing Students Learning Outcomes (SLOs).

As the Curriculum has been revised and new textbook are developed in 2020 for Grades Pre-I to V, hence the need has been felt that these Lesson Plans for Grades I to V are to be revised, developed and aligned with the updated Curriculum 2020, accordingly.

The Directorate of Curriculum and Teacher Education Khyber Pakhtunkhwa constituted different committees comprising of Curriculum/Subject experts and working teachers for developing these Lesson Plans based on Curriculum 2020. DCTE acknowledges the efforts of these experts for developing and reviewing these scripted lesson Plans.

The Directorate of Curriculum and Teachers Education Khyber Pakhtunkhwa is also thankful to the Technical Assistance of Khyber Pakhtunkhwa Education Sector Programme (KESP) in the finalization of these lesson plans.

**Gohar Ali Khan**  
**Director,**  
**Curriculum and Teacher Education**  
**Khyber Pakhtunkhwa, Abbottabad.**

**Month**

**1**

# NUMBERS UP TO 1 MILLION



## STUDENT LEARNING OUTCOMES

- Read numbers up to 1,000,000 (one-million) in numerals and words.
- Write numbers up to 1,000,000 (one million) in numerals and words.

## INFORMATION FOR TEACHERS

Teachers should be able to:

1. Use a place value chart to read numbers written in numerals.
2. Write numbers up to 1,000,000.



**DURATION / NO OF PERIODS: 70 MINUTES / 2 PERIODS**



**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils, Flashcards



## INTRODUCTION

1. Write the following number on the board:  
1 3 8 9 5 3 7
2. Ask students if they know how to read the number written on the board? Let a few students attempt to read the number.
3. After a few attempts, tell students that they can **read** the number by using a place value chart. Draw the place value chart as shown below and write the numbers in the correct boxes.

MILLION	THOUSAND			Hundreds	Tens	Ones
Millions	100 Thousands	10 Thousands	Thousands			
1	3	8	9	5	3	7

4. Tell students to start from the left side and read the number in the first box and add "million" at the end. The teacher should say "one million" out loud as well.
5. Next students should read the three numbers in the next three boxes together (i.e. three hundred and eighty-nine) and add "thousand" at the end. The teacher should say "three hundred and eighty-nine thousand" out loud.
6. Lastly, ask the students to read the next three numbers in the last three boxes (i.e. five hundred and thirty-seven). The teacher should say "five hundred and thirty-seven" out loud.
7. Students will read the number as "one million three hundred and eighty-nine **thousand** five hundred and thirty-seven". The teacher should provide guidance if needed.



## DEVELOPMENT

### Activity:

1. The teacher will ask students to work in pairs for the next activity.
2. Distribute flashcards with the following numbers written on them:  
6312405  
4257863  
9206741  
6742581  
1429563  
1264378
3. Each pair will have one flashcard.
4. Ask the students to use the place value chart to help them read the number written on their flashcards. Give them some time to discuss and ask them to read out their number to the class.  
If needed, other students should also guide the pair to arrive at the correct answer.
5. The pairs should switch flashcards and work on the next one in the same way.
6. Provide guidance where needed and give pairs additional flashcards for further practice.



## CONCLUSION / SUM UP

1. Ask students how they can **read** numbers up to 1,000,000 if written in numerals. Ask students to come up to the board and give examples of how they can read large numbers.
2. Students should mention that they can read numbers by using a place value chart and starting from the left.

# NUMBERS UP TO 1 MILLION



## INTRODUCTION

1. Ask the students to write down the number in numerals which the teacher will be speaking out loud.
2. Draw a place value chart on the board and ask students to do the same in their notebooks.
3. Say out loud "One Million Six Hundred and Forty-Seven thousand, Three hundred and Twenty One". Repeat it slowly so the students can follow.
4. Randomly select a student to come up to the board and fill in the place value chart as the teacher says the number out loud once again. See the example below:

MILLION	THOUSAND			Hundreds	Tens	Ones
Millions	100 Thousands	10 Thousands	Thousands			
1	6	4	7	3	2	1

5. Other students should do the same in their notebooks after they have attempted the question on their own.
6. Divide students into pairs and distribute flashcards among them. On the flashcards, the following numbers in words should be written. Ask the students to write the following numbers in numerals in their notebooks.
  - Four million, five hundred thousand, nine hundred and fifty-six
  - Nine hundred twenty-nine thousand one hundred eleven
  - Five million, six hundred thousand eight hundred
  - Four Million Three Hundred and Sixteen Thousand Seven Hundred and Twenty Three
  - One Million Five Hundred and Sixty-Three Thousand Two Hundred and Sixteen
  - Two Million Seven Hundred and Eighty-Three Thousand Nine Hundred and Sixty-Five
  - Seven Million Nine Hundred and Twenty Four Thousand
7. Ask a few students to write their answers on the board and let the rest of the class help.



## DEVELOPMENT

### Activity:

1. Make the following chart on the writing board.

6	7	5	3	8	1	9
4	8	2	9	3	0	1
9	2	1	3	8	4	7
	4	9	6	3	2	1
1	2	8	9	4	7	5

2. Divide the class into pairs.
3. Ask each pair to discuss and write the above numbers in words in their notebooks.

4. Guide them where necessary.
5. Write the correct answers on the board and ask students to make corrections.



### CONCLUSION / SUM UP

Ask students how do we read and write large numbers. Students should highlight that:

1. To read and write numbers up to 1,000,000 they should use a place value chart.
2. For reading and writing a number, we start from the extreme left digit or the digit with the highest place value.



### ASSESSMENT

1. Write 3,253,800 on board and ask the students to write it in words.
2. Write four million four hundred seven thousand one hundred and nine on the board and ask students to write the number in numerals.
3. After a few minutes of students attempting individually, write the correct answers on the board.



### HOMEWORK / FOLLOW UP

Assign questions from Exercise 1 from the textbook on pages 5 and 6.

**ADDITION AND SUBTRACTION****STUDENT LEARNING OUTCOMES**

Add numbers up to 6-digit numbers.

**INFORMATION FOR TEACHERS**

Teachers should be able to:

1. Add numbers i.e. align the ones digit with the one's digit, the tens with the tens and so on.
2. Carry when doing an addition of numbers.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**

**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils, Flashcards with 6-digit numbers.

**INTRODUCTION**

1. Write the following question on the board:  
Add 567,098 and 381,940.
2. Ask students to work in pairs and attempt the question in their notebooks.
3. After students have discussed and attempted the question in pairs, the teacher should draw a grid like the one shown below. Ask one of the students to volunteer to write 567,098 correctly in the place value chart.
4. Ask another student to volunteer to write 381,940 below the first number. The set-up of the addition should look like:

	Hun Th	Ten Th	Th	H	T	O
567,098	5	6	7	0	9	8
+ 381,940	3	8	1	9	4	0

5. Randomly select a student to carry out addition starting with the ones-digit and moving to the tens-digit, hundreds-digit, thousands-digit, ten thousands-digit, and then the hundred thousands-digit.
6. Guide the student that in the addition of a 6-digit number we add ones with ones, tens with tens, hundreds with hundreds, thousands with thousands, ten thousands with ten thousands and hundred thousands with hundred thousands.
7. Pay special attention while adding the tens, hundreds, and ten thousands digits as carrying should be done during addition here.
8. Discuss with students how after addition the total amount is Rs. 949,038 with the following working:

	Hun Th	Ten Th	Th	H	T	O
	1		1	1		
	5	6	7	0	9	8
+	3	8	1	9	4	0
	9	4	9	0	3	8



### DEVELOPMENT

#### Activity:

1. Divide the students into groups of 5.
2. Write the following questions on different flashcards:
  - ◇  $425036 + 537238$
  - ◇  $562830 + 337456$
  - ◇  $732821 + 186790$
  - ◇  $485621 + 214837$
  - ◇  $571143 + 286249$
3. Students should work in groups of 5 and solve one question and pass it on to the next student in their group. When each student has solved all questions, the students can compare their answers.
4. Ask students from different groups to come to the board and share their solutions.
5. Ask other students to give their input as well.
6. After students have attempted the question, solve and show the correct solutions on the writing board.



### CONCLUSION / SUM UP

Ask students how do we carry out the addition of 6-digit numbers with 6-digit numbers. Students should highlight that in addition, we add ones with ones, tens with tens, hundreds with hundreds, thousands with thousands, ten thousands with ten thousands and hundred thousands with hundred thousands.



### ASSESSMENT

1. Give two different flashcards to each student.
2. Each flashcard should have a 6-digit number on it.
3. Tell them to add the two numbers written on their flashcards and show their work to the student sitting next to them for peer review.
4. Walk through the class and observe if students are adding correctly.
5. Provide guidance where needed.



### HOMEWORK / FOLLOW UP

Assign the relevant questions from Exercise 2 on page 10.

**ADDITION AND SUBTRACTION****STUDENT LEARNING OUTCOMES**

Subtract numbers up to 6-digits.

**INFORMATION FOR TEACHERS**

Teachers should be able to:

1. Align two 6-digit numbers and carry out subtraction i.e. one's digit should be aligned with one digit, tens with tens, and so on.
2. Borrow when doing subtraction of numbers.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

Board, Marker, Notebooks, Textbooks, Pencils, Flashcards with 6-digit numbers.

**INTRODUCTION**

1. Ask students to work in pairs and solve  $769452 - 247673$  in their notebooks.
2. Encourage pairs to come to the board and share their solutions.
3. Write the solution on the board as shown below. Explain each step to the students and highlight why we need to borrow.

	Hundred Thousand	Ten Thousand	Thousand	Hundred	Ten	Ones
					4	1
	7	6	9	4	<del>5</del>	2
-	2	4	7	6	7	3
						9

	Hundred Thousand	Ten Thousand	Thousand	Hundred	Ten	Ones
				3	14	1
	7	6	9	<del>4</del>	<del>5</del>	2
-	2	4	7	6	7	3
					7	9

	Hundred Thousand	Ten Thousand	Thousand	Hundred	Ten	Ones
			8	13	14	1
	7	6	<del>9</del>	<del>4</del>	<del>5</del>	2
-	2	4	7	6	7	3
				7	7	9

	Hundred Thousand	Ten Thousand	Thousand	Hundred	Ten	Ones
			8	13	14	1
	7	6	<del>9</del>	<del>4</del>	<del>5</del>	2
-	2	4	7	6	7	3
			1	7	7	9

	Hundred Thousand	Ten Thousand	Thousand	Hundred	Ten	Ones
			8	13	14	1
	7	6	<del>9</del>	<del>4</del>	<del>5</del>	2
-	2	4	7	6	7	3
			1	7	7	9



### DEVELOPMENT

#### Activity:

1. Prepare flashcards for the class with 6-digit numbers written on them e.g. 405671, 293649, 879502, 687481, 42798, 37089, 49898, 325789, etc. Put these flashcards into a basket.
2. Divide the class into pairs and ask each pair to pick two flashcards from the basket.
3. Ask each pair to find the difference between the two numbers.
4. Remind students that for subtraction it is important to place the bigger number on the top and the smaller number at the bottom.
5. Students who finish early should come to the basket and pick two more flashcards.
6. Walk around the class to provide guidance and give feedback to students as they carry out subtraction.



### CONCLUSION / SUM UP

1. Conclude the lesson by asking students to explain the steps involved in the subtraction of 6-digit numbers. The key points to look for are:
  - ✧ alignment of digits
  - ✧ writing the larger number on top
  - ✧ carrying out borrowing where necessary
2. Reinforce the concept of borrowing if needed.



### ASSESSMENT

Write the following questions on the writing board and ask students to solve these questions in their notebooks.

- i)  $657038 - 456291$
- ii)  $684932 - 597460$

Walkthrough the class and assist students where necessary.



### HOMEWORK / FOLLOW UP

Assign the relevant questions from Exercise 2 on page 10.

# MULTIPLICATION AND DIVISION



## STUDENT LEARNING OUTCOMES

- Multiply numbers up to 5 digits by 10, 100, and 1000.
- Divide numbers up to 5 digits by 10, 100, and 1000.

## INFORMATION FOR TEACHERS

Teachers should know that:

1. When we multiply a whole number by 10 we put one zero to the right of the number.
2. When we multiply a whole number by 100, we put two zeroes to the right of the number.
3. When we multiply a whole number by 1000, we put three zeroes to the right of the number.
4. When we divide a whole number by 10 that has 0 at its ones place, we remove one zero from the right of the whole number.
5. When we divide a whole number by 100 that has 0s at its ones and tens place, we remove two zeroes from the right of the whole number.
6. When we divide a whole number by 1000 that has 0s at its ones, tens and hundreds place, we remove three zeroes from the right of the whole number.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

Board, Marker, Notebooks, Textbooks, Pencils, Flashcards



## INTRODUCTION

1. Write the following questions on the writing board:

$$6 \times 10 = ?$$

$$7 \times 10 = ?$$

$$2 \times 100 = ?$$

$$15 \times 100 = ?$$

$$17 \times 1000 = ?$$

2. Divide the class into pairs.
3. Give students a few minutes to discuss and attempt the questions in pairs.
4. After completing the task, the teacher will discuss it with the whole class.
5. The teacher will tell the class:

When we multiply a whole number by 10 we put one zero to the right of the number. Therefore,

$$6 \times 10 = 60$$

$$7 \times 10 = 70$$

When we multiply a whole number by 100, we put two zeroes to the right of the number. Therefore,

$$2 \times 100 = 200$$

$$15 \times 100 = 1500$$

And when we multiply a whole number by 1000, we put three zeroes to the right of the number. Therefore,

$$17 \times 1000 = 17000$$



## DEVELOPMENT

### Activity 1:

1. Divide the class into groups.
2. Distribute flashcards with the following questions (or similar) written on them to each group.
  - i.  $79 \times 10$
  - ii.  $82 \times 100$
  - iii.  $54 \times 1000$
  - iv.  $31 \times 100$
  - v.  $68 \times 10$
3. Ask the groups to discuss and solve the questions.
4. Each group should do all questions assigned to them.
5. After completing the task, a representative from each group will write their answer, to one question, on the board and the teacher will discuss it with the whole class.

### Activity 2:

1. Write the following questions on the board:

$$4900 \div 10$$

$$530000 \div 100$$

$$62000 \div 1000$$

2. Divide the class into pairs.
3. Give students a few minutes to discuss and attempt the questions in pairs.
4. After completing the task, the teacher will take student responses and discuss the solutions with the whole class.
5. The teacher will tell the class:  
When we divide a whole number by 10 that has 0 at its ones place, we remove one zero from the right of the whole number. Therefore,

$$4900 \div 10 = 490$$

When we divide a whole number by 100 that has 0s at its ones and tens place, we remove two zeroes from the right of the whole number. Therefore,

$$530000 \div 100 = 5300$$

When we divide a whole number by 1000 that has 0s at its ones, tens and hundreds place, we remove three zeroes from the right of the whole number. Therefore,

$$62000 \div 1000 = 62$$

6. In multiplication the number of zeroes increases and in the division the number of zeroes decreases

### Activity 3:

1. Distribute students into 4 groups – 2 groups (A and B) for multiplication and 2 groups (C and D) for division.

2. Give Group A flashcards containing multiplication questions as shown below:

Group A $156 \times 10$	Group A $24 \times 1000$
Group A $74 \times 100$	Group A $8 \times 10$

3. Give Group B flashcards containing the answers to the multiplication questions as shown below:

Group B 1560	Group B 24000
Group B 7400	Group B 80

4. Give Group C flashcards containing division questions as shown below:

Group C $230 \div 10$	Group C $160000 \div 1000$
Group C $96000 \div 100$	Group C $650 \div 10$

5. Give Group D flashcards containing the answers to the division questions as shown below:

Group D 23	Group D 160
Group D 960	Group D 65

6. Ask the students to match the questions with the correct answers. Tell students from group A and group B to discuss. Similarly, tell students from groups C and D to discuss.
7. After the matching, one student from each group should come to the front of the class and explain how they knew how to match the two flashcards.
8. Other students should guide the pair.
9. Make more flashcards as needed.



## CONCLUSION / SUM UP

1. Ask students to summarize the rule of multiplying and dividing a whole number by 10, 100, or 1000.

2. Students should emphasize that in multiplication when we multiply a whole number by 10, 100 and 1000, the number of zeroes increases by 1, 2 and 3 respectively. In division, the zeroes decrease from the right of the whole number.



## ASSESSMENT

Write the following questions on the writing board and ask students to solve them in their notebook:

$$191 \times 10$$

$$3950 \times 100$$

$$1234 \times 1000$$

$$890 \div 10$$

$$37000 \div 100$$

$$87000 \div 1000$$

Guide students where needed.



## HOMEWORK / FOLLOW UP

Assign the relevant questions from Exercise 3 on page 18.

# MULTIPLICATION AND DIVISION



## STUDENT LEARNING OUTCOMES

- Multiply numbers up to 5-digits by a number up to 3-digits

## INFORMATION FOR TEACHERS

Teachers should be able to:

1. Align and set up multiplication questions.
2. Carry while doing multiplication problems.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



## MATERIALS / RESOURCES REQUIRED

- Board, Marker, Notebooks, Textbooks, Pencils, Flashcards with 5-digit and 3-digit numbers written on them



## INTRODUCTION

1. Write the following word problem from a real-life situation on the writing board.  
A shopkeeper bought 356 mobiles from a wholesale shop at Rs 12,590 each. How much did he pay in total to buy the mobiles?
2. Ask students to think about this question and how they would go about answering it. Give students a few minutes to brainstorm and then raise their hands and give their input.
3. Record student responses on the board.
4. Ask students if the final answer will be a large number or a small number? Ask students to explain their answers?
5. Encourage students to say, "multiply", "times" and "product".
6. Draw a place value chart on the board and write 12,590 in the first row and 356 in the second row. Introduce the million-digit as the one which comes after hundred thousand.
7. Ask a student to come to the board and multiply 6 with 12,590 to reach the answer below. Encourage other students to help when needed.

Mil	Hun Th	Ten Th	Th	H	T	O
		1	3	5		
		<b>1</b>	<b>2</b>	<b>5</b>	<b>9</b>	<b>0</b>
	<b>x</b>			<b>3</b>	<b>5</b>	<b>6</b>
		7	5	5	4	0

8. Ask another student to multiply 12,590 with 50. This is the same as multiplying 12,590 with 5 and then adding a 0 at the end of the number.

Mil	Hun Th	Ten Th	Th	H	T	O
		1	2	4		
		1	3	5		
		<b>1</b>	<b>2</b>	<b>5</b>	<b>9</b>	<b>0</b>
	<b>*</b>			<b>3</b>	<b>5</b>	<b>6</b>
		7	5	5	4	0
	6	2	9	5	0	0

9. Ask another student to multiply 12,590 with 300. This is the same as multiplying 12,590 with 3 and then adding two 0s at the end of the number.

Mil	Hun Th	Ten Th	Th	H	T	O
			1	2		
		1	2	4		
		1	3	5		
		<b>1</b>	<b>2</b>	<b>5</b>	<b>9</b>	<b>0</b>
	<b>*</b>			<b>3</b>	<b>5</b>	<b>6</b>
		7	5	5	4	0
	6	2	9	5	0	0
3	7	7	7	0	0	0

10. Ask another student to add all three terms and share the answer with the class.

Mil	Hun Th	Ten Th	Th	H	T	O
			1	2		
		1	2	4		
		1	3	5		
		<b>1</b>	<b>2</b>	<b>5</b>	<b>9</b>	<b>0</b>
	<b>*</b>			<b>3</b>	<b>5</b>	<b>6</b>
1	1	2	1			
		7	5	5	4	0
	6	2	9	5	0	0
3	7	7	7	0	0	0
4	4	8	2	0	4	0



## DEVELOPMENT

### Activity 1:

- Write 53624 x 369 on the writing board.
- Ask students to work in pairs and solve the question.
- Give students some time to discuss and share their answers with the class.
- To guide students, write the numbers in the place value chart and multiply as shown below:

Ten Million	Mil	Hun Th	Ten Th	Th	H	T	O
			1	1		1	
				3	1	2	
			2	5	2	3	
			<b>5</b>	<b>3</b>	<b>6</b>	<b>2</b>	<b>4</b>
		<b>x</b>			<b>3</b>	<b>6</b>	<b>9</b>
		1	1	1			
		4	8	2	6	1	6
	3	2	1	7	4	4	0
+ 1	6	0	8	7	2	0	0
1	9	7	8	7	2	5	6

- Tell students first multiply 53624 with 9. The expected answer is 482616.
- Tell students to multiply 53624 with 60. The expected answer is 3217440.
- Tell students to multiply 53624 with 300. The expected answer is 3217440.
- Tell students to add up the 3 terms to get 19787256.



## CONCLUSION / SUM UP

Ask students how do we multiply 5-digit numbers by 3-digit numbers. Students should highlight the importance of aligning and setting up multiplication questions. Students should also mention when to add the zeroes at the end of the numbers during multiplication and when to carry them while doing multiplication problems.



## ASSESSMENT

- Ask the students to copy and complete the following questions in their notebooks:

a)

Ten Th	Th	H	T	O
5	4	3	8	2
<b>x</b>		1	6	2

---

b)

Ten Th	Th	H	T	O
6	7	4	2	1
<b>x</b>		4	2	5

---

- After students have attempted the questions, share the correct solutions with them on the writing board.



## **HOMEWORK / FOLLOW UP**

- Assign students the relevant questions from Exercise 3 on page 18.

# MULTIPLICATION AND DIVISION COURTESIES



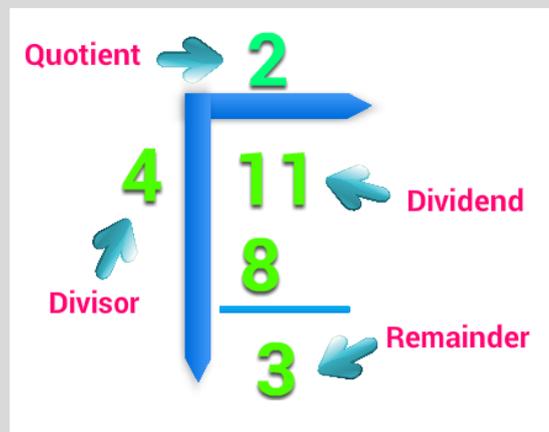
## STUDENT LEARNING OUTCOMES

- Divide numbers up to 5-digits by a number up to 2-digit

## INFORMATION FOR TEACHERS

Teachers should be able:

1. To set up and carry out long division.
2. To understand the terms divisor, dividend, quotient, and remainder, and use them while doing division problems i.e. when a number is divided by another number, the result is called the quotient and the leftover quantity is called the remainder.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils, Charts, Currency Notes and Coins



## INTRODUCTION

1. Write the following word problem on the writing board:  
Murtaza has Rs. 25380. He wants to distribute the money equally among 11 people.
  - ◇ How much money will each person receive?
  - ◇ How much money will be left with him?
2. Ask students to work in pairs and discuss how they will find the money to be distributed to each person.
3. The teacher should solve the division problem ( $11 \div 4$ ) written in the Information for teachers section, in a margin on the writing board for students to understand and remember.
4. Encourage students to use expressions like "divide equally", "divide 25380 by 11", "11 should be the divisor" etc.

- Take student feedback.
- Set up the question as shown below. Tell students that 25380 is the **dividend** and 11 is the **divisor**.

$$\begin{array}{r}
 0 \\
 11 \overline{) 25380}
 \end{array}$$

- Ask students, "Can 2 be divided by 11?"
- Students should reason that 2 cannot be divided by 11 as 2 is smaller than 11. Tell students, therefore we put a 0 (shown in blue).
- Now ask students, "Can 25 be divided by 11?" Give students a few minutes to think about this and ask students to recite the 11 times table to guide their thinking.
- Students should say that 25 is divisible by 11 as 11 times 2 is 22. Write 2 and 22 in the appropriate positions.

$$\begin{array}{r}
 0 \quad 2 \\
 11 \overline{) 25380} \\
 \underline{22} \phantom{00} \\
 03
 \end{array}$$

- Tell students that the next step is to subtract 22 from 25 to get the remainder of 3.
- The question is not yet solved. Ask students what the next step should be? Students should say that the next step is to bring down the 3 as shown below and continue the long division. This time there is no remainder. However, the question is not yet solved.

$$\begin{array}{r}
 0 \quad 2 \quad 3 \\
 11 \overline{) 25380} \\
 \underline{22} \phantom{00} \\
 03 \phantom{0} \\
 \phantom{0} \underline{33} \\
 \phantom{00} 0
 \end{array}$$

- Students should further add that in the next step the 8 is brought down.
- Ask students, "Can 8 be divided by 11?"
- Students should reason that 8 cannot be divided by 11 as 8 is smaller than 11. Tell students, therefore we put a 0 (see below).
- Now ask students, "Can 80 be divided by 11?" Give students a few minutes to think about this and ask students to recite the 11 times table to guide their thinking.
- Students should say that 80 is divisible by 11 as 11 times 7 is 77. Write 7 and 77 in the correct places. See below:

$$\begin{array}{r}
 0 \quad 2 \quad 3 \quad 0 \quad 7 \\
 11 \overline{) 25380} \\
 \underline{22} \phantom{00} \\
 03 \phantom{0} \\
 \phantom{0} \underline{33} \\
 \phantom{00} 0 \phantom{0} \\
 \phantom{00} \phantom{0} \underline{77} \\
 \phantom{000} 03
 \end{array}$$

- Tell students when 25380 is divided by 11 the quotient is 2307 and the final **remainder** is 3.
- Ask students once again how much will each person receive and how much will be leftover with Murtaza?
- Encourage students to answer. The correct answer is that each person receives Rs. 2307 and Murtaza will have Rs. 3 left with him.



## DEVELOPMENT

### Activity 1:

1. Write the following questions on the board and ask the students to work in pairs.
2. Divide the following 5-digit numbers by 2-digit numbers.
  - ◇  $57440 \div 16$                       Ans: Quotient – 3590 Remainder – 0
  - ◇  $94380 \div 12$                       Ans: Quotient – 7865 Remainder – 0
  - ◇  $13344 \div 24$                       Ans: Quotient – 556 Remainder – 0
  - ◇  $81028 \div 40$                       Ans: Quotient – 2025 Remainder – 28
  - ◇  $16768 \div 13$                       Ans: Quotient – 1289 Remainder – 11
3. Ask different pairs to share their answers. Let other students also give their feedback on the solutions.
4. Share the correct answers with students.



## CONCLUSION / SUM UP

Conclude the activity by involving the students in recapping the steps in the division of 5 digit numbers with 2 digit numbers.

1. It is important to recall that while dividing, the answer is the quotient or the number written on top, and the leftover quantity is called the remainder which is written at the bottom.
2. Tell students to pay special attention to which numbers have to be brought down and when to subtract while dividing.



## ASSESSMENT

1. Write the following questions on the board and tell students to copy and solve them in their notebooks.
  - 1)  $15660 \div 15$     Ans: Quotient – 1044 Remainder – 0
  - 2)  $23562 \div 28$     Ans: Quotient – 841 Remainder – 14
  - 3)  $12390 \div 30$     Ans: Quotient – 413 Remainder – 0
  - 4)  $25752 \div 24$     Ans: Quotient – 1037    Remainder – 0
2. Guide students where necessary.
3. Share correct responses after students have answered the questions.



## HOMEWORK / FOLLOW UP

Assign the relevant questions from exercise 3 on page 19.

**REAL-LIFE SITUATIONS****STUDENT LEARNING OUTCOMES**

Solve real-life situations involving operations of addition, subtraction, multiplication, and division.

**INFORMATION FOR TEACHERS**

Teachers should:

1. Understand all the steps involved in carrying out the operations of addition, subtraction, multiplication, and division.
2. Be able to extract relevant information from word problems and carry out the correct operation(s) for a given real-life problem.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

Board, Marker, Notebooks, Textbooks, Pencils, Flashcards, Chart

**INTRODUCTION**

1. Write the following question on the board:  
The price of a scanner is Rs 62,900 and the price of a laser printer is 96,880. Find:
  - ✧ The total price of both items.
  - ✧ The total price of 14 scanners and 5 laser printers.
2. Divide the class into small groups of 3 students each.
3. Ask each group to discuss and answer the question.
4. Ask a student from each group to come to the board and explain their solution for the first part. They should name the mathematical operation used in the part.
5. The teacher should highlight that certain words in a word problem indicate what operation students should use e.g. total indicates sum, less indicates subtraction, more than 1 object e.g. 5 glasses would indicate multiplication.
6. Solve the first part of the question on the board.
7. Follow the same steps for the next part. See the solution below.

**The total price of both items**

	Hun Th	Ten Th	Th	H	T	O
Price of Scanner		6	2	9	0	0
Price of Laser Printer	+	9	6	8	8	0
Total Price	1	5	9	7	8	0

**The total price of 14 scanners and 5 laser printers.**

	Hun Th	Ten Th	Th	H	T	O
Price of Scanner		1 6	3 2		9 0	0 0
				X	1	4
		1				
	2	5	1	6	0	0
	+	6	2	9	0	0
Total Price of 14	8	8	0	6	0	0

**The total price of 5 laser printers.**

	Hun Th	Ten Th	Th	H	T	O
Price of Printer		1 6	4 2		9 0	0 0
					X	5
Total Price of 5	3	1	4	5	0	0

**The total price of 14 scanners and 5 laser printers.**

	Hun Th	Ten Th	Th	H	T	O
Price of 14 Scanners		8 8	0 6		0 0	0 0
Price of 5 Laser Printers	+	3	1	4	5	0
Total Price	1	1	9	5	1	0



**DEVELOPMENT**

**Activity 1:**

1. Divide the class into groups of 4.
  2. Give each student in the group a flashcard with one of the following 4 questions written on it.
  3. Ask students to answer the question and then pass on the flashcard to the next student within their group. Each student should have answered all 4 questions by the end of the activity.
  4. Students may discuss answers within their group.
- ✦ In April the water bill at a factory was Rs. 346,457 and in May it was Rs. 3674,923. What was the total bill for the two months? How much less was the bill for April?
  - ✦ A digital library has 216,875 Mathematics books and 172,643 books in English. What is the total number of digital books? How many more Mathematics books are there than English books?
  - ✦ In a school, 1548 students are to be divided into groups of 25 students each. What is the total number of groups and how many students are left?
  - ✦ A school principal notes that there are 34 students present in each classroom. If there are 13 classrooms in the school. How many students are present in the school altogether?

5. Ask students to volunteer and come up to the writing board and solve each question. Ask other students to also give their input.
6. Share the correct answers with the students by displaying the answers on a chart prepared before the lesson.



### CONCLUSION / SUM UP

1. Ask the students why it is important to read the question carefully to determine which operation shall be used to solve the question. Students should mention that certain words in a word problem indicate what operation students should use for e.g. total indicates sum, less indicates subtraction, more than 1 object e.g. 5 glasses would indicate multiplication.
2. Remind students that addition, subtraction, multiplication, and division come up frequently in everyday life.
3. Students should highlight that they must be careful while doing addition, subtraction, multiplication, and division. They must align ones with ones, tens with tens, and so on. Students must also practice when and how to borrow/carry while doing different operations.



### ASSESSMENT

1. Write the following questions on the board for students to answer in their notebooks.
  - ✧ Farhad's annual income is Rs 198,960. His monthly income will be?
  - ✧ The price of 7 mobiles is Rs. 21452, the price of 13 such mobiles will be?
2. Check their answers and share the correct answer on the board.
3. Paste a chart of the following questions prepared prior to the class.
4. Ask students to raise their hands and **state the operations** to be carried out in each question.
5. Other students should agree or disagree and give their feedback.
  - ✧ Asim receives Rs. 1500 from his baba and Rs. 570 from his daada. How much money does he have in total? Correct answer: Add 1500 and 570
  - ✧ He goes to the sports shop to buy balls for cricket. Cricket balls come in packs of 3 and cost Rs. 360. How much does each cricket ball cost? Correct answer: Divide 360 by 3.
  - ✧ He also wants to buy insulation tape. Insulation tape costs Rs. 60. He wants to buy 5. How much will this cost him? Correct Answer: Multiply 60 by 5.
  - ✧ What is the total cost to Asim if he buys 3 packs of cricket balls and 5 insulation tapes? Correct answer: Multiply 360 by 3. Multiply 60 by 5. Add both answers (1080 + 300=1380)
  - ✧ How much money will Asim have after his purchases? Correct Answer: subtract 1380 from 2070.



### HOMEWORK / FOLLOW UP

Assign the relevant questions from exercise 3 on page 19.

**Month**

**2**

# NUMBER PATTERNS



## STUDENT LEARNING OUTCOMES

- Identify and apply a pattern rule to determine missing elements for a given pattern.
- Identify the pattern rule of a given increasing and decreasing pattern and extend the pattern for the next three terms.

## INFORMATION FOR TEACHERS

The teacher should be able to:

1. Identify trends in various patterns.
2. Find/identify the missing terms within a pattern.
3. Identify the rule for a pattern.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

- Board, Chalk, Marker, Textbook, Notebooks, Chart



## INTRODUCTION

1. Write the following number sequence on the board.

1, 5, 9 \_\_\_\_, 17, 21, \_\_\_\_

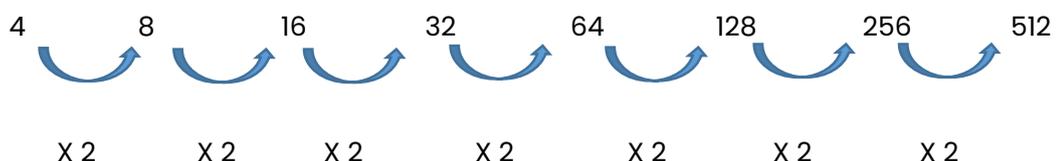
2. Ask students which numbers would come in the blank spaces?
3. Give students a few minutes to discuss in pairs and share their answers.
4. Ask students to state the **rule of the pattern** or how the numbers are related to each other. Let students discuss in pairs for a few minutes and share their ideas.
5. Tell students that for 1, 5, 9, \_\_\_\_, 17, 21, \_\_\_\_ the rule of the pattern is “the next number is 4 more than the previous number”. Show students the missing terms as shown below.

1, 5, 9, 13, 17, 21, 25

6. Now write the following number sequences on the board.

4            8            16            32            64            ?            ?            ?

7. Ask students which numbers would come next?
8. Give students a few minutes to discuss in pairs and share their answers.
9. Ask students to state the **rule of the pattern** or how the numbers are related to each other. Let students discuss in pairs for a few minutes and share their ideas.
10. Tell students that for “4, 8, 16, 32, 64...” the rule of the pattern is “the next number is 2 times (x 2) the previous number”. Show students the next 3 terms as shown below.



- Tell students that numbers in patterns can be related through addition, subtraction, multiplication, or division, and today we will be identifying and applying pattern rules.



## DEVELOPMENT

### Activity 1:

- Draw the following table on the board and ask the students to work in pairs to copy and complete the table.
- Explain that the students also have to write the rule of the pattern.

#	Fill in the blanks	The rule of the pattern is...
1	5, 8, 11, 14, 17, 20, 23	The next number is the previous number plus 3
2	1, 2, 4, 8, 16, ____, ____, ____	
3	19, 17, 15, 13, ____, ____, ____	
4	9, 18, 27, ____, ____, 54, ____	
5	625, 125, 25, 5, ____	
6	56, 49, 42, 35, ____, ____, ____	
7	13, 16, ____, 22, ____, ____	

- Ask a few students to share their answers with the class.
- Record student responses on the board.
- Give students the correct answers and fill in the blanks.



## CONCLUSION / SUM UP

Ask students the following questions:

- How are items related to each other in a pattern?
- How do we find the missing items in a pattern?
- How do we make predictions about the next numbers in a pattern?



## ASSESSMENT

- The chart shown below should be prepared and pasted on the wall/writing board before the lesson. Use different colored chalks to draw this on the board if needed.
- Ask the students to fill in the numbers in the relevant boxes / places.

1	2	3	4	5	6	7		9	
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25				29	30
31	32	33		35	36	37	38	39	40
41	42	43		45	46	47	48		50
51	52	53	54			57	58	59	60
61	62	63		65	66	67	68	69	70
71	72	73	74	75	76	77		79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	

3. What is the rule for the pattern in green if the first term is 1 (next term is 12)?
4. What is the rule for the pattern in blue if the first term is 91 (next term is 82)?
5. What is the rule for the pattern in red if the first term is 5 (next term is 16)?
6. What is the rule for the pattern in yellow if the first term is 71 (next term is 62)?



### **HOMEWORK / FOLLOW UP**

Assign the relevant questions in exercise 4 from the textbook on page 25-26.

# NUMBER PATTERNS



## STUDENT LEARNING OUTCOMES

- Describe the pattern found in a given table or chart.

## INFORMATION FOR TEACHERS

The teacher should be able to:

- Identify trends in various patterns represented in tables/charts.
- Find/identify the missing terms within a pattern.
- Identify the rule for a pattern.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

- Board, Chalk, Marker, Textbook, Notebooks, Charts



## INTRODUCTION

- Paste the chart shown below on the writing board. The chart should be prepared and pasted before the lesson begins.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Students should work in pairs. Ask students the following questions:

- What is the pattern in green if the first term is 41? Predict the next term? What is the rule for the pattern in green?

Correct Answer: 41, 32, 23, 14, 5. Each number is the previous minus 9 (-9)

- What is the pattern in blue if the first term is 4? Predict the next term? What is the rule for the pattern in blue?

Correct Answer: 4, 15, 26, 37, 48, 59, 70, 81. Each number is the previous plus 11 (+11)

3. What is the pattern in red if the first term is 10? Predict the next term? What is the rule for the pattern in red?

Correct Answer: 10, 20, 30, 40, 50, 60, 70. Each number is the previous plus 10 (+10)

4. What is the pattern in yellow if the first term is 91? Predict the next term? What is the rule for the pattern in yellow?

Correct Answer: 91, 93, 95, 97, 99, 101. Each number is the previous plus 2 (+2)

5. Give students a few minutes to discuss in pairs and share their answers. Record student responses.
6. Share the correct answers with students after all pairs have attempted the questions.



## DEVELOPMENT

### Activity 1

1. Paste the chart shown below on the writing board. The chart should be prepared and pasted on the wall before the lesson begins.
2. Students should work in pairs.
3. Ask the students to identify the pattern represented in the table and highlight the rule of the pattern.
4. Give students a few minutes to discuss in pairs and share their answers.
5. Tell students that the number pattern is 1, 12, 23, 34, 45, 56, 67, 78, 89, 100.
6. Discuss with the students that the pattern being made is obtained by adding 11 to the previous number.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

### Activity 2

1. Paste the chart shown below on the writing board. The chart should be prepared and pasted on the wall before the lesson begins.
2. Students should work in pairs.
3. Ask the students to identify the pattern represented in the table and highlight the rule of the pattern.
4. Give students a few minutes to discuss in pairs and share their answers.

- Tell students that the number pattern is 91, 82, 73, 64, 55, 46, 37, 28, 19, 10.
- Discuss with the students that the pattern being made is obtained by subtracting 9 from the previous number.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



### CONCLUSION / SUM UP

- Ask students, "In a pattern how are items related to each other? How do we find the missing items in a pattern? How do we make predictions as to the next items in a pattern?"
- Students should highlight that the pattern sequence is either increasing or decreasing with a specific rule involving addition, subtraction, multiplication or division.



### ASSESSMENT

Paste on the following chart on the writing board. The chart should be prepared prior to the lesson.

5	6	7	8	9	10
15	16	17	18	19	20
25	26	27	28	29	30
35	36	37	38	39	40
45	46	47	48	49	50
55	56	57	58	59	60

1. Students should individually answer the questions below. From the table above:
  - ✧ Identify the rule of the pattern if we start from 10 and end at 55
  - ✧ Identify the rule of the pattern if we start from 5 and end at 60
2. Provide guidance where needed.



### **HOMEWORK / FOLLOW UP**

- Assign the relevant questions in exercise 4 from the textbook on pages 25-26.

# HIGHEST COMMON FACTOR

## HCF



### STUDENT LEARNING OUTCOMES

Find HCF of:

- Two numbers up to 2-digit numbers
- Three numbers up to 2-digit numbers
- Using the prime factorization and division method.

### INFORMATION FOR TEACHERS

#### Information for teachers

Teachers should know:

1. How to find HCF using the prime factorization and division method.
2. That the greatest number which divides 2 or more numbers simultaneously is called their HCF.
3. The HCF of two or more than 2 numbers, which have no common prime factor, is always 1.



**DURATION / NO OF PERIODS: 70 MINUTES / 2 PERIODS**



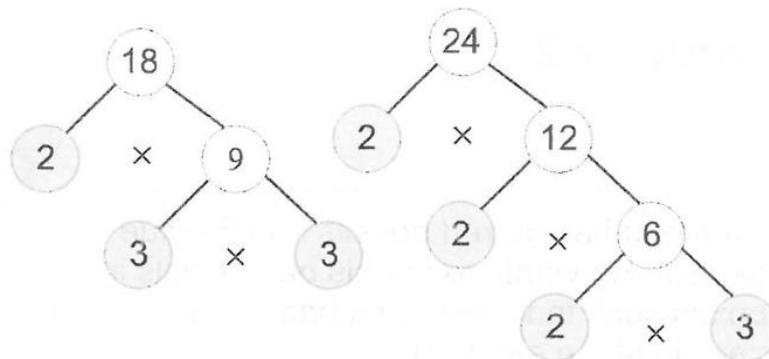
**MATERIALS / RESOURCES REQUIRED**

Board, Marker, Notebooks, Textbooks, Pencils



### INTRODUCTION

1. Write the following numbers on the writing board:  
18      24
2. Ask the students to work in pairs to find the prime factors of 18 and 24 using the factor tree or the table/grid.
3. Let the students think and discuss.
4. Record their responses on the board.
5. Show students the factor trees for 18 and 24 as below:



Factorization of 18 =  $2 \times 3 \times 3$

6. Tell students that they can also use tables to find the prime factors. Draw the following tables/grids on the board.

2	18
3	9
3	3
	1

2	24
2	12
2	6
3	3
	1

7. Write the prime factorization of 18 and 24 on the writing board as follows. Emphasize that the answer is the same from factor trees and the tables/grids:

$$18 = 2 \times 3 \times 3$$

$$24 = 2 \times 3 \times 2 \times 2$$

8. Ask the students to identify the common prime factors.  
 9. Let the students think and discuss in their pairs.  
 10. Record their responses on the board.  
 11. As circled **2** and **3** are the common prime factors and  $2 \times 3 = 6$ .  
 12. Ask students if 6 is a factor of 18 and 24? Record their responses.  
 13. Tell students that 6 is the greatest factor that divides both 18 and 24 completely and 6 is called the HCF of 18 and 24.  
 14. Tell the students that today we will learn how to find the HCF of up to three numbers.



## DEVELOPMENT

### Activity 1

1. Tell students to work in groups of 4 to solve the following question:  
 Draw factor trees or tables/grids in your notebooks and find the prime factors of the following numbers:
- a. 12
  - b. 28
  - c. 30
  - d. 64
2. After finding the prime factors of the numbers, find the HCF of
- i. 12 and 28
  - ii. 12 and 30
  - iii. 28 and 64
  - iv. 12, 28 and 64
3. Let the students think and discuss in their groups.  
 4. Record their responses on the board.  
 5. Show students the prime factorization of 12, 28, 30 and 64 and list the prime factors as follows:

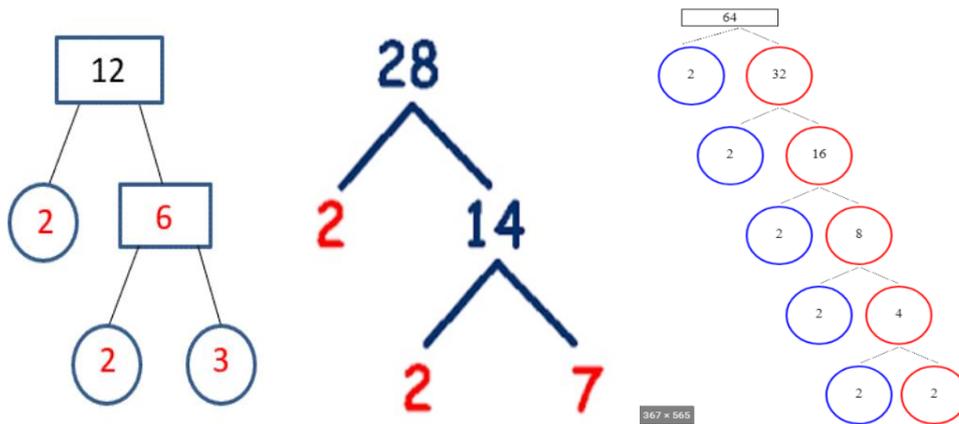
$$12 = 2 \times 2 \times 3$$

$$28 = 2 \times 2 \times 7$$

$$30 = 2 \times 3 \times 5$$

$$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

For teachers' reference:



6. For part iv i.e., find the HCF of 12, 28, and 64, ask a student to volunteer to attempt the question on the board.
7. Other students should also guide.
8. Ask students what the common prime factors are for 12, 28 and 60.
9. Take student responses. Then share with students:
 
$$12 = 2 \times 2 \times 3$$

$$28 = 2 \times 2 \times 7$$

$$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$$
10. Tell students that as circled 2 and 2 are the common prime factors and  $2 \times 2 = 4$ .
11. Ask students if 4 is a factor of 12, 28, and 64? Record student responses.
12. Tell students that 4 is the greatest factor that divides 12, 28, and 64 completely and 4 is called the HCF of 12, 28, and 64.



### CONCLUSION / SUM UP

1. Ask students what is a factor and how do we find the prime factors of a number? Students should mention that a number that divides another number is a factor of that number.
2. Students should also highlight that we can use a factor tree or the table/grid to find prime factors, we should continue to factorize composite numbers until prime numbers are left at the end of each branch and 1 is left at the bottom of the table.
3. Ask students how do we find the HCF of 2 or 3 numbers? Students should mention that after finding the prime factors of 2 or 3 numbers, we identify the common prime factors, and their product is the HCF of those 2 or 3 numbers.
4. Students should complete the questions in exercise 1 on page 34 as homework.

# HIGHEST COMMON FACTOR



## INTRODUCTION

1. Ask students how to use prime factorization to find prime factors and then the HCF.
2. Record student responses.
3. Ask various students to provide input.
4. Tell students that in today's lesson we will learn to find HCF using division.
5. Tell students that we will compare both methods i.e., prime factorization and division at the end of this lesson.



## DEVELOPMENT

### Activity 2

1. Write the following numbers on the writing board  

18
24
2. Ask the students to work in pairs to find the HCF of 18 and 24 using the division method.
3. Let the students think and discuss in their pairs.
4. Record their responses on the board.
5. Show students the method for finding the HCF of 18 and 24 using the division method as shown below:
  - ✦ Divide the bigger number i.e., 24 by the smaller number 18, and find the remainder which is 6
  - ✦ Divide the smaller number 18 by the remainder 6
  - ✦ We will get 0 as the remainder
  - ✦ The last divisor is 6 (circled). It is the HCF of 18 and 24.

$$\begin{array}{r}
 18 \overline{) 24} \\
 \underline{- 18} \quad 3 \\
 \textcircled{6} \overline{) 18} \\
 \underline{- 18} \\
 0
 \end{array}$$

### Activity 3

1. Tell students to work in pairs to solve the following question:  
 Using the division method find the HCF of:
  - i. 12 and 28
  - ii. 12 and 30
  - iii. 28 and 64
  - iv. 12, 28 and 64
2. Let the students think and discuss in their groups.
3. Record their responses on the board.
4. Show students the correct responses:

i	ii	iii
$  \begin{array}{r}  12 \overline{) 28} \\  \underline{- 24} \quad 3 \\  \textcircled{4} \overline{) 12} \\  \underline{- 12} \\  0  \end{array}  $	$  \begin{array}{r}  12 \overline{) 30} \\  \underline{- 24} \quad 2 \\  \textcircled{6} \overline{) 12} \\  \underline{- 12} \\  0  \end{array}  $	$  \begin{array}{r}  28 \overline{) 64} \\  \underline{- 56} \quad 3 \\  8 \overline{) 28} \\  \underline{- 24} \quad 2 \\  \textcircled{4} \overline{) 8} \\  \underline{- 8} \\  0  \end{array}  $

- For part iv i.e., find the HCF of 12, 28, and 64 show students how to find HCF of 3 numbers using the division method.
- First, divide the greatest number 64 by the second greatest; 28

$$\begin{array}{r}
 2 \\
 28 \overline{) 64} \\
 \underline{- 56} \quad 3 \\
 8 \overline{) 28} \\
 \underline{- 24} \quad 2 \\
 4 \overline{) 8} \\
 \underline{- 8} \\
 0
 \end{array}$$

- The HCF of 64 and 28 is 4.
- Now divide the remaining number 12 by 4.
- The number 4 is the last divisor. Therefore, the greatest number which completely divides 12, 28, and 64 is 4.

$$\begin{array}{r}
 3 \\
 4 \overline{) 12} \\
 \underline{- 12} \\
 0
 \end{array}$$



### CONCLUSION / SUM UP

- Ask students how do we find the HCF of 2 or 3 numbers? Students should mention that while using the factor tree or the table/grid we first find the prime factors. Then we identify the common prime factors, and their product is the HCF.
- Students should mention that while using the division method to find HCF the last divisor is the HCF of 2 or 3 numbers.
- Students should highlight that we can find the HCF by both methods i.e., using prime factorization (factor tree or grid/table) or the division method.
- Ask students which method they prefer and why.



### ASSESSMENT

- Students should attempt the following question in their notebooks.  
Using both prime factorization and the division method find the HCF of the given numbers.
  - 24, 72
  - 48, 76, 96
- Guide the students where necessary.



### HOMEWORK / FOLLOW UP

- Assign the relevant questions from exercise 1 on page 34.

**LOWEST COMMON MULTIPLE****STUDENT LEARNING OUTCOMES**

Find LCM of:

- Two numbers up to 2-digit numbers
- Three numbers up to 2-digit numbers using the prime factorization and division method.

**INFORMATION FOR TEACHERS**

Teachers should know:

1. When we multiply any number by another number, their product is called multiple of that number.
2. The LCM of two or more numbers is the smallest number which is divided by each of the given numbers completely.



**DURATION / NO OF PERIODS: 35 + 35 MINUTES / 2 PERIODS**



**MATERIALS / RESOURCES REQUIRED**

Board, Marker, Notebooks, Textbooks, Pencils

**INTRODUCTION**

1. Write the following numbers on the writing board:  

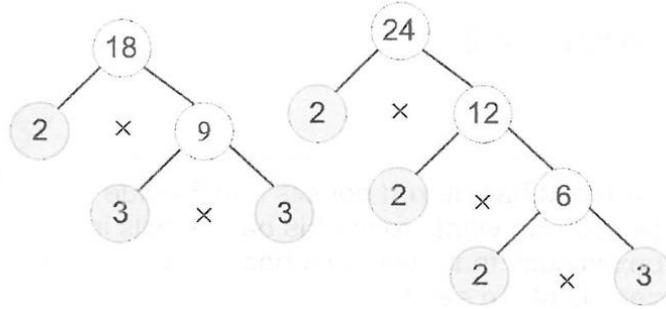
18
24
2. Ask students to work in pairs and answer: What is a multiple? What is the LCM or the lowest common multiple of the two numbers?
3. Give students a few minutes to discuss and then take their responses.
4. Ask students to list the multiples of 18 and 24. Remind students that multiples are all the numbers in the times table of that number.

Students should list the numbers as follows:

<b>18,</b>	36,	54,	72,	90,	108,	126...
<b>24,</b>	48,	72,	96,	120,	144,	168...

5. Ask students to identify the common multiple from the multiples of 18 and 24. Students should identify **72** as the common multiple.
6. Tell students that 72 is the LCM or the lowest common multiple of 18 and 24 i.e., it is the smallest number that is divided by each of the given numbers completely.
7. Tell students that we will also find the LCM using other methods.
8. Ask the students to work in pairs and discuss the method used in the previous lesson to find the prime factors of 18 and 24.

9. Show students the factor trees for 18 and 24 as below:



10. Remind students that they can also use tables to find the prime factors. Draw the following tables/grids on the board:

2	18
3	9
3	3
	1

2	24
2	12
2	6
3	3
	1

11. Write the prime factorization of 18 and 24 on the writing board as follows. Emphasize that we get the same factors using either of the two methods: factor trees and the table/grid.

$$18 = 2 \times 3 \times 3$$

$$24 = 2 \times 3 \times 2 \times 2$$

12. Ask the students to identify the common prime factors.
13. Let the students recall and discuss in pairs.
14. Record their responses on the board.
15. Tell students that **2** and **3** are the common prime factors and the product of the common prime factors is  $2 \times 3 = 6$ .
16. Unlike HCF, to find the LCM students must find the product of the non-common prime factors of 18 and 24 as well. This is  $3 \times 2 \times 2 = 12$
17. Ask students how we can get the LCM of 18 and 24? Give them a few minutes to discuss in pairs.
18. After discussion, tell students that the LCM = product of common prime factors x product of non-common prime factors.
19. Therefore, the LCM of 18 and 24 is  **$6 \times 12 = 72$** .
20. Tell the students that today we will learn how to find the LCM of up to three numbers.



### DEVELOPMENT

#### Activity 1

1. Tell students to work in groups of 4.
2. Refer to factor trees or tables/grids already made in their notebooks (for HCF) and see the prime factors of the following numbers:
  - a. 12
  - b. 28
  - c. 30

d. 64

3. Now find the LCM of

i. 12 and 28

ii. 12 and 30

iii. 28 and 64

iv. 12, 28 and 64

4. Let the students revise and discuss in their groups.

5. Record their responses on the board.

6. Show students the prime factorization of 12, 28, 30 and 64 and list the prime factors as follows:

$$12 = 2 \times 2 \times 3$$

$$28 = 2 \times 2 \times 7$$

$$30 = 2 \times 3 \times 5$$

$$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

7. For part iv i.e., find the LCM of 12, 28, and 64 ask a student to volunteer to answer the question on the board.

8. Other students should be asked to guide as well.

9. The teacher should ask students what the common prime factors are for 12, 28 and 60.

10. Allow students some time for revision and discussion. Then share with students:

$$12 = 2 \times 2 \times 3$$

$$28 = 2 \times 2 \times 7$$

$$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

11. Tell students that 2 and 2 are the common prime factors and  $2 \times 2 = 4$ .

12. Unlike HCF, students must find the product of the non-common prime factors of 12, 28, and 64 as well. This is  $3 \times 7 \times 2 \times 2 \times 2 \times 2 = 336$

13. Remind the students that the LCM = product of common prime factors x product of non-common prime factors.

14. Important point: Tell students that even if a factor is common for 2 numbers it is considered a common factor i.e., to find the LCM the factor doesn't need to be common for all 3 numbers under consideration. To demonstrate this, find the LCM of 16, 30 and 64.

15. Therefore, the LCM of 12, 28 and 64 is  $4 \times 336 = 1344$ .



## CONCLUSION / SUM UP

1. Ask students how do we find the prime factors of a number? Students should mention we can use a factor tree or the table/grid to find prime factors. Students should continue to factorize composite numbers until prime numbers are left at the end of each branch (if using factor tree) and 1 is left at the bottom of the table (if using table) when finding prime factors.
2. Ask students how do we find the LCM of 2 or 3 numbers? Students should mention that after finding the prime factors of 2 or 3 numbers, we identify the common prime factors and find their product. Then we find the product of non-common prime factors. Lastly, LCM = product of common prime factors x product of non-common prime factors.
3. Students should complete the questions in exercise 2 on page 38 as homework.

# LOWEST COMMON MULTIPLE



## INTRODUCTION

1. Ask students to recall how to use prime factorization to find prime factors and then the LCM of 2 or 3 numbers. Record student responses and ask other students to provide input and guidance.
2. Tell students that in today's lesson we will learn to find LCM using division.
3. Tell students that we will compare both methods i.e., prime factorization and division at the end of this lesson.



## DEVELOPMENT

### Activity 2

1. Write the following numbers on the writing board:  

18
24
2. Ask the students to work in pairs and find the LCM of 18 and 24 using the division method.
3. Let the students think and discuss in pairs.
4. Record their responses on the board.
5. Show students the method for finding the LCM of 18 and 24 using the division method as shown below:
  - ✦ Write both the numbers inside the table/grid and start with the smallest prime number that divides both the numbers. In this case, 2 divides 18 and 24.
  - ✦ In the next step, 3 divides 9 and 12.
  - ✦ In the next step, we notice that 3 and 4 do not have any common factor so we first write 2 to bring 4 down to 1 and then we write 4 to bring it down to 1.
  - ✦ Lastly, the LCM is the product of all the prime factors

i.e.,  $2 \times 3 \times 2 \times 2 \times 3 = 72$

2	18,	24
3	9,	12
2	3,	4
2	3,	2
3	3,	1
	1,	1

### Activity 3

1. Tell students to work in groups of 4 to find the LCM of the following numbers using the division method:
  - v. 12 and 28
  - vi. 12 and 30
  - vii. 28 and 64
  - viii. 12, 28 and 64
2. Let the students think and discuss in their groups.
3. Record their responses on the board.
4. Ask students from different groups to come to the writing board and share their solutions.
5. Show students the correct responses:

i.

2	12,	28
2	6,	14
3	3,	7
7	1,	7
	1,	1

LCM of 12 and 28 is  $2 \times 2 \times 3 \times 7 = 72$

ii.

2	12,	30
3	6,	15
2	2,	5
5	1,	5
	1,	1

LCM of 12 and 30 is  $2 \times 3 \times 2 \times 5 = 60$

iii.

2	28,	64
2	14,	32
2	7,	16
2	7,	8
2	7,	4
2	7,	2
7	7,	1
	1,	1

LCM of 28 and 64 is  $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 7 = 448$

6. For part iv i.e., find the LCM of 12, 28 and 64 show students how to find the LCM of 3 numbers using the division method.

2	12,	28,	64
2	6,	14,	32
2	3,	7,	16
2	3,	7,	8
2	3,	7,	4
2	3,	7,	2
3	3,	7,	1
7	1,	7,	1
	1,	1,	1

LCM of 12, 28 and 64 is  $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 7 = 1344$



### CONCLUSION / SUM UP

1. Ask students how we find the LCM of 2 or 3 numbers using the division method.

2. Students should highlight that we write the numbers inside the table/grid and start with the smallest prime number that divides all the numbers. We continue this process until all the numbers are brought down to one using only prime numbers.
3. Students should emphasize that the LCM is the product of all the prime factors when we are using the division method.



### ASSESSMENT

Ask the students to copy and complete the following question in their notebooks:

Using both prime factorization and the division method find the LCM of the following numbers:

- ◇ 18, 72
- ◇ 10, 20, 30

Guide the students where needed.



### HOMEWORK / FOLLOW UP

- Assign the relevant questions from exercise 2 on page 38-39.

**REAL-LIFE SITUATIONS****STUDENT LEARNING OUTCOMES**

Solve real-life situations involving HCF and LCM.

**INFORMATION FOR TEACHERS**

Teachers should understand the difference between HCF and LCM and be able to use the correct methods in a real-life situation/word problem.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

Board, Marker, Notebooks, Textbooks, Pencils

**INTRODUCTION**

1. Ask students to recall what LCM and HCF are.
2. Ask students to identify and explain the methods used to find the HCF and LCM of 2 or 3 numbers.
3. Take their responses and tell them that today we will solve real-life situations involving LCM and HCF.
4. Write the following question on the writing board:  
A mother has two sons in the hostel, Ali and Usman. Ali comes home after every 12th day and Usman comes home after every 8th day. She wants to invite some guests when both her sons are present at home. On what day should she invite the guests?
5. Tell students to read the question carefully and discuss in pairs how they can find the day on which both boys are at home together.
6. Take student responses.
7. Ask students why should the final answer be bigger than 12? Why can't the answer be a number smaller than 8? Take student responses and share the correct reasoning with students i.e. we are looking for a day when both her sons will be back. It cannot be before the 8th, as neither brother will be back. The common day should be after the 12th.
8. Tell students that we will use LCM here because we are trying to find a bigger number than both 12 and 8. We use LCM when we think the answer should be a bigger number.
9. Starting at 1, the teacher may use a calendar to highlight every 8<sup>th</sup> day in blue and every 12<sup>th</sup> day in yellow and show students on which day there is an overlap of blue and yellow.
10. Show students the LCM of 12 and 8 by the division method i.e.

2	12, 8
2	6, 4
3	3, 2
2	1, 2
	1, 1

$$\text{LCM} = 2 \times 2 \times 3 \times 2 = 24$$

11. Ask students what does 24 represent? Give students a few minutes to think, discuss and share their responses. Record student responses.
12. Tell students that the significance of 24 is that Ali and Usman are home together after every 24th day. It is the first day the two are together i.e. it is the lowest common multiple.



## DEVELOPMENT

### Activity 1:

1. Ask students to work in pairs to answer the following question:  
Sara has three sticks having lengths 15 cm, 20 cm and 25 cm. She wants to cut the sticks into pieces of equal length without any leftovers. What will be the maximum length of each piece of the stick?
2. Tell the students to read the situation and discuss how we can find the maximum length of that piece. Give some time for thinking. Take their responses.
13. Tell students we can use the process of HCF to find that length because we know the final answer should be a number smaller than 15, 20, or 25. We use HCF when we think the answer should be a smaller number. In this question we are cutting or dividing the sticks into smaller pieces (factors) of 25, 20 and 15, therefore HCF is used.
3. Ask them to find HCF of 25, 20 and 15. After they have attempted, show them:

$$\begin{array}{r} 1 \\ 20 \overline{) 25} \\ \underline{-20} \\ 5 \end{array} \quad \begin{array}{r} 20 \\ 5 \overline{) 20} \\ \underline{-20} \\ 0 \end{array} \quad 4$$

$$\text{And } 5 \overline{) 15} \begin{array}{r} 3 \\ \underline{-15} \\ 0 \end{array}$$

The HCF of 15, 20 and 25 is 5.

4. Ask students what does the 5 represent? Give students a few minutes to think, discuss and share their responses. Record student responses.
5. Tell students that the significance of 5 is that it is the HCF and it is the maximum length of the each piece of the stick.

### Activity 2:

1. Ask students to work in pairs to solve the following questions.
2. Write the following situations on the writing board and ask students to attempt in their notebooks.
  - ✧ 84 apples, 56 bananas and 21 oranges were distributed equally among some children. If the same combination of all kinds of fruits is distributed among all the children, find out the maximum possible number of children who can get the fruits?
  - ✧ The tour buses for Badshahi Mosque leave the station every 25 minutes, for the interior city every 15 minutes and for the zoo every 30 minutes. If the three buses leave the station simultaneously at 11:05 am, find out the time when the three buses will next leave the station simultaneously.
3. Ask students if part a. requires them to find the HCF or the LCM?

4. Let the students think and discuss in their pairs.
5. Record their responses on the board.
6. Tell students that part a. requires them to find the HCF as the final answer should be a smaller number than 84, 56 and 21.
7. Find the HCF of 84, 56 and 21 on the board. The HCF is 7.
8. Ask students what does 7 represents? Give students a few minutes to think, discuss and share their responses. Record student responses.
9. Tell students that the significance of 7 is that it is the HCF of 84, 56 and 21 and it is the maximum number of children who can receive similar fruit baskets of apples, bananas, and oranges.
14. Ask students if part b. requires them to find the HCF or the LCM?
15. Let the students think and discuss in their groups.
16. Record their initial understanding on the board.
17. Tell students that part b. requires them to find the LCM as the final answer should be a larger number than 25, 15 and 30.
18. The teacher should find the LCM of 25, 15 and 30 on the board. The LCM is 150.
19. Ask students what does 150 represents? Give students a few minutes to think, discuss and share their responses. Record student responses.
20. Tell students that the significance of 150 is that it is the LCM of 25, 15 and 30 and it is the number of minutes after 11:05 am that the buses will once again leave the station together.
21. Ask students what time will it be when they leave the station?
22. Let the students think and discuss in their groups.
23. Tell students that 150 minutes (2 hours 30 minutes) after 11:05 am makes 1:35 pm.
24. Note: The teacher should refer to Unit 8 – Time in the Grade 4 textbook for the conversion and addition of time.



### CONCLUSION / SUM UP

Ask students the difference between HCF and LCM and when do they know which approach to use in real-life situations/word problems. Students should mention that HCF is found when we think the answer should be a smaller number and LCM is found when we think the answer should be a bigger number.



### ASSESSMENT

1. Write the following questions on the writing board.
2. Ask students to identify what the questions below require and why. HCF or LCM?
  - ✧ A milkman has three containers having 25 liters, 30 liters and 40 liters of milk.
  - ✧ Find the maximum capacity of a measuring container that can accurately measure the amount of milk in all three containers. Correct Answer: HCF as the final answer should be a smaller number.
  - ✧ Ali drinks milk after every 12th hour and takes a meal after every 8th hour. After how many hours will he drink milk and meal at the same time? Correct Answer: LCM as the final answer should be a larger number.



### HOMEWORK / FOLLOW UP

Assign the relevant questions from exercise 2 on pages 39 – 41.

# ADDITION AND SUBTRACTION OF FRACTIONS



## STUDENT LEARNING OUTCOMES

- Add and subtract two or three fractions with different denominators.

## INFORMATION FOR TEACHERS

Teachers should be able:

1. To convert a given fraction into an equivalent fraction by finding the LCM. Understand that multiplying both the numerator and denominator of a fraction e.g. for a fraction  $\frac{3}{5}$  if the desired denominator is 10 then  $\frac{3}{5} \times \frac{2}{2} = \frac{6}{10}$  yields an equivalent fraction.
2. To know that in addition and subtraction, where the denominator is the same, only numerators are added or subtracted.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

Board, Marker, Notebooks, Textbooks, Color pencils, Flashcards



## INTRODUCTION

1. Write the following question on the writing board:

$$\frac{2}{3} + \frac{3}{4} + \frac{11}{12}$$

2. Ask students to work in pairs to solve the above question.
3. Ask students what is the first step in adding the 3 fractions?
4. After a few minutes of discussion in pairs, tell students that we must first make sure that the fractions have the same denominator.
5. Tell students to find equivalent fractions so that the denominators of all the fractions are made the same.
6. After students have attempted to find the equivalent fractions in pairs show them the correct approach:

equivalent fractions of  $\frac{2}{3}$  is  $\frac{2}{3} \times \frac{1}{1} = \frac{2}{3}$

$$\frac{2}{3} \times \frac{2}{2} = \frac{4}{6}$$

$$\frac{2}{3} \times \frac{3}{3} = \frac{6}{9}$$

$$\frac{2}{3} \times \frac{4}{4} = \frac{8}{12}$$

equivalent fractions of  $\frac{3}{4}$      $\frac{3}{4} \times \frac{1}{1} = \frac{3}{4}$

$$\frac{3}{4} \times \frac{2}{2} = \frac{6}{8}$$

$$\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$$

7. Ask students to observe that the denominators are the same for all fractions i.e.

$$\frac{8}{12}, \frac{9}{12} \text{ and } \frac{11}{12}$$

therefore the question is solved as  $\frac{8}{12} + \frac{9}{12} + \frac{11}{12} = \frac{8+9+11}{12} = \frac{28}{12}$

8. Now tell the students that there is a shortcut to find the target denominator.  
 9. We can find the LCM of the denominators 3, 4, and 12.

2	3, 4, 12
2	3, 2, 6
3	3, 1, 3
	1, 1, 1

The LCM is  $2 \times 3 \times 3 = 12$

10. 12 is the target denominator for the question above.  
 11. Tell students that we need to explore which two numbers (in the denominators) need to be multiplied in order to get 12.  
 12. Now it is easy to find the desired equivalent fraction for each fraction:

$$\frac{2}{3} \times \frac{4}{4} = \frac{8}{12}$$

$$\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$$

$$\frac{11}{12} \times \frac{1}{1} = \frac{11}{12}$$



## DEVELOPMENT

### Activity 1:

1. Write the following questions on the writing board and ask students to work in pairs to solve them.
  - i.  $\frac{4}{6} - \frac{3}{5}$
  - ii.  $\frac{3}{2} + \frac{6}{7} + \frac{4}{3}$
2. Give students a few minutes to discuss and attempt the questions.
3. Ask students to share their responses. Record student responses.
4. Now tell students to first find the equivalent fractions in question i
5. The students should find the LCM of 6 and 5, which is 30.
6. Guide the students to arrive at

2	6, 5
3	3, 5
5	1, 5
	1, 1

$$\text{LCM} = 2 \times 3 \times 5 = 30$$

7. Therefore the target denominator for both the fractions in part i. should be 30 and the desired equivalent fractions are:

$$\frac{4}{6} \times \frac{5}{5} = \frac{20}{30}$$

$$\frac{3}{5} \times \frac{6}{6} = \frac{18}{30}$$

$$\text{Therefore } \frac{20}{30} - \frac{18}{30} = \frac{2}{30}$$

8. Now tell students to find the equivalent fractions in question ii.

For  $\frac{3}{2} + \frac{6}{7} + \frac{4}{3}$  we need to find the LCM of 2, 7 and 3

2	2, 7, 3
3	1, 7, 3
7	1, 7, 1
	1, 1, 1

$$\text{LCM} = 2 \times 3 \times 7 = 42$$

9. Therefore the target denominator of the fractions should be 42 and the desired equivalent fraction is:

$$\frac{3}{2} \times \frac{21}{21} = \frac{63}{42}$$

$$\frac{6}{7} \times \frac{6}{6} = \frac{36}{42}$$

$$\frac{4}{3} \times \frac{14}{14} = \frac{56}{42}$$

$$\begin{aligned} \text{As the last step } \frac{63}{42} + \frac{36}{42} + \frac{56}{42} &= \frac{63+36+56}{42} \\ &= \frac{155}{42} \end{aligned}$$



### CONCLUSION / SUM UP

- Ask students how do we add and subtract fractions with different denominators. Students should highlight that in order add/subtract fractions with different denominators we have to find equivalent fractions by finding the LCM. Furthermore, students should recall that in addition and subtraction, once the denominators are the same only numerators are added or subtracted.



## ASSESSMENT

- Ask the students to copy and complete the following questions.
- Convert mixed fractions to improper fractions before carrying out addition/subtraction.

$$1) \frac{1}{2} + \frac{3}{4}$$

$$2) 1\frac{1}{7} + 2\frac{2}{3} + 1\frac{2}{21}$$

$$3) \frac{2}{5} + \frac{3}{6} + \frac{5}{7}$$

$$4) \frac{7}{2} - \frac{2}{3}$$

$$5) 5\frac{1}{2} - 1\frac{3}{4}$$

$$6) \frac{9}{2} - \frac{1}{5}$$



## HOMEWORK / FOLLOW UP

- Assign the relevant questions from exercise 1 on page 47.

**Month**

**3**



# MULTIPLICATION AND DIVISION OF FRACTIONS



## STUDENT LEARNING OUTCOMES

Multiply a fraction by a 1-digit number and demonstrate with the help of diagram.

### INFORMATION FOR TEACHERS

Teachers should know:

1. How to multiply any fraction with a whole number.
2. That multiplication is repeated addition of numbers.
3. How to represent with diagram, the multiplication of a fraction with a single-digit whole number.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

Board, Marker, Notebooks, Textbooks, Pencils, Chart



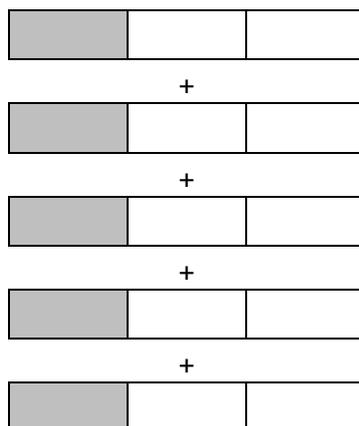
### INTRODUCTION

1. Ask students to work in pairs and multiply the following:

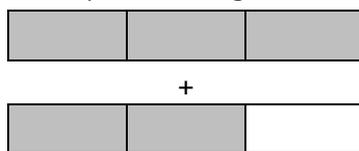
$$\frac{1}{3} \times 5$$

2. The teacher should remind students that multiplication is repeated addition. Give students a few minutes to think and discuss in pairs. Record student responses on the board.
3. After discussion, draw the following figure to help students see multiplication as repeated addition. The figure below shows:

$$\frac{1}{3} \times 5 = \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3}$$



If we re-arrange the shaded parts the figure becomes



4. Tell the students that the shaded portion if rearranged makes 1 whole and  $\frac{2}{3}$  as shown above i.e.  $1\frac{2}{3}$
5. Ask students what is  $1\frac{2}{3}$  as an improper fraction?
6. Give students a few minutes to arrive at the correct answer,  $1\frac{2}{3} = \frac{5}{3}$
7. Tell students that when a fraction is multiplied by a whole number, only the numerator gets multiplied by the whole number while the denominator remains the same. In this case  $5 \times 1 = 5$  and the numerator was 3, so  $\frac{5}{3}$  is the answer.

Therefore,  $\frac{1}{3} \times 5 = \frac{5}{3}$



## DEVELOPMENT

### Activity 1:

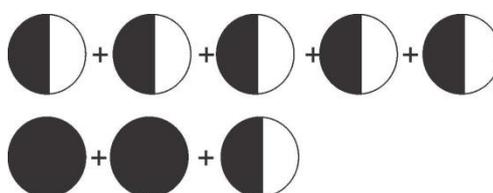
1. Ask students to work in pairs and solve the following question (the teacher should write it on the board)  
Kamil takes  $\frac{1}{2}$  hour to travel from home to school and he goes to school 5 days in a week.  
How much time does he spend travelling from home to school?
2. Ask pairs to discuss and share their answers.
3. Walk through the class and guide students.
4. Show students the correct solution after all pairs have attempted the question. Paste a chart prepared before the lesson on the writing board.

Kamil goes to school 5 days in a week. We can show the multiplication of  $\frac{1}{2} \times 5$  with figures. If

we want to multiply  $\frac{1}{2}$  with 5, we can also add  $\frac{1}{2}$  five times i.e.

$$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$$

As a figure this can be represented as



if we rearrange the shaded parts we get

$$2 \text{ wholes and a half is } 2 + \frac{1}{2} = 2\frac{1}{2} = \frac{5}{2}$$

Therefore, the time taken travelling from home to school by Kamil is  $\frac{1}{2} \times 5 = \frac{5}{2}$  hours.

### Activity 2:

- Write the following questions on the writing board and ask students to work in pairs to solve them:

- $3 \times \frac{3}{4}$

- There are 9 milk packs in a carton. Each milk pack is of  $\frac{1}{4}$  liter.

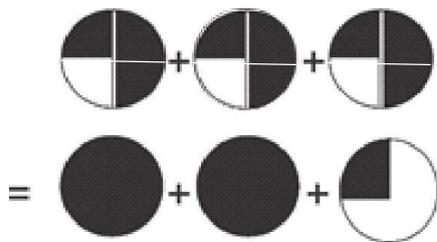
Find the total liters of milk in carton?

- Give students a few minutes to discuss and attempt the questions.
- Ask students to share their responses. Record student responses.
- After all pairs have attempted the questions, share the correct solution.

For part i

$$\begin{aligned} 3 \times \frac{3}{4} &= \frac{3}{4} + \frac{3}{4} + \frac{3}{4} \\ &= \frac{3+3+3}{4} = \frac{9}{4} = 2\frac{1}{4} \end{aligned}$$

Encourage students to represent the multiplication in figures as well. See below:



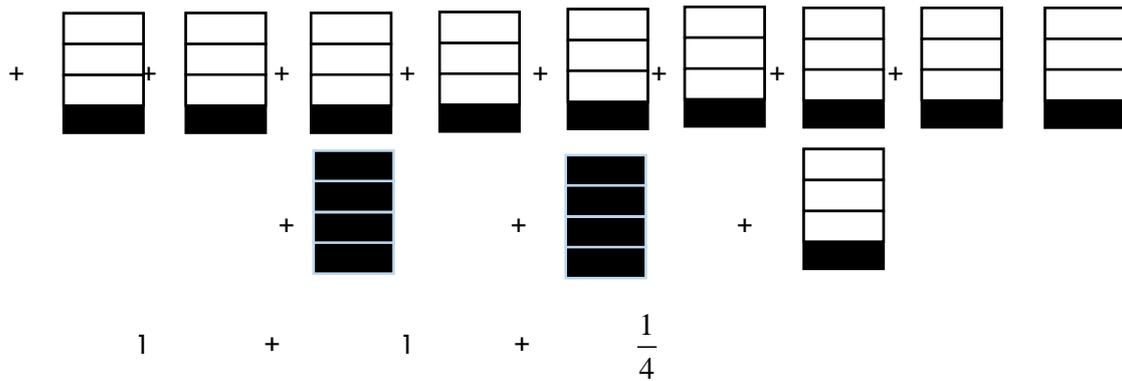
If we rearrange the shaded parts we get

$$2 + \frac{1}{4} = 2\frac{1}{4} = 2\frac{1}{4}$$

For part ii

$$\begin{aligned} 9 \times \frac{1}{4} &= \frac{1}{4} + \frac{1}{4} \\ &= \frac{1+1+1+1+1+1+1+1+1}{4} \\ &= \frac{9}{4} \\ &= 2\frac{1}{4} \end{aligned}$$

Encourage students to represent the multiplication in figures as well. See below:



$$1 + 1 + \frac{1}{4} = 2\frac{1}{4} = \frac{9}{4}$$

We get the same answer from multiplication as well

$$9 \times \frac{1}{4} = \frac{9}{4} = 2\frac{1}{4}$$

The total liters of milk in carton  $2\frac{1}{4}$ .



### CONCLUSION / SUM UP

Ask students how we multiply any fraction with a whole number. Students should answer that multiplication can be seen as repeated addition. Furthermore, students should mention that in the multiplication of a fraction with a whole number, only the numerator is multiplied with the whole number while the denominator remains the same.



### ASSESSMENT

1. Tell students to copy and solve the following questions in their notebooks:

$$1) \frac{1}{4} \times 7 \quad 2) \frac{4}{7} \times 3 \quad 3) \frac{5}{5} \times 4$$

2. Ask the students to draw diagrams for each question as well.



### HOMEWORK / FOLLOW UP

Assign the relevant questions from exercise 2 on page 53.

# MULTIPLICATION AND DIVISION OF FRACTIONS



## STUDENT LEARNING OUTCOMES

- Multiply two or three fractions involving proper, improper fractions and mixed numbers

## INFORMATION FOR TEACHERS

Teachers should be able:

1. To multiply fractions (proper, improper and mixed) with other fractions.
2. To understand that to multiply fractions with mixed numbers, they must first convert the mixed numbers into improper fractions.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils



## INTRODUCTION

1. Ask students to work in pairs and multiply the following:

$$\frac{1}{3} \times \frac{5}{8} \times \frac{2}{7}$$

2. Give students a few minutes to discuss in pairs and share their responses. Record all responses.

Tell students that  $\frac{1}{3} \times \frac{5}{8} \times \frac{2}{7} = \frac{1 \times 5 \times 2}{3 \times 8 \times 7} = \frac{10}{168}$

3. Ask students to share their observations about the multiplication. What do they notice? Give the pairs a few minutes to discuss and share their observations.
4. Tell students that when a fraction is multiplied by another fraction, the numerators are multiplied by the numerators and the denominators by the denominators as shown above.



## DEVELOPMENT

### Activity 1:

1. Ask the students to work in pairs.
2. Write the following questions on the board and ask students to copy and complete them in their notebooks.
3. Tell students to convert mixed numbers to improper fractions before multiplying:

$$\frac{3}{7} \times \frac{2}{3}$$

$$\frac{3}{5} \times \frac{4}{9} \times \frac{6}{7}$$

$$\frac{5}{3} \times \frac{4}{2} \times \frac{6}{5}$$

$$2\frac{3}{5} \times 3\frac{1}{2} \times \frac{2}{3}$$

$$2\frac{1}{3} \times 5\frac{1}{2} \times 3\frac{2}{4}$$

4. Observe the students and guide them where necessary.
5. Ask a few students to come to the board, one by one, and answer each question. Share the correct answers with students.



### CONCLUSION / SUM UP

1. Ask students what are the key takeaways from the multiplication of fractions. Students should recall that in the multiplication of fractions with other fractions, the numerators are multiplied with the numerators and the denominators are multiplied with denominators.
2. Furthermore, students should also highlight that in order to multiply fractions with mixed numbers they must first convert the mixed number into an improper fraction and then proceed with multiplication.



### ASSESSMENT

1. Ask the students to copy the following table in their notebooks and match Column A with the correct answer in Column B

COLUMN A	COLUMN B
$\frac{1}{4} \times 1\frac{5}{7}$	$\frac{144}{175}$
$\frac{12}{5} \times \frac{3}{7} \times \frac{4}{5}$	$\frac{12}{28}$
$\frac{11}{9} \times \frac{1}{9} \times \frac{2}{3}$	$\frac{77}{27}$
$2\frac{1}{3} \times \frac{1}{3} \times 3\frac{2}{3}$	$\frac{22}{243}$

2. After students have attempted the question, share the correct matching.



### HOMEWORK / FOLLOW UP

- Assign the relevant questions from exercise 2 on page 53.

# MULTIPLICATION AND DIVISION OF FRACTIONS



## STUDENT LEARNING OUTCOMES

- Solve real-life situations involving the multiplication of fractions.

## INFORMATION FOR TEACHERS

Teachers should be able:

- To multiply fractions (proper, improper and mixed) with other fractions.
- To understand that to multiply fractions with mixed numbers they must first convert the mixed numbers into improper fractions.
- To be familiar with the application of multiplication of fractions in daily life.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils



## INTRODUCTION

- Write the following question on the board:

Two brothers order a pizza and the older brother eats  $\frac{1}{2}$  the pizza. The younger brother eats  $\frac{3}{4}$  of half the pizza. What fraction of the total pizza does the younger brother eat?

- Explain the question to the students and ask them what operation will be used to solve this question?
- Guide students to arrive at the answer i.e. multiplication.
- Ask a student to come up to the board and write the fractions and the operation.

The question to be solved is:

$$\frac{3}{4} \times \frac{1}{2}$$

- Ask students to recall the multiplication of fractions to get the answer:

$$\frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$$

- Emphasize that the younger brother ate  $\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$  of the whole pizza.



## DEVELOPMENT

### Activity 1:

1. Write the following questions on the writing board.
2. Ask students to work in groups of 3 and attempt the questions.
  - i. A recipe needs  $\frac{3}{4}$  of a cup of flour. If a baker wants to make two and a half times as much, how much flour will be needed?
  - ii. Amna's weight is  $\frac{3}{4}$  of her older brothers. If her brother weighs  $22\frac{1}{2}$  kg. How much does Amna weigh?
  - iii. Aslam spent  $3\frac{1}{2}$  hours preparing for one subject test. If preparing for other tests takes him just as long, how much time will he spend preparing for 3 subjects tests?
3. After giving sufficient time to groups for solving the questions, ask students to volunteer to come up to the board and explain their solutions.
4. Guide the students. Allow other students to give their input.
5. Share the correct solutions with students.

For part i

$$\frac{3}{4} \times 2\frac{1}{2}$$

$$\frac{3}{4} \times \frac{5}{2} = \frac{15}{8} = 1\frac{7}{8}$$

$1\frac{7}{8}$  cup of flour will be required.

For part ii

$$\frac{3}{4} \times 22\frac{1}{2}$$

$$\frac{3}{4} \times \frac{45}{2} = \frac{135}{8} = 16\frac{7}{8}$$

Amna weighs  $16\frac{7}{8}$  kg.

For part iii

$$3\frac{1}{2} \times 3 = \frac{7}{2} \times 3$$

$$\frac{7}{2} + \frac{7}{2} + \frac{7}{2} = \frac{21}{2} = 10\frac{1}{2}$$

Aslam spends  $10\frac{1}{2}$  hours preparing for his test.



## CONCLUSION / SUM UP

The teacher should ask students how they multiply fractions with other fractions. Students should highlight that in order to multiply fractions with mixed numbers they must first convert the mixed numbers into improper fractions. Student should mention that in real life we come across many problems which involve the multiplication of fractions.



### ASSESSMENT

Ask the students to solve the following real-life situation in their notebook:

1. Sania and Ali grew plants in pots. After a week, the height of Sania's plant is  $4\frac{3}{5}$  cm and the height of Ali's plant is  $1\frac{1}{2}$  times that of Sania's plant. Find the height of Ali's plant.
2. Guide students if needed.



### HOMEWORK / FOLLOW UP

- Assign the relevant questions from exercise 2 on pages 53-54.

## NUMBERS UP TO HUNDRED



## STUDENT LEARNING OUTCOMES

- Divide a fraction by another fraction involving proper, improper fractions and mixed numbers.

## INFORMATION FOR TEACHERS

Teachers should know:

1. How to divide fractions (proper, improper fraction and mixed number) by another fraction.
2. That to divide fractions by a mixed number the mixed number should be converted to an improper fraction.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



## MATERIALS / RESOURCES REQUIRED

- Board, Marker, Notebooks, Textbooks, Pencils



## INTRODUCTION

1. Write the following question on the writing board:  

$$\frac{3}{4} \div 2\frac{1}{2}$$
2. Give students a few minutes to think, discuss in pairs and share their responses. Record students' responses on the board.
3. Tell students that in order to solve  $\frac{3}{4} \div 2\frac{1}{2}$  we must first write the mixed fraction as an improper fraction i.e. the question becomes  $\frac{3}{4} \div \frac{5}{2}$ .
4. Next, we can re-write the division question as a multiplication question i.e. the division sign can be changed to multiplication and we invert the 2<sup>nd</sup> fraction from  $\frac{5}{2}$  to  $\frac{2}{5}$
5. Therefore, the question becomes  

$$\frac{3}{4} \times \frac{2}{5}$$
6. Ask students what the final answer is.
7. Students may then recall and solve the multiplication to get the answer  $\frac{6}{20}$ .
8. Tell students to copy the following in their notebooks:

*In the division of fractions*

$\div$  is changed into  $\times$   
 If we change  $\div$  into  $\times$   
 then we must also invert the second fraction  
 The place of numerator and denominator  
 are swapped with one another



## DEVELOPMENT

### Activity 1:

- Ask the students to work in pairs to copy and complete the following questions in their notebooks. Tell students to make sure they convert mixed numbers to improper fractions before dividing.

i)  $5\frac{1}{2} \div \frac{2}{3} = \boxed{\quad}$

ii)  $\frac{1}{8} \div \frac{1}{4} = \boxed{\quad}$

iii)  $\frac{4}{5} \div \frac{2}{3} = \boxed{\quad}$

iv)  $2\frac{3}{5} \div 1\frac{2}{5} = \boxed{\quad}$

v)  $\frac{7}{3} \div \frac{3}{7} = \boxed{\quad}$

vi)  $3\frac{1}{3} \div \frac{5}{6} = \boxed{\quad}$

- After students have completed their work, ask a few students to come to the board, one by one, to solve each part.
- Help students to correctly answer the questions.



## CONCLUSION / SUM UP

Ask the students to share any important rules they have learnt for the division of fractions. Students should mention that in the division of fractions with another fraction, they should change the division sign to multiplication and invert the 2nd fraction. Students should also highlight that in order to divide mixed numbers, students must first convert the mixed number into an improper fraction and then proceed with division.



## ASSESSMENT

Ask the students to copy and solve the following questions in their notebooks:

1)  $7\frac{1}{2} \div \frac{2}{5}$

2)  $\frac{7}{2} \div \frac{7}{1}$

$$3) \frac{1}{2} \div \frac{4}{2}$$

After students have attempted the questions, share the correct solutions.



### **HOMEWORK / FOLLOW UP**

Assign the relevant questions in exercise 2 on pages 53-54.

# MULTIPLICATION AND DIVISION OF FRACTIONS



## STUDENT LEARNING OUTCOMES

- Solve real-life situations involving the division of fractions.

## INFORMATION FOR TEACHERS

Teachers should:

- Understand how to divide fractions (proper, improper, and mixed) with other fractions.
- Know that to divide fractions (proper, improper, and mixed) by other fractions, the mixed number should first be converted to an improper fraction.
- Know how to multiply two fractions; multiply the numerator with the numerators and the denominator with the denominators.
- Understand that in multiplication, the order of the fractions does not affect the product.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils



## INTRODUCTION

- Write the following question on the board:  
 $22\frac{3}{4}$  kilograms salt are to be packed in  $2\frac{1}{3}$  kilogram packets.  
 How many packets of salt will be prepared?
- Explain the question to the students i.e. ask students how many smaller packets can be made from a bigger salt bag.
- Ask students what operation will be used to solve this question?
- Guide students to arrive at the answer i.e. division.
- Ask a student to come up to the board, write the fractions, the operation and attempt the question.

The question to be solved is:

$$22\frac{3}{4} \div 2\frac{1}{3}$$

- Tell students that first we convert a mixed number into improper fractions and the question becomes:

$$\frac{91}{4} \div \frac{7}{3}$$

7. Next, we can re-write the division question as a multiplication question i.e. the division sign can be changed to multiplication and we invert the 2<sup>nd</sup> fraction from  $\frac{7}{3}$  to  $\frac{3}{7}$ . Therefore, the question becomes

$$\frac{91}{4} \times \frac{3}{7}$$

8. Ask students to recall the multiplication of fractions to get the answer:

$$\frac{91}{4} \times \frac{3}{7} = \frac{273}{28}$$

9. Now we can convert the fraction  $\frac{273}{28}$  into mixed number

$$10. \quad \frac{273}{28} = 9 \frac{21}{28} = 9 \frac{3}{4}$$

Therefore,  $9 \frac{3}{4}$  a packet of salt will be prepared.



## DEVELOPMENT

### Activity 1:

- Ask the students to work in pairs
- Copy and complete the following questions in their notebooks.
- Write the following questions on the board.  
Remind students to convert mixed numbers to improper fractions before dividing.
  - The teacher brings  $7 \frac{1}{2}$  cakes for a class of strength 30. How much cake will each student get?
  - A car travels  $250 \frac{3}{4}$  km in  $5 \frac{1}{2}$  hours. Find how far the car travels in 1 hour.
- After students have completed their work, ask a few students to come to the board one by one and solve each part.
- Help students to correctly answer the questions.

For part i

$$= 7 \frac{1}{2} \div 30 = \frac{15}{2} \div \frac{30}{1}$$

$$= \frac{15^1}{2} \times \frac{1}{30^2} = \frac{1}{4}$$

Therefore, each student will get  $\frac{1}{4}$  a portion of the cake

For part ii

$$250 \frac{3}{4} \text{ Convert into improper fraction} = \frac{1003}{4}$$

$$5 \frac{1}{2} \text{ Convert into improper fraction} = \frac{11}{2}$$

Now, we find the distance the car travels in 1 hour.

$$= \frac{1003}{4} \div \frac{11}{2}$$

$$= \frac{1003}{4} \times \frac{2}{11}$$

$$\begin{aligned}
&= \frac{2006}{44} \\
&= \frac{1003}{22} \text{ Convert into mixed number} \\
&= 45\frac{13}{22}
\end{aligned}$$

Therefore, the car covered a distance of  $45\frac{13}{22}$  km in 1 hour



### CONCLUSION / SUM UP

1. Ask the students to share any important rules they have learnt for the division of fractions.
2. Students should mention that in the division of fractions with another fraction, they should change the division sign to multiplication and invert the 2nd fraction.
3. Students should also highlight that in order to divide mixed numbers, students must first convert the mixed number into an improper fraction and then proceed with division.
4. Students should mention that in real life we come across many problems which involve the division and multiplication of fractions.



### ASSESSMENT

- Ask the students to solve the following real-life situation in their notebook.
  1. How much pizza will a boy get if we divide  $3\frac{2}{3}$  pizza among 11 boys.
  2. How many sticks of length  $1\frac{3}{5}$  meters can be cut from the stick of length  $5\frac{7}{8}$  meter?
- Guide students if needed.



### HOMEWORK / FOLLOW UP

- Assign the relevant questions from exercise 2 on pages 53-54.



- Ask the students to compare these. Which one is smaller?
- Ask students how do you represent the order with a symbol?
- Call a student to come to the writing board and represent the smaller and bigger number with a symbol. Tell the student to use the symbol " $<$ ". Correct Answer:  $15 < 23$ .
- Write the following decimal numbers on the board

**3.52****3.42****3.54**

- Ask how you will compare the numbers above.
- Take their initial responses and then tell the students that today we will learn how to compare decimal numbers.

**DEVELOPMENT****Activity 1:**

- Write the decimal numbers 5.38 and 5.07 on the board.
- Ask students how you will compare the numbers. Take their initial responses
- Tell students that they should write the numbers in a place value table as follows:

Ones	.	Tenths	Hundredths
5	.	3	8
5	.	0	7

- Ask students to look at the table carefully. Ask the students which number is bigger/greater and why. Give students a few minutes to discuss their answers in pairs.
- Explain to the students that to determine which number is bigger, we start the comparison with the digit with the greatest place value i.e. the Ones digit. If both the digits are the same (which they are), we move to the digit with the second largest place value i.e. the tenths digit, and so on until one number is larger/smaller than the other.
- Help students notice that the numbers at ones place are the same i.e. 5 but the number 3 at the tenths place is greater than 0.
- Therefore, 5.38 is greater than 5.07.
- Now ask a student to come to the board and draw the symbol between the two numbers:  $5.38 > 5.07$ .

**Activity 2:**

- Divide students into groups of six.
- Distribute 6 different flashcards to each group.
- Write different decimal numbers (3-digit numbers with two decimal places) on each flashcard.
- Tell students in a group that they should compare all 6 cards, one by one, in their group i.e. compare them as smaller or larger.
- Call the students of one group to come to the front of the class, along with their flashcards, and stand from the smallest number to the largest number i.e. in ascending order.
- The 1<sup>st</sup> student will say his number out loud and will say "I am the smallest number".
- Then the 2<sup>nd</sup> student will come and say that I am bigger than 1 and state the reason and so on until all 6 students have spoken within a group.
- Remind students that this arrangement from smaller to larger is called ascending order.
- Now call another group and tell them to stand from largest to smallest.

10. Remind students that this type of arrangement of numbers from largest to smallest is called descending order.



### CONCLUSION / SUM UP

1. Ask students how do we compare decimal numbers.
2. Ask them what is the difference between ascending and descending order.
3. Students should emphasize that in order to determine which decimal number is greater or smaller we first look at the digits with the greatest place value i.e. the ones digit. If both the digits are the same, we move to the digit with the second largest place value i.e. the tenths digit, and so on until one number is larger/smaller than the other.
4. Students should also highlight that ascending order means arranging numbers from smallest to largest and descending order means arranging numbers from largest to smallest.



### ASSESSMENT

Ask the students to copy and complete the following in their notebooks.

Fill in the boxes with < or >

5.31  5.03

4.21  5.21

6.32  6.41



### HOMEWORK / FOLLOW UP

Assign the relevant questions from exercise 1 on page 60.

# ADDITION AND SUBTRACTION OF DECIMALS



## STUDENT LEARNING OUTCOMES

- Add and subtract 4-digit numbers up to 3 decimal places.

## INFORMATION FOR TEACHERS

Teachers should be able to:

1. Align the ones digit with the ones digit, the tenths with the tenths, and so on in the addition and subtraction of decimal numbers.
2. Carry when doing the addition of numbers and borrow when doing subtraction.
3. Identify the accurate place value of each digit in a decimal number.
4. Understand that if the number of digits after the decimal point is not equal, they should put the required number of zeros as a placeholder in the decimals to be added or subtracted.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils, Flashcards.



## INTRODUCTION

1. Write the given question on board
2. Ask the student to solve these question  $\longrightarrow$
3. Call one student to come and solve it on board
4. Ask the procedure from the students i.e.
  - Place the numbers in place value table
  - Add ones with ones tens with tens and so on
  - Tell the students that with the same technique we will add the decimal number

$$\begin{array}{r} 3521 \\ + 6025 \\ \hline \end{array} \qquad \begin{array}{r} 6235 \\ - 3102 \\ \hline \end{array}$$



## DEVELOPMENT

### Activity 1:

1. Write the following question on the board:  
 $5.323 + 4.501$
2. Draw the given place value table

Ones	.	Tenths	Hundredths	Thousands
	.			
	.			
	.			

- Ask one of the students to write 5.323 with correct placement in the place value chart.
- Ask another student to write 4.501 below the first number.
- The table should look like the one shown below:

Ones	.	Tenths	Hundredths	Thousandths
5	.	3	2	3
4	.	5	0	1

- Tell the students that we will start adding from the right side and will add:
  - 1<sup>st</sup>: thousandth with thousandths
  - 2<sup>nd</sup>: hundredths with hundredths
  - 3<sup>rd</sup>: tenths with tenths
 Ensure decimal is in the correct position.
  - 4<sup>th</sup>: ones with ones.

- Call another student to come and add the digits.
- Ensure that most of the students are engaged in the activity.

Ones	Decimal Point	Tenths	Hundredths	Thousandths
5	.	3	2	3
+ 4	.	5	0	1
9	.	8	2	4

Therefore,  $5.323 + 4.501 = 9.824$

### Activity 2:

- Write the following question on the board:

$$4.954 - 1.76$$

- Draw the place value table on the board:

Ones	.	Tenths	Hundredths	Thousandths
	.			
	.			

- Ask one of the students to write 4.954 with correct placement in the place value chart.
- Ask another student to write 1.76 below the first number.
- The teacher should ask other students what to do about the empty box under the thousandths place?
- Take student responses
- The teacher should emphasize to the students that if the number of digits after the decimal point is not equal, we put the required number of zeros as a placeholder in the decimals to be added or subtracted. Therefore, 1.76 becomes 1.760.
- The table should look like the one shown below:

Ones	.	Tenths	Hundredths	Thousands
4	.	9	5	4
1	.	7	6	0

- Emphasize the importance of placing the larger number on top and the smaller number at the bottom when subtracting.
- Tell the students that we will start subtraction from the right side and will subtract:
  - 1<sup>st</sup>: thousandth with thousandths
  - 2<sup>nd</sup>: hundredths with hundredths
  - 3<sup>rd</sup>: tenths with tenths
  - Ensure decimal is in the correct position

- 4<sup>th</sup>: ones with ones.

11. Call another student to come and subtract the digits.
12. Ensure that most of the students are engaged in the activity.

	Ones	.	Tenths	Hundredths	Thousandths
			8	1	
	4	.	9	5	4
-	1	.	7	6	0
	3	.	1	9	4

Therefore,  $4.954 - 1.760 = 3.194$

### Activity 3:

1. Ask students to work in pairs.
2. Distribute flashcards among students. Each flashcard should have a 4-digit number up to 3 decimal places on it.
3. Give two different flashcards to each pair.
4. Tell the 1<sup>st</sup> student to add the two numbers written on their flashcards and show their work to the student sitting next to them for peer review.
5. Tell the 2<sup>nd</sup> student to subtract the two numbers written on their flashcards and show their work to the student sitting next to them for peer review.
6. If a pair finishes early, the teacher should give that pair two new flashcards.
7. Teacher should walk through the class and guide students to arrive at the correct answers.



### CONCLUSION / SUM UP

1. Ask students to recap the steps involved in the addition and subtraction of decimal numbers.
2. Students should highlight that we should align the ones digit with the ones digit, the tenths with the tenths, and so on. It is important to note when to carry when doing the addition of numbers and borrow when doing subtraction.
3. Students should also mention the importance of accurately identifying the place value of each digit in a decimal number.
4. Lastly, students should recall that if the number of digits after the decimal point is not equal, we put the required number of zeros as a placeholder in the decimals to be added or subtracted.



### ASSESSMENT

Ask the students to copy and complete the following questions in their notebooks:

- i)  $8.042 + 1.561 = \underline{\hspace{2cm}}$
- ii)  $7.521 - 6.611 = \underline{\hspace{2cm}}$
- iii)  $9.152 - 8.512 = \underline{\hspace{2cm}}$

Assist students where necessary.



### HOMEWORK / FOLLOW UP

Assign the relevant questions from exercise 2 on page 63.

# MULTIPLICATION OF DECIMALS



## STUDENT LEARNING OUTCOMES

- Multiply a-3 digit number up to 2 decimal places by 10, 100, and 1000
- Divide 3-digit numbers up to 2-decimal places by 10, 100 and 1000

## INFORMATION FOR TEACHERS

Teachers should know:

1. That to multiply any decimal number by 10, the decimal point moves 1 place to the right; with 100 it moves 2 places to the right and with 1000 it moves 3 places to the right.
2. That to divide any decimal number by 10, the decimal point moves 1 place to the left; with 100 it moves 2 places to the left and with 1000 it moves 3 places to the left.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

Board, Marker, Notebooks, Textbooks, Pencils, Flashcards



## INTRODUCTION

1. The teacher will write the number 15 on the writing board and ask one of the students to come forward and multiply 15 and 10. (Expected Answer: 150)
2. Ask another student to multiply 15 x 100. (Expected Answer 1500)
3. Ask another student to multiply 15 x 1000 (Expected Answer 15000)
4. Tell the students that they observed that in multiplying 15 by 10, 100, and 1000 we just place zeros at the right side of 15 according to the number of zeros in the multiplier.
5. Now write  $1.75 \times 10$  on the writing board
6. Ask students if we will place zeros here as well after multiplication?
7. Give students a few minutes to think and discuss in pairs.
8. Write the number 7.95 on the board.
9. Tell the students that in a decimal number, the position of the decimal point is quite important. If the decimal point moves towards the left, the number becomes smaller as 0.795 is smaller than 7.95
10. If the decimal moves towards the right the number becomes larger as 79.5 is larger than 7.95
11. Tell students to recall:
  - ✧ When we multiply a decimal number by 10 the position of decimal point moves 1 place value to the right i.e. it becomes larger. When we divide by 10 it moves 1 place value to the left i.e. it becomes smaller.
  - ✧ When we multiply a decimal number by 100 the position of the decimal point shifts 2 place values to the right. When we divide by 100 it moves 2 place values to the left.

- ✧ When we multiply a decimal number by 1000 the position of decimal point shifts 3 place values to the right. When we divide by 1000 it moves 3 place values to the left.

12. Tell students that today we will learn multiplication and division of 2-digit numbers up to 2-decimal places by 10, 100, and 1000.



## DEVELOPMENT

### Activity 1:

- Write the following questions on the writing board
  - $2.15 \times 10$
  - $2.15 \times 100$
  - $2.15 \times 1000$
- Ask one of the students to come forward and count the number of zeros in the multiplier of part I (Answer: 1)
- Ask the student to move the decimal point to the right according to the number of zeros in the multiplier to get the correct answer. (Answer: 21.5)  
i.e.  $2.15 \times 10 = 21.5$ .
- Ensure the involvement of all the students. Repeat the same process for the other two parts of the question given above.

### Activity 2:

- Write the following questions on the writing board:
  - $6.25 \div 10$
  - $6.25 \div 100$
  - $6.25 \div 1000$
- Ask one of the students to come forward and count the number of zeros in the divisor of part I (Ans: 1)
- Ask the student to move the decimal point to the left according to the number of zeros in the divisor to get the correct answer. (Ans: 0.625)
- i.e.  $6.25 \div 10 = 0.625$
- Ensure the involvement of all the students. Repeat the same process for the other two parts of the question given above.



## CONCLUSION / SUM UP

- The teacher should ask students to summarize the rule of multiplying and dividing a decimal number by 10, 100, or 1000 i.e. when we multiply a decimal number by 10 the position of decimal point moves 1 place value to the right i.e. it becomes larger. When we divide by 10 it moves 1 place value to the left i.e. it becomes smaller.
- When we multiply a decimal number by 100 the position of the decimal point shifts 2 place values to the right. When we divide by 100 it moves 2 place values to the left.
- When we multiply a decimal number by 1000 the position of decimal point shifts 3 place values to the right. When we divide by 1000 it moves 3 place values to the left.



## ASSESSMENT

To assess the students write the following on the board and ask the students to match the entry in column A with the correct entry in column B.

Column A	Column B
$315 \times 10$	0.315
$31.5 \div 10$	3150
$0.315 \times 1000$	3.15
$31.5 \div 100$	315



### HOMEWORK / FOLLOW UP

Assign question 1 from exercise 3 on page 69 and question 1 from exercise 4 on page 73.

# WHOLE NUMBERS



## STUDENT LEARNING OUTCOMES

- Multiply a 3-digit number up to 2 decimal places by a whole number up to 2-digits
- Multiply a 3-digit number up to 2 decimal places by a 3- digit number up to 2 decimal places.

## INFORMATION FOR TEACHERS

Teachers should know that:

1. The multiplication of a 3-digit number with 2-decimal places with a 2-digit whole number is quite similar to the multiplication of a 3-digit whole number with a 2-digit whole number.
2. Similarly, the multiplication of a 3-digit number with 2-decimal places with another 3-digit number with 2 decimal places is quite similar to the multiplication of a 3-digit whole number with another 3-digit whole number.
3. To multiply any decimal number by another number, the multiplication should start with the smallest place value.
4. The number of decimal places in the product of two decimal numbers is equal to the sum of the digits after the decimal point in both the numbers, multiplicand, and multipliers.



**DURATION / NO OF PERIODS: 35 + 35 MINUTES / 2 PERIODS**



**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils



## INTRODUCTION

1. Write the following question on the board
2. Ask students to answer the question in pairs.
3. After a few minutes, take students' responses and record them on the board.
4. Tell the students that the steps in the multiplication of a 3-digit number with 2 decimal places with a 2-digit whole number are quite similar to the steps in the multiplication of a 3-digit whole number with a 2-digit whole number.
5. Show students the multiplication of 125 x 12. Write the following on the board.

$$\begin{array}{r}
 1.25 \times 12 \\
 \hline
 1.25 \\
 \times 12 \\
 \hline
 250 \\
 1250 \\
 \hline
 15000
 \end{array}$$

6. Now show the students what happens when there is a decimal number.
7. Guide students to fill in the following grid/table with the correct numbers in the correct places. See below:

	Tens	Ones	.	Tenths	Hundredths
				1	
		1	.	2	5
×				1	2
	1				
		2		5	0
1	2			5	0
1	5	.		0	0

8. Ask students to make observations about the decimal point.
9. After taking their responses, tell students that the number of decimal places in the product of two decimal numbers is equal to the sum of the digits after the decimal point in both the numbers, multiplicand, and multipliers. In the example above, the number of decimal places in the multiplicand is 2 and the number of decimal places in the multiplier is 0, therefore the number of decimal places in the product/answer is 2.
10. Tell students to count the number of digits in the decimal part i.e. 2. Therefore, place the decimal point after 2 digits from the right as shown above.
11. By multiplication, we get 15.00
12. Tell students that in today's lesson we will be multiplying a 3-digit number with 2 decimal places by a 2-digit whole number.



## DEVELOPMENT

### Activity 1

1. Ask the students to work in groups of 6 to complete the following questions in their notebooks. Use a grid/table like the one shown above.
2. Walk across the classroom and help the groups where necessary.
  - i.  $3.35 \times 27$
  - ii.  $3.22 \times 31$
  - iii.  $7.38 \times 25$
  - iv.  $9.25 \times 44$
  - v.  $5.24 \times 96$
  - vi.  $9.99 \times 99$
3. Ask a few students to solve any three questions on the board.
4. Guide students to arrive at the correct answers.



## CONCLUSION / SUM UP

1. Ask students to sum up the steps in the multiplication of a 3-digit number with 2 decimal places with a 2-digit whole number. Students should mention that to multiply any decimal number with a 2-digit whole number, the multiplication should start with the smallest place value i.e., the hundredths digit.
2. Prompt students to mention that the multiplication of a 3-digit number with 2 decimal places with a 2-digit number is quite similar to the multiplication of a 3-digit whole number with a 2-digit whole number.
3. Students should mention that carrying should be done wherever needed.

# MULTIPLICATION OF DECIMALS



## INTRODUCTION

- Write the following question on the board

$$5.25 \times 6.98$$

- Ask students to attempt the question in pairs.
- After a few minutes, record student responses on the board.
- Tell the students that the steps in the multiplication of a 3-digit number with 2 decimal places with another 3-digit number with 2 decimal places are quite similar to the steps in the multiplication of a 3-digit whole number with another 3-digit whole number.
- Show students the multiplication of 536 x 698. Write the following on the board.

			1	3	
			2	4	
			2	4	
<hr/>					
			5	2	5
		×	6	9	8
<hr/>					
	1				
<hr/>					
		4	2	0	0
	4	7	2	5	0
3	1	5	0	0	0
<hr/>					
3	6	6	4	5	0
<hr/>					

- Now show the students what happens when 2 decimal numbers are multiplied together.
- Guide students to fill in the following grid/table with the correct numbers in the correct places. See below:

Thousands	Hundreds	Tens	Ones	.	Tenths	Hundredths
			1		3	
			2		4	
			2		4	
<hr/>						
			5	.	2	5
		×	6	.	9	8
<hr/>						
	1					
		4	2		0	0
	4	7	2		5	0
3	1	5	0		0	0
<hr/>						
3	6	6	4		5	0
<hr/>						

- Ask students to make observations about the decimal point.
- After taking their responses tell students that the number of decimal places in the product of two decimal numbers is equal to the sum of the digits after the decimal point in both the numbers, multiplicand, and multipliers. In the example above, the number of decimal places in the multiplicand is 2 and the number of decimal places in the multiplier is also 2, therefore the number of decimal places in the product/answer is 4.

10. Tell students to count the number of digits in the decimal part which is 2 for the multiplicand and 2 for the multiplier. Therefore, place the decimal point after 4 digits from the right as shown above.
11. By multiplication, we get 36.6450
12. Tell students that in today's lesson we will be multiplying a 3-digit number with another 3-digit number, both with 2 decimal places.



## DEVELOPMENT

### Activity 2

1. Ask the students to work in groups of 6.
2. Copy and complete the following questions in their notebooks. Use a grid/table like the one shown above.
3. Walk across the classroom and help the groups where necessary.
  - i.  $4.25 \times 4.7$
  - ii.  $4.12 \times 3.1$
  - iii.  $8.46 \times 5.2$
  - iv.  $7.27 \times 36.4$
  - v.  $6.15 \times 7.21$
  - vi.  $8.89 \times 9.99$
4. Ask a few students to solve any three questions on the board.
5. Guide students to arrive at the correct answers.



## CONCLUSION / SUM UP

1. Ask students to sum up the steps in the multiplication of a 3-digit number with 2 decimal places with another 3-digit number with 2 decimal places. Students should mention that to multiply any decimal number with another decimal number, the multiplication should start with the smallest place value i.e., the hundredths digit with the hundredths digit.
2. Prompt students to mention that the multiplication of a 3-digit number with 2 decimal places with another 3-digit number with 2 decimal places is quite similar to the multiplication of two 3-digit whole numbers.
3. Students should highlight that the number of decimal places in the product of two decimal numbers is equal to the sum of the digits after the decimal point in both the numbers i.e., multiplicand and multipliers.
4. Students should mention that carrying should be done wherever needed.



## ASSESSMENT

- Ask students to copy and complete the following questions in their notebooks.

Tick the correct choice			
$1.53 \times 15$	=	229.5	True   False
$6.35 \times 1.53$	=	9.7155	True   False
$3.9 \times 12$	=	46.8	True   False
$69.3 \times 13$	=	900.9	True   False



## HOMEWORK / FOLLOW UP

- Assign the relevant questions from the textbook in exercise 3 on page 69.

**Month**

**4**



# DIVISION OF DECIMALS



## STUDENT LEARNING OUTCOMES

- Divide a 3-digit number up to 2 decimal places by a whole number up to 2-digits.
- Divide a 3-digit number up to 2 decimal places by a 2 digit number up to 1 decimal place.

## INFORMATION FOR TEACHERS

Teachers should know that:

1. To divide any decimal number by a 2-digit number the division should start with the largest place value i.e. the digit to the most left.
2. The division of a 3-digit number up to 2 decimal places with a 2-digit whole number is quite similar to the division of a 3-digit whole number with a 2-digit whole number.
3. The division of a 3-digit number up to 2 decimal places with a 2-digit number up to 1 decimal place is quite similar to the division of a 3-digit whole number with a 2-digit whole number.



**DURATION / NO OF PERIODS: 35 + 35 MINUTES / 2 PERIODS**



**MATERIALS / RESOURCES REQUIRED**

Board, Marker, Notebooks, Textbooks, Pencils, Flashcards, Chart



## INTRODUCTION

1. Write the following question on the board:
 
$$1.92 \div 12$$
2. Tell students that the division of 1.92 by 12 is quite similar to dividing 192 by 12. However, we must be careful of the decimal point.
3. Ask students to work in pairs and attempt the question. Give them a few minutes. Record student responses.
4. Use the following grid/table and show students the solution. See below:

$$\begin{array}{r}
 0.16 \\
 12 \overline{) 1.92} \\
 \underline{- 12} \phantom{0} \\
 072 \\
 \underline{- 72} \\
 00
 \end{array}$$

5. Show students that 1.92 divided by 12 is 0.16
6. Direct student attention to the specific placement of the decimal point in the quotient i.e. aligned with the decimal point in the dividend.
7. Ask students to note down the example in their notebooks.



## DEVELOPMENT

### Activity 1

1. Ask the students to work in pairs to copy and answer the following questions in their notebooks:
  - vii.  $8.4 \div 7$
  - viii.  $6.9 \div 3$
  - ix.  $3.9 \div 13$
  - x.  $3.12 \div 12$
  - xi.  $6.24 \div 48$
  - xii.  $9.90 \div 11$
2. Ask a student to volunteer to solve the first question on the board. Guide the student at each step and help them answer correctly.
3. Walk around the classroom and help where needed.



## CONCLUSION / SUM UP

1. Ask students to list the key steps in dividing a 3-digit number up to 2 decimal places by a 2 digit whole number.
2. Students should highlight that the division of a 3-digit number up to 2 decimal places by a 2 digit whole number is quite similar to the division of a 3-digit whole number by a 2-digit whole number.
3. Students should mention the importance of the specific placement of the decimal point in the quotient i.e., aligned with the decimal point in the divisor.

# DIVISION OF DECIMALS



## INTRODUCTION

- Write the following question on the board:

$$8.91 \div 3.3$$

- Tell students that the division of 8.91 by 3.3 is quite similar to dividing 891 by 33. However, we must be careful of the treatment of the decimal point.
- Tell students that in this question, we must remove the decimal from the divisor (3.3) to make it a whole number. Therefore, for 3.3, the decimal point moves one place to the right making it 33 which is a whole number.
- If the decimal point is moved one place to the right for the divisor, then it must also be moved one place to the right for the dividend making it 89.1, rather than 8.91.
- Ask students to work in pairs and attempt the question  $89.1 \div 33$
- Give them a few minutes. Record student responses.
- Use the following grid/table and show students the solution. See below:

$$\begin{array}{r}
 02.7 \\
 33 \overline{) 89.1} \\
 \underline{- 66} \phantom{0} \\
 231 \\
 \underline{- 231} \\
 000
 \end{array}$$

- Show students that 8.91 divided by 3.3 or 89.1 divided by 33 is 2.7
- Direct student attention to the specific placement of the decimal point in the quotient i.e. aligned with the decimal point in the dividend.
- Ask students to note down the example in their notebooks.



## DEVELOPMENT

### Activity 2

- Ask the students to work in pairs.
- Copy the following questions in their notebooks:
  - $4.8 \div 1.2$
  - $7.8 \div 2.6$
  - $4.35 \div 1.5$
  - $6.66 \div 1.8$
  - $6.25 \div 0.5$
  - $27.3 \div 3.9$
- Ask a student to volunteer to solve the first question on the board. Guide the student at each step and help them answer correctly.
- Walk around the classroom and help where needed.



## CONCLUSION / SUM UP

1. Ask students to list the key steps in dividing a 3-digit number up to 2 decimal places by a 2 digit number up to one decimal place.
2. Students should highlight that the division of a 3-digit number up to 2 decimal places by a 2 digit number up to one decimal place is quite similar to the division of a 3-digit whole number by a 2-digit whole number.
3. Students should specifically mention how the decimal must be removed from the divisor, making it a whole number. The decimal point should then also be moved accordingly for the dividend.
4. After moving the decimal in the dividend, students should also mention the importance of the specific placement of the decimal point in the quotient i.e. aligned with the decimal point in the dividend.



## ASSESSMENT

1. Ask students to voluntarily solve the following questions on the board:
  - i. Solve  $13.3 \div 1.9$
  - ii. Solve  $7.5 \div 1.5$
  - iii. Solve  $16.9 \div 1.3$
2. Share the correct answers with the students after they have attempted all parts.



## HOMEWORK / FOLLOW UP

- Assign the relevant questions from the textbook in exercise 4 on page 73.

# DIVISION OF DECIMALS



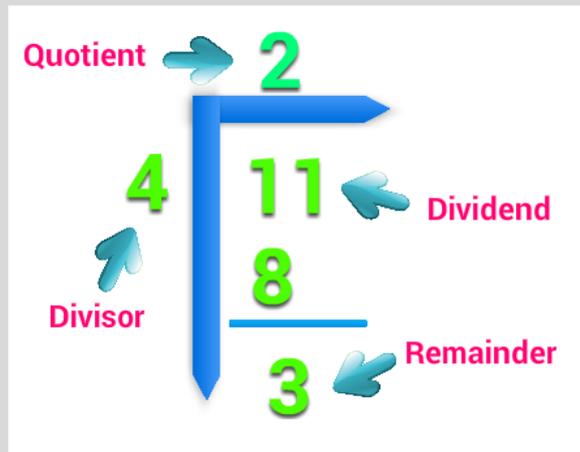
## STUDENT LEARNING OUTCOMES

- Convert fraction to decimal using division.

## INFORMATION FOR TEACHERS

Teachers should:

1. Understand that a whole number can be written as a decimal by putting zero to the right of the decimal i.e. 5 can be written as 5.0.
2. Be able to do long division.
3. Know the terms divisor, dividend, quotient, and remainder, and use them while doing division problems.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils



## INTRODUCTION

1. Ask students if every fraction can be converted into a decimal number?
2. Let students discuss the question in small groups. Ask students to use  $\frac{3}{5}$  as an example.
3. After students have discussed, record their responses on the board.
4. If students say that we should convert the denominator into 10 and find an equivalent fraction, encourage the answer but ask them for an alternative approach to find decimals as well.
5. Remind students that if the denominator of the fraction is converted to 10 then it is easy to convert the fraction into a decimal, e.g.  $\frac{3}{5}$  becomes  $\frac{6}{10}$  which can be written as 0.6.
6. Write the following on the board. Show students the steps in the division:

$$\begin{array}{r}
 0.6 \\
 5 \overline{) 3.0} \\
 \underline{- 0} \phantom{0} \\
 3 \phantom{0} \\
 \underline{- 3} \phantom{0} \\
 0 \phantom{0} \\
 \underline{- 0} \\
 0
 \end{array}$$

7. Ask students what do they notice about the decimal point? Where was it added? Why was it added?
8. Let students discuss the questions in small groups. After discussion, tell students that a whole number can be written as a decimal by putting zero to the right of the decimal. Therefore, example 3 can be written as 3.0.
9. Direct students' attention to the placement of the decimal point in the quotient i.e. aligned with the dividend.
10. Direct student to the remainder, i.e. it must be zero.
11. Therefore  $\frac{3}{5} = 0.6$  through division.
12. Tell students that we can convert any fraction to a decimal number by using long division.



## DEVELOPMENT

### Activity 1:

1. Ask the students to work in pairs and write the following fractions as decimals by using division.
  - i.  $\frac{7}{5}$
  - ii.  $\frac{1}{4}$
  - iii.  $\frac{19}{25}$
  - iv.  $\frac{72}{45}$
  - v.  $\frac{1}{8}$
2. Ask students to share their answers.
3. Guide the students to arrive at the correct answers.



## CONCLUSION / SUM UP

1. Ask the students how they can represent a fraction as a decimal number.
2. Students should say that a fraction can be converted to a decimal number through division. They should highlight that a whole number can be written as a decimal by putting zero to the right of the decimal.
3. Furthermore, guide the discussion so that students also touch upon the importance of the placement of the decimal point in the quotient i.e. it should be aligned with the dividend and they should continue to divide until the remainder is 0.



## ASSESSMENT

1. Write the following questions on the board. Ask the students to solve them in their notebooks.
2. Convert the fraction into decimals:
  - 1)  $\frac{17}{2}$
  - 2)  $\frac{3}{8}$
  - 3)  $\frac{7}{40}$
  - 4)  $\frac{55}{16}$
3. Walk across the classroom and help students where needed.



### **HOMEWORK / FOLLOW UP**

Assign the relevant questions from the textbook in exercise 5 on page 75.

# DIVISION OF DECIMALS



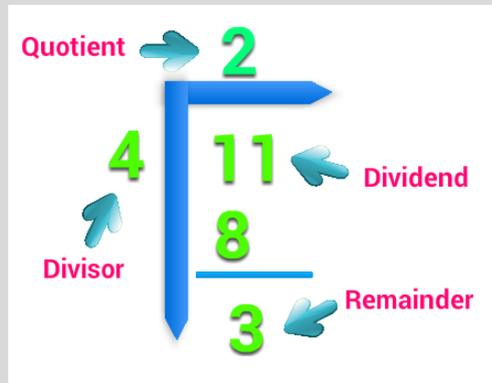
## STUDENT LEARNING OUTCOMES

- Solve real-life situations involving the division of 3-digit numbers up to 2-decimal places.

## INFORMATION FOR TEACHERS

Teachers should:

- Be able to set up and carry out the long division with decimal numbers.
- Know that a whole number can be written as a decimal by putting zero to the right of the decimal i.e. 5 can be written as 5.0.
- Understand the terms divisor, dividend, quotient, and remainder, and use them while doing division problems.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils



## INTRODUCTION

- Write the following real-life situation on the board:  
'Javed has a string that is 12.5 cm long. He wants to cut it into strips that are 2.5 cm in length. How many strips will Javed be able to cut the string into?'
- Ask students how they will find the number of strips. Encourage students to use expressions like "divide 12.5 by 2.5", "12.5 should be the divisor", "2.5 should be the dividend", etc.
- Tell students that the division of 12.5 by 2.5 is quite similar to dividing 125 by 25. However, we must be careful of the treatment of the decimal point.
- Tell students that in this question, we must remove the decimal from the divisor (2.5) to make it a whole number. Therefore, for 2.5, the decimal point moves one place to the right making it 25 which is a whole number.

- If the decimal point is moved one place to the right for the divisor then it must also be moved one place to the right for the dividend making it 125, rather than 12.5.
- Ask students to work in pairs and attempt the question  $125 \div 25$
- Write the following on the board:

Length of the string: 12.5 cm

Length of each smaller strip: 2.5 cm

We will find the number of strips by dividing 12.5 by 2.5 i.e.  $125 \div 25$

$$\begin{array}{r}
 2 \quad 5 \quad \overline{) 125} \\
 \underline{10} \phantom{0} \\
 25 \phantom{0} \\
 \underline{25} \\
 0
 \end{array}$$

Therefore, the number of smaller strips is 5.

Explain all the steps in the division to the students.



### DEVELOPMENT

#### Activity 1:

- Write the following question on the board.  
"Sara is given 10.50 kg of rice. She has small boxes that can hold 1.5 kg. How many boxes are required to store the rice?"
- Divide the students into small groups.
- Ask each group to solve the question neatly in one notebook.
- Ask various groups at random to present their solution at the front of the class.
- Other students should listen attentively and give their feedback.
- Assist the groups to reach the correct answer by setting up the question as follows:

$$\begin{array}{r}
 1 \quad 5 \quad \overline{) 105} \\
 \underline{10} \\
 5
 \end{array}$$



### CONCLUSION / SUM UP

- Conclude the activity by asking students the importance of using division in real-life situations and the steps required in the division of 3 digit numbers up to 2 decimal places.
- Students should mention that while dividing, the answer is the quotient or the number written on top.
- Students should highlight that a whole number can be written as a decimal by putting zero to the right of the decimal.



### ASSESSMENT

- Ask students to solve the following question in their notebooks:  
Ali has multiple bottles. He has 6.75 liters of oil which he wants to pour into these bottles. Find the number of bottles he will be able to fill if the capacity of each bottle is 0.45 liters.
- Share the correct answers with the students after they have attempted the question.



### HOMEWORK / FOLLOW UP

Students should revise the worked examples on pages 71 and 72.

# ROUNDING OF DECIMALS



## STUDENT LEARNING OUTCOMES

- Round off a 4-digit number up to 3-decimal places to the nearest tenth or hundredth.

## INFORMATION FOR TEACHERS

Teachers should know that the method to round off different decimal numbers to the nearest tenth or hundredth is to look at the digit to the right of the one we are rounding to.

1. If it is 5 or more, then round up.
2. If it is less than 5, then round it down.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



## MATERIALS / RESOURCES REQUIRED

- Board, Chalk, Marker, Textbook, Notebooks



## INTRODUCTION

1. Write the following real-life situation on the writing board:  
The children's park is 2.473 km away from Ibrahim's home. Write this distance in km to
  - ◇ the nearest tenth.
  - ◇ the nearest thousandth

2. Ask students to attempt the question in pairs. Tell students the following:  
The rounding rule is to look at the digit to the right of the one we are rounding to:
  - ◇ If it is 5 or more, then round up.
  - ◇ If it is less than 5, then round it down.

3. Give students a few minutes to attempt and share their responses. Record student responses.

4. Then show the correct answer on the board as shown below:

- ◇ The nearest tenth

Ones	.	Tenths	Hundredths	Thousandths
2	.	4	7	3

5. Tell students that to round off to the nearest tenth we look at the digit to the right of the tenths digit i.e. we look at 7. It is bigger than 5, therefore 2.473 rounded off to the nearest tenth is 2.5. We write  $2.473 \approx 2.5$  (rounded off to the nearest tenths)

- ◇ The nearest hundredth

Ones	.	Tenths	Hundredths	Thousandths
2	.	4	7	3

6. Tell students that to round off to the nearest hundredth we look at the digit to the right of the hundredths digit i.e. we look at 3. It is smaller than 5, therefore 2.473 rounded off to the

hundredths is 2.47. We write  $2.473 \approx 2.47$  (rounded off to the nearest hundredths)

- Tell students that today we will learn about rounding off to the nearest tenths or hundredths.



## DEVELOPMENT

### Activity 1:

- Ask students to come to the board and round off the following numbers to:
  - ✧ To the nearest tenths
  - ✧ To the nearest hundredths
 [Remember to use the symbol “ $\approx$ ”]
  - ✧ 3.768
  - ✧ 87.849
  - ✧ 1.355
  - ✧ 24.218
  - ✧ 17.736
- Ask other students to guide the volunteers
- Share the correct answers with the students.



## CONCLUSION / SUM UP

- Ask students what is the rounding rule with regards to decimal numbers. Give examples. Students should summarize that the rounding rule is to look at the digit to the right of the one they are rounding up to.
- If it is 5 or more, then round up. However, if it is less than 5, then round it down. For example, if 8.726 is rounded off to the nearest hundredths, we look at the digit to the right of the hundredths digits i.e. we look at 6. As 6 is greater than 5, 8.726 is rounded up to 8.73 and we write  $8.726 \approx 8.73$  (rounded off to the nearest hundredths)



## ASSESSMENT

- Write the following on the board and ask students to verify if the rounding off is true or false.

A	B	True / False
<b>Decimal Number</b>	<b>Rounding off to the nearest tenths</b>	
1.231	1.23	
1.292	1.3	
<b>Decimal Number</b>	<b>Rounding off to the nearest hundredths</b>	
3.516	3.51	
3.513	3.52	

- Share the correct responses with the students after their attempts.



## HOMEWORK / FOLLOW UP

Assign the relevant questions from the textbook in exercise 6 on page 77.

# ESTIMATING SUM AND DIFFERENCE OF DECIMALS



## STUDENT LEARNING OUTCOMES

- Estimate sum or difference of the numbers (up to 4-digit)

## INFORMATION FOR TEACHERS

Teachers should know that:

- Estimation is to find an answer which is closest to the actual answer but not the actual one.
- They can estimate the sum and difference of decimals by rounding them off to the nearest whole numbers.
- The method to round off different decimal numbers to the nearest tenth or hundredth is to look at the digit to the right of the one we are rounding to.
  - ◇ If it is 5 or more, then round up.
  - ◇ If it is less than 5, then round it down.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

Board, Chalk, Marker, Textbook, Notebooks



## INTRODUCTION

- Write the following question on the writing board:
- Estimate the sum of  $351.1 + 123.7$  by rounding off the given numbers to the nearest whole number.
- Ask students to attempt the question in pairs. Remind students of the following:  
The rounding rule is to look at the digit to the right of the one we are rounding to:
  - ◇ If it is 5 or more, then round up.
  - ◇ If it is less than 5, then round it down.
- Give students a few minutes to attempt and share their responses. Record student responses.
- Then tell students that if we round off 351.1 to the nearest whole number we look at the digit to the right of the ones digit i.e. we look at 1. As it is less than 5 we round off 351.1 to 351 and we can write  $351.1 \approx 351$ .
- If we round off 123.7 to the nearest whole number we look at the digit to the right of the ones digit i.e. we look at 7. As it is more than 5 we round off 123.7 to 124 and we can write  $123.7 \approx 124$ .
- Now tell the students to add  $351 + 124 = 475$  and compare this approximation with the actual addition of  $351.1 + 123.7 = 474.8$ .

- Ask students to make observations about the estimated sum and the actual sum. Students should observe that the two answers are quite close.
- Tell students that in today's lesson they will estimate the sum or difference of numbers.



## DEVELOPMENT

### Activity 1:

- Ask students to come to the board and solve the following questions.
- For each question estimate the sum or difference by rounding off each number to the nearest whole number and then adding or subtracting  
[Remember to use the symbol “ $\approx$ ”]  
  - ✧  $87.2 + 33.7$
  - ✧  $21.4 - 13.1$
  - ✧  $124.8 + 33.3$
  - ✧  $17.7 - 11.2$
- Ask other students to guide.
- Now ask other students to volunteer to come to the board and carry out the actual addition and subtraction.
- Ask other students to guide.
- Ask all students to fill out the following table. (All text in blue is only for the teachers and students must fill in this part on their own.)

Question	Estimate Answer	Actual Answer	Estimation is correct? Yes / No
a) $87.2 + 33.7$	<b>121</b>	<b>120.9</b>	<b>YES</b>
b) $21.4 - 13.1$	<b>8</b>	<b>8.3</b>	<b>YES</b>
c) $124.8 + 33.3$	<b>158</b>	<b>158.1</b>	<b>YES</b>
d) $1.77 - 1.12$ Round off these numbers to the nearest tenths	<b>0.7</b>	<b>0.65</b>	<b>YES</b>
e) $9.955 - 7.471$ Round off these numbers to the nearest hundredths	<b>2.49</b>	<b>2.484</b>	<b>YES</b>

- Share the correct answers with the students.



## CONCLUSION / SUM UP

- Ask students how do we estimate the sum and difference of decimal numbers.
- Students should highlight that to estimate the sum or difference we first round off a decimal number to the nearest whole number if that decimal number has one decimal place, we round off to the nearest tenths if that decimal number has two decimal places and we round off to the nearest hundredths for a decimal number that has three decimal places.
- Students should mention that we can compare the estimated answers to the actual sum and/or difference to assess if the estimation was correct or not.



## ASSESSMENT

- Write the following on the board and ask students to copy and complete the table in their notebooks.

Question	Estimate Answer	Actual Answer	Estimation is correct? Yes / No
a) $87.2 - 33.7$			
b) $21.4 + 13.1$			
c) $124.8 - 33.3$			
d) $1.77 + 1.12$ Round off these numbers to the nearest tenths			
e) $9.955 + 7.471$ Round off these numbers to the nearest hundredths			

2. Share the correct responses with the students after their attempts.



### **HOMEWORK / FOLLOW UP**

- Assign the relevant questions from the textbook in exercise 6 on page 77.

# PERCENTAGES



## STUDENT LEARNING OUTCOMES

- Recognize percentage as a special kind of fraction.
- Convert percentage to fraction and decimal number and vice versa (only for numbers without decimal part i.e. 35%, 75%, etc.)

## INFORMATION FOR TEACHERS

Teachers should:

1. Know that percentage is a special kind of fraction with 100 as the denominator.
2. Know that the symbol to represent percentage is %.
3. Be able to write fractions as percentages when fractions have denominators of 100.
4. Be able to write fractions as percentages when fractions have denominators other than 100.
5. Be able to write decimals as fractions and fractions as percentages.
6. Know how to simplify a fraction.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

Board, Marker, Notebooks, Textbooks, Pencils, Chart



## INTRODUCTION

1. Write the symbol “%” on the writing board.
2. Ask the students if they have ever seen this symbol.
3. Paste the following picture of a 30% OFF Sale on the writing board:



4. Ask students what is meant by this advertisement.
5. Take student responses.
6. Write the following scenario on the board.  
In a mathematics test, Alina scored 7 marks out of 10. What percentage did she score on this math test?
7. Ask students to discuss the question in pairs for a few minutes.
8. Give students prompts like, “how can we express her marks as a fraction?” and “what kind of a fraction is a percentage?”

9. Take and record student responses.
10. Tell students that Alina's marks can be represented as a fraction i.e.  $\frac{7}{10}$ .
11. Tell students that percentage is a special kind of fraction with 100 as the denominator.
12. Ask students how can we convert the given fraction i.e.  $\frac{7}{10}$  into an equivalent fraction where the denominator is 100.
13. Again allow the pairs to discuss for a few minutes.
14. After discussion tell students that  $\frac{7}{10} \times \frac{10}{10} = \frac{70}{100}$ .
15. This fraction  $\frac{70}{100}$  can also be written in a special way called a percentage.
16. Tell students that  $\frac{70}{100}$  can be written as 70% or  $\frac{70}{100} = 70\%$ .
17. Therefore, Alina scored 70% on her math test.
18. Lastly, ask students how can we write  $\frac{70}{100}$  as a decimal.
19. After discussion students should recall that  $\frac{70}{100} = 0.7$  as a decimal.



## DEVELOPMENT

### Activity 1:

1. Paste the following table on the writing board.
2. The chart should be prepared before the lesson
3. Tell students to work in groups of four and fill in the empty boxes (all the text in blue is for the teacher only)
4. Solve the first row and demonstrate the requirement of the question to the students.

**Note:** To write a decimal as a fraction/percentage teachers should refer to Unit 4 Lesson 37 for Grade 4.

Teachers should remind students how to simplify a fraction by finding the common factors in the numerator and the denominator.

Fraction	Fraction with Denominator as 100	Percentage	Decimal Number
$\frac{3}{10}$	$\frac{30}{100}$	30%	0.3
$\frac{1}{50}$	$\frac{2}{100}$	2%	0.02
$\frac{1}{4}$	$\frac{25}{100}$	25%	0.25
$\frac{7}{20}$	$\frac{35}{100}$	35%	0.35
$\frac{13}{20}$	$\frac{65}{100}$	65%	0.65
$\frac{23}{100}$	$\frac{23}{100}$	23%	0.23

5. Guide students during the activity.
6. Tell each group to share their answers.



### CONCLUSION / SUM UP

1. Ask students how we convert a percentage to a fraction and decimal number and vice versa. Students should mention that percentage is a special kind of fraction with 100 as the denominator.
2. Students should highlight that a percent can be written as a decimal number as it is just a fraction with a denominator of 100. Students should recall how to convert a decimal into a fraction and from there find an equivalent fraction where the denominator is 100.



### ASSESSMENT

1. Write the given questions on board and ask students to convert the numbers into percentages and then to the simplest fraction in their notebooks.
  - 1) 0.35
  - 2) 0.72
  - 3) 0.059
2. Guide students to arrive at the correct answers.



### HOMEWORK / FOLLOW UP

- Assign the relevant questions from the textbook on page 81 in exercise 7.

# PERCENTAGES



## STUDENT LEARNING OUTCOMES

- Solve real-life situations involving percentages

## INFORMATION FOR TEACHERS

Teachers should be able:

1. To write fractions as percentages when fractions have denominators other than 100.
2. To know how to find the percentage of a number.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



## MATERIALS / RESOURCES REQUIRED

- Board, Marker, Notebooks, Textbooks, Pencils, Chart



## INTRODUCTION

1. Ask students if they have used percentages in their daily lives?
  - ✧ Ask the following questions from the students:
  - ✧ What does it mean to get 60% marks in an exam if the exam is out of 125 marks?
  - ✧ What does 50% off on shoes imply if the shoes' full price is Rs. 2600?
  - ✧ A student has 75% attendance in school. If the school year had 96 days. How many days did he attend?
2. Take their responses and have a detailed discussion on each question.
3. Explain to the students that we can find the percentage of a number by writing the percentage as a fraction i.e. with a denominator of 100 and then multiplying with the number.
4. Tell students that in daily life we face many situations where we use percentages.



## DEVELOPMENT

### Activity 1:

1. Write the following scenario on the board.  
Ali got 750 marks out of 1200. What percentage did he score?
2. Ask students to discuss the question in pairs for a few minutes.
3. Record student responses.
4. After discussion, solve the question on the writing board.
 

Total marks: 1200 marks  
Ali's marks: 750 marks

Therefore, Ali got 750 out of 1200

i.e.  $\frac{750}{1200}$

Now, we will convert this fraction into a percentage

$$\frac{750}{1200} = \left[ \frac{750}{1200} \times 100 \right] \%$$
$$= \left[ \frac{750}{12} \right] \% \text{ Here long division may be used to find the answer.}$$
$$= 62.5 \%$$

Tell students that to find the percentage a fraction represents, we simply multiply the fraction by 100 as shown above.

5. Tell students that Ali got 62.5 % marks.

### Activity 2:

1. Make four groups and give one question to each group:

#### Group 1 Question

Today 60 students out of 85 are present in the class. Find the percentage of present students.

#### Group 2 Question

Today 60 students out of 85 are present. Find the percentage of absent students.

#### Group 3 Question

The teacher covered 4 chapters of math out of 9. Find the percentage of the covered chapter?

#### Group 4 Question

The teacher covered 4 chapters of math out of 9. Find the percentage of uncovered chapters?

2. Tell the students to solve the question in the group and pass on their question slip to another group.
3. After all, groups have solved all 4 questions, they should share their work with other groups
4. By the end of this exercise, each group should have done all 4 questions.



### CONCLUSION / SUM UP

- Conclude the activity by asking about the use of percentages in real-life situations.
- Students should highlight that to find the percentage that a fraction represents, we simply multiply by 100. Students should mention that to find the percentage of a number, we write the percentage as a fraction (with the denominator of 100) and then multiply by the number.



### ASSESSMENT

Share with the students on record in the school and then share with them that day's attendance record. Ask students to find the present student percentage and absent student percentage in the school that day.



### HOMEWORK / FOLLOW UP

- Assign the relevant questions from the textbook on page 82 in exercise 7.

**Month**

**5**



# CONVERSION OF UNITS OF DISTANCE



## STUDENT LEARNING OUTCOMES

Convert measures given in:

- Kilometers to meters and vice versa.
- Meters to centimeters and vice versa.
- Centimeters to millimeters and vice versa.

## INFORMATION FOR TEACHERS

Teachers should know how to convert kilometers, meters, centimeters, and millimeters using:

$$1 \text{ km} = 1000 \text{ m}$$

$$1 \text{ m} = 100 \text{ cm}$$

$$1 \text{ cm} = 10 \text{ mm}$$



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



## MATERIALS / RESOURCES REQUIRED

- Board, Chalk, Marker, Textbook, Notebook/Copy, Meter ruler, Measuring Tape



## INTRODUCTION

1. Ask students the following questions. Record their responses and address any misconceptions.
  - ◇ Which units are used for measuring distance? Acceptable response: km, m, cm and mm
  - ◇ Which unit is used for measuring the distance between two cities? Acceptable Response: km
  - ◇ Which unit is used for measuring cloth? Acceptable Response: m
  - ◇ Which unit is used for measuring the sides of geometrical shapes in a book? Acceptable Response: cm
2. Give a student the meter ruler and ask him/her to measure the length of the board.
3. The student should measure in meters i.e. 1 meter, 2 meters ... and the last reading should be in centimeters.
4. Assume the last reading is 24 centimeters.
5. Write on the board 2 m and 24 cm
6. Ask how can we write the length of the board in cm i.e. How can we convert 2 m into cm? (Give students the hint: 1m = 100 cm).
7. Ask students to raise their hands and give their answers. Tell students that we can multiply 2 with 100 to convert 2 meters to 200 centimeters.

8. Guide students to get to the right answer i.e. add 24 cm to 200 cm to get the length of the board as 224 cm.
9. Repeat the process for the height of the board.
10. Assume the height of the board is 1 meter and 57 cm.
11. Ask students to discuss the following questions in pairs:
  - ✧ What is the height of the board in cm? Acceptable Response: 157 cm
  - ✧ What is the height of the board in mm? Acceptable Response: 1570 mm
  - ✧ What is the height of the board in m? Acceptable Response: 1.57 m
  - ✧ What is the height of the board in km? Acceptable Response: 0.00157 km
12. After allowing a few minutes for student discussion ask students to share their ideas.
13. Ask students to write the following conversions in their notebooks:
  - 1 km = 1000 m
  - 1 m = 100 cm
  - 1 cm = 10 mm
14. Tell students to write the following rules of conversion in their notebooks:
  - ✧ In order to convert from cm to mm we multiply by 10 and in order to convert from mm to cm we divide by 10
  - ✧ In order to convert from m to cm we multiply by 100 and in order to convert from cm to m we divide by 100
  - ✧ In order to convert from km to m we multiply by 1000 and in order to convert from m to km we divide by 1000
15. Share the correct answers with the students.
16. Tell students that in today's lesson we will be converting between kilometers, meters and centimeters.



## DEVELOPMENT

### Activity 1:

1. Ask students to work in pairs to answer the following questions in their notebooks:
  - ✧ The length of a wall is 17 m. What is the length in cm? (hint: multiply 17 with 100)
  - ✧ The height of a teacher's desk is 163 cm. What is the height of the teacher in m? (hint: divide 163 with 100)
  - ✧ Amal and Annum are good friends. The distance between their houses is 1750 meters. What is the distance in km? (hint: divide 1750 with 1000)
2. Share the correct solutions with the students.

### Activity 2:

1. Ask the students to work in pairs.
2. Copy and complete the table given below.
3. Answer the first question on the board and show all steps.

#	Length	Convert to
i	7 km 671 m	Kilometers = 7.671 m
ii	17 km 532 m	Meters =
iii	16 m and 14 cm	Centimeters =
iv	2480 m	Kilometers =
v	67 cm and 24 mm	Millimeters =

4. Write the correct answers for all the parts and ask students to make corrections in their notebooks.



### CONCLUSION / SUM UP

1. Ask students to provide a summary of the steps required in the conversion of:
  - ✧ meters to centimeters
  - ✧ kilometers to meters
  - ✧ centimeters to millimeters and vice versa.
2. Students should highlight that:
  - ✧ In order to convert from cm to mm we multiply by 10 and in order to convert from mm to cm we divide by 10
  - ✧ In order to convert from m to cm we multiply by 100 and in order to convert from cm to m we divide by 100
  - ✧ In order to convert from km to m we multiply by 1000 and in order to convert from m to km we divide by 1000



### ASSESSMENT

1. Ask students the following questions:
  - i. How many meters are there in 1 kilometer? Correct answer: 1000m in 1 km
  - ii. How many centimeters are there in 1 meter? Correct answer: 100 cm in 1 m
  - iii. How many millimeters are there in 1 cm? Correct answer: 10 mm in 1 cm
2. Write the following questions on the writing board and ask students to solve them in their notebooks.

29 km and 39m      = \_\_\_\_\_ m  
56 cm                = \_\_\_\_\_ mm  
45 mm                = \_\_\_\_\_ cm  
2700 m               = \_\_\_\_\_ km  
400 mm               = \_\_\_\_\_ cm



### HOMEWORK / FOLLOW UP

- Assign the relevant questions from the textbook on page 94 in exercise 1.

# CONVERSION OF UNITS OF DISTANCE



## STUDENT LEARNING OUTCOMES

- Solve real-life situations involving conversion, addition, and subtraction of measures of distance.

## INFORMATION FOR TEACHERS

Teachers should know how to:

- Convert kilometers, meters, centimeters, and millimeters using:
  - 1 km = 1000 m
  - 1 m = 100 cm
  - 1 cm = 10 mm
  - and vice versa
- Add and subtract similar units of distance/length.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

Board, Chalk, Marker, Textbook, Notebook.

Students should come to this lesson with their height (in meters and centimeters)



## INTRODUCTION

- Call upon different students to answer and record their input.  
How would you **measure** the **length** of the board? What would be the length of the board in class? What other units are used for measuring the length? Guide students to the correct answer; kilometers, meters, centimeters, and millimeters.
- Ask the students which unit of distance is used for measuring the distance between two cities?
  - ✦ How many meters in one kilometer?
  - ✦ Which operation is used for converting larger units to smaller units?
  - ✦ Which operation is used for converting smaller to larger units?
  - ✦ 3 km and 450 m in meters is \_\_\_\_\_.



## DEVELOPMENT

### Activity 1:

- Write the following real-life situation on the writing board:

Fahad walks 3 km and 850 meters daily while Akbar walks 2km, 450 meters daily. How much distance is covered by both altogether?

How much more does Fahad walk than Akbar every day?

Write your final answers in km and m.

- Ask the students to read the question carefully and discuss it in pairs.
- Record student responses and ask a student to volunteer to come up to the board and attempt the question.
- Other students should give their input on the solution as well.
- Share the solution with students as shown below:

Fahad walks 3km 850m

Akbar walks 2km 450m

- Remind the students that meters are added to meters and km to km.

	Kilometer	Meter		
	1	1		
	3	8	5	0
+		2	4	5
		6	3	0

- Altogether, Fahad and Akbar walk 6 km 300 m
- The answer can also be expressed as 6.3 km or 6300 m.
- Now ask another student to solve the second part on the board and guide that student to arrive at the correct answer. To find the difference, make the table like the one shown below:

	Kilometer	Meter		
	3	8	5	0
-		2	4	5
		1	4	0

- As per the table above, Fahad walks 1 km and 400 m more than Akbar every day.
- The answer can also be expressed as 1.4 km or 1400 m.

### Activity 2:

- Ask students to work in pairs.
- Write the following questions on the board and explain them to the students:
  - ✧ The length of Ayesha's dining table is 3 m and 519 cm. She bought a plastic sheet of length 5 m for covering the surface of the table. What length of the plastic sheet will fall off the table?
  - ✧ Karam Ali travels a distance of 526 km 375 m from Lahore to Peshawar. On the way back from Peshawar to Lahore, he takes a different route and travels 511 km 238 m. What is the total distance traveled by Karam Ali? How much shorter was the route on his journey back to Lahore? Give both your answers in km and meters.
- Ask the pairs to solve the question in their notebooks.
- Ask volunteers to solve the questions on the board and guide all students on how to arrive at the correct answer.



## CONCLUSION / SUM UP

- Ask students to list all the steps involved in adding and subtracting measures of length in the same unit. Students should highlight that it is important to align like units with like units and to be careful as to which operation to use i.e. + or -. Students should also state the relationship between the units.



## ASSESSMENT

1. Ask students to work in pairs.
2. Each pair fills in the following table and submits it to the teacher for marking.

	Student 1	Student 2	Total (in m)	Total (in cm)	Difference (in m)	Difference (in cm)
Height						

3. Encourage students to write the total and difference of height in meters and then in centimeters.



## HOMEWORK / FOLLOW UP

- Assign the relevant questions from the textbook on page 95 in exercise 1.

# CONVERSION OF UNITS OF TIME



## STUDENT LEARNING OUTCOMES

Convert:

- Hours to minutes and vice versa
- Minutes to seconds and vice versa

## INFORMATION FOR TEACHERS

Teachers should know:

1 minute = 60 seconds

1 hour = 60 minutes

1. To convert hours to minutes we multiply by 60
2. To convert minutes to hours we divide by 60.
3. To convert minutes to seconds we multiply by 60.
4. To convert seconds to minutes we divide by 60.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



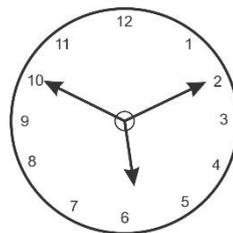
**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils, Flashcards, Wall clock



## INTRODUCTION

1. Remind students that in an analog clock, the shorthand represents hours, the long hand represents minutes, and the longest/thin hand represents seconds.
2. Tell the students that when the second hand completes 1 rotation, one minute passes as 1 minute = 60 seconds.
3. Tell the students that when the minute hand completes 1 rotation one hour passes as 1 hour = 60 minutes.
4. Draw the analog clock shown below on the writing board.



5. Ask students to look carefully at the clock and tell the correct time.
6. Encourage students to raise their hands. (Correct answer: 5:50:10).
7. Ask students if they can differentiate between a.m and p.m?

8. Tell students to discuss in pairs for a few minutes and share their input.
9. Remind students that a.m. is used when the time is after midnight to just before 12 at noon (middle of the day) and p.m. is used when the time is from 12 at noon to just before midnight.
10. Tell the students that even though it is not possible to tell whether an analog clock is showing a.m. or p.m., the time shown in the clock drawn on the board is 5:50 p.m. and 10 seconds.
11. Ask students, according to this clock, how many hours and minutes have passed since noon?
12. Let students discuss before telling them the correct answer: 5 hours and 50 minutes.
13. Now ask students how many minutes have passed since noon or how many minutes are in 5 hours and 50 minutes?
14. Give students a few minutes to think in pairs and to discuss.
15. Let students share their input on how many minutes have elapsed. The teacher should prompt thinking by asking students how many minutes are in 1 hour? How many minutes will there be in 5 hours?
16. Facilitate students in arriving at the correct answer i.e.  $5 \text{ hours} \times 60 \text{ minutes} = 300 \text{ minutes}$ . Tell students to also add the minutes.
17. Therefore, the complete answer is  $300 + 50 = 350 \text{ minutes}$ .
18. Now ask students how many seconds have elapsed since noon?
19. Prompt students' thinking by asking "how many seconds are there in 350 minutes?"
20. Give students a few minutes to think in pairs and to discuss. Let students share their input on how many seconds have elapsed. The teacher should prompt thinking by asking students how many seconds are in 1 minute? How many seconds will there be in 350 minutes?
21. Guide students to arrive at the answer  $350 \text{ minutes} \times 60 \text{ seconds} = 21000 \text{ seconds}$ .
22. Now ask students to also add the 10 seconds shown on the clock to arrive at the final answer i.e. according to the clock, the seconds elapsed since noon are  $21000 + 10 = 21010 \text{ seconds}$ .
23. Tell students to write the following conversion rules in their notebooks:
  - to convert hours to minutes we multiply by 60
  - to convert minutes to hours we divide by 60.
  - to convert minutes to seconds we multiply by 60.
  - to convert seconds to minutes we divide by 60.



## DEVELOPMENT

### Activity 1:

1. Ask the students to work in pairs.
2. Draw the table shown below on the writing board.
3. Ask students to copy and complete the table shown below in their notebooks.
4. Ask a few students to volunteer to solve the questions on the board. Guide students through the solution.
5. Write the correct answers in all the spaces after students have attempted the questions.

Convert the given time to hours, minutes, and seconds in the empty boxes.

#	Time	Hours	Minutes	Seconds
1	2 hrs	X		
2	5 mins 30 secs	X	X	
3	960 mins		X	
4	540 secs			X
5	480 mins		X	



### CONCLUSION / SUM UP

1. Ask students to list down all the steps involved in the conversion of hours to minutes and minutes to seconds and vice versa.
2. Students should mention that we multiply by 60 to convert hours to minutes and minutes to seconds and we divide by 60 to convert seconds to minutes and minutes to hours.



### ASSESSMENT

1. Ask the students to copy the following in their notebooks and fill in the blanks.
  - ◇ 24 hours = \_\_\_\_\_ minutes
  - ◇ 1800 seconds = \_\_\_\_\_ minutes
  - ◇ 1800 seconds = \_\_\_\_\_ hours
  - ◇ 16 hours 44 mins = \_\_\_\_\_ seconds
  - ◇ 4140 minutes = \_\_\_\_\_ hours
2. Walkthrough the class and guide students in arriving at the correct answer.



### HOMEWORK / FOLLOW UP

Assign question 1 from the textbook on page 104 in exercise 2.

# CONVERSION OF UNITS OF TIME



## STUDENT LEARNING OUTCOMES

Convert:

- Years to months and vice versa.
- Months to days and vice versa
- Weeks to days and vice versa

## INFORMATION FOR TEACHERS

Teachers should know that to convert:

1 year = 12 months

1 month = 30 days

1 week = 7 days

1. weeks to days we multiply by 7
2. days to weeks we divide by 7.
3. months to days we multiply by 30.
4. days to months we divide by 30.
5. years to months we multiply by 12.
6. months to years we divide by 12.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils, Worksheet, Calendars



## INTRODUCTION

1. Divide the class into small groups.
2. Distribute a calendar to each group and ask students to make as many observations as possible.
3. Students should record their observations in their notebooks.
4. Ask the following questions after students have recorded their observations:
  - ✧ How many months are there in one year?
  - ✧ How many days in one month? Let students comment on the different number of days in different months.
  - ✧ How many days are there from Sunday to Saturday or in one week?
  - ✧ Extra credit: How many days in one year?
5. Tell students to read and record in their notebooks the following equivalences:

1 year = 12 months

1 month = 30 days

1 week = 7 days

6. Tell students that we can convert between years, months, and weeks using the following conversion rules. Students should note these in their notebooks.

To convert weeks to days we multiply by 7

To convert days to weeks we divide by 7.

To convert months to days we multiply by 30.

To convert days to months we divide by 30.

To convert years to months we multiply by 12.

To convert months to years we divide by 12.



## DEVELOPMENT

### Activity 1:

- Write the following on the writing board and ask students to come up to the board and fill in the blanks.
- Ask other students to guide the volunteers where needed.  
72 months = \_\_\_\_\_ years  
3 years = \_\_\_\_\_ months  
3 weeks = \_\_\_\_\_ days  
180 days = \_\_\_\_\_ months  
30 days = \_\_\_\_\_ months  
2 years 3 months and 4 days = \_\_\_\_\_ days
- Share the correct answers with students after several students have attempted the questions.

### Activity 2:

- Ask the students to work in pairs.
- Draw the table shown below on the writing board.
- Ask students to copy and complete the table shown below in their notebooks.
- Ask a few students to voluntarily solve the questions on the board. Guide students through the solution.
- Write the correct answers in all the spaces after students have attempted the questions. Convert the given time to years, months, days, and weeks in the empty boxes only.

#	Duration	Years	Months	Weeks	Days
1	5 weeks and 9 days	X	X	X	
2	6 Years and 7 Months	X			
3	28 days	X	X		X
4	1095 days				X
5	16 months and 14 days	X	X		



## CONCLUSION / SUM UP

1. Ask students to list down all the steps involved in the conversion of years to months, months to days, and weeks to days, and vice versa. Students should mention that:
  - ✧ To convert weeks into days, multiply by 7
  - ✧ To convert days into weeks, divide by 7
  - ✧ To convert years into months, multiply by 12
  - ✧ To convert months into years, divide by 12
  - ✧ To convert months into days, multiply with 30
  - ✧ To convert days into months, divide by 30



## ASSESSMENT

Ask the students to copy the following in their notebooks and fill in the blanks.

1.  $2\frac{1}{2}$  years = \_\_\_\_\_ months
2. 56 days = \_\_\_\_\_ weeks
3. 3 years and 24 months = \_\_\_\_\_ months
4. 3 years and 24 months = \_\_\_\_\_ years
5. 360 months = \_\_\_\_\_ years.
6. 360 months = \_\_\_\_\_ days.

Walkthrough the class and guide students where needed.



## HOMEWORK / FOLLOW UP

- Assign question 2 from the textbook on page 104 in exercise 2.

# ADDITION AND SUBTRACTION OF UNITS OF TIME



## STUDENT LEARNING OUTCOMES

- Add and subtract intervals of time in hours and minutes with carrying and borrowing.

## INFORMATION FOR TEACHERS

The teacher should know that:

1 minute = 60 seconds

1 hour = 60 minutes

1. To add and subtract measures of time they should always start from the smaller units.
2. In addition and subtraction of time the same units are added and/or subtracted i.e. we add/subtract hours to hours, minutes to minutes, and seconds to seconds.
3. If the sum of the minutes is 60 or more than 60, we add 1 hour in the hour column for every 60 minutes and write the remaining minutes in the minutes' column.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



## MATERIALS / RESOURCES REQUIRED

- Board, Marker, Notebooks, Textbooks, Pencils, Worksheet



## INTRODUCTION

1. Write the following question on the board:
  - ✧ Hina travels from Peshawar to Islamabad in 2 hours and 45 minutes. She then travels from Islamabad to Lahore in 4 hours and 40 minutes.
  - ✧ Find the total time she took to travel from Peshawar to Lahore.
2. Ask students to work in pairs and attempt the question.
3. Give students a few minutes to discuss and then take their responses.
4. Show students how to add up units of time as shown below:

	Hours	Minutes
Peshawar to Islamabad	2	45
Islamabad to Lahore	+	40
<b>Total Time Travelled</b>	6	85

5. Ask students how we can write 85 minutes in hours and minutes.
6. Give students time to discuss in pairs.
7. Students should say that 85 minutes is the same as 1 hour and 25 minutes. Now make the following changes to the solution.

	Hours	Minutes
	1	
Peshawar to Islamabad	2	35
Islamabad to Lahore	+	40
<b>Total Time Travelled</b>	7	25

- Tell students that if the sum of the minutes is more than 60, we add 1 hour in the hours' column for every 60 minutes and write the remaining minutes in the minutes' column.
- Therefore, the total time traveled by Hina is 7 hours and 25 minutes.
- Ask students how much longer it took her to travel from Islamabad to Lahore than to travel from Peshawar to Islamabad.
- Ask students to work in pairs and attempt the second question.
- Give students a few minutes to discuss and then take their responses.
- Show students how to subtract units of time as shown below:

	Hours	Minutes
	3	1 0 0
Islamabad to Lahore	<del>4</del>	<del>40</del>
Peshawar to Islamabad	-	2 4 5
<b>Difference in Time Travelled</b>	1	5 5

- Ask students to pay special attention to the set-up of the question i.e. the greater time is written on top.
- Ask students can 2 hours 45 minutes be subtracted from 4 hours and 40 minutes? Students should say yes.
- Ask students how do we subtract 45 minutes from 40 minutes?
- Give students a few minutes to discuss and then take their responses.
- Tell students that we must borrow 1 hour (60 minutes) from 4 hours as shown above. Subtraction then becomes possible.
- Tell students when we carry 1 hour it means we are adding 60 minutes to the minutes we already have in the first row i.e. 40. Since the total is now 100, we can easily subtract 45 from it.
- Therefore, it took Hina 1 hour and 55 minutes more to travel from Islamabad to Lahore than it took her to travel from Peshawar to Islamabad.
- Tell students that in today's lesson they will learn about adding and subtracting measures of time with carrying and borrowing.



## DEVELOPMENT

### Activity 1:

- Ask the students to work in groups of 5.
- Copy and complete the following table in their notebooks.

#	Time 1	Time 2	Sum	Difference
1	2 hrs 35 mins	2 hrs 47 mins		
2	4 hrs 37 mins	5 hrs 26 mins		
3	14 hrs 26 mins	6 hrs 54 mins		

4	6 hrs 50 mins	6 hrs 55 mins		
5	17 hrs 56 mins	9 hrs 51 mins		

- After students have attempted all questions in their groups, enter the solutions to all parts.
- Tell students to make corrections in their attempts.



### CONCLUSION / SUM UP

- Ask students to list the key takeaways in the addition and subtraction of time in hours and minutes.
- Students should mention that in the addition and subtraction of units of time, we always start with the smallest unit and we add/subtract minutes with minutes and hours with hours.
- Students should also highlight that if the sum of the minutes is 60 or more than 60, we add 1 hour in the hours' column for every 60 minutes and write the remaining minutes in the minutes' column. Similarly, if needed, we borrow 60 minutes from the hour as well during subtraction.



### ASSESSMENT

- Write the following questions on the board and ask the students to solve them in their notebooks:
  - 5 hours 43 minutes + 7 hours 40 minutes
  - 13 hours 15 minutes – 11 hours 20 Minutes
- Give students feedback and share the correct answers.



### HOMEWORK / FOLLOW UP

Assign Q1 a,b and Q2 a and b from the textbook on page 106 in exercise 3.

# ADDITION AND SUBTRACTION OF UNITS OF TIME



## STUDENT LEARNING OUTCOMES

- Solve real-life situations involving conversion, addition, and subtraction of intervals of time.

## INFORMATION FOR TEACHERS

Teachers should be able:

- To convert hours to minutes and minutes to seconds.
- To convert years to months, months to days, and weeks to days
- To know that the conversion, addition, and subtraction of measures of time is an important aspect of everyday life.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



## MATERIALS / RESOURCES REQUIRED

- Board, Marker, Notebooks, Textbooks, Pencils, Flashcards



## INTRODUCTION

- Write the given real-life situation on board.  
"Ali completes his English homework in 1 hour and 47 minutes and completes his Math homework in 3 hours and 33 minutes".
- Ask students, how much total time was spent on homework in hours and minutes? Give students a few moments to think and discuss.
- Record students' responses on the board.
- Share the solution on the board as shown below:

	Hours	Minutes
		1
	1	47
+	3	33
	4	80

- Ask students how can we write 80 minutes in hours and minutes?
- Give students a few moments to think and discuss. Students should say that 80 minutes is the same as 1 hour and 20 minutes.
- Now make the following changes to the solution.

	Hours	Minutes
	1	
	1	47
+	3	33
	5	20

8. Remind students that if the sum of the minutes is more than 60, we add 1 hour in the hours' column for every 60 minutes and write the remaining minutes in the minutes' column.
9. Tell students the total time taken is 5 hours and 20 minutes
10. Ask students to find the total time in minutes. Guide them through the steps.
11. As  $5 \times 60 = 300$ . Therefore,  $300 + 20 = 320$  minutes.
12. Ask students to find the difference between the time spent on the homework in hours and minutes.
13. Give students a few moments to think and discuss.
14. Record students' responses on the board.
15. Share the solution on the board as shown below:

	Hours	Minutes
	2	93
	<del>3</del>	<del>33</del>
-	1	47
	1	46

16. Ask students to pay special attention to the set-up of the question i.e. the greater time is written on top.
17. Ask students can 1 hour 47 minutes be subtracted from 3 hours and 33 minutes? Students should say yes.
18. Ask students how do we subtract 47 minutes from 33 minutes?
19. Give students a few minutes to discuss and then take their responses.
20. Tell students that we must borrow 1 hour (60 minutes) from 3 hours as shown above. Subtraction then becomes possible.
21. Ask students to find the total time in minutes. Guide them through the steps.
22. As  $1 \times 60 = 60$  minutes. Therefore,  $60 + 46 = 106$  minutes.
23. Tell students that today we will be learning about conversion, addition, and subtraction of time in real-life situations.



## DEVELOPMENT

### Activity 1:

1. Divide the class into 5 groups.
2. Give each group one flashcard to solve in their notebooks.
3. After a designated time, each group passes on their flashcard to the next group.
4. By the end of the allotted time, each group should have completed all 5 questions.
  - ✧ A professional squash player trains with coach Rasheed for 2 years and 9 months and then trains with coach Shoaib for 3 years and 7 months. How long did the squash player take coaching altogether (addition)? How much longer does the player train with coach Shoaib than coach Rasheed (subtraction)? Write your answers in months.

- ✧ Kiran travels from Peshawar to Swabi in 2 hours and 44 minutes in her car. On the way back (Swabi to Peshawar) she takes public transport and the return journey takes her 4 hours and 35 minutes. How long was the total time spent on the road (addition)? How much longer did the return journey take (subtraction)? Write your answers in minutes.
  - ✧ Akbar takes 2 hours 57 minutes to complete a Science assignment and 5 hours 44 minutes to complete an English assignment. How long does Akbar take in completing both assignments (addition)? How much longer does the English assignment take (subtraction)? Write your answers in minutes.
  - ✧ Junaid's journey from Islamabad to Jeddah, Saudi Arabia took 5 hours and 42 minutes. Rabia's journey from Islamabad to Tehran, Iran takes 7 hours and 39 minutes. How much was the total time taken for both journeys (addition)? How much longer did Rabia's journey take compared to Jamal's journey (subtraction)? Write your answers in minutes.
  - ✧ Fareeha walked from her home to school in 1 hour and 44 minutes and her friend Humaira walked from her home to school in 17 minutes. How much total time were both friends walking for (addition)? How much longer did Fareeha's journey take compared to Humaira's journey (subtraction)? Write your answers in minutes.
5. Ask students to volunteer and solve each question on the board.
  6. Guide students to reach the correct answer.



### CONCLUSION / SUM UP

Ask students the importance of the conversion, addition, and subtraction of measures of time. Why is it an important aspect of everyday life? Encourage students to give examples. By the end of the discussion students should recall:

1. How to convert hours to minutes and minutes to seconds.
2. How to convert years to months, months to days, and weeks to days
3. That is the addition of intervals of time, minutes are added with minutes and hours are added with hours.
4. That is the subtraction of intervals of time, minutes are subtracted from minutes and hours are subtracted from hours



### ASSESSMENT

1. Ask the students to copy and complete the following questions in their notebooks:
 

Mubarik walks on a round track in a park. If he starts walking at 6:45 pm and finishes his walk at 8:30 pm. How much time did he walk?

Ali works on a painting for 3 hours and 10 minutes, he studies for 3 hours 30 minutes, and does gardening for 1 hour 20 minutes. Find the total time. Ali spends on the 3 activities?
2. Provide guidance wherever needed.



### HOMEWORK / FOLLOW UP

- Assign questions from exercise 3 on page 106 and questions 6 and 7 from the textbook on page 109 in the review exercise.

**Month**

**6**



# ANGLES



## STUDENT LEARNING OUTCOMES

- Recognize straight and reflex angles.
- Recognize the standard units for measuring angles is  $1^\circ$  which is defined as  $\frac{1}{360}$  of a complete revolution.

## INFORMATION FOR TEACHERS

Teachers should know that:

1. The standard unit of measuring angles is a degree and is written as  $^\circ$
2. An angle of  $180^\circ$  represents a straight line.
3. An angle whose measure is greater than  $180^\circ$  but less than  $360^\circ$  is called a reflex angle.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



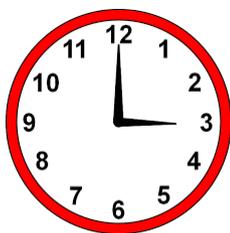
**MATERIALS / RESOURCES REQUIRED**

Board, Marker, Notebooks, Textbooks, Pencils, Geometry Box, Teacher's Ruler and Protractor, Chart



## INTRODUCTION

1. Ask the students "What is an angle?"
2. Take their responses and then paste a chart with the following figures of analogue clocks on the writing board:



**CLOCK A**



**CLOCK B**



**CLOCK C**

3. Ask students how do we measure the space between the minute hand and the hour hand on each clock?
4. Ask students if the hands of the clocks are making angles? Are the size of all these angles the same or different?
5. Let students discuss these questions in pairs.
6. Take students' responses and record them on the writing board.
7. Draw the angles on the board which are being formed by the clock hands.
8. Tell students that to measure the **space between two intersecting lines** such as the hands of a clock, we measure the angle between them.
9. Tell students that the standard unit of measuring an angle is degree and it is written as  $^\circ$

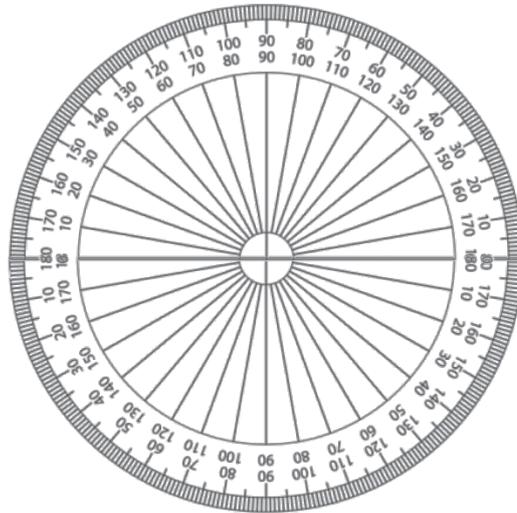
10. Tell students to note down the definition of angle in their notebooks: The space between two intersecting lines is called an angle.



## DEVELOPMENT

### Activity 1:

1. Tell students to work in pairs for this activity.
2. Tell the students to take out the protractors from their geometry box.
3. Tell them to place two protractors together so that a circle is formed. See below:

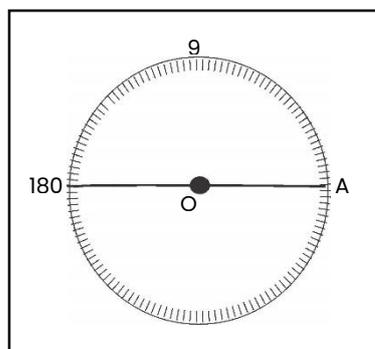


4. Ask students to make observations about the two protractors together.
5. Ask students the following questions to prompt their thinking:
  - ◇ How many small parts are there on one semi-circle?
  - ◇ How many small parts are there on the complete circle?
  - ◇ Do the two protractors together represent angles around a point?
  - ◇ What do the angles along one of the protractors represent?
6. Give students a few minutes to discuss in pairs and share responses.
7. Tell them that there are 180 equal parts on one protractor. There are also 180 equal parts on the other protractor. In total, there are 360 equal parts or 360 **degrees** around a point and 180 **degrees** along a straight line.
8. Tell students that one small part or division on a protractor equals 1 degree and is written as  $1^\circ$ . One degree is  $\frac{1}{360}$ <sup>th</sup> of a complete revolution/rotation.
9. Tell students that  $1^\circ$  is the standard unit for measuring angles and with the help of a protractor, we can draw and measure different angles.

### Activity 2:

Prepare the following chart before the class. Paste it on a soft surface such that a thumb pin is attached at point O. Attach a long thread around the thumb pin so that it reaches both ends.

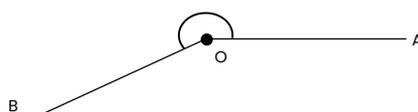
### Chart



1. Ask for a volunteer to come to the front of the class and hand him/her both ends of the string which is tied to point O.
2. Tell the student to align both ends of the string with point A.
3. Ask students what angle is between the two lines of the string?
4. Take student responses and then inform them that the angle is  $0^\circ$
5. Now, ask the student to keep one end of the string aligned with A and move the other end of the string anti-clockwise.
6. Ask students "what is happening to the size of the angle as the string is moving?"
7. Let students give their responses.
8. Tell all students that as the string moves the size of the angle increases.
9. Tell the volunteer to stop the string when he/she reaches  $180^\circ$
10. Draw the position of the string on the board as shown below:

180° \_\_\_\_\_ 0 \_\_\_\_\_ A

11. Ask students what do they notice about the  $180^\circ$  angle?
12. Take student responses.
13. Tell students that an angle of  $180^\circ$  represents a straight line. This is called a **straight angle** and we can define it as an angle of measure  $180^\circ$ . Tell students to draw and record this in their notebooks.
14. Now tell the volunteer to once again move the string counterclockwise from the  $180^\circ$  marker.
15. Tell the volunteer student to hold the string at the angle shown below. The teacher should draw this angle on the writing board.



16. Ask students what is the angle shown on the board? Is it less than  $180^\circ$ ? Is it greater than  $180^\circ$ ?
17. Take students' responses and record them on the board.
18. Tell students that this angle is called a **reflex angle** and we can define it as an angle whose measure is greater than  $180^\circ$  but less than  $360^\circ$ .



### CONCLUSION / SUM UP

1. Ask students how the space between two lines is measured.
2. Students should mention that the space between two lines is measured in angles and that there are 360 degrees around a point.

3. Ask students to define straight and reflex angles with examples.
4. Students should highlight that an angle of measure 180 is called a straight angle and an angle whose measure is greater than 180 but less than 360 is called a reflex angle.



### ASSESSMENT

Ask students to raise their hands and answer the following questions:

1. What is the difference between a reflex angle and a straight angle?
2. What is the unit of measurement of angle?
3. Which Clock (A, B, or C) from the Introduction section has a straight angle between the hour and minute hands?
4. Record student responses.
5. Share the correct answers with the students.



### HOMEWORK / FOLLOW UP

1. Draw and label a straight angle and a reflex angle.
2. Write the angle measure of both the angles.

# ANGLES



## STUDENT LEARNING OUTCOMES

- Identify, describe and estimate the size of angles.
- Classify angles as acute, right, or obtuse.
- Compare angles with right angles and recognize that a straight line is equivalent to two right angles.

## INFORMATION FOR TEACHERS

Teachers should be familiar with the definitions of acute, right, and obtuse angles.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



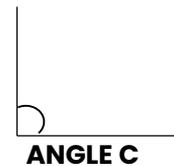
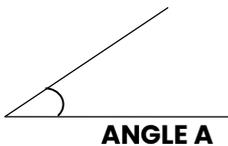
## MATERIALS / RESOURCES REQUIRED

- Board, Marker, Notebooks, Textbooks, Pencils, Rulers, Geometry Box, Teachers Ruler, and Protractor, Chart



## INTRODUCTION

1. Draw the given figures of angles on the writing board:



2. Ask the students what observations do they have about the three angles?
3. Record students' responses.
4. Ask students to fill in the table in their notebooks.

ANGLE	ANGLE A, B OR C
ACUTE	ANGLE A
OBTUSE	ANGLE B
RIGHT ANGLE	ANGLE C

5. The second column has been filled for the teacher's guidance.
6. Tell students to write the following definitions in their notebooks with the above examples:
  - Acute angles** measure less than 90 degrees.
  - Right angles** measure 90 degrees.
  - Obtuse angles** measure more than 90 degrees.
7. Tell students that to separate an obtuse angle from an acute angle, it is a good idea to keep the right angle as an indicator i.e. students should keep the vertical line at a right angle as a reference line to decide if an angle is acute or obtuse.

8. Tell students that in today's lesson they will be classifying angles.

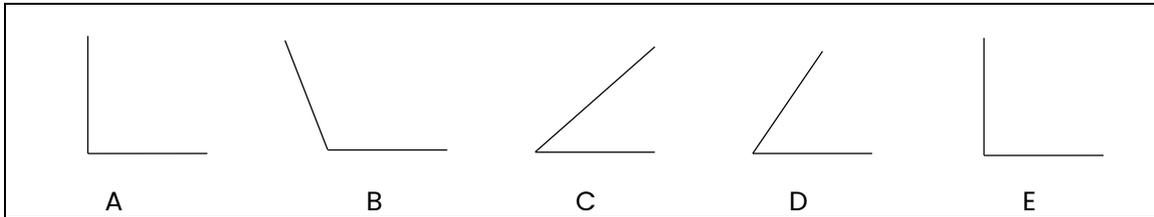


**DEVELOPMENT**

**Activity 1:**

1. Ask students to attempt the following question in pairs.
2. Paste a chart of the following angles on the writing board. The chart should be prepared before the lesson.

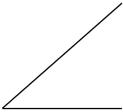
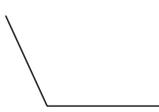
**Angles Chart**



3. Tell students to copy and complete the following table in their notebooks by writing the letters corresponding to the angles in the correct boxes in the table.

Acute Angles	Right Angles	Obtuse Angle

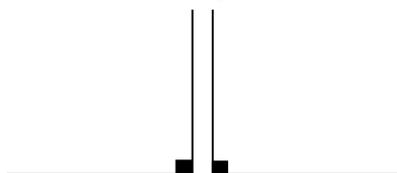
4. Encourage students to draw a visual representation (not drawn by protractor) on the table as well. Walkthrough class and guide students.
5. Show the complete table on the writing board after all pairs have attempted the question.

Acute Angles	Right Angles	Obtuse Angle
 C   D	 A   E	 F

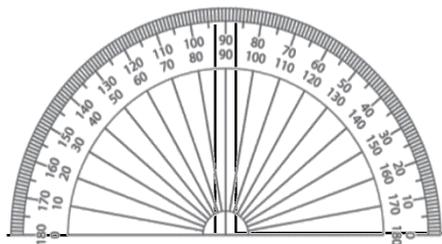
6. Remind students that angles whose measures are less than  $90^\circ$  are acute angles.
7. Angles whose measures are equal to  $90^\circ$  are right angles.
8. Angles whose measures are more than  $90^\circ$  are obtuse angles.
9. Tell students that to separate an obtuse angle from an acute angle, it is a good idea to keep the right angle as an indicator i.e. students should keep the vertical line in a right angle as a reference line to decide if an angle is acute or obtuse.

**Activity 2:**

1. Draw the following right angles on the writing board.



2. Ask students to make as many observations about the two right angles as possible.
3. Now show students the following figure drawn on a chart.



4. Ask students to share their observations.
5. Tell students that a straight line of  $180^\circ$  is equal to two right angles as shown above.
6. Tell students that two right angles make a straight line as  $90^\circ + 90^\circ = 180^\circ$ .



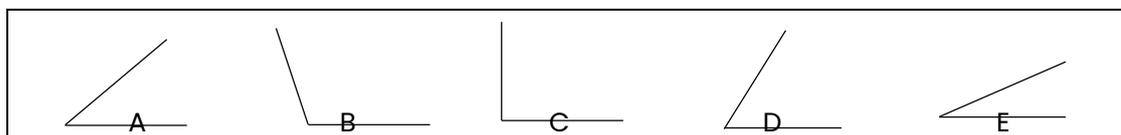
### CONCLUSION / SUM UP

1. Ask students to differentiate between acute, right, and obtuse angles.
2. Students should mention that acute angles measure less than 90 degrees, right angles measure 90 degrees and obtuse angles measure more than 90 degrees.



### ASSESSMENT

1. Prepare a chart having different angles and paste it on the writing board:



2. Ask students to classify each angle as acute, obtuse, or right without using a protractor.
3. Students should attempt this question in their notebooks.
4. Share the correct answers with students after all students have attempted the question.

Acute – A, D and E

Right – C

Obtuse – B



### HOMEWORK / FOLLOW UP

Assign the relevant questions from the textbook on page 124 in exercise 1.

# CONSTRUCTION OF ANGLES BY USING PROTRACTOR



## STUDENT LEARNING OUTCOMES

Use protractor and ruler to construct

- A right angle
- A straight angle
- Reflex angles of different measures

## INFORMATION FOR TEACHERS

Teachers should know how to construct different angles using a protractor and ruler.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



## MATERIALS / RESOURCES REQUIRED

- Board, Marker, Notebooks, Textbooks, Pencils, Rulers, Geometry Box, Ruler and Protractor



## INTRODUCTION

1. Ask the following questions from students:
  - ◇ What is a right angle?
  - ◇ What is a straight angle?
  - ◇ What is a reflex angle?
2. Take students' responses.
3. Remind students that:
  - ◇ Right angles measure 90 degrees.
  - ◇ Straight angles measure 180 degrees.
  - ◇ Reflex angles measure more than 180 degrees but less than 360 degrees.
4. Tell students that today we will learn how to construct these angles.



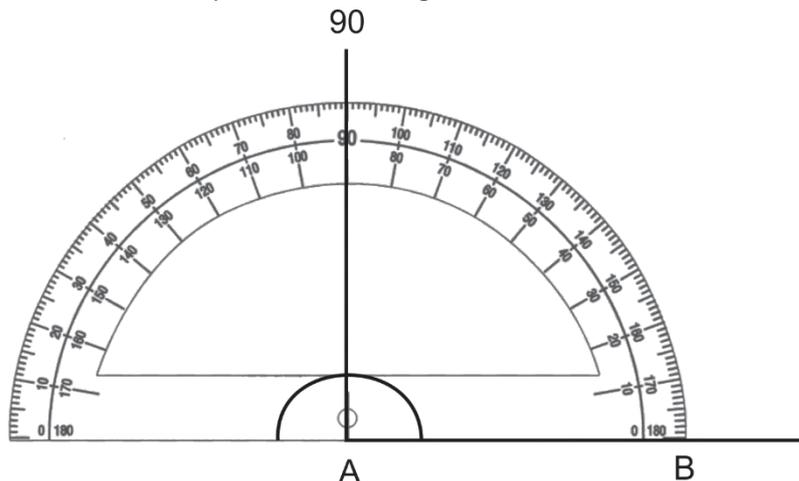
## DEVELOPMENT

### Activity 1:

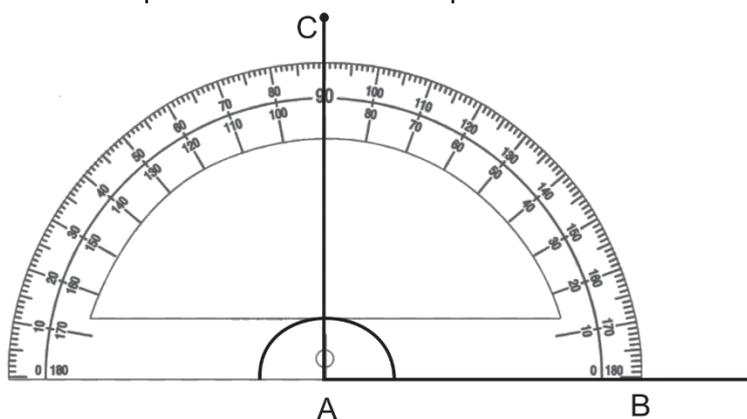
1. Demonstrate the following steps and construct a right angle on the board using a protractor and ruler.
2. Tell students to copy each step in their notebooks.
3. Draw a ray  $\overrightarrow{AB}$  with the help of a ruler as shown below:



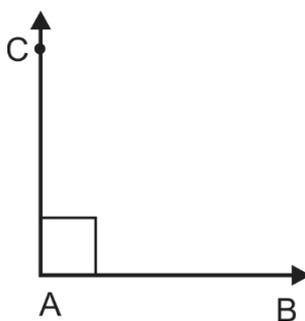
- Place the protractor on the ray  $AB$  such that the center point of the protractor is exactly at point A and the baseline of the protractor is aligned with the arm  $AB$  as shown below:



- Read the inner scale on the protractor and mark a point C at  $90^\circ$  as shown below:



- Remove the protractor and draw a line from A to C as shown below:



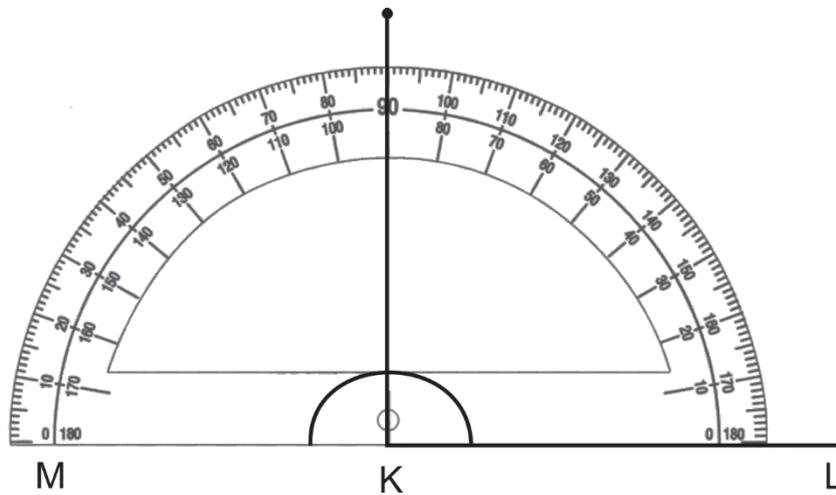
- $\angle BAC$  is the required right angle i.e.  $\angle BAC = 90^\circ$
- Ensure that all students have drawn the right angle in their notebooks.

### Activity 2:

- Construct a straight angle on the writing board with the help of a protractor and ruler.
- Tell students to copy each step in their notebooks individually using tools from their own geometry box.
- Draw a ray  $\overrightarrow{KL}$  by using a ruler as shown below:



- Place the protractor on the ray  $\overrightarrow{KL}$  such that the center point of the protractor is exactly at point K and the baseline of the protractor is aligned with the ray  $\overrightarrow{KL}$  as shown below:



5. Mark the point M at the  $180^\circ$  mark.
6. Remove the protractor and join K to M as shown below:



7.  $\angle MKL$  is the required straight angle i.e.  $\angle MKL = 180^\circ$
8. Ensure that all students have drawn the straight angle.

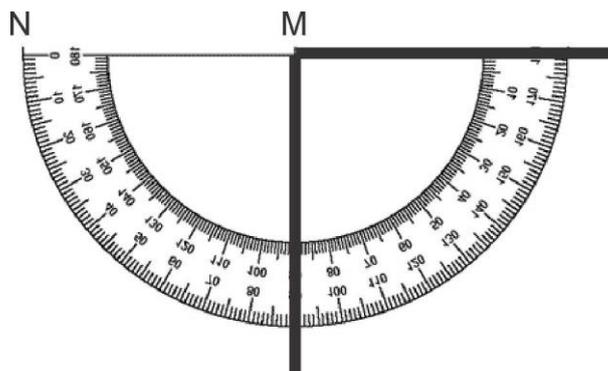
### Activity 3:

1. Construct a reflex angle on the writing board with the help of a protractor and ruler.
2. Tell students to copy each step in their notebooks individually using tools from their own geometry box.
3. Tell students that they will be constructing a reflex angle of measure  $280^\circ$
4. To construct this angle, first, subtract the given measure i.e.  $280^\circ$  from  $360^\circ$ .  

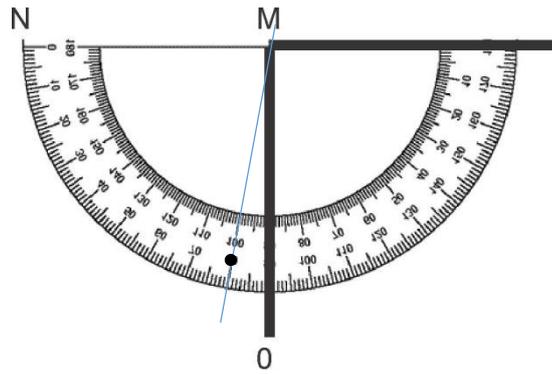
$$360^\circ - 280^\circ = 80^\circ$$
5. Draw a ray  $\overrightarrow{MN}$  using a ruler as shown below:



6. Place the protractor **upside down** on the ray  $\overrightarrow{MN}$  so that the center of the protractor is exactly on point M and the baseline of the protractor is aligned with the ray  $\overrightarrow{MN}$  as shown below:



7. Read the scale on the protractor and mark a point O at  $80^\circ$

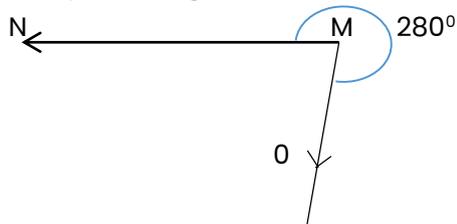


8. Remove the protractor and join M to O.

9. Tell students that the acute angle  $\angle NMO$  is  $80^\circ$ . Since angles around a point are  $360^\circ$ , the remaining angle is  $360 - 80 = 280^\circ$ .

10. This angle is also called  $\angle NMO$

11. The final required angle is shown below:



12.  $\angle NMO$  is the required reflex angle i.e.  $\angle NMO = 280^\circ$ . Ensure that all students have drawn the reflex angle.



### CONCLUSION / SUM UP

Ask students to explain the steps in the construction of right, straight and reflex angles. The students should come to the board and give examples.



### ASSESSMENT

1. Ask a few students to:
  - ✧ Construct right angle on the board
  - ✧ Construct a reflex angle of measure  $260^\circ$  on the writing board.
2. Guide the students where required.



### HOMEWORK / FOLLOW UP

- Construct and label a right angle, a straight angle, and reflex angles ( $210^\circ$ ,  $240^\circ$ , and  $280^\circ$ ) of different measures in your notebook.

# PAIRS OF ANGLES



## STUDENT LEARNING OUTCOMES

- Describe adjacent, complementary and supplementary angles

## INFORMATION FOR TEACHERS

Teachers should know that:

- Two angles are called adjacent angles if they have a common arm and a common vertex
- Two angles are called complementary if their sum is equal to  $90^\circ$
- Two angles are called supplementary if their sum is equal to  $180^\circ$



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



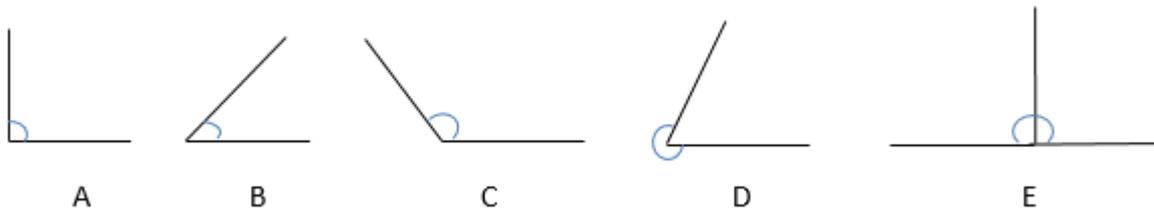
**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils, Chart



## INTRODUCTION

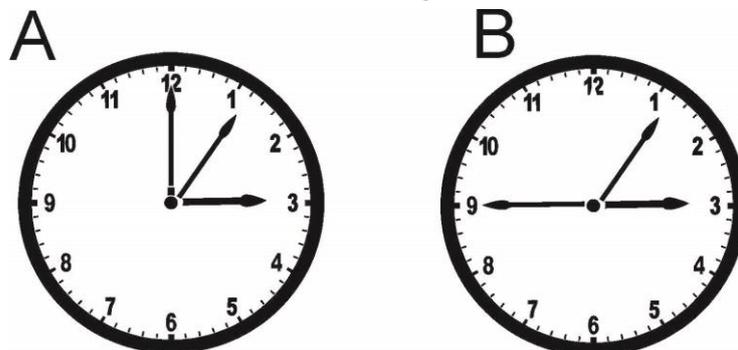
- Draw the given figures on the writing board



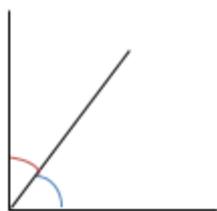
- Ask the students to observe these angles and classify them as acute, right, obtuse, straight or reflex.
- Tell students to raise their hands and comment on each angle.
- After taking a few responses, share the correct answers with students.
- Correct answers
  - Right Angle -  $\angle A$
  - Acute Angle -  $\angle B$
  - Obtuse Angle -  $\angle C$
  - Reflex Angle -  $\angle D$
  - Straight Angle -  $\angle E$
- Tell students that in today's lesson they will be learning about adjacent, complementary and supplementary angles.

**Activity 1:**

Draw the given models of wall clocks on the writing board.



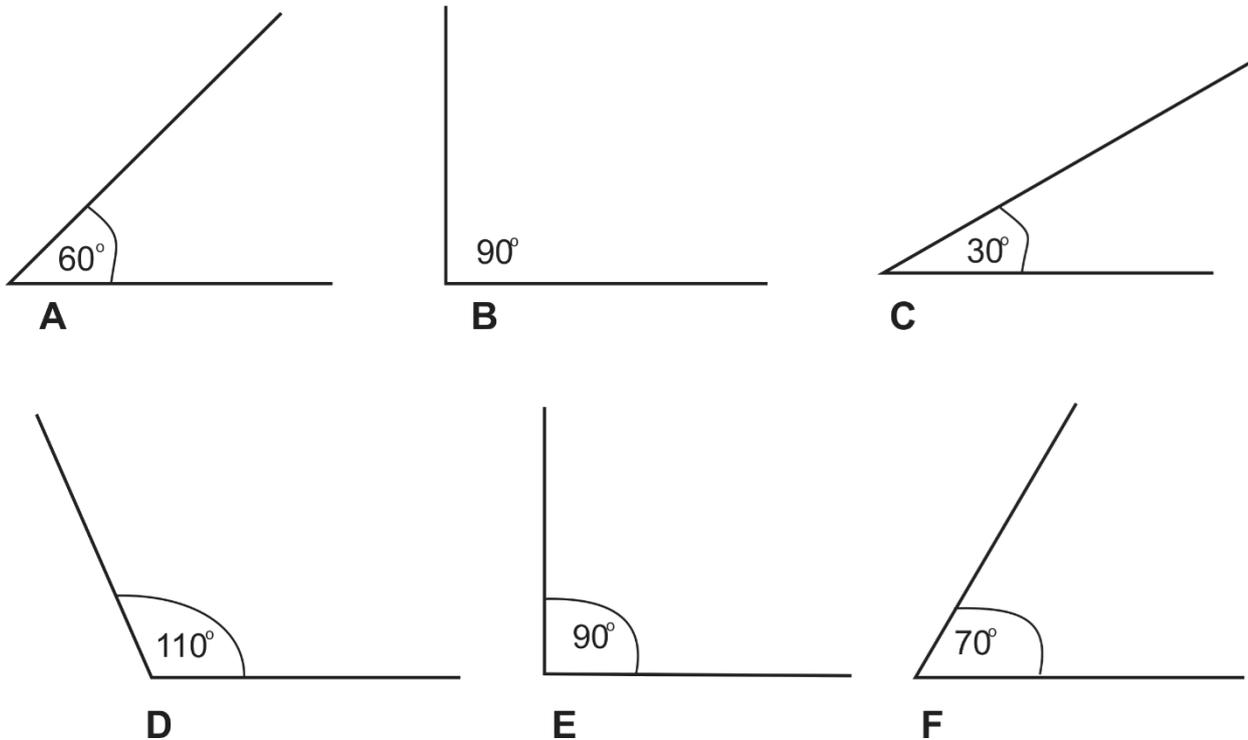
1. Tell students to work in pairs.
2. Ask students to observe the clocks drawn on the board and identify how many angles there are in these clocks.
3. Ask students to come up to the board and record their responses with straight lines.
4. Other students should also give their input.
5. Tell students that there are two angles in clock A and two angles in clock B as shown below. Draw Fig A and Fig B on the board.

**Fig A****Fig B**

6. Ask students can you estimate the sum of the two angles in Fig A.
7. Give students a few minutes to discuss among themselves and take their responses.
8. Tell students that the two angles in Fig A add up to make  $90^\circ$
9. Now ask students to estimate the sum of the two angles in Fig B?
10. Give students a few minutes to discuss among themselves and take their responses.
11. Tell students that the two angles in Fig B add up to make  $180^\circ$
12. Students should note the following:
  - ✧ The two angles whose sum of measures is  $90^\circ$  are called complementary angles.
  - ✧ The two angles whose sum of measures is  $180^\circ$  are called supplementary angles.
13. Tell students that these angles are also called adjacent angles as they have a common vertex and a common arm i.e. they are right next to each other.

**Activity 2:**

Paste the given chart on the writing board. The chart should be prepared prior to the lesson.



1. Ask students to work in small groups.
2. Ask the students to pair any two angles together so that they get:
  - i. Complementary angles
  - ii. Supplementary angles
3. Ask students which angles they paired together and why.
4. Give students a few minutes to discuss in their groups and share their responses.
5. Students should attempt the question in their notebooks.
6. Tell students that if we add the measures of  $\angle A$  and  $\angle C$  we get  $90^\circ$ . Therefore,  $\angle A$  and  $\angle C$  are complementary angles.
7. If we add the measures of  $\angle B$  and  $\angle E$ , and even the measure of  $\angle D$  and  $\angle F$  we get  $180^\circ$ . Therefore,  $\angle B$  and  $\angle E$ , and  $\angle D$  and  $\angle F$  are supplementary angles.
8. Ask students to write the summary in their notebooks as:
  - ✦ Sum of  $\angle A$  and  $\angle C = 90^\circ$  (Complementary)
  - ✦ Sum of  $\angle B$  and  $\angle E = 180^\circ$  (Supplementary)
  - ✦ Sum of  $\angle D$  and  $\angle F = 180^\circ$  (Supplementary)
9. Tell the students that  $\angle A$  and  $\angle C$  are complementary angles but they do not have any common vertex and arm. Therefore, these angles are called non-adjacent complementary angles.
10. Similarly  $\angle B$ , and  $\angle E$  are non-adjacent supplementary angles



### CONCLUSION / SUM UP

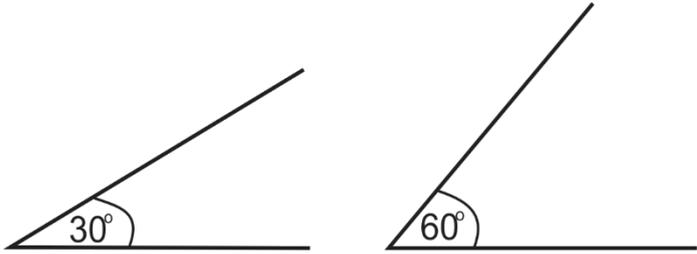
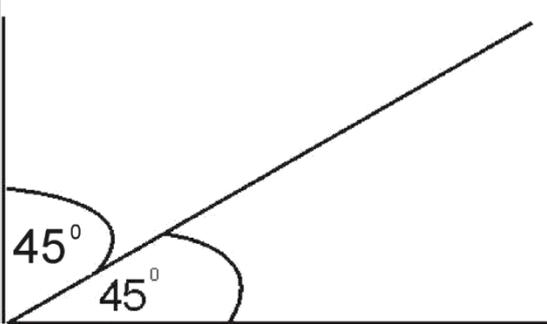
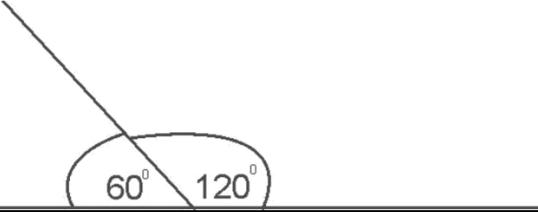
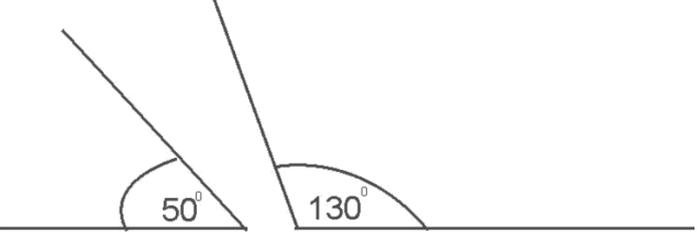
Ask students to define complementary and supplementary angles. Students should also be asked to differentiate between adjacent and non-adjacent angles. Students should mention that:

1. two angles are called adjacent angles if they have a common arm and a common vertex
2. two angles are called complementary if their sum is equal to  $90^\circ$
3. two angles are called supplementary if their sum is equal to  $180^\circ$



## ASSESSMENT

1. Paste the chart on the board and ask students to match the entry in column A with the correct description in column B

Column A	Column B
	Adjacent Supplementary Angles
	Non Adjacent Complementary Angles
	Adjacent Complementary Angles
	Non Adjacent Supplementary Angles

2. After students have individually attempted the question, share the correct matching with the students.



## HOMEWORK / FOLLOW UP

- Assign the relevant questions from the textbook on page 124 in exercise 1

# TRIANGLE



## STUDENT LEARNING OUTCOMES

- Identify and describe triangles with respect to their sides (isosceles, equilateral, and scalene)
- Identify and describe triangles with respect to their angles (Acute angled triangle, obtuse angled triangle, and right angled triangle)

## INFORMATION FOR TEACHERS

A teacher should know that:

1. A triangle in which all three sides are equal is called an equilateral triangle and all angles of an equilateral triangle are equal to  $60^\circ$ .
2. A triangle having two equal sides is called an isosceles triangle and the two base angles of an isosceles triangle are equal in measure.
3. A triangle having all sides of a different measure is called a scalene triangle and all angles in a scalene triangle are different in measure.
4. A triangle in which all angles are acute is called an acute-angled triangle.
5. A triangle in which one angle is a right angle is called a right-angled triangle.
6. A triangle in which one angle is obtuse is called an obtuse-angled triangle.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



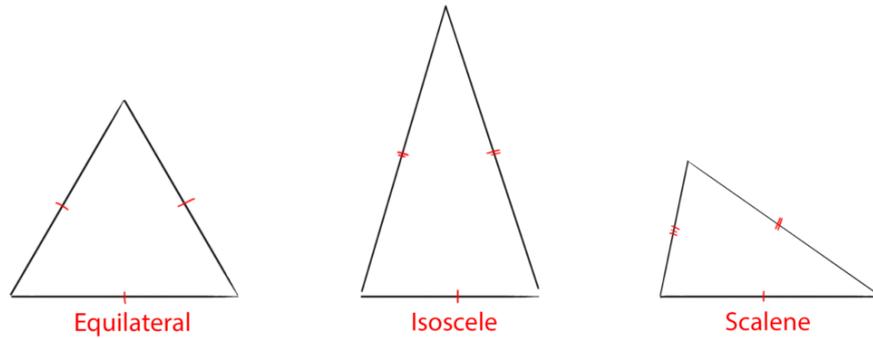
## MATERIALS / RESOURCES REQUIRED

- Board, Marker, Notebooks, Textbooks, Pencils, Chart, Protractor, Straight Straws of Different Lengths



## INTRODUCTION

1. Ask students to work in groups of 3.
2. Place a few pieces of straight straws of different lengths on the teacher's desk.
3. Call a student from each group to take 9 pieces of straw for their group.
4. Tell students to join any three straws to make a closed figure/shape.
5. Encourage students to make different figures with different combinations of straws.
6. Select 3 different triangles from different groups; ensure that you pick an equilateral triangle, an isosceles triangle, and a scalene triangle.
7. Draw the figures of the triangles on the board as shown below:



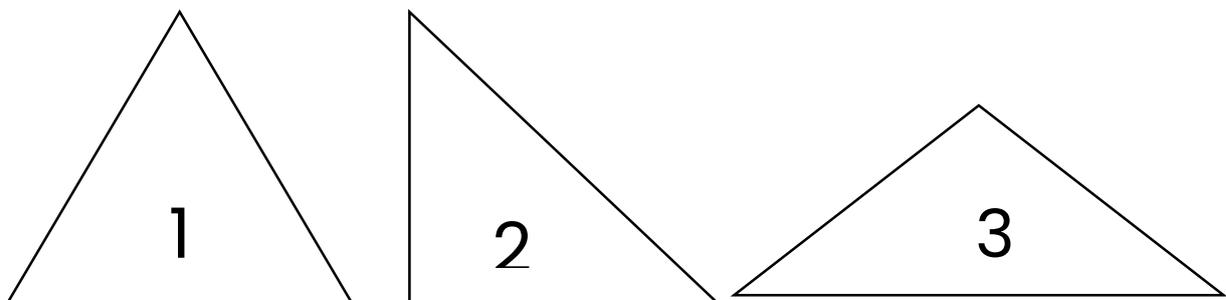
8. Tell the students that these closed figures are called **triangles** and every triangle has three sides and three angles.
7. Tell students that a triangle in which all three sides are equal is called an equilateral triangle and all angles of an equilateral triangle are equal to  $60^\circ$ . Show the sides and angles of an equilateral triangle and tell students that the single red dash on the sides indicates that the lengths of these sides are equal.
8. Tell students that a triangle having two equal sides is called an isosceles triangle and the two base angles of an isosceles triangle are equal in measure. Show the sides and angles of an isosceles triangle and tell students that the double red dashes on the sides indicate that the lengths of these sides are equal, and the base (single red dash) has a different length.
9. Tell students that a triangle having all sides of different lengths is called a scalene triangle and all angles in a scalene triangle are different in measure. Show the sides and angles of a scalene triangle and tell students that the three different red dashes (single, double, and triple) on the sides indicate that the lengths of the three sides are different.
10. Students should note these important details in their notebooks.
11. Tell students that in today's lesson we will learn about the different types of triangles.



## DEVELOPMENT

### Activity 1

1. Tell students to work in the same groups of 3.
2. Prepare a worksheet with the following triangles: one with acute angles, one with a right angle, and the third with an obtuse angle.
3. Distribute one worksheet to each group and instruct them to complete it.



Number of angles in triangles = \_\_\_\_\_

Use a protractor.

Measure of angles in triangle 1 = \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_

Measure of angles in triangle 2 = \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_

Measure of angles in triangle 3 = \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

4. After students have completed their worksheets ask them to share their answers.
5. Other groups should also compare and correct their measurements.
6. Ask the following questions from the students, who should raise their hands to answer:
  - ✦ Which triangle had only acute angles? Answer: Triangle 1
  - ✦ Which triangle had a right angle? Answer: Triangle 2
  - ✦ Which triangle had an obtuse angle? Answer: Triangle 3
7. Share the correct answers and then tell students:
  - ✦ A triangle with 3 acute angles is called an acute-angled triangle (Triangle 1)
  - ✦ A triangle with one obtuse angle is called an obtuse-angled triangle (Triangle 3)
  - ✦ A triangle with one right angle is called a right-angled triangle (Triangle 2)



### CONCLUSION / SUM UP

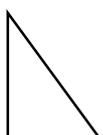
Ask students to differentiate between an equilateral, an isosceles, and a scalene triangle. Furthermore, ask them to differentiate between an acute-angled, right-angled, and obtuse-angled triangle. Students should mention that:

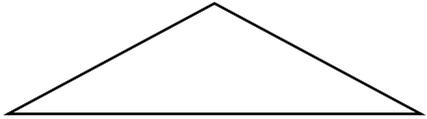
1. A triangle in which all three sides are equal is called an equilateral triangle and all angles of an equilateral triangle are equal to  $60^\circ$ .
2. A triangle having two equal sides is called an isosceles triangle and the two base angles of an isosceles triangle are equal in measure.
3. A triangle having all sides of a different measure is called a scalene triangle and all angles in a scalene triangle are different in measure.
4. A triangle in which all angles are acute is called an acute-angled triangle.
5. A triangle in which one angle is a right angle is called a right-angled triangle.
6. A triangle in which one angle is obtuse is called an obtuse-angled triangle.



### ASSESSMENT

1. Paste the chart on the board and ask students to come to the board and match the entry in column A with the correct description in column B

Column A		Column B
1		Right angled triangle
2		Obtuse angled triangle
3		Scalene triangle

4 	Equilateral triangle
--	----------------------

2. After students have attempted the question, share the correct matching with the students.

- 1 – Scalene Triangle
- 2 – Equilateral Triangle
- 3 – Right angled Triangle
- 4 – Obtuse angled Triangle



### **HOMEWORK / FOLLOW UP**

Assign the relevant questions from the textbook on page 130 in exercise 2.

**CONSTRUCTION OF TRIANGLE****STUDENT LEARNING OUTCOMES**

Use protractor and ruler to construct a triangle when:

- Two angles and their included sides are given
- Two sides and included angle is given

Measure the length of the remaining sides and angles of the triangle

**INFORMATION FOR TEACHERS**

The teacher should know that:

1. A triangle has three angles and three sides
2. A triangle is represented by the symbol  $\Delta$
3. The sum of the interior angles of a triangle is  $180^\circ$



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**

**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils, Rulers, Geometry Box, Ruler and Protractor

**INTRODUCTION**

1. Ask the following questions from the students.  
What are the different types of triangles with respect to the sides?
2. What are the different types of triangles with respect to angles?
3. Take student responses and re-cap with them the different types of triangles.  
Remind students that:
  - ✧ a triangle in which all three sides are equal is called an equilateral triangle and all angles of an equilateral triangle are equal to  $60^\circ$ .
  - ✧ a triangle having two equal sides is called an isosceles triangle and the two base angles of an isosceles triangle are equal in measure.
  - ✧ a triangle having all sides of a different measure is called a scalene triangle and all angles in a scalene triangle are different in measure.
  - ✧ a triangle in which all angles are acute is called an acute-angled triangle.
  - ✧ a triangle in which one angle is a right angle is called a right-angled triangle.
  - ✧ a triangle in which one angle is obtuse is called an obtuse-angled triangle.
4. Tell students that in today's lesson we will construct a triangle with two angles and their included side given. We will also construct a triangle having two sides and their included angle is given.



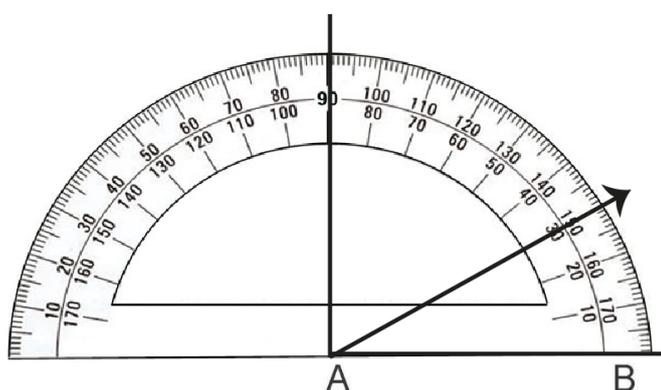
## DEVELOPMENT

### Activity 1:

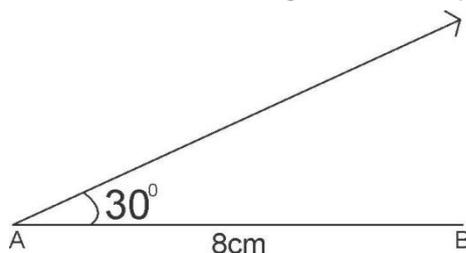
1. Construct a triangle ABC in which  $\overline{AB} = 8\text{cm}$ ,  $\angle A = 30^\circ$  and  $\angle B = 75^\circ$  by using protractor and ruler on the writing board.
2. Tell students to copy each step in their notebooks individually using tools from their own geometry box.
3. Draw a line segment  $\overline{AB}$  of 8 cm by using a ruler as shown below:



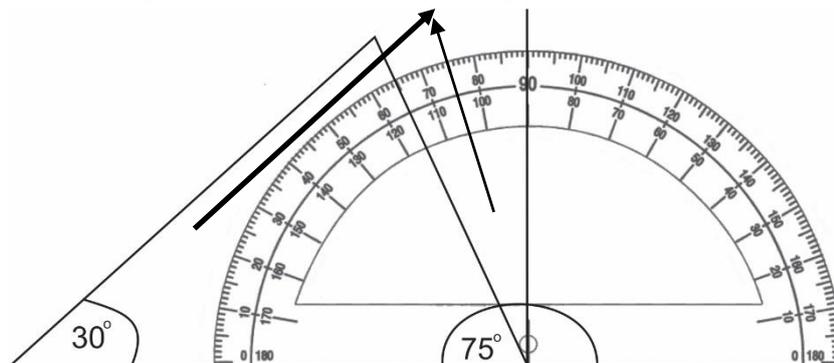
4. Next, draw an angle of  $30^\circ$  at point A with the help of a protractor as shown below:



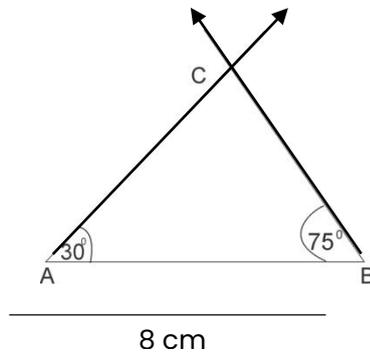
Remove the protractor to show students the angle drawn at point A



5. Similarly, draw an angle of  $75^\circ$  at point B by using protractor as shown below:



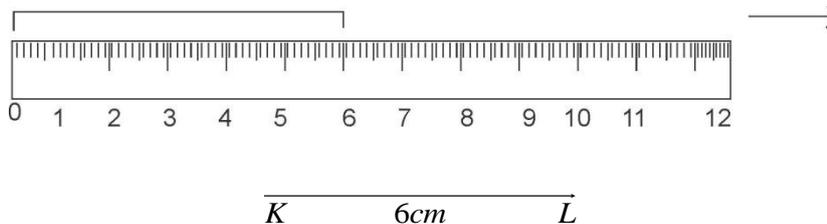
Remove the protractor to show students the angle drawn at point B



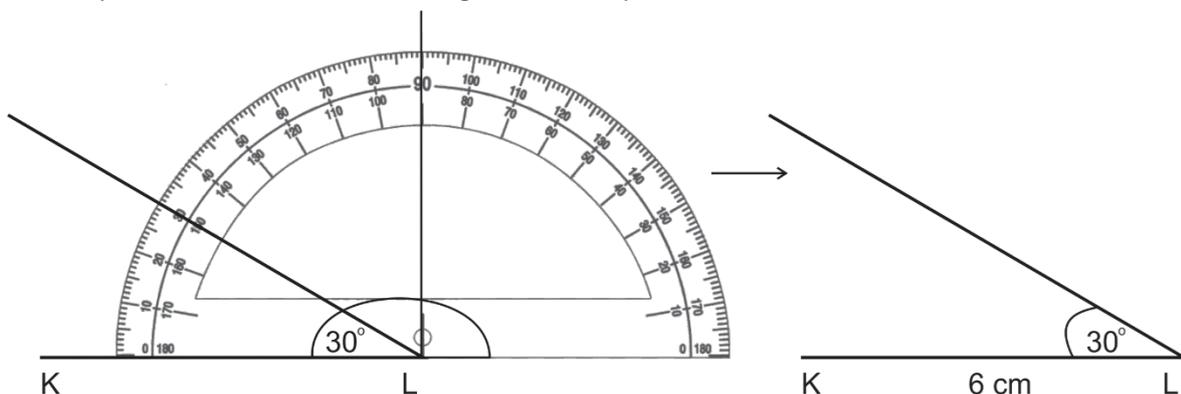
6. The two drawn rays intersect each other at point C
7.  $\triangle ABC$  is the required triangle.
8. Say that the 3<sup>rd</sup> angle is  $75^\circ$ .
9. Ask students to verify the measure of the third angle by using a protractor.
10. Students will also find that the measure of the third angle is  $75^\circ$
11. Tell students that when we add the angles of any triangle they always add up to make  $180^\circ$
12. Therefore,  $30^\circ + 75^\circ + 75^\circ = 180^\circ$
13. Tell students that they can measure any angle of a triangle with the help of a protractor and measure the sides of a triangle with the help of a ruler.

### Activity 2:

1. Construct a triangle when two sides and included angle are given. Tell students that the letter "m" indicates "the measure of".  
Let  $m\overline{RL} = 6\text{cm}$  and  $m\overline{LM} = 4\text{cm}$  and  $m\angle L = 30^\circ$
2. Construct the triangle on the writing board by using a protractor and ruler
3. Tell students to copy each step in their notebooks individually using tools from their own geometry box.
4. Draw a line segment  $\overline{KL} = 6\text{cm}$  with the help of a ruler.

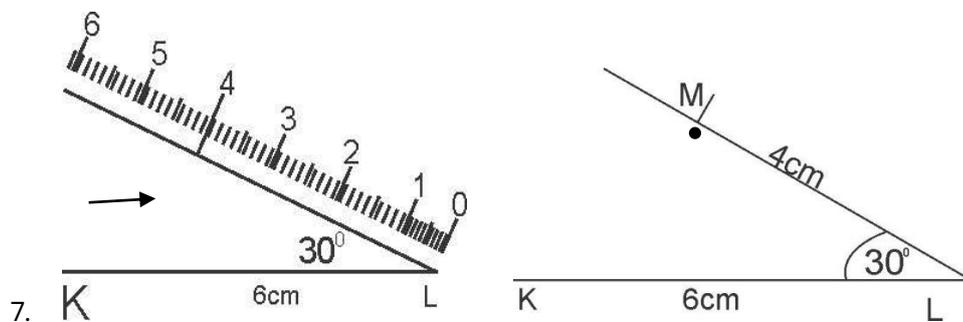


5. Use a protractor and draw an angle of  $30^\circ$  at point L as shown below:

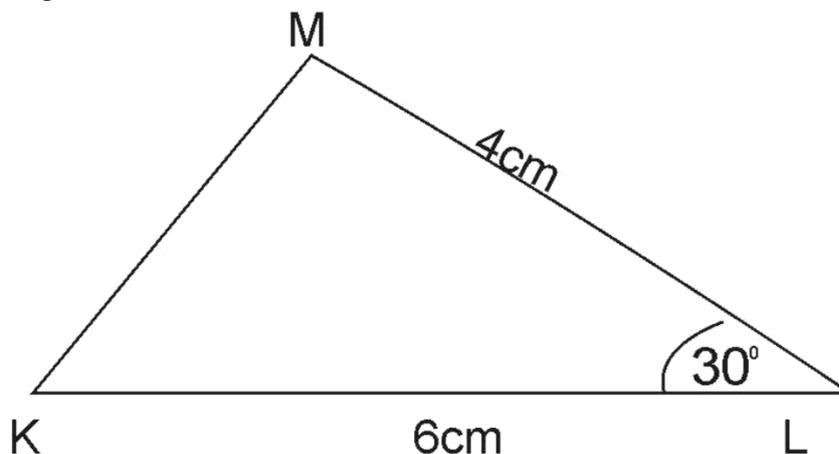


Mark point M on the arm of  $30^\circ$  such that  $m\overline{LM} = 4\text{cm}$  by using a ruler

6. Measure 4 cm along the ray starting from point L. Put a marker at the 4 cm mark and call that point M. See below:



8. Use a ruler and pencil to join K and M as well as L and M to complete the triangle.
9. Draw the triangle shown below:



10.  $\triangle KLM$  is the required triangle
11. Tell students to measure the lengths of the remaining sides of the triangle with the help of a ruler and to measure the remaining angles with the help of a protractor.



### CONCLUSION / SUM UP

1. Ask students to explain the steps in the construction of triangles when:
  - Two angles and the included side is given
  - Two sides and the included angle is given.
2. Ask students how we measure the remaining sides and angles? Students should highlight that the remaining sides and angles can be measured with a ruler and protractor respectively.



### ASSESSMENT

3. To assess the students ask them to individually construct the triangles given below:
  - A triangle PQR, in which  $\overline{PR} = 5\text{cm}$ ,  $\overline{PQ} = 7\text{cm}$  and  $\angle P = 70^\circ$
  - A triangle ABC, in which  $\angle A = 60^\circ$ ,  $\overline{AB} = 5.5\text{ cm}$  and  $\angle B = 30^\circ$
4. Guide the students in their construction of the various angles.



### HOMEWORK / FOLLOW UP

Assign the relevant questions from the textbook on page 131 in exercise 2

**Month**

**7**



# QUADRILATERALS



## STUDENT LEARNING OUTCOMES

- Recognize different kinds of quadrilateral (square, rectangle, parallelogram, rhombus, trapezium, and kite)
- Identify and describe properties of quadrilaterals including square, rectangle, parallelogram, rhombus, trapezium, and kite, and classify those using parallel sides, equal sides, and equal angles.

## INFORMATION FOR TEACHERS

The teacher should know that:

1. Shapes that have four sides and four angles are called quadrilaterals.
2. Square, rectangle, parallelogram, rhombus, trapezium, and kite are all types of quadrilaterals.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



## MATERIALS / RESOURCES REQUIRED

- Board, Marker, Notebooks, Textbooks, Pencils, Rulers, Geometry Box, Chart, Straight Straws of Different Lengths



## INTRODUCTION

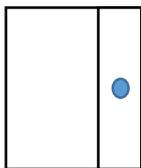
1. Ask students to look at their surroundings and identify any four-sided closed figures.
2. Tell students to list these figures on the board.
3. Some expected answers may include a window, board, desk, door, etc.
4. Record their responses and draw the corresponding shape on the writing board. See below:



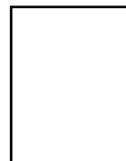
Writing Board



Window



Door



Book

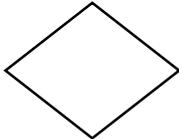
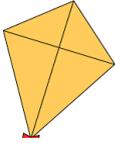
5. Ask students if they know what all 4 sided shapes are called.
6. Tell students that all four-sided shapes are called **quadrilaterals**.
7. Students should note this in their notebooks.



## DEVELOPMENT

### Activity 1:

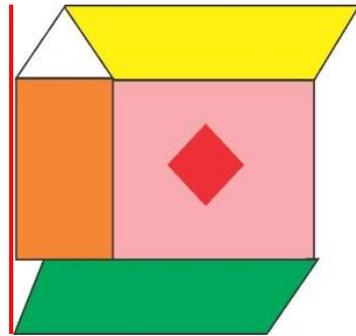
1. Ask students to work in groups of 4.
2. Place a few pieces of straight straws of different lengths on the teachers' desk
3. Call a student from each group to take a handful of pieces of straw for their group.
4. Tell groups to join any four straws to make a closed figure/shape.
5. Encourage students to make different figures with various combinations of straws.
6. Monitor and facilitate them during the activity.
7. Tell students to show their work to other groups and also write the names of the shapes that they are familiar with such as square and rectangle.
8. Draw the various shapes on the board that students have made in their groups.
9. The teacher should then paste a chart of the different quadrilaterals on the writing board. The teacher should emphasize that all the shapes on this chart are quadrilaterals.
10. Students should copy the chart of the quadrilaterals in their notebooks.

Figure	Name	Properties of the quadrilateral
	Square	a geometrical shape having four equal sides and four right angles
	Rectangle	a geometrical shape having opposite sides equal in length and all angles as right angles
	Parallelogram	a geometrical shape with two pairs of opposite sides which are parallel and opposite angles which are equal
	Rhombus	a geometrical shape in which all sides are equal and opposite sides are parallel.
	Trapezium	a geometrical shape in which only one pair of opposite sides that are parallel
	Kite	a geometrical shape having two pairs of equal and adjacent sides

11. Refer to pages 132-133 to explore all the sides and angles of each quadrilateral.
12. Give students time to explore the sides and angles of each quadrilateral as a lot of important information has been summarized in the chart above.

### Activity 2:

Draw a house on writing board as shown below:



1. Ask students the following questions:
  - ✧ which quadrilateral is a square? (pink)
  - ✧ which quadrilateral is a parallelogram? (green)
  - ✧ which quadrilateral is a trapezium? (yellow)
  - ✧ which quadrilateral is a rhombus? (red)
  - ✧ which quadrilateral is a rectangle? (orange)
  - ✧ which quadrilateral is a kite? (light orange)
2. Ask students to raise their hands and identify the different quadrilaterals.
3. Ask students to mention the properties of each quadrilateral.



### CONCLUSION / SUM UP

1. Ask students about the different types of quadrilaterals along with their properties.
2. Students should draw the shape and list down its properties.
3. The teacher should guide the students during this exercise.



### ASSESSMENT

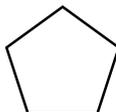
Paste the chart shown below and ask students the following question:

1. Which of the following shapes is not a quadrilateral?

A



B

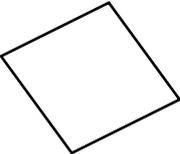
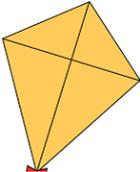


C




**HOMEWORK / FOLLOW UP**

Ask the students to copy and complete the following question in their notebooks.

Shapes	Names
	-----
	-----
	-----
	-----
	-----
	-----

# CONSTRUCTION OF A SQUARE AND RECTANGLE



## STUDENT LEARNING OUTCOMES

- Use protractor and ruler to construct square and rectangle when lengths of sides are given

## INFORMATION FOR TEACHERS

The teacher should know:

1. The definition and properties of a square and a rectangle.
2. How to use protractor and ruler to construct different squares and rectangles when measurements are given.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils, Rulers, Geometry Box, Ruler and Protractor



## INTRODUCTION

1. Ask the students to identify various objects in the classroom that are squares and rectangles.
2. Ask students to raise their hands and share their observations.
3. Take student responses and write/draw them on the board such as window, door, cupboard, desk, board, pencil box, sharpener, eraser, etc.
4. Remind students about the definition of a square and rectangle:
 

**Square** – a quadrilateral having four equal sides and four right angles is called a square

**Rectangle** – a quadrilateral having opposite sides equal in length and four right angles are called a rectangle.
5. Tell students that today we will learn how to construct a square and a rectangle geometrically.



## DEVELOPMENT

### Activity 1:

1. Using protractor and ruler, construct a square ABCD whose length of a side is 4.5 cm
2. Tell students to copy each step in their notebooks individually using tools from their own geometry box.
3. Draw a line segment  $\overline{AB}$  of length 4.5 cm with the help of ruler as shown below:

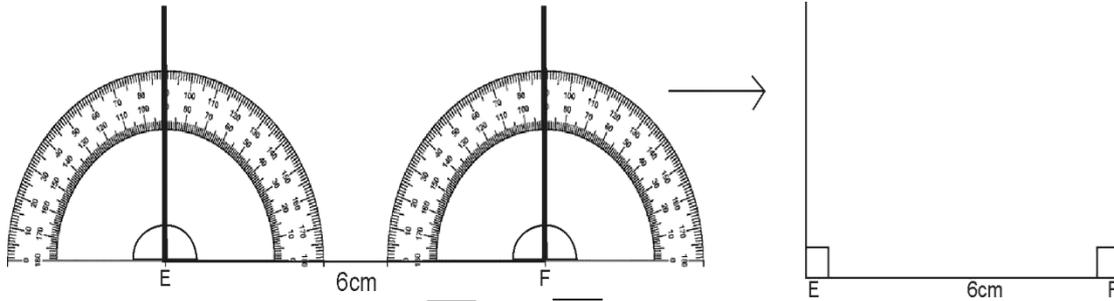


**Activity 2:**

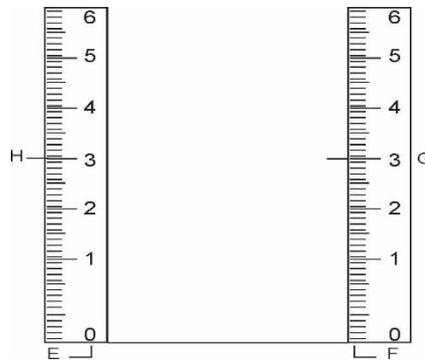
- Using a protractor and ruler, construct a rectangle EFGH whose length is 6 cm and width is 3 cm.
- Tell students to copy each step in their notebooks individually using tools from their own geometry box.
- Draw a line segment  $\overline{EF}$  of length 6cm with the help of a ruler



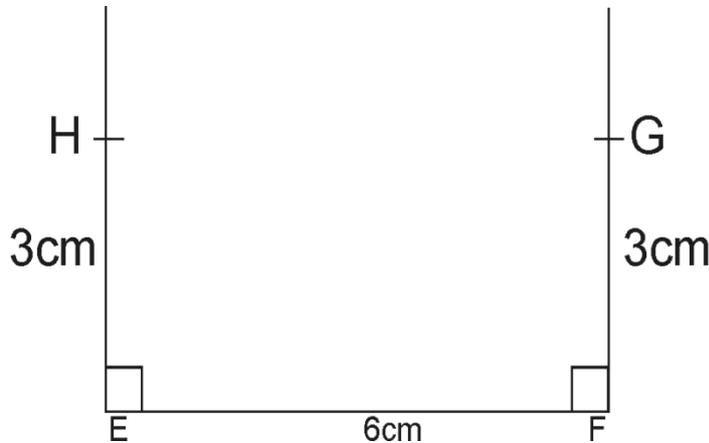
- Using protractor draw right angles at points E and F



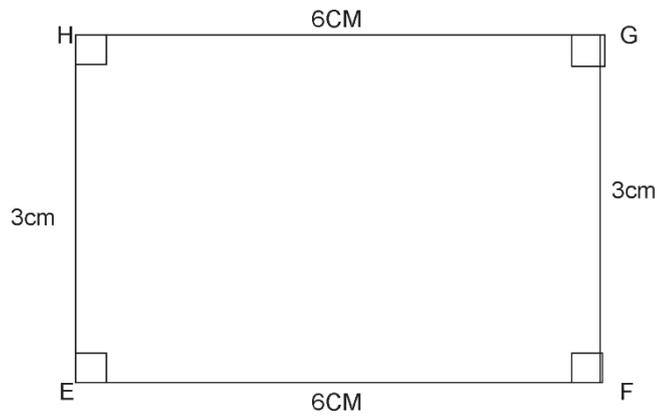
- Mark points G and H such that  $m\overline{FG} = m\overline{EH} = 3\text{cm}$



Remove the protractor to show students the right angles drawn at point E and F



- Join point G and H by using ruler and pencil.
- Rectangle EFGH is the required rectangle as shown below:



### CONCLUSION / SUM UP

Conclude the activity by asking students to explain the steps involved in the construction of a square and a rectangle. Students should mention the use of a protractor and ruler to draw the shapes and how all angles in a square and rectangle are right angles.



### ASSESSMENT

1. Ask students to individually construct:
  - ✧ a square KLMN whose length of a side is 4.6 cm
  - ✧ a rectangle ABCD whose length is 8 cm and width is 4 cm
2. Guide the students in their construction of the above.



### HOMEWORK / FOLLOW UP

Assign the relevant questions to the students from the textbook on page 137 in exercise 3

**SYMMETRY****STUDENT LEARNING OUTCOMES**

- Recognize different types of symmetry (reflective and rotational in 2-D figures).
- Identify lines of symmetry for given 2-D figures.
- Find the point of rotation of order of rotational symmetry of given 2-D figures.

**INFORMATION FOR TEACHERS**

Teachers should know that:

1. A shape or figure has symmetry when it is turned, flipped, or rotated and the same shape or figure is formed.
2. A line of symmetry divides a shape into two equal parts, which when folded onto each other completely overlaps.
3. Certain shapes have more than one line of symmetry.
4. A figure will have rotational symmetry if it is rotated about a center point and looks the same at least two times during the full rotation.
5. The number of times a shape looks the same when it is rotated about a point, is called the order of its rotational symmetry.
6. The center of the shape is called the center of rotation.



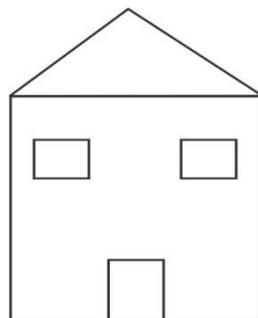
**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**

**MATERIALS / RESOURCES REQUIRED**

- Writing Board, Soft Board, Marker, Notebooks, Textbooks, Pencils, Ruler, Worksheet, Cardboard Cut-outs, Pin

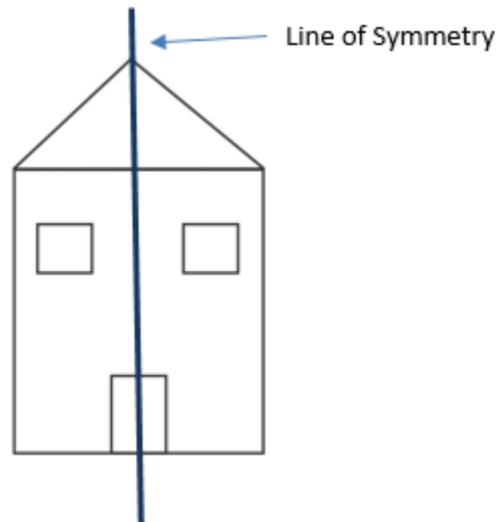
**INTRODUCTION**

1. Draw the given figure on the board and give groups of students a cardboard cut-out of the figure as well. The cardboard cut-out should be prepared before the lesson.



2. Ask students in their small groups to fold the cardboard in such a way that the figure completely overlaps.

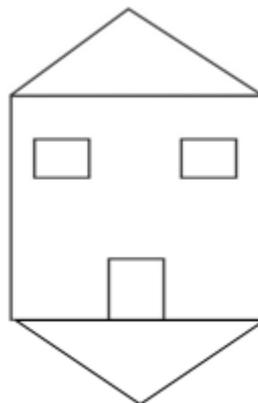
3. After exploration, ask a student to come to the board and draw a line on the figure that divides it into two equal parts. Tell the student that a horizontal line will not divide the figure into two equal parts.
4. Tell all students that a vertical line right down the center of the figure will divide it into two equal parts similar to when they folded the cardboard cutout along the center of the figure and it completely and perfectly overlapped.
5. Draw the line, as shown below, and tell students that it is called the **line of symmetry**.



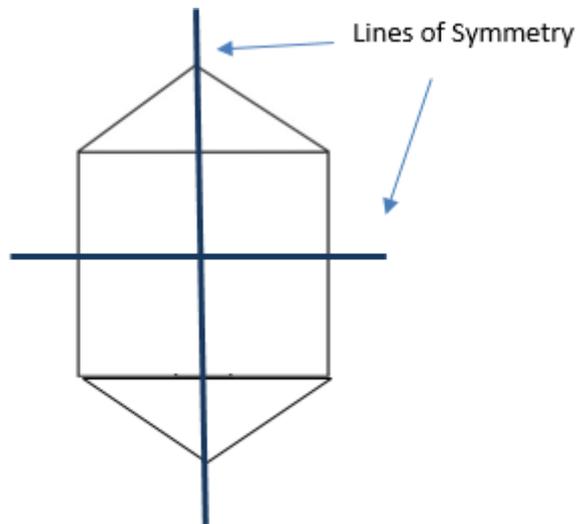
## DEVELOPMENT

### Activity 1:

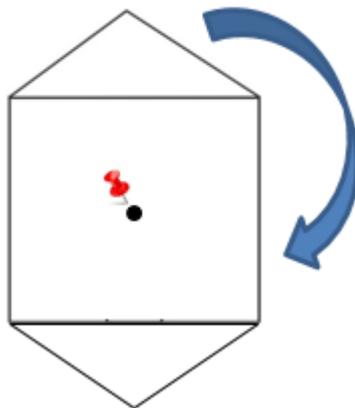
1. Draw the following figure on the board and give the same groups of students a cardboard cut-out of the figure as well.



2. Ask students to work in their small groups and fold the cardboard in such a way that the figure completely overlaps i.e. find the line(s) of symmetry.
3. After the students have tried to find the line of symmetry, ask a student to come to the board and draw it on the figure.
4. Tell all students that a vertical line right down the center of the figure will divide it into two equal parts. Similarly, a horizontal line will also divide it into two equal parts.
5. Tell students that a figure may have more than one **line of symmetry**. Show students the lines of symmetry.



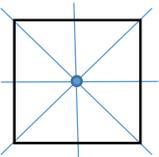
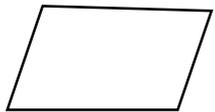
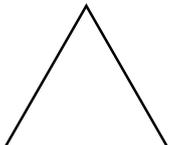
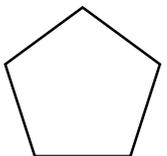
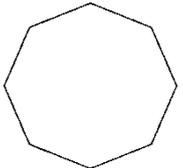
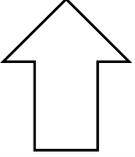
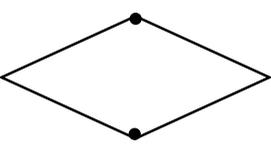
6. Take one of the cardboard cut-outs of the figure shown above and pin it to a soft board.
7. Stick the pin at the point where the two lines of symmetry intersect.
8. Now ask one student to come up to the soft board and rotate the figure as shown:



9. Tell the student to rotate the figure through 360 degrees i.e. one complete rotation.
10. Ask all students, during the rotation, did the figure looks the same at any point? Hold up another cut-out of the figure as well.
11. Give students a few minutes to discuss in small groups.
12. Take students' responses.
13. Tell students that at half a rotation i.e. at 180 degrees the figure is identical to the original figure. Demonstrate to the students how the figure is identical at half a rotation by comparing it to the other cut-out as well.
14. Tell students that a figure will have rotational symmetry if it is rotated about a center point and looks the same at least two times during the full rotation.
15. Tell students, the number of times a shape looks the same when it is rotated about a point is called the order of its rotational symmetry.
16. Ask students what is the order of rotational symmetry of the figure above?
17. Give students a few minutes to discuss in small groups.
18. Take students' responses.
19. Tell students that the order of rotational symmetry of the figure is 2 i.e. the figure looks the same twice when it is rotated about its center point, through 360 degrees.
20. Tell students that the center of the shape is called the center of rotation.
21. For the figure above, the point where the two lines of symmetry intersect is the center of the shape i.e. the center of rotation.
22. Ensure that all students note these important details in their notebooks.

### Activity 2:

1. Ask the students to work in pairs for the following activity.
2. Paste the chart of the following table on the writing board.
3. The chart should be prepared before the lesson.
4. Ask students to copy and complete the following table in their notebooks.
5. Each shape should be discussed among the pairs of students.
6. Ask various students to come up to the board and draw the line(s) of symmetry.
7. Ask students if the shape under consideration has rotational symmetry? If yes, what is the order of rotational symmetry? Where is the center of rotation? It should be indicated in the figure.
8. Complete the activity with the students. The first row has been solved.

#	Shape	Line(s) of Symmetry	Rotational Symmetry? Yes / No	Order of Rotational Symmetry
1	Square		YES	4
2	Rectangle			
3	Parallelogram			
4	Equilateral Triangle			
5	Regular Pentagon			
6	Regular Octagon			
7	Arrow			
8	Irregular Diamond			



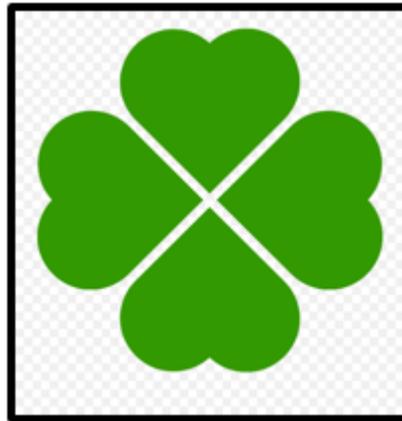
## CONCLUSION / SUM UP

1. Ask students to define symmetry and to give examples of simple and rotational symmetry. Ask students to give examples for each.
2. Students should highlight that if a shape or figure is turned, flipped, or rotated and the same shape or figure is formed it is said to have symmetry.
3. Students should mention that a line of symmetry divides a shape into two equal parts and that certain shapes/figures may have more than one line of symmetry.
4. Furthermore, students should mention that a figure will have rotational symmetry if it is rotated about a center point and looks the same at least two times during the full 360-degree rotation.
5. Students should state that the number of times a shape looks the same when it is rotated about a point is called the order of rotational symmetry and the center of the shape i.e. where the lines of symmetry intersect is called the center of rotation.



## ASSESSMENT

1. Draw the figure shown below on the writing board.
2. Ask students to identify the line(s) of symmetry (4), center of rotation, and order of rotational symmetry (4) for the following figure.



3. After students have attempted the question, share the correct answer with students.



## HOMEWORK / FOLLOW UP

- Assign the relevant questions from the textbook on page 140 in exercise 4.

# NETS OF 3-D SHAPES



## STUDENT LEARNING OUTCOMES

- To identify cubes, cuboids, and pyramids from their nets
- To describe and make 3-D objects (cubes, cuboids, cylinders, cones, spheres, pyramids).

## INFORMATION FOR TEACHERS

Teachers should know that:

1. A net is a two-dimensional shape which can be folded in a specific pattern to get a three-dimensional solid.
2. Three-dimensional solids can have more than one possible net.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



## MATERIALS / RESOURCES REQUIRED

- Textbook, Chalk/Marker, Worksheet Snippets, Writing board, Charts, Cardboard, Ruler, Cardboard Cut-Outs, Cardboard Cube, Cuboid, Paper Cutter / Scissors, Gum Stick / Sticking Tape.



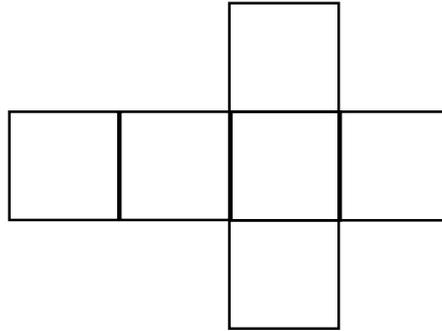
## INTRODUCTION

1. Bring a cardboard box shaped like a cube to the classroom and place it on the teacher's desk.



2. Ask students to discuss the following questions in pairs.
  - ✧ What is the name of the 3-D shape?
  - ✧ What is the shape of each face?
  - ✧ How many faces are there?
  - ✧ How would you make your own cardboard box from square cardboard cutouts?
3. Record all responses on the board.
4. Then guide student discussion and tell them that the cardboard box is a three-dimensional solid shape.
5. Tell students that all three-dimensional (3-D) solids are made up of different two-dimensional (2-D) shapes; in this case, the 3-D cube is made up of 6 squares (2-D).

6. Using the cutter, cut the box in such a way that the following net emerges. See below:



7. Tell students that the 2-D flat squares are the **net** of the 3-D cube.

8. Students should note the definition of a net.

A net is a two-dimensional shape which can be folded in a specific pattern to get a three-dimensional solid.

9. Fold the net to show how the net can become a cube and then unfold it to show how a cube can become a net.

10. Ask students is there only one net for a cube?

11. Give students a few minutes to think and discuss in small groups.

12. Take responses from various groups.

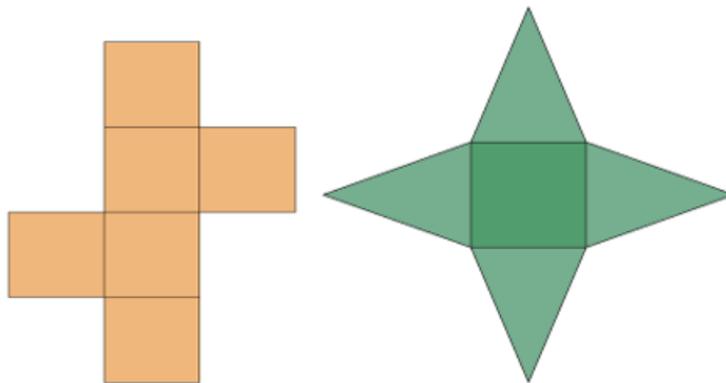
13. Tell students that three-dimensional solids can have more than one possible net and in today's lesson we will be learning about cubes, cuboids, and pyramids from their nets



## DEVELOPMENT

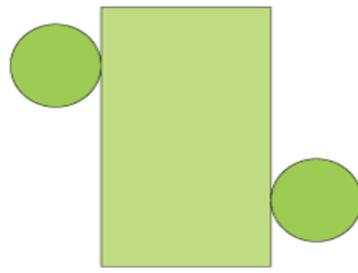
### Activity 1:

1. Divide the class into pairs.
2. Give each pair a set of scissors and pieces of sticking tape.
3. Ensure that students use the scissors safely.
4. Distribute the following nets to the students and instruct students to cut along the lines and then stick the pieces together to make a 3-D object.
5. If possible, the teacher should distribute the prepared cut-outs to the pairs.
6. Ensure that each pair has at least one net.

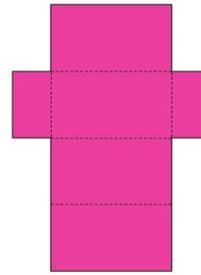


Cube

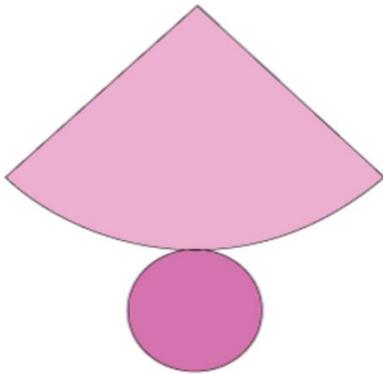
Square Pyramid



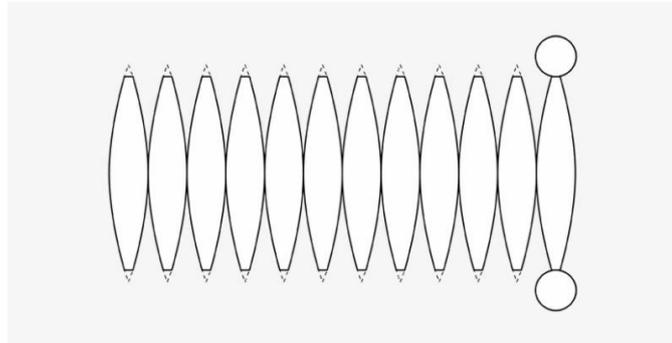
Cylinder



Cuboid



Cone



Sphere

7. Give the net of the sphere to the most talented pair(s) in the class.
8. Walkthrough the class and guide students during the cutting and sticking.
9. Expect that students may not be able to cut the shapes correctly or stick them correctly. Prepare many copies of the nets and assist the struggling pairs.
10. Reshuffle groups so that more able students help the struggling students.
11. After each pair has finished correctly cutting the nets and creating their 3-D shapes they should come up to the front of the class and give a brief presentation.
12. In the presentation, students should cover
  - ✧ The name of the 3-D shape
  - ✧ The number of faces the 3-D shape has
  - ✧ The names of the faces on the net.
13. Ask the groups that were given the net of the cube:
  - a. How did we get a cube even though the net was different from the net shown in the introductory activity?
  - b. Let all students discuss the question in their pairs and then share their responses.
14. Remind the students once again that three-dimensional solids can have more than one possible net.
15. Guide the students during their presentations and other students should also give their input.



### CONCLUSION / SUM UP

1. Ask students to define a net of a 3-D object and give an example as well.
2. Students should mention that the net of 3-D shape is actually a two-dimensional shape made up of various shapes e.g. the net of a 3-D cube is made up of 6, 2-D squares.
3. Students should highlight that different shapes have different nets.



## ASSESSMENT

1. Students should attempt the following question:
  - ✧ Draw the net of Cylinder
  - ✧ Draw the net of Cone
  - ✧ Draw the net of Cuboid
  - ✧ Draw the net of a Square Pyramid
2. After students have attempted the question, give feedback and make corrections.



## HOMEWORK / FOLLOW UP

Assign the relevant questions from the textbook on pages 143-144 in exercise 5.





## DEVELOPMENT

### Activity 1:

1. Ask students to work in pairs and answer the following questions in their notebooks:
  - ✧ The cost of one pen is Rs. 15. Find the cost of 25 pens? Answer: Rs. 375
  - ✧ A grandfather gives each of his 28 grandchildren Rs. 50 each. How much money did he distribute? Rs. 1400.
  - ✧ One pack of bulbs has 12 bulbs. How many bulbs are there in 37 packs? 444 bulbs.
2. Ask a few volunteers to come to the board and solve each question.
3. Other students should guide the volunteers.
4. The teacher should share the solution with all students on the writing board.

### Activity 2:

1. Ask the students to work in pairs.
2. Ask the students to copy and complete the column labeled **Total Cost** in their notebooks.

#	Price of 1 Object	Number of Objects	Total Cost
1	7 Rupees	12	
2	9 Rupees	8	
3	15 Rupees	17	
4	35 Rupees	5	
5	75 Rupees	2	
6	124 Rupees	7	

3. Guide students where needed.
4. Share the correct answers with all students.



## CONCLUSION / SUM UP

Ask students how can we find the value of many objects of the same kind when the value of one of these objects is given. Students should mention that when the value of one item is known the value of many items of the same kind can be found by multiplication.



## ASSESSMENT

1. Ask the students to copy and complete the following in their notebooks:  
Choose the correct option
  - i. The price of 1 book is 250, the price of 3 books will be Rs. \_\_\_  
a) 100                      (b) 150                      (c) 750                      (d) 1000
  - ii. If the cost of 1 kg mango is Rs. 75, then the cost of 4 kg mangos is  
(a) Rs. 250                      (b) Rs. 300                      (c) Rs. 450                      (d) Rs. 500
2. After students have attempted both questions the teacher should share the correct answers with students.



## **HOMEWORK / FOLLOW UP**

- Assign the relevant questions from the textbook on page 112 in exercise 1.

# UNITARY METHOD



## STUDENT LEARNING OUTCOMES

- Calculate the value of one object of the same kind when the value of many of these objects is given.

## INFORMATION FOR TEACHERS

The teacher should know that to find the value of one unit from the value of multiple objects we use division.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils



## INTRODUCTION

- Write the following real-life example on the writing board:  
The cost of 24 books is 5280. Find the cost of 1 book?
- Ask students to discuss the question in pairs and share their answers.
- Record student responses on the board.
- Tell students that to find the cost of 1 book we divide 5280 with 24.
- Show students the following solution:

$$5280 \div 24$$

$$\begin{array}{r}
 24 \overline{) 5280} \\
 \underline{48} \phantom{0} \\
 048 \phantom{0} \\
 \underline{48} \phantom{0} \\
 000 \phantom{0} \\
 \underline{000} \\
 0000 \\
 \underline{0000} \\
 0000 \\
 \underline{0000} \\
 0000
 \end{array}$$

Therefore, one book costs Rs. 220

Tell students that in today's lesson they will be calculating the value of one object, of the same kind, when the value of many of these objects is given.



## DEVELOPMENT

### Activity 1:

- Ask students to work in pairs and answer the following questions in their notebooks:

- ◇ The cost of 1 dozen eggs is Rs. 180. Find the cost of 1 egg? Answer: Rs. 15
  - ◇ The rent of a house for 9 months is Rs. 225,000. Find the rent of the house for 1 month? Answer: Rs. 25,000
  - ◇ A school with 750 students has 30 classrooms. How many students are in each classroom? Answer: 25 students
2. Ask a few volunteers to come to the board and solve each question.
  3. Other students should guide the volunteers.
  4. The teacher should share the solution with all students on the writing board.

### Activity 2:

1. Ask the students to work in pairs to copy and complete the column labeled **Price of 1 Object** in their notebooks.

#	Total Price	Number of Objects	Price of 1 Object
1	250	5	
2	1000	25	
3	3051	27	
4	242	121	

2. Guide students where needed.
3. Share the correct answers with all students.



### CONCLUSION / SUM UP

Ask students how we can find the value of one object from the value of many identical objects. Students should mention that when the value of many items is known the value of one item of the same kind can be found by division.



### ASSESSMENT

1. Copy and complete the following individually.
  - The price of 52 toffees is Rs. 260. Find the price of one toffee.
  - The cost of 35 notebooks is Rs. 5075. Find the cost of one notebook.
2. After students have attempted both questions, the teacher should share the correct answers with students.



### HOMEWORK / FOLLOW UP

- Assign the relevant questions from the textbook on page 112 in exercise 1.

# UNITARY METHOD



## STUDENT LEARNING OUTCOMES

- Calculate the value of many objects of the same kind when the value of some of these is given.
- Identify place values of digits up to one hundred thousand (100,000).

## INFORMATION FOR TEACHERS

The teacher should know:

1. That to find the value of one unit from the value of multiple objects we use division.
2. Multiplication is used to find the value of multiple objects of the same kind from the value of a given unit.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils



## INTRODUCTION

1. Write the following real-life example on the board:  
Arshad bought 9 identical books which cost him Rs. 3150. If he wants to buy 7 such books then what amount should he pay?
2. Ask students to discuss the question in pairs and share their answers.
3. Record student responses on the board.
4. Tell students that to find the cost of 7 books, we must first find the cost of 1.
5. Show students the following solution:

$$3150 \div 9$$

$$\begin{array}{r}
 \phantom{9} \overline{) 3150} \\
 \underline{27} \phantom{0} \\
 045 \phantom{0} \\
 \underline{045} \\
 0000 \\
 \hline
 0000
 \end{array}$$

Therefore, one book costs Rs. 350

Now we must find the cost of 7 such books i.e.  $350 \times 7$

Th	H	T	O
	3		
	3	5	0
×			7
2	4	5	0

6. Therefore, the cost of 7 books is Rs. 2,450.
7. Tell students that in today's lesson they will be calculating the value of many objects of the same kind when the value of some of these is given.
8. Tell students that this approach is called the **Unitary method**. It is used to calculate the value of many objects when the value of some of these is given.



### DEVELOPMENT

#### Activity 1:

1. Ask students to work in pairs and answer the following questions in their notebooks:
  - ✦ Asma buys 32 toffees for Rs 96. What is the price of 16 toffees?
  - ✦ The price of 5 toy cars is Rs. 1530. Find the price of 2 toy cars.
  - ✦ A train travels 7,650 km in 72 hours. How much distance does the train cover in 1 day (24 hours)?
2. Ask a few volunteers to come to the board and solve each question.
3. Other students should guide the volunteers.
4. The teacher should share the solution with all students on the writing board.



### CONCLUSION / SUM UP

1. Ask students how can we find the value of many objects of the same kind when the value of some of these objects is given.
2. Students should mention that when the value of many items is known the value of one item of the same kind can be found by division.
3. Students should further highlight that when the value of one item is known the value of many items of the same kind can be found by multiplication.
4. Students should touch upon both steps in the unitary method.



### ASSESSMENT

1. Write the following questions on the board and ask students to answer them in their notebooks:
  - The price of 20 pens is Rs. 600. Find the price of 13 pens.
  - The cost of 12 bags is Rs. 3552. Find the cost of 72 bags.
2. After students have attempted both questions the teacher should share the correct answers with students.



### HOMEWORK / FOLLOW UP

Assign the relevant questions from the textbook on page 114 in exercise 2.

**Month**

**8**



# AREA AND PERIMETER



## STUDENT LEARNING OUTCOMES

- Differentiate between perimeter and area of a square and rectangular region.
- Identify the units for measurement of perimeter and area.

## INFORMATION FOR TEACHERS

Teachers should:

1. Understand that the surface covered by a shape is called its area. The area of a square or rectangle can be calculated in  $cm^2$  and  $m^2$ .
2. Be able to find the area of a square or rectangle.
3. Understand that the length of the boundary of any shape is called its perimeter. The perimeter of a square or rectangle is calculated in cm and m.
4. Be able to find the perimeter of rectangles and squares.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



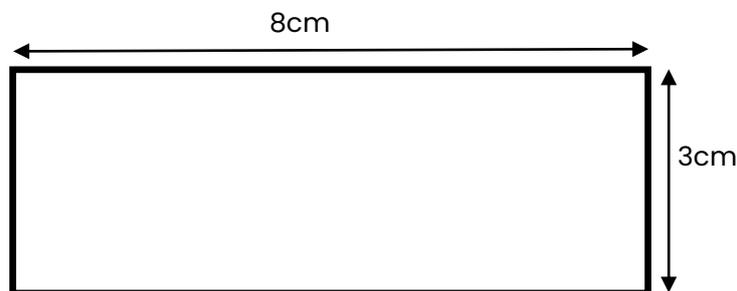
**MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils



## INTRODUCTION

1. Draw the figure shown below on the board:



2. Ask students which shape is drawn? (Answer: Rectangle)
3. Now ask students what is the length and width of the rectangle. Students should say that the length is 8 cm and the width is 3 cm. Emphasize that the length and width can be in centimeters or meters.
4. Ask students “what is the measure of the complete boundary of the rectangle?”
5. Tell students that this complete measure of the boundary is called the **perimeter**.
6. Let students discuss and come up with their answers.
7. Record student responses.
8. Share with students the correct answer as shown below:  
Perimeter of rectangle =  $2 \times \text{length} + 2 \times \text{width}$ .

$$\begin{aligned}
 &= 2 \times 8 + 2 \times 3 \\
 &= 16 + 6 \\
 &= 22 \text{ cm}
 \end{aligned}$$

- Once again emphasize that since the length and width is in centimeters, the total length of the boundary will also be in centimeters.
- Tell students to write the formula for the perimeter of a rectangle in their notebooks.



## DEVELOPMENT

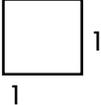
### Activity 1:

- Divide the students into pairs.

Distribute the worksheet to each pair or draw the figure and grid shown below on the board:

<b>A</b>					<b>D</b>
	1	2	3	4	
	2				
	3				
<b>B</b>					<b>C</b>



1

Each small square is a 1 cm x 1 cm square  
What is the area of the rectangle ABCD?

- Let them discuss in pairs.
- Guide students that the area of rectangle ABCD is the number of square centimeters completely enclosed by the rectangle.
- Ask students how many square centimeters are enclosed by the rectangle?
- Let them discuss in pairs and then take their responses.
- Guide students to count the number of square meters which should be 12.
- Tell students that the surface covered by a shape is called its **area**. The area of a square or rectangle can be calculated in  $cm^2$  and  $m^2$ .
- The area of rectangle ABCD above 12  $cm^2$



## CONCLUSION / SUM UP

- Ask students to recall the definition of the perimeter. Students should mention that the length of the boundary of a shape is called the perimeter. Students should also state that the perimeter of any shape is measured in various units of length such as centimetres and meters.
- Ask students to define and explain the area. Students should mention that the definition of area is the surface covered by a shape that can be measured in various square units i.e. in meter square ( $m^2$ ) and centimeter square ( $cm^2$ ).



## ASSESSMENT

- Ask students the following questions:

- ◇ What units are used to find the perimeter of a rectangle or square?
  - ◇ What units are used to find the area of a rectangle or square?
  - ◇ How are area and perimeter different from one another?
2. Tell students to raise their hands and then call upon them to answer.
  3. Ask the rest of the class to guide and add to the answers.
  4. The teacher should also guide students.



#### **HOMEWORK / FOLLOW UP**

- Assign the relevant questions from the textbook on page 154 in exercise 1.

# AREA AND PERIMETER



## STUDENT LEARNING OUTCOMES

Find and apply formulas to find the perimeter and area of a square and rectangular region.

## INFORMATION FOR TEACHERS

Teachers should be able:

1. To understand that the surface covered by a shape is called its area. The area of a square or rectangle can be calculated in  $cm^2$  and  $m^2$ .
2. To find the area of a square or rectangle.
3. To understand that the length of the boundary of any shape is called its perimeter. The perimeter of a square or rectangle is calculated in cm and m
4. To find the perimeter of various rectangles and squares.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



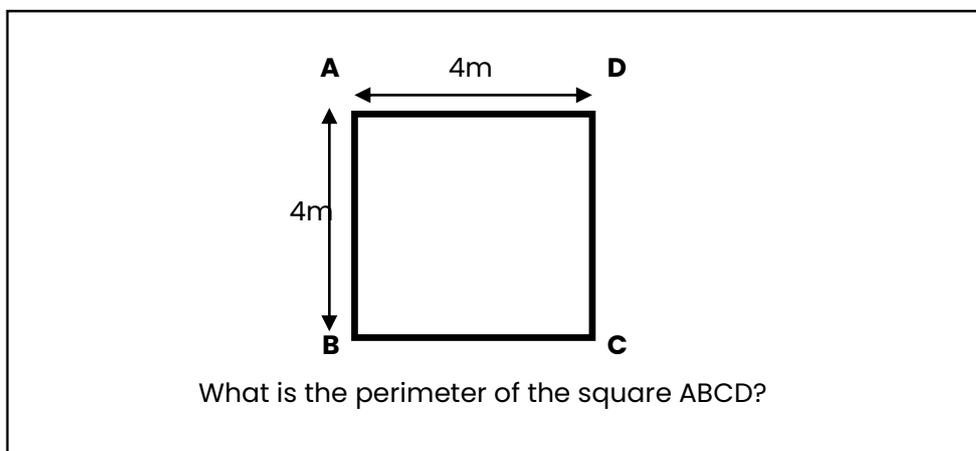
**MATERIALS / RESOURCES REQUIRED**

Board, Marker, Notebooks, Textbooks, Pencils, Chart



## INTRODUCTION

1. Divide the students into pairs.
2. Draw the figure shown below on the board.



3. Ask students to answer the question in their notebooks.
4. Let students discuss in pairs. Record student responses after a few minutes.
5. Guide students that the perimeter of square ABCD is the sum of all 4 sides i.e.  $4 + 4 + 4 + 4 = 16$ .
6. Tell students that instead of using repeated addition they may also use multiplication.
7. Tell students that the formula for the perimeter of a square is

**The perimeter of the square = 4 x length of one side.**

8. Ensure that students remember the units and write the final answer as 16 meters.
9. Emphasize that the perimeter is measured in cm or m.
10. Tell students to copy the formula in their notebooks.
11. Remind students that the formula for the perimeter of a rectangle was discussed in the previous lesson

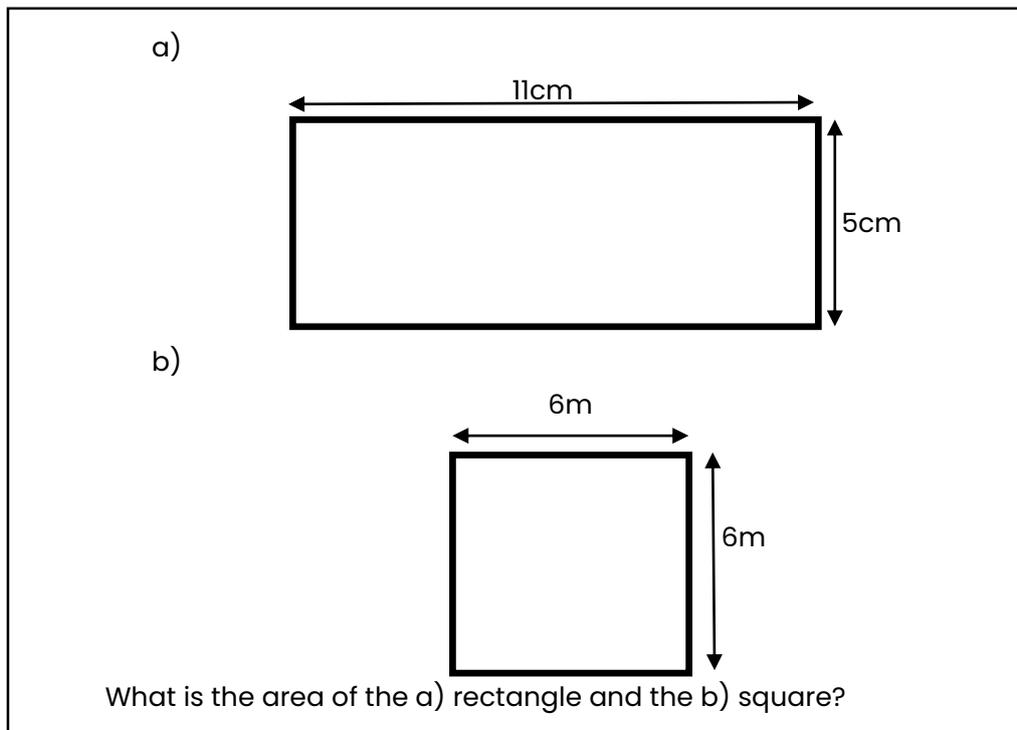
**Perimeter of rectangle = 2 x length + 2 x width.**



## DEVELOPMENT

### Activity 1:

1. Prepare the chart shown below before the lesson. Paste it on the board.



2. Divide the students into pairs.
3. Let students discuss the answers to the questions in pairs.
4. Take students' responses.
5. Tell students that earlier they found an area by the counting number of square centimeters completely enclosed by the shape.
6. To calculate the surface covered by a rectangle or square we use the following formulas.

$$\begin{aligned}\text{Area of rectangle} &= \text{Length} \times \text{Width} \\ &= L \times W\end{aligned}$$

$$\begin{aligned}\text{Area of square} &= \text{Length} \times \text{Length} \\ &= L \times L\end{aligned}$$

7. Therefore, the area of the a) rectangle  
= Length x Width  
= 11 x 5  
= 55cm<sup>2</sup> And

8. The area of the b) square

$$= \text{Length} \times \text{Length}$$

$$= 6 \times 6$$

$$= 36 \text{ m}^2$$

9. Tell students to pay special attention to the units.

If the measurements are in cm the area is in  $\text{cm}^2$

If the measurements are in m the area is in  $\text{m}^2$



### CONCLUSION / SUM UP

1. Ask students to recall the definition of the perimeter. Students should mention that the length of the boundary of a shape is called the perimeter. Students should also state that the perimeter of any shape is measured in various units of length such as centimeters and meters. Students should also state the formulas for the perimeter of rectangle and square i.e.

$$\text{Perimeter of rectangle} = 2 \times \text{length} + 2 \times \text{width.}$$

$$\text{The perimeter of the square} = 4 \times \text{length of one side.}$$

2. Ask students to define and explain the area. Students should mention that the definition of area is the surface covered by a shape that can be measured in various square units i.e. in meter square ( $\text{m}^2$ ) and centimeter square ( $\text{cm}^2$ ). Students should also state the formulas for the area of rectangle and square

$$\text{Area of rectangle} = \text{Length} \times \text{Width}$$

$$= L \times W$$

$$\text{Area of square} = \text{Length} \times \text{Length}$$

$$= L \times L$$



### ASSESSMENT

1. Ask students the following questions:

✧ Find perimeter and area of a square whose length is 8 cm

✧ Find perimeter and area of a rectangle whose length is 6m and width is 3m

2. Tell students to solve each part in their notebooks.

3. After students have attempted the questions, tell students to raise their hands to share their answers.

4. Let the other students help as well.

5. The teacher should also guide students.



### HOMEWORK / FOLLOW UP

Assign the relevant questions from the textbook on page 158 in exercise 2.

**AVERAGE****STUDENT LEARNING OUTCOMES**

- Find and describe the average of given quantities in the data.
- Solve real-life problems involving average.

**INFORMATION FOR TEACHERS**

The teacher should know that to find the average of given quantities we first find the sum of the quantities and then divide this sum by the number of quantities:

$$\text{Average} = \frac{\text{Sum of quantities}}{\text{Number of quantities}}$$

**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD****MATERIALS / RESOURCES REQUIRED**

- Board, Marker, Notebooks, Textbooks, Pencils, Measuring Tapes

**INTRODUCTION**

1. Ask students to work in pairs and answer the following question in their notebooks:  
Ibrahim has 5 books. Hareem has 7 books. Qaiser has 12 books.  
How can these books be distributed equally among the three friends?
2. Let students discuss and come up with their answers.
3. Record student responses.
4. Tell students that to find how many books each individual will get, we need to find the **average**.
5. Tell students that the average is the total number of books divided by the total number of people.
6. In the example above, the total number of books is  $5 + 7 + 12 = 24$  and the total number of people is 3.
7. Therefore, the average or the number of books is  $\frac{24}{3} = 8$  books per person.
8. Tell students to note down the formula for average in their notebooks.

$$\text{Average} = \frac{\text{Sum of quantities}}{\text{Number of quantities}}$$



## DEVELOPMENT

### Activity 1:

Write the following numbers on the board:

11, 25, 33, 51, 60.

1. Ask students to find the average of the 5 numbers.
2. Let students discuss in pairs.
3. Ask a volunteer to come to the front of the class and explain what steps are involved to find the average.
4. The teacher should write the steps on the board.
5. Ask other students to also guide the volunteer.
6. Show the correct steps on the board as follows:

Step 1 – Add the numbers

$$11 + 25 + 33 + 51 + 60 = 180$$

Step 2 – Count the numbers

$$5$$

Step 3 – Write the formula for average

$$\frac{\text{sum of quantities}}{\text{No of quantities}}$$

Step 4 – Find the average

$$= 180 / 5 \\ = 36$$

### Activity 2:

1. Divide the students into groups of 5.
2. Provide a measuring tape to each group.
3. Ask the students in a group to measure and record the height of each student in centimeters.
4. Tell students to find the average height of their group in centimeters.
5. Ask groups to come to the front of the class and write their average on the board.
6. The teacher should verify that the calculation is correct for each group.
7. Students should compare and give feedback on the answers of each group.
8. The teacher should walk around the class, monitor and guide students during the activity.



## CONCLUSION / SUM UP

Ask students to explain what the average is with examples. Students should mention that to find the average of given quantities we first find the sum of the quantities and then divide this sum by the number of quantities.

$$\text{Average} = \frac{\text{Sum of quantities}}{\text{Number of quantities}}$$



## ASSESSMENT

1. Write the questions below on the writing board:  
Hashir ate 15 chocolates on Monday, 21 chocolates on Tuesday, and 27 chocolates on Wednesday. On average, how many chocolates did Hashir eat each day?
2. Ask students to answer in their notebooks.

3. The teacher should provide guidance where needed.



## **HOMEWORK / FOLLOW UP**

Assign the relevant questions in the textbook on page 165 in exercise 1.

# ORGANIZE THE DATA USING A BAR GRAPH



## STUDENT LEARNING OUTCOMES

- Organizing the given data using a bar graph.
- Read and interpret a bar graph given in the horizontal and vertical form.
- Draw horizontal and vertical bar graphs for the given data.
- Solve the real-life situation using data presented in a bar graph.

## INFORMATION FOR TEACHERS

Teachers should know how to:

1. Represent data in simple bar graphs; both in horizontal (left to right) and vertical (top to bottom) forms.
2. Represent real-life data like different types of blood types, heights, temperature, etc in bar graphs.



**DURATION / NO OF PERIODS: 35 MINUTES / 1 PERIOD**



## MATERIALS / RESOURCES REQUIRED

- Board, Marker, Notebooks, Textbooks, Worksheet, Charts, Graph Paper.

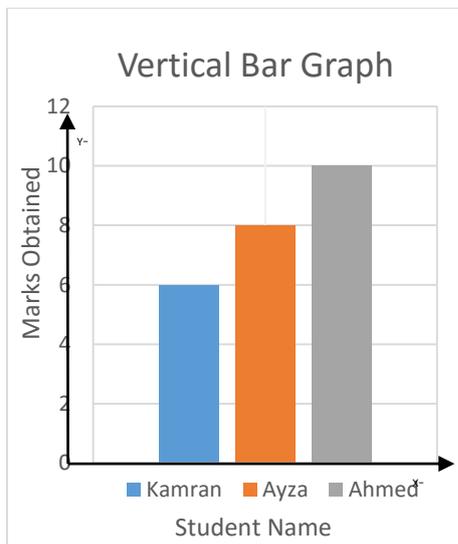


## INTRODUCTION

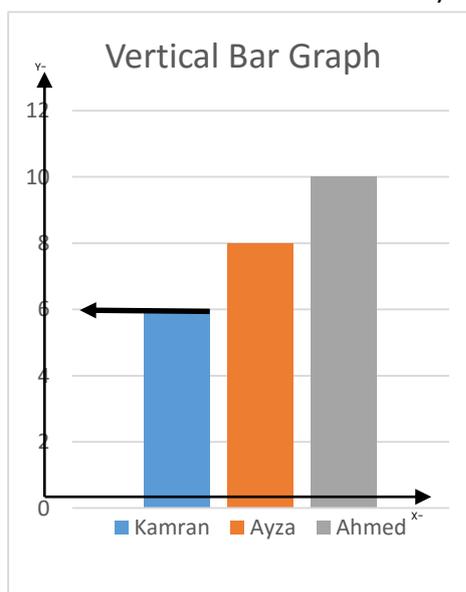
1. Distribute 3 sheets of graph paper to all students at the start of the lesson.
2. Draw the following table on the board.

Student Name	Kamran	Ayza	Ahmed
Marks in a Math Test	6	8	10

3. Divide students into pairs
4. Ask students to represent the data above using a bar graph.
5. Give students a few minutes to attempt the question.
6. Walk around the class to review student work.
7. Paste the following chart on the writing board.  
This chart should be prepared before the lesson.



8. Tell students that the data given in the table has been represented in this **vertical bar graph**.
9. Give students some time to observe and analyze the vertical bar graph.
10. Ask students to discuss in pairs: what does the bar graph represent? What does each bar represent? What do the different heights of the bars represent?
11. Ask students, "Who received the highest marks in the math test? Who received the lowest?"
12. Ask students how many marks did Ayza receive?
13. Take student responses and record them on the board. Share the correct responses with the students through a discussion.
14. Tell students, step by step, how to draw vertical bar graphs.
15. Mark the horizontal line as the X-axis and the vertical line as the Y-axis. Label these axes as well i.e. the X-axis represents Student Name and the Y-axis represents the marks obtained.
16. Write the student names along the X-axis and the marks on the Y-axis. Point out to students that the width of each bar is the same. This is an important point that the teacher must highlight.
17. Each step on the Y-axis represents 2 marks. Students should be told to keep a reasonable step size when drawing vertical or horizontal bar graphs.
18. The blue bar represents the marks obtained by Kamran. Tell students that the top of the blue bar must be aligned with the number of marks obtained by Kamran. See below:



19. Similarly, for Ayza and Ahmed. Their bars should represent the marks obtained by them in the math test.
20. Once again, tell students to pay special attention to the names of the axis. The horizontal axis is called the X-axis. The vertical axis is called the Y-axis.
21. Tell students that in today's lesson they will be learning how to draw, read and interpret vertical and horizontal bar graphs.



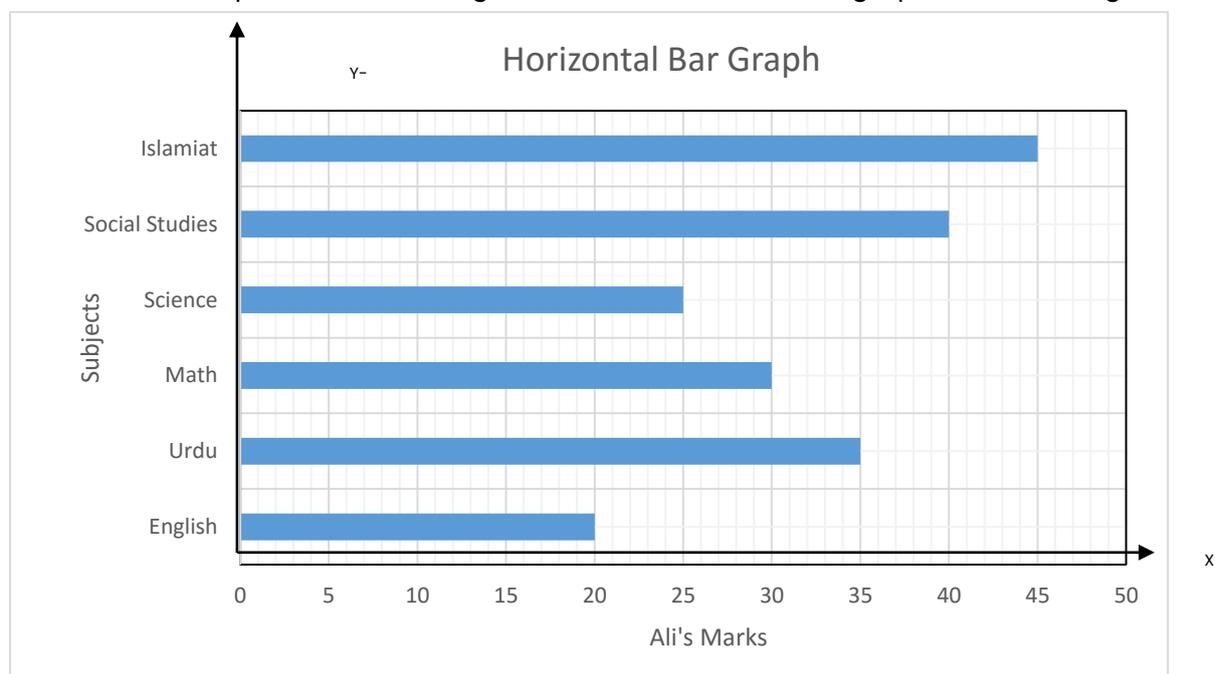
## DEVELOPMENT

### Activity I:

1. Draw the given table on the board.
2. Tell the students that the table shows Ali's marks in different subjects.

Subject	Islamiat	S. Studies	Science	Math	Urdu	English
Marks	45	40	25	30	35	20

3. Divide students into pairs.
4. Tell students to represent the data in a horizontal bar graph.
5. Give students a few minutes to attempt the question.
6. Walk around the class to review student work.
7. After a while, paste the following chart of the horizontal bar graph on the writing board.



8. Mark the horizontal line as the X-axis and the vertical line as the Y-axis.
9. Write "Ali's Marks" along the X-axis and "Subjects" along the Y-axis.
10. Tell students to write what each axis represents.
11. Highlight that the width of each bar, like the vertical bar graph, is the same.
12. Each square on the X-axis represents 1 mark so that one block represents 5.
13. Students should be told to keep a reasonable step size when drawing a bar graph.
14. Give students a few moments to work in pairs and make as many observations about the graph as possible.
15. Ask students to raise their hands to answer the following questions:
  - ✧ How many marks did Ali get in Urdu?
  - ✧ How many marks did Ali get in Social Studies?

- ✧ In which subject did Ali get the most marks?
  - ✧ In which subject did Ali get the least marks?
16. Make sure students participate in the discussion. Guide students to arrive at the correct answers.
17. List down the important steps for the students to follow to make a bar graph
- ✧ Label the X axis and Y axis
  - ✧ Mark the axis with appropriate numbers and determine the step size
  - ✧ Draw a bar for each row/column

### Activity 2:

1. Draw the table given below on the board:

Day Number	Student Attendance at an Event
Day 1	11
Day 2	23
Day 3	29
Day 4	38
Day 5	12

2. Tell students that the table above represents student attendance at a 5-day event.
3. Tell students to work in pairs and attempt the question below in their notebooks.
4. Represent the data given in the table below in a:
- ✧ Vertical Bar Graph
  - ✧ Horizontal Bar Graph
5. The teacher should walk through the class and guide students to draw accurate vertical and horizontal bar graphs.
6. The teacher should display a chart of the correct bar graphs after all pairs have attempted the activity for students' self-assessment.



### CONCLUSION / SUM UP

Ask students how we can represent data in vertical and horizontal bar graphs. Ask them how do we read and interpret bar graphs. Students should highlight that with the help of bar graphs we can easily represent, read and interpret data.

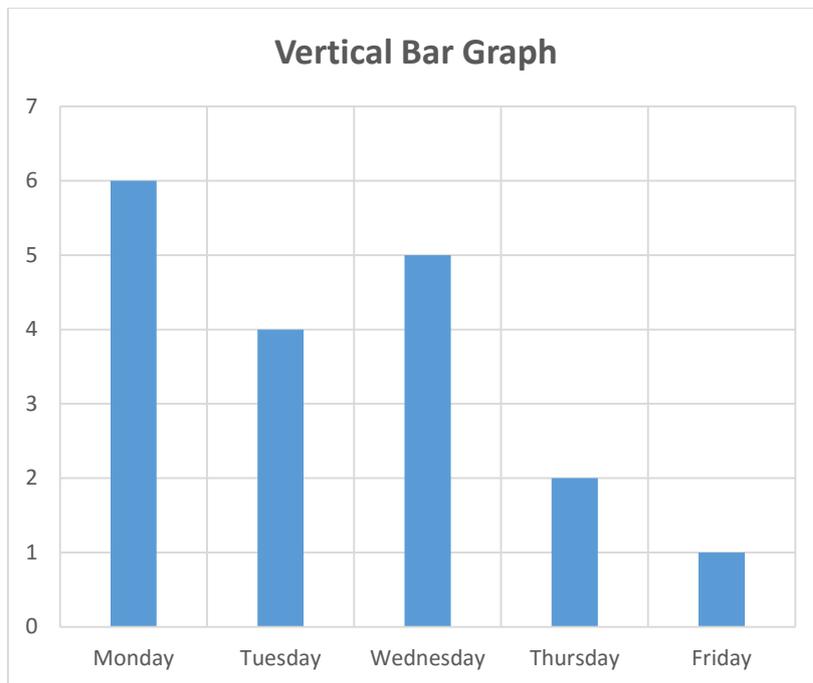


### ASSESSMENT

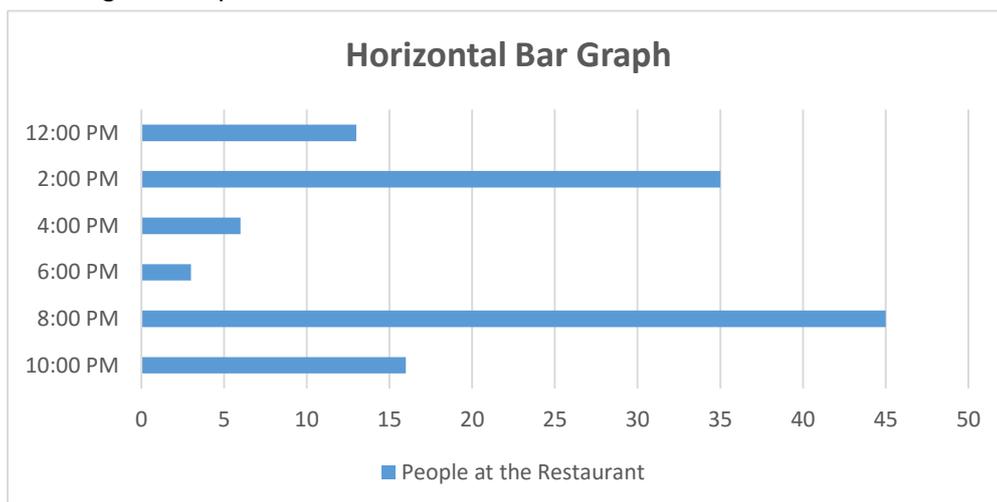
Paste the charts of the following Vertical and Horizontal Bar Graphs on the board.

These charts should be prepared before the lesson.

1. The vertical bar graph represents the distance run every day by Salman in a given week. Answer the questions that follow.



- ❖ What labels, axis, and information should be added to the Vertical Bar Graph?
  - ❖ What is the step size on the vertical axis?
  - ❖ How many km did Salman run on a Wednesday?
  - ❖ Which day did Salman run the most?
  - ❖ Which day did Salman run the least?
  - ❖ What is the total distance Salman ran from Monday to Friday?
2. The horizontal bar graph represents the number of people in a restaurant at different times over a given day.



- ❖ What labels, axis, and information should be added to the Horizontal Bar Graph?
- ❖ At what time were there the fewest people in the restaurant? Approximately how many people were there at this time?
- ❖ At what time are there the most people at the restaurant? Approximately how many people were there at this time?



#### HOMework / FOLLOW UP

- Assign the relevant questions from the textbook on pages 170-172 in exercise 2.

# قومی ترانہ

پاک سرزمین شاد باد      کشور حسین شاد باد  
تو نشان عزم عالی شان      ارض  
مرکز یقین شاد باد      پاکستان!

پاک سرزمین کا نظام      قوت اخوت عوام  
قوم، ملک، سلطنت      تابندہ باد  
شاد باد منزل مراد      پائندہ

پرچم ستارہ و ہلال      رہبر ترقی و کمال  
ترجمان ماضی شانِ حال      جان  
سایہ خدائے ذوالجلال      استقبال!

