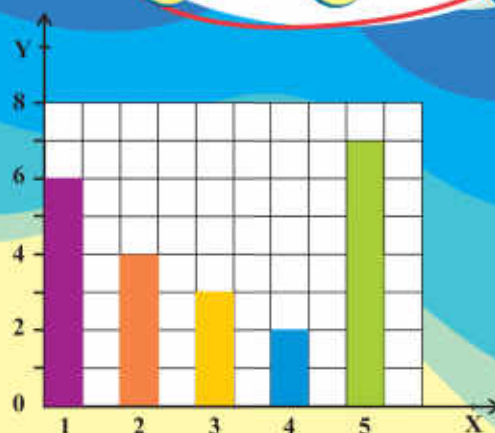
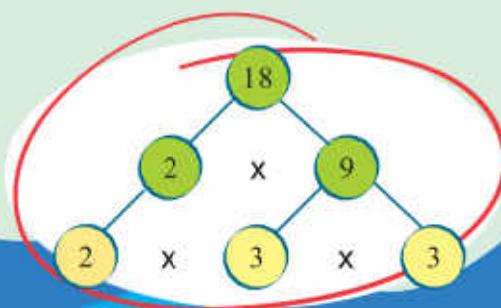


# Mathematics

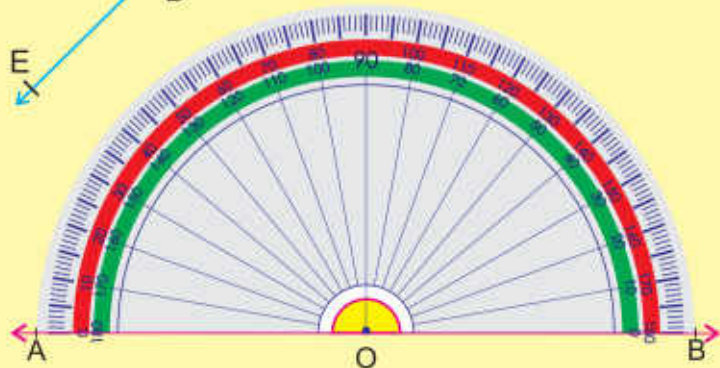
Grade  
**5**

Based on Single National Curriculum 2020  
**One Nation, One Curriculum**

$$\begin{array}{r} 4 \overline{) 495} \\ \underline{-44} \phantom{5} \\ 55 \\ \underline{-55} \\ 0 \end{array}$$



$$\begin{array}{r} 2 \overline{) 12} \\ \underline{-2} \phantom{6} \\ 6 \\ \underline{-6} \\ 0 \end{array}$$



Punjab Curriculum and Textbook Board, Lahore

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

(In the Name of Allah, the Most Compassionate, the Most Merciful)

# Mathematics

## Grade 5

Based on Single National Curriculum 2020

**ONE NATION, ONE CURRICULUM**



**PUNJAB CURRICULUM AND  
TEXTBOOK BOARD, LAHORE**

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## Contents

Sr.No	Unit	Page
1	Whole Numbers and Operations	1
2	HCF and LCM	29
3	Fractions	40
4	Decimals and Percentage	54
5	Distance and Time	83
6	Unitary Method	107
7	Geometry	113
8	Perimeter and Area	145
9	Data Handling	158
10	Answers	171
11	Glossary	178

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# Unit 1

# Whole Numbers and Operations



## Learning Outcomes

After completing this unit, you will be able to:

- Read and write numbers up to 1,000,000 (one million) in words and numerals.
- Add numbers up to 6-digit numbers.
- Subtract numbers up to 6-digits.
- Multiply numbers, up to 5-digits, by 10, 100, and 1 000.
- Multiply numbers, up to 5-digits, by a number up to 3-digits.
- Divide a number up to 5-digits by 10, 100 and 1 000
- Divide numbers up to 5-digits by a number up to 2-digits.
- Solve real-life situations involving operations of addition, subtraction, multiplication, and division.
- 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
- Describe the pattern found in a given table or chart.



The minimum distance between the earth and the moon is about 363 104 km and the maximum distance is about 405 696 km. How will you write these distances in words?



## Numbers up to one Million



According to a 2016 report, there are about 391000 types of plants in the world. How can we write this quantity in words?



The number which is greater than three digits, we leave space after every three digits from the right side of that number i.e. 391 000. We read and write this quantity as "three hundred ninety-one thousand."



### Try Yourself

How many hundreds are there in one hundred thousands?  
How many thousands are there in ten thousands?

Let's write 456 907 in a place value chart.

Second Period			First Period		
Thousands			Ones		
Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
4	5	6	9	0	7

We write,

In numerals: 456 907

In words: Four hundred fifty-six thousand nine hundred seven.



Let's write the place and place value of each digit in this number.



### Try Yourself

Find the place and place value of each digit in 237 112. Also write this number in words.

"4" is at the hundred thousands place, so its place value =  $4 \times 100\ 000 = 400\ 000$   
 "5" is at the ten thousands place, so its place value =  $5 \times 10\ 000 = 50\ 000$   
 "6" is at the thousands place, so its place value =  $6 \times 1\ 000 = 6\ 000$   
 "9" is at the hundreds place, so its place value =  $9 \times 100 = 900$   
 "0" is at the tens place, so its place value =  $0 \times 10 = 0$   
 "7" is at the ones place, so its place value =  $7 \times 1 = 7$



Writing a number as the sum of the place value of its digits is called expanded form.

$$456\ 907 = 400\ 000 + 50\ 000 + 6\ 000 + 900 + 0 + 7$$



### Try Yourself

After Mount Everest, K-2 is the 2nd highest mountain in the world. It is situated in Gilgit Baltistan at the border of Pakistan and China. Its height is 861 100 centimetres.



- Write it in expanded form.
- Write the place value of each digit.
- Write this height in words.



Let's write the place and place value of each digit in 987 516.

"9" is at hundred thousands place, so its place value =  $9 \times 100\ 000 = 900\ 000$

"8" is at ten thousands place, so its place value =  $8 \times 10\ 000 = 80\ 000$

"7" is at thousands place, so its place value =  $7 \times 1\ 000 = 7\ 000$

"5" is at hundreds place, so its place value =  $5 \times 100 = 500$

"1" is at tens place, so its place value =  $1 \times 10 = 10$

"6" is at ones place, so its place value =  $6 \times 1 = 6$



987 516 is read as "Nine hundred eighty-seven thousand five hundred sixteen".

In expanded form, we can write it as:

$$987\ 516 = 900\ 000 + 80\ 000 + 7\ 000 + 500 + 10 + 6$$



Give flash cards of place values written in numerals and words. Write a few numbers on the board and ask the students to tell place value of each digit.





**What number am I?**

I am a 6-digit number. My tens place digit is 5.  
 My ten thousands place digit is 3 less than my tens digit.  
 My ones place digit is the greatest 1-digit even number.  
 My thousands place digit is 3 times my ten thousands place digit.  
 My the greatest place value digit is the sum of my tens place digit and my ten thousands place digit.  
 My hundreds place digit is the ones digit of the smallest 2-digit number.

999 999 is the greatest 6-digit number.

If we add 1 more to it, we get one million (1 000 000) which is the smallest 7-digit number.

We can write this number with the help of a place value chart as shown below.



Third Period			Second Period			First Period		
Millions			Thousands			Ones		
Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
			9	9	9	9	9	9
		1	0	0	0	0	0	0

**Exercise 1**

1. Write the following numbers in words:

- a) 290 014
- b) 433 453
- c) 910 009
- d) 871 653
- e) 242 140
- f) 688 069
- g) 874 454
- h) 495 523

2. Write the following numbers in expanded form:

- a) 131 441
- b) 600 900
- c) 949 181
- d) 466 456
- e) 286 019
- f) 479 321
- g) 510 602
- h) 202 001



Divide the students in groups and ask them to make a 6-digit number. Then ask them to tell the place and place value of each digit.



3. Match column A with column B.

Column A	Column B
a) Eight hundred seven thousand eight hundred.	808 808
b) Two hundred seventy-eight thousand seventy-eight.	206 002
c) Eight hundred eight thousand eight hundred eight	807 800
d) Two hundred seven thousand five hundred five	278 078
e) Two hundred six thousand two	207 505

4. Write the place and place value of the coloured digits.

- |            |            |            |            |
|------------|------------|------------|------------|
| a) 545 445 | b) 846 532 | c) 682 456 | d) 980 714 |
| e) 997 924 | f) 425 419 | g) 817 656 | h) 701 232 |

5. According to 2017 census, the population of Islamabad is 114 825.

- Write it in words.
- Write it in expanded form.
- Write the place of each digit in it.

6. The speed of light in vacuum is 299 792 kilometres per second.

- Write it in words.
- Write it in expanded form.
- Write the place of each digit in it.

## Addition and Subtraction

### Addition

After the construction of a new national hospital, 40 655 beds were arranged during the first month. In the second month, 32 263 more beds were arranged. Find the total number of beds arranged in two months.



By adding the two quantities, we can find the total number of beds.

		T.th	Th	H	T	O
Number of beds in the first month =		4	0	6	5	5
Number of beds in the second month =	+	3	2	2	6	3
Total beds =		7	2	9	1	8

Total number of beds arranged = 72 918



### Try Yourself

Add 567 098 and 381 940.

There are 124 789 Mathematics books and 200 699 English books in a library. Find the total number of Mathematics and English books.



		H.th	T.th	Th	H	T	O
Mathematics books	=	1	2	4 <sup>①</sup>	7 <sup>①</sup>	8 <sup>①</sup>	9
English books	= +	2	0	0	6	9	9
Total books	=	3	2	5	4	8	8

Total number of books = 325 488

Add 293 109 and 625 834.

	H.th	T.th	Th	H	T	O
	2 <sup>①</sup>	9	3	1	0 <sup>①</sup>	9
+ 625 834	6	2	5	8	3	4
	9	1	8	9	4	3



**Try Yourself**

Find the sum of the smallest and the greatest 6-digit numbers.

**Subtraction**

During a tree planting campaign, 554 876 trees were planted in March. In April, 263 755 trees were planted. Find:

- a) In which month more trees were planted?
- b) How many more trees were planted?



		H.th	T.th	Th	H	T	O
Trees planted in March	=	5 <sup>④</sup>	5 <sup>⑩</sup>	4	8	7	6
Trees planted in April	= -	2	6	3	7	5	5
Difference	=	2	9	1	1	2	1



**Try Yourself**

Make any two 6-digit numbers. Then find their difference.

- a) More trees were planted in March.
- b) 291 121 more trees were planted.



A toy factory manufactured 598 248 toys out of which 446 719 toys are of plastic. How many toys are non-plastic toys?



To find the number of non-plastic toys, we will subtract 446 719 from 598 248.

	H.th	T.th	Th	H	T	O
Total toys =	5	9	<del>8</del> <sup>10</sup>	2	<del>4</del> <sup>10</sup>	8
Plastic toys = -	4	4	6	7	1	9
Non-plastic toys =	1	5	1	5	2	9

The number of non-plastic toys = 151 529

Subtract 289 344 from 760 862.

H.th	T.th	Th	H	T	O
<del>7</del> <sup>10</sup>	<del>6</del> <sup>10</sup>	0	8	<del>5</del> <sup>10</sup>	2
- 2	8	9	3	4	4
4	7	1	5	1	8



**Try Yourself**

Find the difference of the smallest 6-digit number and the greatest 5-digit number.



Write the digits from 0-9 on the board and ask the students to make two 6-digit numbers. Then ask them to subtract the smaller number from the greater number.



## Exercise 2

1. Add the following:

- a)  $100\ 700 + 291\ 562$    b)  $417\ 381 + 309\ 201$    c)  $591\ 727 + 702\ 929$   
d)  $319\ 898 + 428\ 888$    e)  $766\ 442 + 611\ 222$    f)  $542\ 001 + 621\ 416$

2. Subtract the following:

- a)  $209\ 856 - 205\ 660$    b)  $788\ 991 - 206\ 070$    c)  $395\ 108 - 165\ 439$   
d)  $673\ 265 - 656\ 600$    e)  $686\ 898 - 333\ 333$    f)  $744\ 762 - 565\ 656$

3. Sadia bought a plot for Rs 659 814 and another plot for Rs 799 999. Find the total amount she spent.
4. Amaan has an annual income of Rs. 456 750. He spends Rs 125 295 on the construction of a Masjid. How much amount is he left with?
5. Lahore has a population of 459 814 in one town and 325 919 in the other.
- a) What is the total population of both the towns?  
b) What is the difference between their population?
6. The annual yield of mango orchard is 656 565 kg. In the second year, the yield of mango orchard decreased by 100 984 kg. How much mangoes were produced in the second year?
7. The government built 386 655 houses for the homeless in one year. The second year 24 521 fewer homes were built than the previous year. How many houses did the government build in both the years?
8. Fatima has Rs 954 888 in her bank account. If she withdraws Rs 135 600 from the bank to buy a laptop, how much money is she left with?
9. A factory owner gave Rs 448 870 as reward to his employees in one year. In the second year Rs 437 995 were given as reward.
- a) What is the total amount given as reward in both the years?  
b) In which year the factory owner gave less reward and how much less?
10. Farhan donates Rs 600 000 to two Edhi organizations. If he pays Rs 385 990 to one Edhi organization, how much will he pay to the other organization?



## Multiplication and Division

### Multiplication

If the price of a solar panel is Rs 18 250, then find:

- the price of 10 panels.
- the price of 100 panels.
- the price of 1 000 panels.



To find the price of 10, 100 and 1 000 panels, we multiply the price of one panel by 10, 100 and 1 000 respectively.

$$\text{Price of 10 panels} = 18\,250 \times 10 = \text{Rs } 182\,500$$

$$\text{Price of 100 panels} = 18\,250 \times 100 = \text{Rs } 1\,825\,000$$

$$\text{Price of 1 000 panels} = 18\,250 \times 1000 = \text{Rs } 18\,250\,000$$



#### Key Fact

- When we multiply a whole number by 10, we put one zero to its right.
- When we multiply a whole number by 100, we put two zeros to its right.
- When we multiply a whole number by 1 000, we put three zeros to its right.





Let's Multiply 34 523 by 10, 100 and 1 000.

$$34\ 523 \times 10 = 345\ 230$$

$$34\ 523 \times 100 = 3\ 452\ 300$$

$$34\ 523 \times 1\ 000 = 34\ 523\ 000$$



**Try Yourself**

Find the product of:

- a)  $100 \times 100 = ?$
- b)  $1\ 000 \times 100 \times 10 = ?$
- c)  $1\ 000 \times 10 = ?$



The price of a laptop is Rs 102 900. How much does 215 such laptops cost?



To find the price of 215 such laptops, we will multiply the cost of 1 laptop by 215 i.e. 102 900 by 215.



Price of 1 laptop	=	1	0	2	9	0	0					
Number of laptops	=	×			2	1	5					
				5	1	4	5	0	0	→	102900 × 5	
			1	0	2	9	0	0	0	→	102900 × 10	
		+	2	0	5	8	0	0	0	0	→	102900 × 200
Total cost	=	2	2	1	2	3	5	0	0			

The cost of 215 laptops = Rs 22 123 500



**Try Yourself**

Multiply the greatest 6-digit number by the greatest 3-digit number.  
 Multiply the smallest 6-digit number by the smallest 3-digit number.

A company buys 185 motorbikes. If the cost of one motorbike is Rs 79 459, what will be the total cost of 185 such motorbikes?

To find the cost of 185 motorbikes, we will multiply 79 459 by 185.



Price of 1 motorbike =		7	9	4	5	9
Total motorbikes =	×			1	8	5
				3	9	7 2 9 5
				6	3	5 6 7 2 0
	+			7	9	4 5 9 0 0
Total cost =		1	4	6	9	9 9 1 5



The cost of 185 motorbikes = Rs 14 699 915

Find the product of 23 678 and 32.

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

$32 \times 23\,678 = 757\,696$

Find the product of 60 392 and 425.

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

$425 \times 60\,392 = 25\,666\,600$



Explain the method of multiplication of 5-digit numbers by 3-digit numbers. Ask the students to write few 5-digit and 3-digit numbers on their notebooks and find the product.





First write both numbers in their expanded form.

$$243 = 200 + 40 + 3$$

$$21 = 20 + 1$$

Now write one number horizontally and the other one vertically in grid as shown in the table.

×	200	40	3
20			
1			

Now multiply every digit in horizontal grid by every digit in vertical grid one by one.

×	200	40	3	
20	4000	800	60	4860
1	200	40	3	243
	4200	840	63	5103

Finally, add the resulting products (in blue grids). This will give us the product of 243 and 21.

$$4\ 000 + 800 + 60 + 200 + 40 + 3 = 5\ 103$$

So, there are 5 103 apple trees altogether in the farm.



**Try Yourself**

Find the product of 5 623 and 418 using box method.



Explain the box or grid method of multiplication to the students by multiplying various numbers.



## Division

A mask manufacturing factory produced 45 000 masks which are to be packed in boxes of three different sizes. Find the number of boxes required if:

- a small box has 10 masks in it.
- a medium box has 100 masks in it.
- a large box has 1 000 masks in it.



To find the required number of boxes, we will divide the total number of masks by 10, 100 and 1 000 respectively.

Required number of small boxes having 10 masks each =  $45\ 000 \div 10 = 4\ 500$  boxes

Required number of medium boxes having 100 masks =  $45\ 000 \div 100 = 450$  boxes

Required number of large boxes having 1 000 masks =  $45\ 000 \div 1\ 000 = 45$  boxes



### Key Fact

- When we divide a non-zero whole number having 0 at its ones place by 10, we remove one zero from its right.
- When we divide a non-zero whole number having 0 at its ones and tens place by 100, we remove two zeros from its right.
- When we divide a non-zero whole number having 0 at its ones, tens and hundreds place by 1 000, we remove three zeros from its right.



Explain the method of dividing a 5-digit number by 10, 100 and 1 000. Ask the students to write a few 5-digit numbers which have zeros at their ones, tens and hundreds places. Then ask them to divide these numbers by 10, 100 and 1 000.



Let's divide 76 000 by 10, 100 and 1 000.

$$76\ 000 \div 10 = 7\ 600$$

$$76\ 000 \div 100 = 760$$

$$76\ 000 \div 1\ 000 = 76$$



I have saved Rs 16 620 from my pocket money. I want to distribute this amount among 12 children. How can I find the amount each child will get?



To find the amount each child will get, we will divide 16 620 by 12.



**Key Fact**

When a number is divided by another number, the result is called the quotient and the left over quantity is called the remainder.

		1 3 8 5						
Quotient	←		1 2		1 6 6 2 0	→	Dividend	
Divisor	←		1 2		- 1 2	→		
					-----			
					4 6			
					- 3 6			
					-----			
					1 0 2			
					- 9 6			
					-----			
					6 0			
					- 6 0			
					-----			
					0	→	Remainder	



**Try Yourself**

Shahzad equally divided Rs 34 760 among 21 needy people. How much amount did each person get? Also find the remaining amount.

So, each child will get = Rs 1 385.

$$16\ 620 \div 12 = 1\ 385$$

$$\text{Quotient} = 1\ 385$$



For Pakistan Day celebrations, 10 125 students participated from all over the country. If groups of 95 students are to be made, then find:

- a) how many groups can be made?
- b) find the number of un-grouped students.
- c) if 720 students cannot participate due to some reason, then how many groups can be made?



To find the number of groups, we will divide the number of students by 95.

$$\begin{array}{r}
 106 \\
 95 \overline{) 10125} \\
 \underline{- 95} \phantom{0} \\
 62 \phantom{0} \\
 \underline{- 0} \phantom{0} \\
 625 \\
 \underline{- 570} \\
 55
 \end{array}$$



**Try Yourself**

If 532 more students participated, then how many groups will be made?

$$10\,125 \div 95 = 106 \text{ r } 55$$

Quotient = 106, Remainder = 55

- a) Number of groups = 106
- b) Un-grouped students = 55

If 720 students cannot participate, then the number of remaining students can be found by subtracting 720 from 10 125. Then divide this amount by 95.

$$10\,125 - 720 = 9\,405$$

Now, we will divide this quantity by 95 to find the number of groups.

$$9\,405 \div 95 = 99$$

c) So, 99 groups can be made.

$$\begin{array}{r}
 99 \\
 95 \overline{) 9405} \\
 \underline{- 855} \phantom{0} \\
 855 \\
 \underline{- 855} \\
 0
 \end{array}$$

Divide 45 205 by 74. Also find the quotient and remainder.

$$\begin{array}{r}
 610 \\
 74 \overline{) 45205} \\
 \underline{-444} \phantom{0} \\
 80 \phantom{0} \\
 \underline{-74} \phantom{0} \\
 65 \phantom{0} \\
 \underline{-65} \\
 0
 \end{array}$$

$$45\,205 \div 74 = 610 \text{ r } 65$$

Quotient = 610, Remainder = 65



### Exercise 3

1. Multiply the following numbers by 10, 100 and 1 000:

- a) 381    b) 4 090    c) 97 509    d) 69 472    e) 52 118

2. Divide the following numbers by 10, 100 and 1 000:

- a) 49 000    b) 78 000    c) 65 000    d) 97 000    e) 21 000

3. Multiply the following numbers:

- a)  $624 \times 23$     b)  $2\,456 \times 90$     c)  $1\,092 \times 981$     d)  $78\,543 \times 49$   
 e)  $45\,201 \times 561$     f)  $11\,256 \times 342$     g)  $90\,902 \times 643$     h)  $56\,219 \times 101$



Explain the method of division of 5-digit number by 2-digit number. Ask the students to write a few 5-digit and 2-digit numbers on their notebooks and divide them.



4. Divide the following numbers:
- a)  $13\ 440 \div 15$    b)  $86\ 449 \div 29$    c)  $32\ 536 \div 56$    d)  $47\ 088 \div 48$   
e)  $56\ 780 \div 20$    f)  $26\ 166 \div 98$    g)  $73\ 810 \div 11$    h)  $64\ 454 \div 32$
5. Aliya has Rs 22 580. She wants to distribute them among 18 needy people. Find:
- a) how much money will each person get?  
b) how much money will be left?
6. Omar's monthly income is Rs. 13 582. Find out his total income in 134 months.
7. A toy factory manufactures 28 550 toys in 25 days. How many toys will it manufacture in a day?
8. A poultry farm sells 76 012 eggs in a day. How many eggs will poultry farm sell in 56 days?
9. A laptop costs Rs 89 710. If Hammad buys 10 such laptops, how much amount will he need?
10. There are 145 boxes of pencils in one shop. Each box has 5 pencils. If 48 boxes are of blue pencils and the rest are of red pencils, then find:
- a) the total number of pencils.  
b) the number of red pencils.

### Number Patterns



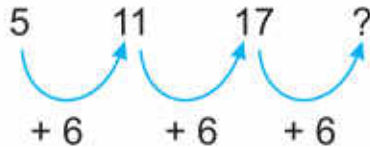
This week, Arham has started exercising. He increased his exercise time gradually. He exercised for 5 minutes on Monday, 11 minutes on Tuesday and 17 minutes on Wednesday. If he keeps increasing the time in the same manner, for how many minutes will he exercise on Thursday?



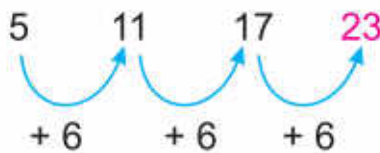
First write the given values (duration/minutes) in sequence.

5, 11, 17, \_\_\_\_\_

Now try to find out a rule in it. Observe that time is increasing by 6 minutes everyday.



It means by adding 6 to 17, we will get the next number.



So, on Thursday Arham will exercise for 23 minutes.



### Key Fact

The rule of a number pattern tells us how the next number in the pattern is obtained.

We observed that the duration of Arham's exercise is increasing in a pattern whose rule is: Adding 6 minutes. So, this is addition pattern in which every next number is obtained by adding 6 to the previous number. It is called arithmetic sequence.



Look at this number pattern:

4, 12, 20, 28, 36, ...

- find its rule.
- find the next three terms.

If we look at the terms of this pattern, we see that by adding 8 to 4, we get 12. It means this is addition pattern.

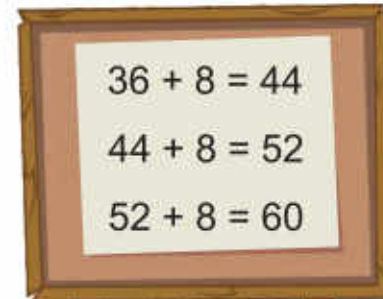



Divide the students in 2 groups. Ask each group to make at least 5 patterns. Then exchange these patterns with other groups and ask them to identify the rules of the pattern.





So, this is addition pattern in which every next number is obtained by adding 8 to the previous number.



 **Try Yourself**

Identify the rule for this pattern and find the next three terms. 52, 47, 42,

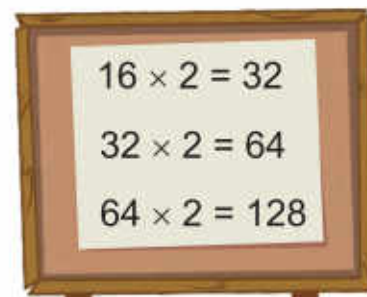
So, the next three terms are:

44, 52, 60

Now, observe this pattern. Identify the rule for this pattern and find the next three terms.



If we observe the terms of this pattern, we see that every next number is obtained by multiplying the previous number with 2. It means its a multiplication pattern.



So, its a multiplication pattern in which every next number is obtained by multiplying the previous number by 2.

Rule of the pattern: Multiplying by 2

So, its next 3 terms will be:

32, 64, 128



**Try Yourself**

Ahad planted a plant in the pot. He observed that the height of the plant is increasing by 4 cm daily. If on Monday the height of plant was 12 cm, find on which day the plant will be 36 cm high?

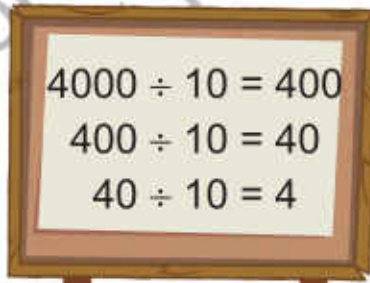
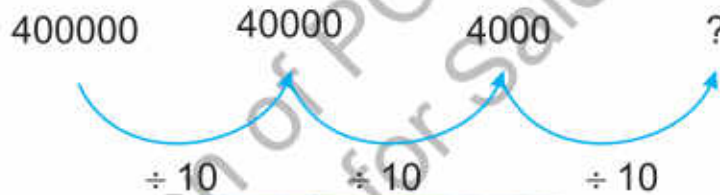


Look at this number pattern:

400 000, 40 000, 4 000, ...

- Find its rule.
- Find the next three terms.

If we look at the terms of this pattern, we see that by dividing 400000 by 10, we get 40000 and by dividing 40000 by 10, we get 4000. It means this is division pattern.



Rule of pattern: dividing by 10.

So, its next 3 terms will be:

400, 40, 4



**Try Yourself**

Identify if this pattern is increasing or decreasing and then find the next three terms.

60, 600, 6 000, 60 000, \_\_\_\_, \_\_\_\_, \_\_\_\_





We can also find patterns in a chart or table.  
Observe the given hundreds chart:

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

By starting at 10, we can see that in the pattern being made in coloured boxes, every next number is obtained by adding 9 to the previous one.

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

By starting at 100, we can see that in the pattern being made in coloured boxes, every next number is obtained by subtracting 11 from the previous one.



**Try Yourself**

Observe the hundreds chart and find 3 patterns of various arithmetic operations. Also identify the rules for the patterns.



Divide the students in groups. Ask each group to create a table of patterns. Then ask the other groups to identify the rules of the patterns given in the table.



Munir has made a table showing the number of chocolate packets and the number of chocolates in each packet. What is the rule of the pattern found in his table?



No. of packets	No. of chocolates
1	$9 \times 1 = 9$
2	$9 \times 2 = 18$
3	$9 \times 3 = 27$
4	$9 \times 4 = 36$
5	$9 \times 5 = 45$
6	$9 \times 6 = 54$

Rule of pattern: Multiplying the numbers of packets by '9'



### Try Yourself

Identify the rules of these pattern and also find the next three terms.

a) 3, 6, 12, 24, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

b) 5, 7, 10, 14, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

c) 100, 96, 91, 85, 78, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

d) 8, 80, 800, 8 000, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

e) 900 000, 90 000, 9 000, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.





## Exercise 4

1. Identify the rules of this patterns and also find the next 3 terms.

a) 10, 40, 160, 640, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

b) 22, 220, 2200, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

c) 352, 176, 88, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

d) 780, 880, 980, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

e) 560, 540, 520, 500, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

2. Observe the given hundreds chart and identify at least 5 patterns of various arithmetic operations. Also find the rules of these patterns.

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

3. Observe the given tables and find the rules of the pattern.

a)

Position	Term
12	4
15	5
18	6
21	7
24	8

b)

Position	Term
7	12
17	22
27	32
37	42
47	52

c)

Position	Term
20	11
31	22
42	33
53	44
64	55

d)

Position	Term
50	100
100	200
150	300
200	400
250	500
300	600

**I Have Learnt to:**



- 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.
- add numbers up to 6-digit numbers.
- subtract numbers up to 6-digits numbers.
- multiply numbers up to 5-digits, by 10, 100, and 1 000.

#### Vocabulary

- Numbers
- Digit
- Place value
- Addition
- Subtraction
- Multiply
- Division
- Pattern
- Ascending
- Descending
- Table
- Chart



- multiply numbers up to 5-digit by a number up to 3-digit.
- divide a number up to 5-digit by 10, 100 and 1 000.
- divide numbers up to 5-digit by a number up to 2-digit.
- solve real-life situations involving operations of addition, subtraction, multiplication and division.
- 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.
- describe the pattern found in a given table or chart.

### Review Exercise



1. Choose the correct options and fill in the blanks.

(a) We put space after every \_\_\_\_\_ digits in numbers.

- (i) 2      (ii) 3      (iii) 4      (iv) 16

(b) The place value of 2 in the number 985 621 is \_\_\_\_\_.

- (i) 2      (ii) 20      (iii) 200      (iv) 2 000

(c) In 856 211, the digit \_\_\_\_\_ is at thousands place.

- (i) 2      (ii) 5      (iii) 6      (iv) 8

(d) When we multiply a number by \_\_\_\_\_, we put 3 zeros to the right side.

- (i) 10      (ii) 100      (iii) 1 000      (iv) 1

(e) When we divide a number by \_\_\_\_\_ we remove one zero from the right side.

- (i) 10      (ii) 100      (iii) 1 000      (iv) 1

2. Write the following numbers in words:

- (a) 734 123      (b) 965 129      (c) 982 009      (d) 912 011

3. Solve the following:

- (a)  $212\ 121 + 56\ 234$     (b)  $18\ 315 + 102\ 376$     (c)  $727\ 191 + 92\ 921$   
(d)  $139\ 657 + 247\ 777$     (e)  $532\ 481 + 100\ 008$     (f)  $200\ 454 + 126\ 654$

4. Solve the following:

- (a)  $675\ 921 - 31\ 412$     (b)  $986\ 543 - 65\ 219$     (c)  $108\ 761 - 70\ 021$   
(d)  $846\ 109 - 591\ 089$     (e)  $865\ 439 - 761\ 212$     (f)  $696\ 349 - 288\ 888$

5. Solve the following:

- (a)  $12\ 356 \times 122$       (b)  $65\ 781 \times 100$   
(c)  $62\ 825 \times 522$       (d)  $37\ 564 \times 519$

6. Solve the following:

- (a)  $66\ 693 \div 33$       (b)  $35\ 788 \div 42$       (c)  $25\ 111 \div 69$   
(d)  $28\ 000 \div 1\ 000$     (e)  $58\ 580 \div 10$       (f)  $28\ 104 \div 28$

7. What are the rules for these patterns? Also find the next three terms of each pattern.

(a) 50, 100, 150, 200, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

(b) 180, 165, 150, 135, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

(c) 18, 90, 450, 2 250, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

(d) 6 100 000, 610 000, 61 000, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.



8. Find the patterns in the given arithmetic sentences and complete them.

a)  $10 \times \underline{\quad} = 10$   
 $10 \times \underline{\quad} = 100$   
 $10 \times \underline{\quad} = 1\ 000$   
 $10 \times \underline{\quad} = 10\ 000$

b)  $\underline{\quad} \div 10 = 1\ 000$   
 $\underline{\quad} \div 100 = 100$   
 $\underline{\quad} \div 1\ 000 = 10$   
 $\underline{\quad} \div 10\ 000 = 1$

9. The price of a shop is Rs 456 721 and the price of a flat is Rs 987 676. Find the total price of the shop and the flat.
10. There are 768 121 children and 456 789 women in the City. How many more children are there than the women?
11. The price of a scanner is Rs 62,900 and the price of a laser printer is Rs 96 880. Find:  
 a) the total price of both items  
 b) the total price of 15 scanners and 3 laser printers.
12. 35 288 blocks are to be packed in 28 boxes. Find:  
 a) how many blocks are there in each box?  
 b) how many blocks will be left?  
 c) how many blocks will be there in 555 remaining boxes?
13. Observe the given tables and find the rules of patterns given in them.

a)

Position	Term
40	2
80	4
120	6
160	8

b)

Position	Term
1	10
2	20
3	30
4	40

# Unit 2

## HCF and LCM

### Learning Outcomes

After completing this unit, you will be able to:

- Find HCF of
  - two numbers up to 2-digit numbers
  - three numbers up to 2-digit numbers
- using prime factorization method and division method
- Find LCM of
  - two numbers up to 2-digit numbers
  - three numbers up to 2-digit numbers
  - using prime factorization method and division method
- Solve real life situations involving HCF and LCM.

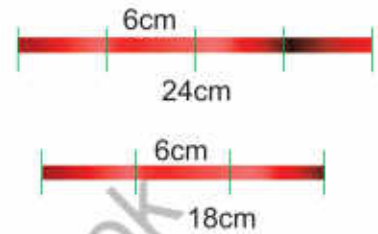
*S* Nida wants to plant 12 rose plants and 18 jasmine plants in rows in her home garden. If she wants to plant the same type of plant in one row, find the maximum number of plants that can be grown in one row.



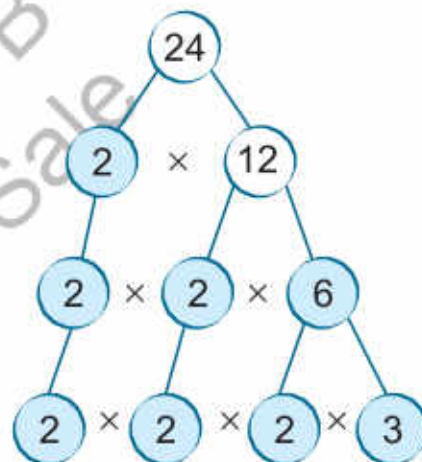
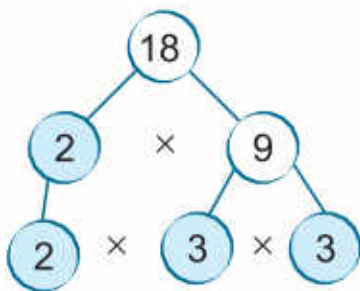
## Highest Common Factor (HCF)



Sara has two pieces of ribbon whose lengths are 18 cm and 24 cm respectively. She wants to cut the ribbon into smaller pieces of equal length without any ribbon left. What will be the greatest possible length of each piece?



To cut both ribbons in equal lengths, we need to find the greatest number which can divide both 18 and 24 simultaneously.



Prime factorization of 18 =  $2 \times 3 \times 3$

Prime factorization of 24 =  $2 \times 3 \times 2 \times 2$

Common prime factors of 18 and 24 = 2, 3

product of common prime factors of 18 and 24 =  $2 \times 3 = 6$

6 is the greatest factor which divides both 18 and 24 completely.

6 is called the HCF of 18 and 24.

So, the greatest possible length of each piece will be 6cm.



### Key Fact

The greatest number which divides 2 or more given numbers simultaneously is called their HCF.



Give ropes of different lengths to the students. Ask them to divide the pieces of ropes into equal lengths.



Let's find the HCF of 12, 30 and 44 by using prime factorization.

$$\begin{array}{r|l} 2 & 12 \\ \hline 2 & 6 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 30 \\ \hline 3 & 15 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 44 \\ \hline 2 & 22 \\ \hline 11 & 11 \\ \hline & 1 \end{array}$$

Prime factorization of 12 =  $2 \times 2 \times 3$

Prime factorization of 30 =  $2 \times 3 \times 5$

Prime factorization of 44 =  $2 \times 2 \times 11$

Common prime factor = 2

$$\text{HCF} = 2$$



Hammad has 36 red pencils and 54 blue pencils. He wants to put these pencils in boxes such that every box has equal number of pencils of the same colour. What will be the maximum number of pencils in each box?



For this we will find the HCF of 36 and 54 by using division.

- (i) Divide the greater number 54 by the smaller number 36 and find the remainder.
- (ii) By dividing 36 by the remainder 18 will get zero as remainder.



$$\begin{array}{r} 1 \\ 36 \overline{) 54} \\ \underline{-36} \quad 2 \\ 18 \overline{) 36} \\ \underline{-36} \\ 0 \end{array}$$

(iii) The last divisor is 18. So, it is the HCF of 36 and 54.

$$\text{HCF of 36 and 54} = 18$$

The maximum number of pencils of same colour in each box will be 18.

I want to find out the greatest number which completely divides 26, 48 and 60.



First divide the greatest number 60 by 48.

$$\begin{array}{r} 1 \\ 48 \overline{) 60} \\ \underline{-48} \quad 4 \\ \textcircled{12} \overline{) 48} \\ \underline{-48} \\ 0 \end{array}$$



**Key Fact**

The HCF of two or more than two numbers, which have no common prime factor, is always 1.

HCF of 48 and 60 is 12  
Now, divide 26 by 12.

$$\begin{array}{r} 2 \\ 12 \overline{) 26} \\ \underline{-24} \quad 6 \\ \textcircled{2} \overline{) 12} \\ \underline{-12} \\ 0 \end{array}$$

**Try It!**



Find three 2-digit numbers whose sum is 152 and whose HCF is 8.

The number 2 is the last divisor. So, this is the greatest number which completely divides 26, 48 and 60.



**Exercise 1**

1. Find the HCF of the following numbers by using prime factorization method:

- |               |               |               |               |
|---------------|---------------|---------------|---------------|
| a) 58, 72     | b) 21, 48     | c) 56, 70     | d) 45, 90     |
| e) 42, 49     | f) 15, 18, 56 | g) 42, 54, 64 | h) 18, 30, 90 |
| i) 12, 24, 36 | j) 18, 36, 76 | k) 5, 35, 40  | l) 13, 52, 78 |

2. Find the HCF of the following numbers by using division method:

- |               |               |               |               |
|---------------|---------------|---------------|---------------|
| a) 13, 65     | b) 25, 75     | c) 42, 98     | d) 16, 20, 70 |
| e) 56, 84, 88 | f) 57, 76, 95 | g) 16, 32, 96 | h) 20, 40, 80 |
| i) 48, 76, 96 | j) 24, 48, 72 | k) 51, 65, 75 | l) 13, 39, 78 |



3. The lengths of the two ropes are 24 metres and 14 metres respectively. If Ali wants to cut the ropes into pieces of equal length without any rope left, find out what will be the maximum length of each piece?

4. For the Independence Day celebrations, 52 students in white dress, 65 students in green dress and 39 students in blue dress are to be arranged in equal rows in such a way that students of one colour dress will be in each row. What is the greatest number of students that could be in each row?



5. Find the greatest number that divides 16, 24 and 48 completely.

6. Ibrahim and Mehwish are preparing first aid kits for the students. They have 30 perforated adhesive bandages, 60 triangular bandages and 75 rectangular bandages. They must distribute these equally in the kits, with nothing left over. What is the greatest number of kits they can be made with this quantity of bandages?



## Least Common Multiple (LCM)



For a Science project preparation, grade 4 students visit the science laboratory after every 8 days. While grade 5 students visit the laboratory after every 12 days. If the students of both grades visited the laboratory today, find out when will they again visit the laboratory on the same day?



### Method-1

Multiples of 8 and 12 will be used to find the day when the students of both grades will visit the laboratory on the same day.

Multiples of 8 are: 8, 16, 24, 32, 40, 48, ...

Multiples of 12 are: 12, 24, 36, 48, ...

The first two common multiples of 8 and 12 are 24, 48.

The smallest common multiples of 8 and 12 is 24.

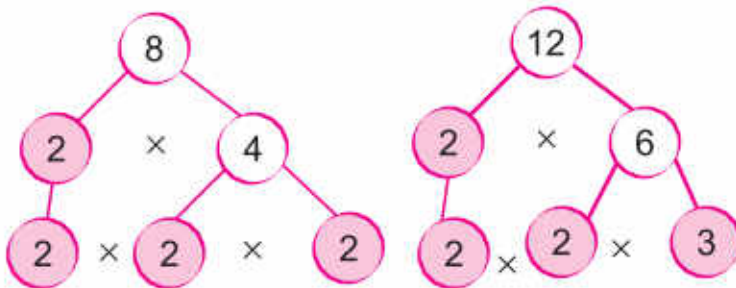


24 is called the least common multiple of 8 and 12.

So, the students of both grades will visit the laboratory together on the 24<sup>th</sup> day.

**Method-2**

Now, we will find the LCM of 8 and 12 by using prime factorization.



**Key Fact**

When we multiply any number by any other number, their product is called multiple of both numbers.

Prime factorization of 8 =  $2 \times 2 \times 2$

Prime factorization of 12 =  $2 \times 2 \times 3$

Common prime factors 8 and 12 = 2, 2

Non-common prime factors 8 and 12 = 2, 3

$$\text{LCM} = \left[ \text{Product of two or more than two common prime factors} \right] \times \left[ \text{Product of two or more than two non-common prime factors} \right]$$

LCM =  $(2 \times 2) \times (2 \times 3)$

LCM =  $4 \times 6 = 24$



**Key Fact**

The LCM of two or more numbers is the smallest number which is completely divisible by the given numbers.

So, next time students of both grades will visit the laboratory together on 24<sup>th</sup> day.



Write pairs of numbers on the writing board. Ask the students to find the first two common multiples of these numbers.

Let's find out the LCM of 16, 30 and 64 by using prime factorization.

2	16
2	8
2	4
2	2
	1

2	30
3	15
5	5
	1

2	64
2	32
2	16
2	8
2	4
2	2
	1

Prime factorization of 16 =  $2 \times 2 \times 2 \times 2$

Prime factorization of 30 =  $2 \times 3 \times 5$

Prime factorization of 64 =  $2 \times 2 \times 2 \times 2 \times 2 \times 2$

Common prime factors of 16, 30 and 64 =  $2, 2, 2, 2$

Non-common prime factors of 16, 30 and 64 =  $2, 2, 3, 5$

LCM = [Product of two or more than two common prime factors]  $\times$  [Product of two or more than two non-common prime factors]

LCM =  $(2 \times 2 \times 2 \times 2) \times (2 \times 2 \times 3 \times 5)$

LCM =  $16 \times 60 = 960$

So, the LCM of 16, 30 and 64 = 960



Ali, Ahmad and Umar exercise after every 10, 18 and 20 days respectively. If they all are exercising today, when will they exercise on the same day again?

To find the day, when they will exercise together again, we will find the LCM of 10, 18 and 20.

LCM = Product of all prime factors

LCM =  $2 \times 2 \times 3 \times 3 \times 5$

LCM = 180

2	18, 10, 20
2	9, 5, 10
3	9, 5, 5
3	3, 5, 5
5	1, 5, 5
	1, 1, 1



They will again exercise together on the 180<sup>th</sup> day.



Ask the students to differentiate between HCF and LCM. Write two or three numbers on the board and ask them to find their LCM.

Find the LCM of 12, 20 and 30 by using division.

2	12, 20, 30
2	6, 10, 15
3	3, 5, 15
5	1, 5, 5
	1, 1, 1

LCM = Product of all prime factors

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

$$\text{LCM} = 60$$

So, the LCM of 12, 20 and 30 is 60.

Try It!

Challenge



A welfare organization is distributing bundles of basic safety items among the people. If a packet of masks has 25 masks, a packet of gloves has 20 pairs of gloves and a packet of sanitizer has 5 sanitizer bottles in it, then find out the minimum number of packets of each item so that every bundle has one mask, one glove pair and one sanitizer bottle in it and no object is left over. (Hint : First find the LCM of 25,20 and 5)



## Exercise 2

1. Find the LCM of the following numbers using prime factorization:

- |                |                |                |                |
|----------------|----------------|----------------|----------------|
| (a) 3, 21      | (b) 12, 80     | (c) 20, 15     | (d) 4, 10, 16  |
| (e) 9, 18, 27  | (f) 10, 20, 35 | (g) 20, 60, 75 | (h) 30, 45, 90 |
| (i) 16, 24, 36 | (j) 18, 60, 75 | (k) 49, 51, 56 | (l) 13, 65, 71 |



2. Find the LCM of the following numbers using division:

- |                |                |                |                |
|----------------|----------------|----------------|----------------|
| (a) 14, 70     | (b) 15, 30     | (c) 45, 90     | (d) 35, 60, 75 |
| (e) 7, 21, 49  | (f) 25, 45, 95 | (g) 16, 32, 48 | (h) 28, 32, 40 |
| (i) 12, 14, 26 | (j) 10, 20, 25 | (k) 7, 14, 21  | (l) 8, 32, 42  |

3. Find the minimum length of the ribbon which can completely be cut into pieces of length 45 cm, 75 cm and 85 cm without any left over.

4. Find the smallest number that can completely be divided by 42, 38 and 16 without leaving any remainder.

5. The tour buses for Badshahi Masjid leave the station every 25 minutes, for interior city every 15 minutes and for the zoo every 30 minutes. If the three buses leave the station simultaneously at 11:05 a.m, find out the time when the three buses will next leave the station simultaneously?

6. Boxes having 22 centimetre, 35 centimetre and 50 centimetre height respectively are to be stacked next to each other. What is the shortest possible height at which the three types of boxes will be at the same height?

7. Students of grade 5 have Mathematics test after every 3 days, English test after every 6 days and Science test after every 9 days. If all the three tests were conducted today, find out when will the three tests be conducted next on the same day?

**I Have Learnt to:**



find HCF of:

- two numbers up to 2-digit numbers.
- three numbers up to 2-digit numbers by using prime factorization method and division method.

find LCM of:

- two numbers up to 2-digit numbers.
- three numbers up to 2-digit numbers using prime factorization method and division method.
- solve real life situations involving HCF and LCM.

### Vocabulary

- HCF
- Prime Factorization
- Prime
- Multiples
- Factors
- LCM

## Review Exercise



1. Choose the correct options and fill in the blanks.

(a) The HCF of 20, 48 and 56 is \_\_\_\_\_.

- (i) 4                      (ii) 3                      (iii) 5                      (iv) 1

(b) The HCF of two or more than two numbers, which have no common prime factor, is always \_\_\_\_\_.

- (i) 1000                      (ii) 100                      (iii) 10                      (iv) 1

(c) Prime factorization of 16 is \_\_\_\_\_.

- (i)  $2 \times 8$                       (ii)  $1 \times 16$                       (iii)  $2 \times 2 \times 2 \times 2$                       (iv)  $2 \times 4 \times 2$

(d) The LCM of 33, 66 and 81 is \_\_\_\_\_.

- (i) 1770                      (ii) 1872                      (iii) 1782                      (iv) 1287

(e) The LCM of two or more prime numbers is always equal to their \_\_\_\_\_.

- (i) Prime factor                      (ii) Quotient                      (iii) LCM                      (iv) Product

2. Find the HCF of the following numbers by using prime factorization:

- (a) 15, 18      (b) 10, 20      (c) 25, 40      (d) 56, 88  
(e) 10, 18, 22      (f) 20, 40, 82      (g) 16, 38, 98      (h) 39, 51, 75

3. Find the HCF of the following numbers using division:

- (a) 20, 50      (b) 15, 45      (c) 60, 70, 80      (d) 22, 28, 32  
(e) 44, 55, 99      (f) 34, 48, 62      (g) 30, 45, 70      (h) 26, 52, 65

4. Find the LCM of the following numbers using prime factorization:

- (a) 2, 5      (b) 3, 7      (c) 5, 8      (d) 4, 10, 16  
(e) 20, 25, 50      (f) 45, 90, 95      (g) 32, 70, 80      (h) 33, 66

5. Find the LCM of the following numbers using division:

- (a) 4, 9      (b) 7, 11      (c) 14, 26      (d) 20, 40,  
(e) 6, 24, 42      (f) 10, 20, 30      (g) 12, 18, 38      (h) 6, 15, 21

6. 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?

7. Three water containers contain 12 litres, 24 litres and 42 litres of water.

- (a) Find the maximum capacity of a measuring container that can fully measure the quantity of water in all three containers.  
(b) Find out how many times this container needs to be filled to empty each container?

8. Find the smallest number that can completely be divided by 32 and 55 without leaving any remainder.

9. Find the least number of stickers which can equally be distributed among 15, 12 and 10 children.



# Unit 3

# Fractions

## Learning Outcomes

After completing this unit, you will be able to:

- Add and subtract two or three fractions with different denominators.
- Multiply a fraction by a 1 - digit number and demonstrate with the help of diagram.
- Multiply two or three fractions involving proper, improper fractions, and mixed numbers.
- Solve real life situations involving multiplication of fractions.
- Divide a fraction by another fraction involving proper, improper fraction, and mixed numbers.
- Solve real life situations involving division of fractions.

According to a report of 2016,  $\frac{2}{3}$  of the land in Pakistan is arable. How much part is not arable?

## Addition and Subtraction of Fractions

### Addition of Fractions



Yesterday, we spent  $\frac{1}{2}$  hour and today we spent  $\frac{1}{4}$  hour in the computer lab. How much time have we spent altogether in the computer lab?



To find the total time spent in the computer lab, we need to add these fractions.

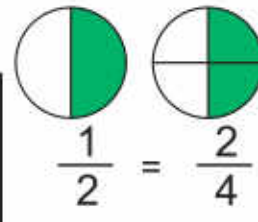


Time spent yesterday =  $\frac{1}{2}$  h

Time spent today =  $\frac{1}{4}$  h

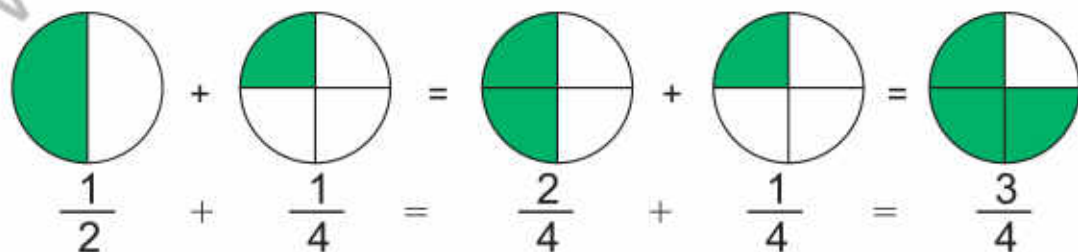
Total time spent = ?

$\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4}$  [ Multiply the numerator and the denominator by 2 to make the denominator 4 ]



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

Now, add these like fractions.



The total time spent in the computer lab in 2 days is  $\frac{3}{4}$  hours.



Use cut-outs of different shapes and ask the students to represent equivalent fraction using the shapes.



**Key Fact**

Two or more than two fractions whose numerators and denominators are different but they have same values are called equivalent fractions.



**Try Yourself**

What is the sum of  $\frac{2}{3}$  and  $\frac{5}{6}$ ?



Let's solve.  $\frac{2}{5} + \frac{3}{10} + \frac{1}{20} = \square$

1. Find the LCM of 5, 10 and 20.
2. Multiply all the fractions by a number so that their denominators become equal to their LCM.

2	5, 10, 20
2	5, 5, 10
5	5, 5, 5
	1, 1, 1

LCM of 5, 10 and 20 =  $2 \times 2 \times 5 = 20$

$$\frac{2}{5} = \frac{2 \times 4}{5 \times 4} = \frac{8}{20}, \quad \frac{3}{10} = \frac{3 \times 2}{10 \times 2} = \frac{6}{20}, \quad \frac{1}{20}$$

Now, add these fractions

$$\frac{2}{5} + \frac{3}{10} + \frac{1}{20} = \frac{8}{20} + \frac{6}{20} + \frac{1}{20}$$



**Try Yourself**

Observe the given shapes. Write the addition sentence for them and solve.



$$= \frac{8 + 6 + 1}{20}$$

$$= \frac{15}{20} = \frac{3}{4}$$



Write different fractions on the board. Explain how to make their denominator same and then find their sum.





Sidra used  $1\frac{3}{4}$  metre red ribbon and  $\frac{7}{8}$  metre blue ribbon to decorate the gift boxes. Find the total length of the ribbon she used.



Convert the mixed fraction into improper fraction.

$$\text{Red ribbon} = 1\frac{3}{4} \text{ m} = \frac{7}{4} \text{ m}$$

$$\text{Blue ribbon} = \frac{7}{8} \text{ m}$$

$$\begin{aligned} \text{Total length of both ribbons} &= \frac{7}{4} + \frac{7}{8} \\ &= \frac{7 \times 2}{4 \times 2} + \frac{7}{8} \\ &= \frac{14}{8} + \frac{7}{8} \\ &= \frac{14+7}{8} = \frac{21}{8} = 2\frac{5}{8} \end{aligned}$$

So, Sidra used  $2\frac{5}{8}$  m ribbon.



### Key Fact

Mixed fraction is also known as mixed number.

## Subtraction of Fractions



Sara uses  $\frac{1}{2}$  spoon sugar and  $\frac{1}{3}$  spoon of tea to make a cup of tea. Find how much more sugar she uses than the tea?



To find this, we will subtract the quantity of tea from the quantity of sugar.

$$\text{Quantity of sugar} = \frac{1}{2}$$

$$\text{Quantity of tea} = \frac{1}{3}$$



Tell the students that while adding two fractions their order does not matter but when subtracting two fractions always subtract smaller fraction from the greater fraction otherwise they will get the wrong answer.

$$\begin{aligned} \text{Difference} &= \frac{1}{2} - \frac{1}{3} \\ &= \frac{1 \times 3}{2 \times 3} - \frac{1 \times 2}{3 \times 2} = \frac{3}{6} - \frac{2}{6} = \frac{3-2}{6} = \frac{1}{6} \end{aligned}$$

$$\frac{1}{2} - \frac{1}{3} = \frac{3}{6} - \frac{2}{6} = \frac{1}{6}$$

So, Sara uses  $\frac{1}{6}$  more spoon of sugar.

Let's subtract  $\frac{3}{4}$  from  $2\frac{2}{3}$ .



$$2\frac{2}{3} = \frac{8}{3}$$



**Try Yourself**

Subtract  $\frac{7}{12}$  from the sum of  $\frac{5}{9}$  and  $\frac{2}{3}$ .

- (i) Convert the mixed fraction into the improper fraction.
- (ii) Find the LCM of 3 and 4.
- (iii) Now, multiply all the fractions by a number so that the denominators of all the fractions become equal to their LCM.
- (iv) Subtract the fractions.

$$\begin{aligned} 2\frac{2}{3} - \frac{3}{4} &= \frac{8}{3} - \frac{3}{4} \\ &= \frac{8 \times 4}{3 \times 4} - \frac{3 \times 3}{4 \times 3} \\ &= \frac{32}{12} - \frac{9}{12} = \frac{32-9}{12} \\ &= \frac{23}{12} = 1\frac{11}{12} \end{aligned}$$



**Try Yourself**

Subtract  $\frac{6}{9}$  from  $\frac{5}{6}$ .



**Key Fact**

Always subtract the smaller fraction from the greater fraction.

**Try It!**

Challenge



Write two fractions whose difference is 1.



## Exercise 1

1. Solve the following fractions:

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

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

c)  $3\frac{4}{5} + \frac{5}{7}$

d)  $4\frac{7}{10} + \frac{6}{8}$

e)  $\frac{7}{9} + \frac{6}{8} + \frac{6}{3}$

f)  $1\frac{3}{10} + 6\frac{14}{20} + 2\frac{15}{40}$

g)  $\frac{24}{6} + \frac{31}{12} + \frac{43}{24}$

h)  $\frac{7}{8} + 4\frac{1}{4} + \frac{15}{16}$

2. Solve the following fractions:

a)  $\frac{3}{2} - \frac{2}{24}$

b)  $2\frac{16}{18} - 1\frac{4}{6}$

c)  $3\frac{5}{14} - 1\frac{2}{21}$

d)  $\frac{5}{6} - \frac{6}{11}$

e)  $4\frac{1}{6} - \frac{17}{18}$

f)  $\frac{21}{12} - \frac{8}{10}$

g)  $2\frac{13}{24} - \frac{4}{18}$

h)  $5\frac{1}{8} - \frac{5}{15}$

3. To practice for a marathon, Raheel ran  $\frac{1}{4}$  km on Monday,  $\frac{7}{8}$  km on Tuesday and  $\frac{15}{6}$  km on Wednesday. Find out how many kilometres did he run in three days?

4. Saad spent  $2\frac{1}{2}$  hours for the preparation of Mathematics test and  $1\frac{1}{4}$  hours for the preparation of Urdu test. Find:

a) in which subject did he spend more time and by how much?

b) how much time did he spend altogether?



5. An electrician has  $18\frac{8}{9}$  m of wire. If he uses  $2\frac{1}{9}$  m and  $2\frac{1}{3}$  m in two rooms, then find:

- a) how much wire did he use altogether?
- b) how much wire is left?

### Multiplication and Division of Fractions

#### Multiplication of Fractions

Ibrahim takes  $\frac{3}{4}$  hours daily to complete his homework. How much time does he spend on his homework in a week?



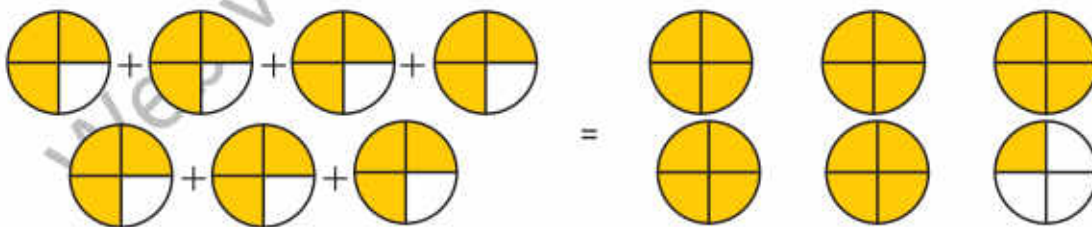
There are 7 days in a week, so to find the required time we will multiply  $\frac{3}{4}$  hours by 7.



We can show the multiplication process by the given figures.

As, multiplication is repeated addition.

To multiply  $\frac{3}{4}$  by 7, we will add  $\frac{3}{4}$  seven times.



$$\frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} = 5 + \frac{1}{4}$$

$$\frac{3 + 3 + 3 + 3 + 3 + 3 + 3}{4} = \frac{21}{4} = 5\frac{1}{4}$$



By using various figures explain the method of multiplication of fractions to the students. Then tell them that how a fraction can be expressed in its lowest form.

Alternatively,

Time to do homework =  $\frac{3}{4}$  hour  
in one day

Time to do homework =  $7 \times \frac{3}{4}$  hour  
in whole week



**Key Fact**

Multiply 7 by  $\frac{3}{4}$  means to find  $\frac{3}{4}$  of 7.

$$7 \times \frac{3}{4} = \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} = \frac{21}{4} = 5 \frac{1}{4}$$

So, time taken by Ibrahim to complete the homework in a week is  $5 \frac{1}{4}$  h.

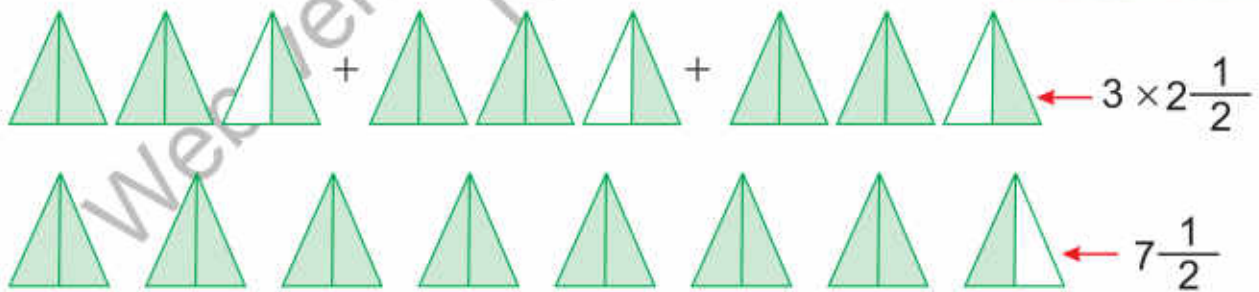


**Key Fact**

In multiplication, the order of the fractions does not effect the product.



Rabia completed one round of the park and covered a distance of  $2 \frac{1}{2}$  km. If she took 3 rounds of the park, how much distance did she cover?



Distance covered in 1 round =  $2 \frac{1}{2}$  km =  $\frac{5}{2}$  km

Distance covered in 3 rounds =  $3 \times \frac{5}{2}$  km =  $\frac{15}{2}$  km =  $7 \frac{1}{2}$  km

So, Rabia covered  $7 \frac{1}{2}$  km in 3 rounds.

**Key Fact**

To multiply two fractions, multiply the numerator by numerator and the denominator by the denominator

Sania and Ali planted their plants in pots. After a week, the height of Sania's plant was  $3\frac{2}{5}$  cm while height of Ali's plant was  $1\frac{1}{4}$  times Sania's plant. Find the height of Ali's plant.



To find the height of Ali's plant, we will multiply the height of Sania's plant by  $1\frac{1}{4}$ .

$$\text{Height of Sania's plant} = 3\frac{2}{5} \text{ cm} = \frac{17}{5} \text{ cm}$$

$$\begin{aligned} \text{Height of Ali's plant} &= 1\frac{1}{4} \times \frac{17}{5} \text{ cm} = \frac{5^1}{4} \times \frac{17}{5^1} \text{ cm} \\ &= \frac{17}{4} \text{ cm} = 4\frac{1}{4} \text{ cm} \end{aligned}$$

So, the height of Ali's plant was  $4\frac{1}{4}$  cm



Let's multiply  $\frac{1}{5}$ ,  $\frac{9}{4}$  and  $\frac{2}{3}$ .

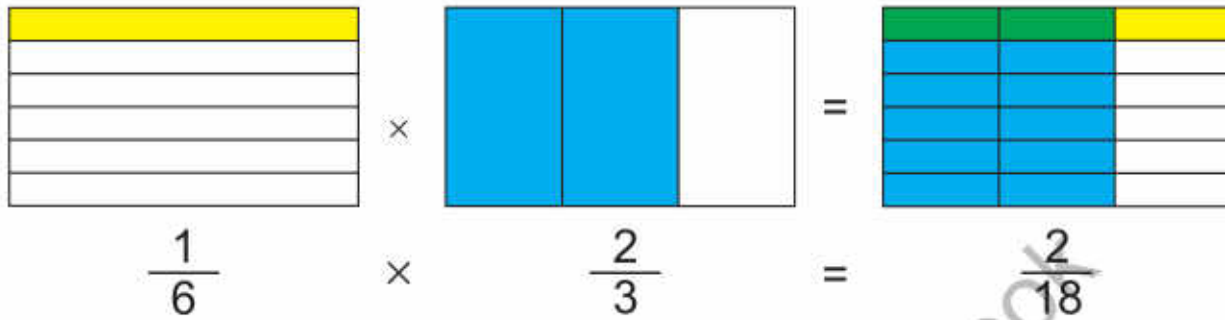
$$\begin{aligned} \frac{1}{5} \times \frac{9}{4} \times \frac{2}{3} &= \frac{1 \times \overset{3}{\cancel{9}} \times \overset{1}{\cancel{2}}}{5 \times \underset{2}{\cancel{4}} \times \underset{1}{\cancel{3}}} \\ &= \frac{3}{10} \text{ (Lowest form)} \end{aligned}$$



Make groups of students and ask each group to create a real life problem involving multiplication. Then ask them to exchange their problems with other groups to solve.



Find the product of  $\frac{1}{6}$  and  $\frac{2}{3}$ .



$$\frac{1}{6} \times \frac{2}{3} = \frac{2^1}{18_9} = \frac{1}{9} \text{ (Lowest form)}$$

**Try Yourself**

Find the product of  $\frac{7}{2}$  and  $\frac{3}{8}$  and express in figures.

**Division of Fractions**



For an experiment on cold and hot water, I have to pour  $7\frac{1}{3}$  litres of water in glasses with a capacity of  $\frac{1}{3}$  litres. Find the number of glasses to fill this quantity of water.



To find this, we have to divide the total volume of water  $7\frac{1}{3}$  litres by the capacity of one glass which is  $\frac{1}{3}$  litres.



Total volume of water  $= 7\frac{1}{3} \ell = \frac{22}{3} \ell$

Capacity of one glass  $= \frac{1}{3} \ell$

Required number of glasses  $= \frac{22}{3} \div \frac{1}{3} = \frac{22}{3} \times \frac{3}{1} = 22$

So, I will need 22 glasses of  $\frac{1}{3} \ell$  capacity to fill  $7\frac{1}{3} \ell$  of water.

How many pieces of  $\frac{4}{10}$  metres of wire can be cut from a wire which is  $\frac{8}{5}$  metres long?



The number of pieces will be found by dividing  $\frac{8}{5}$  by  $\frac{4}{10}$ .

$$\text{Number of pieces} = \frac{8}{5} \div \frac{4}{10} = \frac{8}{5} \times \frac{10}{4} = 4$$

So, the total length of wire can be cut into 4 equal parts of length  $\frac{4}{10}$  metres.



**Try Yourself**

Find the product of  $\frac{1}{6}$  and  $\frac{9}{12}$  and divide it by  $\frac{7}{8}$ .



Let's divide  $3\frac{5}{8}$  by  $2\frac{3}{10}$ .

$$\begin{aligned} 3\frac{5}{8} \div 2\frac{3}{10} &= \frac{29}{8} \div \frac{23}{10} \\ &= \frac{29}{8} \times \frac{10}{23} \\ &= \frac{145}{92} \\ &= 1\frac{53}{92} \end{aligned}$$

By looking at the given figures, find out the two fractions whose product is shown by the green portion. Explain your answer. Also write the multiplication sentence for the given figures.

**Try It!**

Challenge



Provide different ropes to the students whose lengths are in fractions. Ask them to cut these ropes into 6 equal pieces and measure each piece. Explain the method of division of fractions with the help of given examples.



## Exercise 2

1. Solve the following and represent with figures:

a)  $\frac{1}{2} \times 12$

b)  $\frac{5}{9} \times 7$

c)  $\frac{6}{7} \times 3$

d)  $\frac{3}{4} \times 4$

e)  $\frac{2}{3} \times 5$

f)  $\frac{5}{6} \times 9$

2. Solve the following:

a)  $\frac{4}{5} \times \frac{1}{4}$

b)  $\frac{3}{7} \times \frac{14}{18}$

c)  $\frac{5}{3} \times \frac{75}{20}$

d)  $\frac{58}{60} \times \frac{4}{20} \times \frac{10}{20}$

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

f)  $\frac{30}{28} \times \frac{2}{8} \times \frac{6}{9}$

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

h)  $5\frac{10}{35} \times 8\frac{2}{5} \times 9\frac{3}{11}$

i)  $9\frac{1}{9} \times 10\frac{1}{3} \times 5\frac{1}{2}$

3. Solve the following:

a)  $\frac{4}{12} \div \frac{4}{18}$

b)  $\frac{3}{25} \div \frac{9}{45}$

c)  $\frac{5}{60} \div \frac{7}{20}$

d)  $2\frac{58}{60} \div 4\frac{4}{20}$

e)  $5\frac{5}{9} \div 9\frac{6}{7}$

f)  $6\frac{30}{32} \div 7\frac{2}{4}$

g)  $2\frac{5}{6} \div 4\frac{2}{9}$

h)  $3\frac{1}{2} \div \frac{4}{9}$

i)  $\frac{1}{7} \div 2\frac{6}{7}$

4. If  $5\frac{1}{2}$  m of cloth is used to stitch one dress, how much cloth will be used to stitch 7 such dresses?

5. Hina ate  $\frac{1}{2}$  part of a cake. If there were 8 pieces of cake, how many pieces did Hina eat?

6. Nida had  $\frac{3}{12}$  of a pizza. She gave  $\frac{1}{8}$  of it to her friend Madeeha. Find out what part of the whole pizza did Madeeha get?

7. To decorate the classroom, Hassan used ribbons of two colours. The length of blue ribbon is  $5\frac{7}{8}$  metres. The length of red ribbon is  $\frac{2}{3}$  of the length of blue ribbon.

- What is the length of red ribbon?
- Find the total length of both ribbons.



8.  $44\frac{1}{6}$  kilogram sugar is to be packed in  $4\frac{5}{12}$  kilogram packets. Find:
- in how many packets sugar will be packed?
  - how much sugar will be there in 9 packets of mass  $4\frac{5}{12}$  kilograms?

### I Have Learnt to:



- add and subtract two or three fractions with different denominators.
- multiply a fraction by a 1-digit numbers and demonstrate with the help of diagram.
- multiply two or three fractions involving proper, improper fractions, and mixed numbers.
- solve real life situations involving multiplication of fractions.
- divide a fraction by another fraction involving proper, improper fraction, and mixed numbers.
- solve real life situations involving division of fractions.

#### Vocabulary

- Fractions
- Numerator
- Denominator
- Equivalent Fractions
- Mixed Numbers

### Review Exercise



1. Choose the correct options and fill in the blanks.

a)  $\frac{1}{3} + \frac{2}{5} = \underline{\hspace{2cm}}$

i)  $\frac{3}{5}$

ii)  $\frac{11}{15}$

iii)  $\frac{3}{8}$

iv)  $\frac{2}{15}$

b)  $\frac{2}{3} - \frac{5}{9} = \underline{\hspace{2cm}}$

i)  $\frac{3}{9}$

ii)  $\frac{7}{3}$

iii)  $\frac{1}{9}$

iv)  $\frac{7}{9}$

c) The product of  $\frac{3}{4}$  and  $\frac{4}{3}$  is \_\_\_\_\_

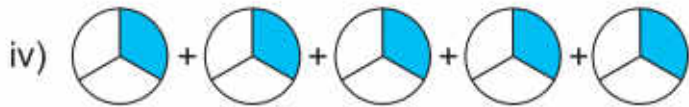
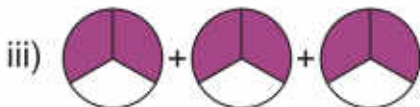
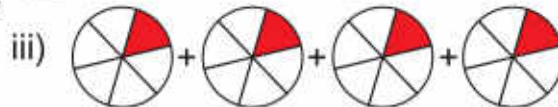
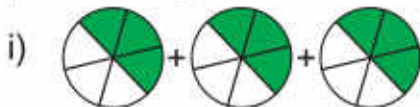
i) 1000

ii) 10

iii) 1

iv) 111

d) Which figure is showing  $5 \times \frac{1}{3}$  \_\_\_\_\_?



- e) In \_\_\_\_\_ the order of the fractions does not effect the result.
- i) addition and subtraction
  - ii) subtraction and divisions
  - iii) multiplication and division
  - iv) addition and multiplication

2. Solve the following:

- a)  $\frac{7}{20} + 4\frac{3}{10}$
- b)  $\frac{8}{5} + \frac{19}{15} + 5\frac{4}{30}$
- c)  $3\frac{14}{50} - 2\frac{9}{25}$
- d)  $1\frac{16}{44} \div \frac{4}{11}$
- e)  $2\frac{6}{31} \times \frac{62}{24}$
- f)  $1\frac{4}{7} + 2\frac{13}{28} + \frac{3}{4}$
- g)  $3\frac{6}{8} + 3\frac{3}{4}$
- h)  $1\frac{3}{9} \times 25$
- i)  $6\frac{2}{3} \div 3\frac{1}{12}$

3. Find  $2\frac{3}{4}$  of 36.

4. How many months will be there in  $\frac{3}{4}$  of a year?

5. Add the product of  $\frac{4}{5}$  and 6 to the quotient of  $\frac{4}{45} \div \frac{4}{5}$ .

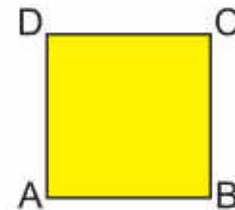
6. Sana prepared  $5\frac{6}{7}$  litres of apple juice. She served  $3\frac{2}{5}$  litres of juice to the guests. Find out how much juice was left?

7. Ali's mother bought  $3\frac{1}{2}$  kg of chicken,  $1\frac{1}{2}$  kg of fish and  $2\frac{1}{4}$  kg of mutton. Find out how many kilograms of meat did she buy altogether?

8. Umair exercises for  $2\frac{1}{5}$  hours daily. How many hours will he exercise in 30 days?

9. The length of a side of the square is  $1\frac{7}{8}$  metres.

If the perimeter of square is  $4 \times$  length of a side, find the perimeter of the square. Also, verify your answer by adding this length four times.



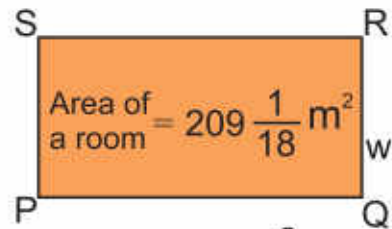
Length of a side =  $1\frac{7}{8}$  m

10. The area of a room is  $209\frac{1}{18}$  m<sup>2</sup>. If the length of the room is  $17\frac{2}{3}$  m, find the width of the room.



**Hint**

The area of the room is calculated by multiplying its length and width.



Area of a room =  $209\frac{1}{18}$  m<sup>2</sup>

width = ?

Length =  $17\frac{2}{3}$  m



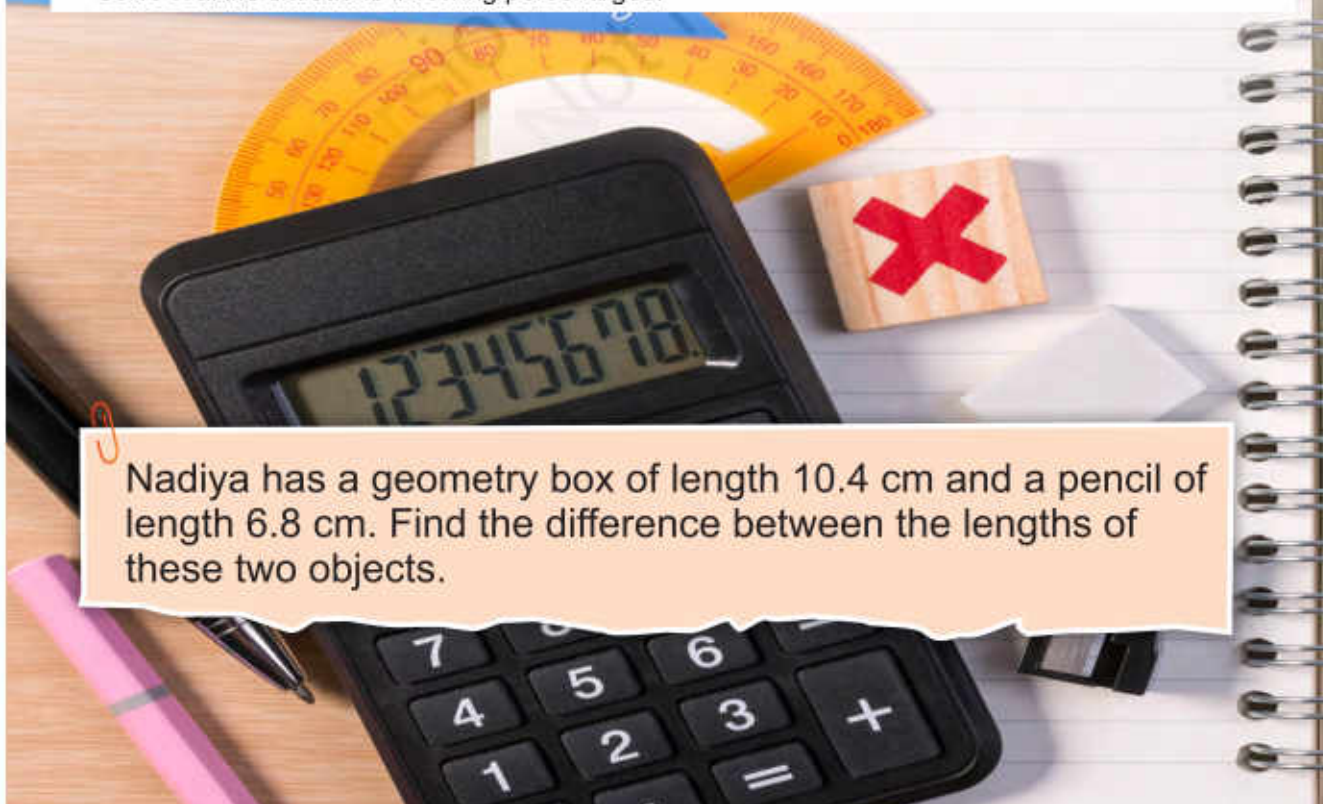
# Unit 4

## Decimals and Percentages

### Learning Outcomes

After completing this unit you will be able to:

- Arrange numbers up to 3-digit numbers with 2-decimal places in ascending and descending order.
- Add and subtract 4-digit numbers up to 3-decimal places.
- Multiply a 3-digit number up to 2-decimal places by 10, 100, and 1000.
- Multiply a 3-digit number up to 2-decimal places by a whole number up to 2-digit.
- Multiply a 3-digit number up to 2-decimal places by a 3-digit number up to 2-decimal places.
- Divide a 3-digit number up to 2-decimal places by 10, 100, and 1000.
- Divide a 3-digit number up to 2-decimal places by a whole number up to 2-digit.
- Divide a 3-digit number up to 2-decimal places by a 2-digit number up to 1-decimal place.
- Convert fractions to decimals using division.
- Solve real life situations involving division of 3-digit numbers up to 2-decimal places.
- Round off a 4-digit number up to 3-decimal places to the nearest tenth or hundredth.
- Estimate sum or difference of the numbers (up to 4-digit).
- Recognize percentage as a special kind of fraction.
- Convert percentage to fraction and to decimal number and vice versa (only for numbers without decimal part i.e. 35%, 75% etc.).
- Solve real life situations involving percentages.

A photograph of a desk with various school supplies. In the foreground, a black calculator shows the number 12345678 on its display. To the left, a yellow protractor is partially visible. A pink pencil lies horizontally across the bottom left. A wooden block with a red 'X' is positioned to the right of the calculator. The background shows a spiral-bound notebook with lined pages.

Nadiya has a geometry box of length 10.4 cm and a pencil of length 6.8 cm. Find the difference between the lengths of these two objects.



# Comparing and Ordering Decimals



For a science project, Nida used 2.53 metre rope while Noor used 2.58 metre rope. Who used the longer rope?



Ones	Decimal Point	Tenths	Hundredths
2	.	5	3
2	.	5	8

- (i) Here the digits at ones and tenths place are equal.
  - (ii) At hundredths place, digit 8 is greater than digit 3.  $8 > 3$
  - (iii) So, 2.58 is greater than 2.53  
 $2.58 > 2.53$
- So, Noor used the longer rope.



### Key Fact

The symbols '>' and '<' are used for comparison. The number towards the open side of the symbol shows the greater number. The number towards the closed side of the symbol shows the smaller number.



Let's find which decimal is smaller 7.1 or 7.09



### Try Yourself

- Compare by using correct symbol.
- i)  $0.30 \square 0.3$
  - ii)  $1.02 \square 1.22$
  - iii)  $1.31 \square 1.3$
  - iv)  $5.13 \square 5.03$

Let's compare 7.1 and 7.09

- (i) 7.1 and 7.09 both have the same ones place digits.
- (ii) At tenths place, digit 0 is smaller than digit 1.
- (iii) So,  $7.09 < 7.1$

Ones	Decimal Point	Tenths	Hundredths
7	.	0	9
7	.	1	



Write some decimals on the board and ask the students to tell the place value of each digit.

Sara bought some fruits and make a table according to their masses. Let's compare their masses and write them in ascending and descending order.

Fruit	Mass (kg)
Apple	2.75
Guava	3.5
Grapes	1.25
Peach	2.00



Ones	Decimal Point	Tenths	Hundredths
2	.	7	5
3	.	5	
1	.	2	5
2	.	0	0

- (i) Compare the digits at the greatest place. Ones digit of 3.5 is the greatest. So, guavas have the greatest mass.
- (ii) Next 2.75 and 2.00 have same ones place digits.
- (iii) The tenth place digit of 2.75 is greater than the tenth place digit of 2.00. So after guava, apple and peach have the greater mass i.e 2.75 kg and 2kg respectively.
- (iv) The grapes have the least mass which is 1.25 kg.

By using symbols, we can write the masses as:



Divide the students in groups. Ask them to write at least four decimals having 3 digits and then arrange them in ascending and descending order.

$$3.5\text{kg} > 2.75\text{kg} > 2.00\text{kg} > 1.25\text{kg}$$

or

$$1.25\text{kg} < 2.00\text{kg} < 2.75\text{kg} < 3.5\text{kg}$$

Let's arrange these masses in ascending order.

1.25 kg, 2.00 kg, 2.75 kg, 3.5 kg

Let's arrange these masses in descending order.

3.5 kg, 2.75 kg, 2.00 kg, 1.25 kg

Try It!

Challenge



Put decimal point in 999, 463, 208 and 175. Also arrange them in ascending and descending order.

### Exercise 1

1. Compare the following decimals using the correct symbol (>, < or =):

a)  $0.4 \underline{\hspace{1cm}} 0.5$

b)  $1.3 \underline{\hspace{1cm}} 1.6$

c)  $34.56 \underline{\hspace{1cm}} 35.66$

d)  $6.67 \underline{\hspace{1cm}} 6.69$

e)  $0.45 \underline{\hspace{1cm}} 0.45$

f)  $23.12 \underline{\hspace{1cm}} 51.31$

g)  $71.2 \underline{\hspace{1cm}} 71.02$

h)  $6.06 \underline{\hspace{1cm}} 6.1$

i)  $4.8 \underline{\hspace{1cm}} 4.80$

2. Write the following decimals in ascending order:

a) 7.2, 12.4, 10.8, 9.4, 18.2

b) 8.56, 8.06, 8.5, 8.52, 8.51, 8.05

c) 3.4, 3.54, 3.55, 3.45, 3.14, 3.04

d) 9.5, 9.05, 9.52, 9.55, 9.09, 9.45

3. Write the following decimals in descending order:

a) 2.51, 3.31, 2.47, 3.81, 3.01

b) 4.32, 4.68, 0.31, 4.23, 4.31

c) 6.21, 6.77, 6.31, 6.33, 6.60

d) 1.62, 1.03, 1.60, 1.66, 1.61



## Addition and Subtraction of Decimals



Hassan ran 2.62 kilometres in the morning and 1.06 kilometres in the evening. How many kilometres did he cover altogether?



To find the total number of kilometres, we need to add both the distances.

Distance covered in the morning =  
 Distance covered in the evening =  
 Total distance covered =

Ones	Decimal Point	Tenths	Hundredths
2	.	6	2
+ 1	.	0	6
3	.	6	8

So, the total distance covered by Hassan is 3.68km.  
 Let's add 4.463 and 3.24.

To make the number of decimal places same in 3.24 and 4.463, we will put 0 at the thousandths place in 3.24.  
 $3.240 = 3.24$



Ones	Decimal Point	Tenths	Hundredths	Thousandths
4	.	①4	6	3
+ 3	.	2	4	0
7	.	7	0	3



Write a few decimals on the board and explain the method of addition.

A newborn giraffe is about 1.8 metres tall and an adult giraffe is about 5.5 metres tall. Find the difference in their heights.



**Try Yourself**

Always subtract the smaller decimal from the greater decimal.

Height of an adult giraffe =

Ones	Decimal Point	Tenths
5	.	5
1	.	8
3	.	7

Height of newborn giraffe = -

Difference in their heights =

So, the difference between their heights is 3.7m.



Let's subtract 7.925 from 9.9.

To make the number of decimal places same, we put zeros at the hundredths and thousandths places in 9.9.

$$9.9 = 9.900$$

Ones	Decimal Point	Tenths	Hundredths	Thousandths
9	.	9	0	0
- 7	.	9	2	5
1	.	9	7	5



Write a few decimal numbers on the board and explain the method of their subtraction.

**Key Fact**

If the number of digits after the decimal point are not equal, we put required number of zeros as place holder in the decimals to be added or subtracted.

**Try It!**

Write a decimal number in the given box to balance the scale.

**Exercise 2**

1. Solve the following:

a)  $4.131 + 8.3$

b)  $3.211 + 1.860$

c)  $3.211 + 89.02$

d)  $2.001 + 75.46$

e)  $47.04 + 5.007$

f)  $2.341 + 5.914$

g)  $1.781 + 9.111$

h)  $1.194 + 3.876$

i)  $3.562 + 1.210$

j)  $1.831 + 21.24$

k)  $5.008 + 30.44$

l)  $69.25 + 3.100$

2. Solve the following:

a)  $9.410 - 2.392$

b)  $11.45 - 2.86$

c)  $3.238 - 2.376$

d)  $6.188 - 2.109$

e)  $3.80 - 3.09$

f)  $5.341 - 2.864$

g)  $6.554 - 1.309$

h)  $5.555 - 4.201$

i)  $1.999 - 1.088$

j)  $2.018 - 1.740$

k)  $4.99 - 3.400$

l)  $12.34 - 11.90$

3. Rohan spent Rs 65.33 on Monday and Rs 97.29 on Tuesday. How much amount did he spend in two days?



4. Muaaz covered a distance of 76.36 km in car and 55.45 km in train to meet his grandmother. In which vehicle did he travel more and how much more?
5. Saad ran 5.13 km on the first day and 2.33 km on the second day. Find the total distance he covered in both days.
6. A tailor had 15.25 metre cloth. He used 11.55 metre cloth in stitching two dresses. How much cloth was left with him?
7. Nida needs 50.55 gram sugar for a cake and 28.5 gram sugar for a few cupcakes. Find:
  - a) how much sugar does she need altogether?
  - b) which recipe requires more sugar and how much more?

## Multiplication of Decimals

### Multiplication of Decimals by 10, 100 and 1 000



A piece of wood is 0.85 cm thick. If 10, 100 and 1 000 such pieces are piled, what will be their total thickness?



To find the total thickness of 10, 100 and 1 000 such pieces, we will multiply the thickness of one piece by 10, 100 and 1 000 respectively.



Solve different examples on the board to explain the method of multiplication of decimals.

Thickness of 10 pieces =  $0.85 \times 10 = 8.5$  cm  
 Thickness of 100 pieces =  $0.85 \times 100 = 85$  cm  
 Thickness of 1 000 pieces =  $0.85 \times 1000 = 850$  cm  
 Thickness of all the pieces together =  $8.5 + 85 + 850 = 943.5$  cm  
 So, the thickness of all the pieces will be 943.5 cm



**Key Fact**

- When we multiplying a decimal by 10, 100 and 1 000, we move decimal points 1, 2 and 3 places to the right side respectively.
- When we multiplying a decimal by 10, 100 and 1 000, if the digits to the right side of the decimal places are not enough, we put the required number of zeros to the right side.

**Multiplication of Decimals by a Whole Number**



The capacity of a juice pack is 1.5 litres.  
 What will be the capacity of 7 such packs?



To find the capacity of 7 such packs, we will multiply the capacity of 1 pack by 7.



Capacity of one pack	= 1 . 5	Ones ↑ Decimal Point ↑ Tenths	1 decimal place →
Number of packs	= × 7		
Total capacity	= 10 . 5		← 1 decimal place

The capacity of 7 packs will be 10.5 litres.



A bus covers a distance of 9.85 kilometres going from one town to another and then coming back. If it takes 56 such rounds in a week, find the total distance it covers.



To find the total distance, we will multiply 9.85 with 56.

Distance between the towns	=	9	.	8	5	→ 2 decimal places	
Number of rounds	=	×		5	6		
		<hr/>					
		5	9	1	0	(985 × 6)	
		+	4	9	2	5	(985 × 50)
		<hr/>					
Total distance covered	=	5	5	.	6	0	← 2 decimal places

So, the total distance covered by the bus in a week is 551.60 km

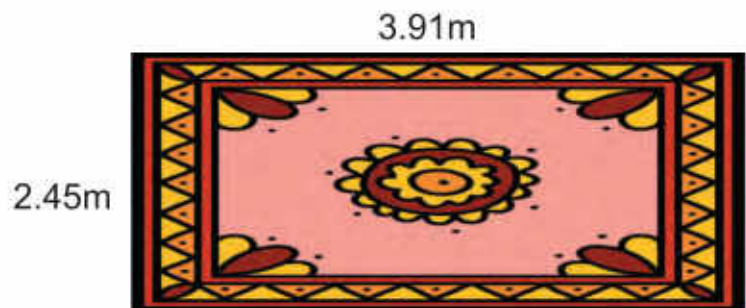


**Key Fact**

The number of decimal places in the product of two decimals is equal to the sum of the digits after decimal point in multiplicand and the multiplier.

**Multiplication of Decimal by Decimal**

Aneela measured the length and width of the carpet in her room. She wants to find the area covered by carpet.







By multiplying the length and width of the carpet, we can find the area covered by the carpet.



**Try Yourself**

What is the product of 12.9, 6.32 and 0.06

Length of the carpet = 3.91  
 Width of the carpet = 2.45

1 9 5 5	(391 × 5)
1 5 6 4 0	(391 × 40)
+ 7 8 2 0 0	(391 × 200)
9 5 7 9 5	

Area of the carpet = 9.5795

So, the area covered by the carpet is 9.5795 m<sup>2</sup>.

*Labels in diagram: Ones, Decimal Point, Tenths, Hundredths, 2 decimal places, 2 decimal places, 4 decimal places.*



The product of decimals can also be found by converting the decimal into fractions.

$$\begin{aligned}
 4.02 \times 0.5 &= \frac{402}{100} \times \frac{5}{10} \\
 &= \frac{402 \times 5}{100 \times 10} \\
 &= \frac{2010}{1000} \\
 &= 2.010
 \end{aligned}$$



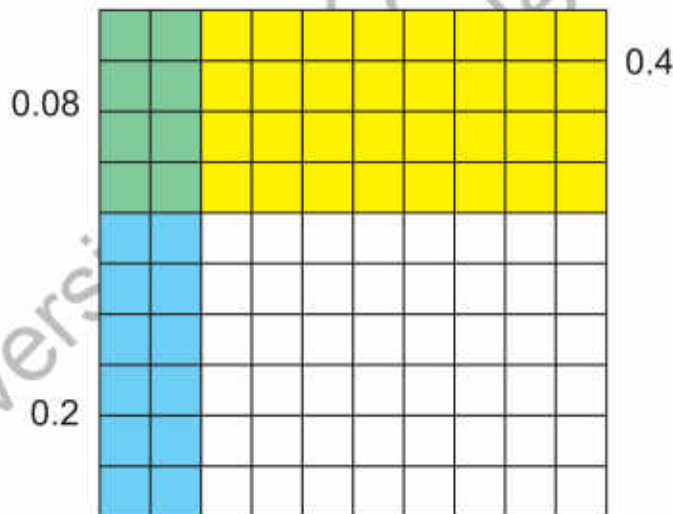
Solve different examples on the board by converting decimals into fractions and explain this method of multiplication of decimals.

We can also multiply two decimals on the square grid. Let's multiply 0.2 by 0.4 on a square grid.



1. First colour 0.2 with blue colour vertically. It means we have coloured two tenths or 2 out of 10 columns in blue.
2. Next colour 0.4 horizontally with yellow colour. It means we have coloured four tenths or 4 out of 10 rows in yellow.
3. Now, the portion of the grid covered by both yellow and blue colours represents the product of 0.2 and 0.4. We have represented this portion with green colour.

We can see that it 8 out of 100 squares are green, so the product of 0.4 and 0.2 is 0.08.



$0.2 \times 0.4 = 0.08$

Try It!

Challenge



Make at least three pairs of 3-digit decimals with two decimal places that give product with 1, 2 and 3 decimal places respectively. Verify your answer.



Solve different examples of multiplication of decimals on the writing board by using square grid and explain method.

**Exercise 3**

1. Solve the following:

a)  $1.59 \times 10$

b)  $2.48 \times 100$

c)  $4.37 \times 1\,000$

d)  $5.43 \times 100$

e)  $3.03 \times 100$

f)  $3.06 \times 1\,000$

g)  $3.54 \times 100$

h)  $8.73 \times 10$

i)  $3.103 \times 100$

j)  $4.72 \times 10$

k)  $3.42 \times 1\,000$

l)  $2.44 \times 100$

2. Solve the following:

a)  $5.36 \times 82$

b)  $1.71 \times 12$

c)  $4.91 \times 34$

d)  $3.54 \times 18$

e)  $1.23 \times 2$

f)  $5.49 \times 23$

g)  $2.51 \times 89$

h)  $3.05 \times 80$

i)  $1.46 \times 61$

j)  $9.17 \times 11$

k)  $2.50 \times 43$

l)  $4.13 \times 86$

3. Solve the following:

a)  $5.36 \times 2.5$

b)  $2.82 \times 2.3$

c)  $5.82 \times 5.34$

d)  $4.65 \times 39.7$

e)  $2.66 \times 5.02$

f)  $6.38 \times 2.12$

g)  $1.42 \times 8.89$

h)  $4.16 \times 1.87$

i)  $2.57 \times 2.54$

j)  $9.28 \times 2.22$

k)  $3.19 \times 6.98$

l)  $5.24 \times 7.23$

4. A train covers 96.5 kilometres in an hour. How much distance will be covered by the train in 25 hours?

5. 25.5 metres of fabric is required to make a sofa cover. How many metres of fabric is needed to make:

a) 10 covers

b) 100 covers

c) 1 000 covers

6. A cement block weighs 4.23 kg. What will be the weight of 12 such blocks?

7. The price of a litre of petrol is Rs 103.8. What will be the price of 35 litres of petrol?



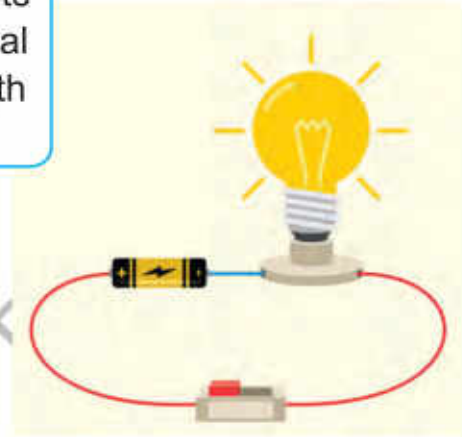
## Division of Decimals

### Division of Decimals by 10, 100 and 1 000



For an experiment, Hina wants to cut 82.8 cm wire in 10 equal pieces. What will be the length of each piece of wire?

To find the length of each piece, we will divide the total length of the wire by 10.



#### Key Fact

- When we divide a decimal by 10, 100 and 1 000, we move decimal points 1, 2 and 3 places to the left respectively.
- When we divide a decimal by 10, 100 and 1 000, if the number of digits to the left side of the decimal places are not enough, we put the required number of zeros to the left side.

Length of the wire = 82.8 cm

Number of pieces to be cut = 10

Length of each piece of the wire =  $82.8 \div 10$   
 $= 8.28$  cm

The length of each piece of wire will be 8.28 cm.

Divide 4.73 by 10, 100 and 1 000.

$$4.73 \div 10 = 0.473$$

$$4.73 \div 100 = 0.0473$$

$$4.73 \div 1\,000 = 0.00473$$



Explain the method of division of decimals by 10, 100 and 1 000 by solving different examples on the writing board.

## Division of Decimals by a Whole Number



Saba wants to put 7.75 kilogram of rice in 5 packets equally. How can she find the quantity of rice in each packet?



To find the quantity of rice in each packet, we will divide 7.75 by 5.

Total quantity of rice = 7.75kg

Number of packets = 5

Rice in each packet =  $7.75 \div 5$

So, the quantity of rice in each packet is 1.55 kg.

$$\begin{array}{r}
 1.55 \\
 5 \overline{) 7.75} \\
 \underline{-5} \phantom{0} \\
 27 \\
 \underline{-25} \\
 25 \\
 \underline{-25} \\
 0
 \end{array}$$

Faraz read 49.5 pages of a book in 11 hours. Find the number of pages he read in 1 hour. (if he read equal pages in each hours)

Number of pages = 49.5

Number of hours = 11

Pages read in each hour =  $49.5 \div 11 = 4.5$

Faraz read 4.5 pages in an hour

$$\begin{array}{r}
 4.5 \\
 11 \overline{) 49.5} \\
 \underline{-44} \phantom{0} \\
 55 \\
 \underline{-55} \\
 0
 \end{array}$$



### Try Yourself

Divide 6.24 by 3.



Solve various examples on the writing board and explain the method of division of decimals.

## Division of Decimals by Decimals



If 13.5 kilogram of sugar is to be packed in the boxes, each box contains 1.5 kg of sugar. Find the number of required boxes.



To find the number of required boxes, we will divide 13.5 by 1.5. We will convert the decimals into fractions and divide it.

$$\text{Quantity of sugar} = 13.5\text{kg}$$

$$\text{Quantity of sugar in each box} = 1.5\text{kg}$$

$$\begin{aligned} \text{Number of boxes} &= 13.5 \div 1.5 \\ &= \frac{135}{10} \div \frac{15}{10} \\ &= \frac{135}{\cancel{10}} \times \frac{\cancel{10}^1}{15} \\ &= \frac{135}{15} = 9 \end{aligned}$$

So, 9 boxes are required.

Divide 3.12 by 2.6 (by converting the decimal into fractions).

$$\begin{aligned} 3.12 \div 2.6 &= \frac{312}{100} \div \frac{26}{10} \\ &= \frac{312}{100} \times \frac{10}{26} = \frac{156}{130} \\ &= \frac{12}{10} = 1.2 \end{aligned}$$

Divide 6.25 by 0.5 without converting into fractions.

$$\begin{array}{r} 12.5 \\ 5 \overline{) 62.5} \\ \underline{-5} \phantom{0} \\ 12 \phantom{0} \\ \underline{-10} \phantom{0} \\ 25 \\ \underline{-25} \\ 0 \end{array}$$

$$\begin{aligned} 6.25 \div 0.5 &= \frac{6.25}{0.5} \times \frac{10}{10} \\ &= \frac{62.5}{5} \\ &= 12.5 \end{aligned}$$



### Try Yourself

- Without converting into fractions, divide 18.9 by 6.3.
- Divide 24.5 by 3.5 by converting decimal into fractions.



Explain the method of division of decimals by solving various examples on the writing board, using the above methods.





## Exercise 4

1. Solve the following:

(a)  $41.8 \div 10$

b)  $4.59 \div 100$

c)  $5.48 \div 1000$

d)  $6.430 \div 100$

e)  $4.14 \div 10$

f)  $6.17 \div 1000$

g)  $2.43 \div 100$

h)  $71.4 \div 10$

i)  $4.24 \div 100$

2. Solve the following:

(a)  $3.40 \div 2$

b)  $5.73 \div 3$

c)  $5.05 \div 5$

d)  $2.2 \div 55$

e)  $3.66 \div 3$

f)  $57.8 \div 34$

g)  $80.6 \div 4$

h)  $8.19 \div 18$

i)  $62.4 \div 52$

3. Solve the following:

a)  $2.92 \div 1.6$

b)  $7.7 \div 3.5$

c)  $4.37 \div 1.9$

d)  $6.24 \div 7.8$

e)  $2.73 \div 1.3$

f)  $8.91 \div 3.3$

g)  $16.1 \div 4.6$

h)  $3.68 \div 0.4$

i)  $9.24 \div 1.1$

4. In 5 bags, 3.75 kg of flour is to be packed. How much flour will be in each bag?

5. Sana wants to fill 67.5 litres of oil in bottles. Find the number of bottles if:

(a) the capacity of the bottle is 4.5 litre.

(b) the capacity of the bottle is 2.5 litre.

## Conversion of Fractions into Decimals



The swimming speed of a sea-turtle is  $\frac{7}{5}$  km per hour. How can we write this speed in decimals?



To convert  $\frac{7}{5}$  into decimals, we will divide 7 by 5.



To make division easier, here we will write 7 as 7.0.

$$\begin{array}{r}
 1.4 \\
 5 \overline{) 7.0} \\
 \underline{-5} \phantom{0} \\
 2 \phantom{0} \\
 \underline{-2} \phantom{0} \\
 0
 \end{array}$$

So, the swimming speed of a sea-turtle in decimal is 1.4 km per hour. Grass has been grown on  $\frac{3}{4}$  part of a park. How can we write this as decimals?

$$\begin{array}{r}
 0.75 \\
 4 \overline{) 3.00} \\
 \underline{-2} \phantom{00} \\
 1 \phantom{00} \\
 \underline{-0} \phantom{0} \\
 10 \phantom{0} \\
 \underline{-8} \phantom{0} \\
 20 \\
 \underline{-20} \\
 0
 \end{array}$$



So, the part of the park on which grass has been grown is 0.75.



**Key Fact**

A whole number can be written as a decimal by putting zero to the right of the decimal. It means 5 can be written as 5.0



Write some fractions on the writing board and explain the method of converting them into decimals.

 **Exercise 5**

1. Convert the following fractions into decimals:

- (a)  $\frac{45}{2}$       (b)  $\frac{19}{25}$       (c)  $\frac{7}{40}$       (d)  $\frac{33}{100}$       (e)  $\frac{97}{8}$       (f)  $\frac{78}{8}$   
 (g)  $\frac{34}{25}$       (h)  $\frac{2}{5}$       (i)  $\frac{55}{16}$       (j)  $\frac{69}{30}$       (k)  $\frac{72}{45}$       (l)  $\frac{99}{55}$

2. Noman ate  $\frac{1}{8}$  of a pizza. How can we write this in decimal?

**Rounding-off Decimals**



School library is at the distance of 1.47 km from the laboratory. Write this distance in kilometres to the nearest tenths.



To find the distance to the nearest tenth, we need to round-off this distance to one decimal place.

$1 . \overset{\circ}{4} 7 \approx 1 . 5$

Circle the digit at the tenths place.

Look at the digit next to the tenths place (i.e. hundredths place). If this digit is 5 or greater than 5, we will add 1 to the tenths digit and remove all the next digits towards its right. If this digit is smaller than 5, we will write the tenths place digit as it is and remove all the next digits towards its right.

In 1.47, the digit next to 4 is 7 which is greater than 5, so:  
 $1.47 \approx 1.5$



Decimal	Round off to the nearest tenths	Round off to the nearest hundredths
a) 2.513	2.5	2.51
b) 0.674	0.7	0.67
c) 8.230	8.2	8.23
d) 6.267	6.3	6.27

## Estimating Sum and Difference of Decimals



Umar's home is at a distance of 12.8 km from his office. The distance from the office to the bank is 20.3 km. If Umar goes to office from home and then to the bank, how much distance will he cover in all? First estimate the total distance and then verify your answer.

$$\begin{array}{r} 13 \\ +20 \\ \hline 33 \end{array}$$

$$12.8 \approx 13$$

$$20.3 \approx 20$$

$$12.8 + 20.3 \approx 13 + 20 = 33$$

So, Umar will cover the distance of 33 km.

Now, actually add the distances and check if our estimation is correct or not.

$$12.8 + 20.3 = 33.1$$

So, our estimation is correct.



### Key Fact

Estimation means to find an answer which is closest to the actual answer but is not the actual one. We can estimate the sum and difference of decimals by rounding them off to the nearest whole numbers.

$$\begin{array}{r} 12.8 \\ +20.3 \\ \hline 33.1 \end{array}$$



Write some decimals on the writing board and explain the method of rounding them off to one and two decimal places. Use this concept to explain the method of estimating sum and difference of the decimals.

Estimate the difference between 25.3 and 7.9.

$$\begin{array}{r} 25 \\ - 8 \\ \hline 17 \end{array}$$

$$7.9 \approx 8$$

$$25.3 \approx 25$$

$$25.3 - 7.9 \approx 25 - 8 = 17$$

Now, actually we subtract 7.9 from 25.3 to check our estimation is correct or not.

$$25.3 - 7.9 = 17.4$$



### Try Yourself

Estimate the sum and difference of the given numbers and then verify your answer.

(a) 3.7, 11.4 (b) 30.8, 4.2

So, our estimation is correct.



## Exercise 6

1. Round-off the following decimals to one and two decimal places:

- a) 47.125    b) 4.732    c) 2.322    d) 0.942    e) 45.675    f) 2.150  
g) 91.547    h) 94.172    i) 5.183    j) 3.767    k) 4.172    l) 90.267

2. Estimate the sum of the given numbers. Then verify your answer.

- a)  $52.90 + 17.98$     b)  $630.1 + 280.9$     c)  $41.01 + 36.87$     d)  $307.2 + 357.6$   
e)  $741.2 + 30.10$     f)  $845.1 + 396.9$     g)  $63.81 + 25.91$     h)  $21.35 + 83.05$   
i)  $99.99 + 87.91$     j)  $943.6 + 834.6$     k)  $123.4 + 567.8$     l)  $737.8 + 721.2$

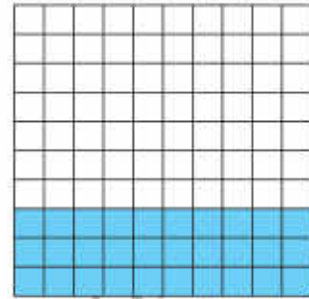
3. Estimate the difference of the given numbers. Then verify your answer.

- a)  $22.30 - 17.99$     b)  $78.92 - 69.11$     c)  $56.23 - 11.26$     d)  $234.6 - 159.8$   
e)  $587.6 - 320.9$     f)  $402.3 - 292.1$     g)  $995.5 - 747.1$     h)  $673.1 - 430.5$   
i)  $53.25 - 25.62$     j)  $544.1 - 41.45$     k)  $3.5 - 2.1$     l)  $9.355 - 7.316$

## Percentages



There are 100 pieces of a picture puzzle. Out of these 30 pieces are blue (30 out of 100). We can write it in fraction as:  $\frac{30}{100}$



This fraction can also be written in a special way called percentage.  
30 out of 100 can be written as 30%.

$$\frac{30}{100} = 30\%$$



### Key Fact

Percentage is a special kind of fraction with 100 as denominator. The symbol to represent percentage is "%".

30% pieces of the puzzle are blue.



## Conversion of Fractions into Percentage



Mariyam got 23 marks out of 25. (i.e.  $\frac{23}{25}$ ). Calculate the percentage of her marks?



To write this number in percentage, first we will convert the denominator of this fraction into 100, so that we can easily find its percentage.

$$\begin{aligned} \frac{23}{25} &= \frac{23 \times 4}{25 \times 4} \\ &= \frac{92}{100} \\ &= 92\% \end{aligned}$$

So, the percentage of Mariyam's marks is 92%.



**Try Yourself**

Write the following in percentage:

- 22 out of 100
- 1 out of 100
- 76 out of 100
- 100 out of 100

**Try Yourself**

Write the following in percentage:

$$\frac{1}{2}, \frac{1}{10}, \frac{1}{100}$$

**Conversion of Percentage into Fractions**

42% of students of our school wear glasses. How can we write it in fraction?

$$\begin{aligned} \text{Students who wear glasses} &= 42\% \\ &= \frac{42}{100} \\ &= \frac{21}{50} \text{ (lowest form)} \end{aligned}$$

42% can be written in fraction as:

$$42\% = \frac{21}{50}$$

So, the students who wear glasses are  $\frac{21}{50}$ .



Amir got 83 out of 100 marks in a Mathematics test. What was the percentage of his marks? How can we write in decimals?

$$\begin{aligned} \text{Total marks} &= 100 \\ \text{Marks obtained} &= 83 \\ \text{Percentage of marks} &= \frac{83}{100} = 83\% \\ \text{Marks in decimal} &= 0.83 \end{aligned}$$



Use hundred's charts and colour different number of squares. Find their percentage and explain how each square is representing 1%.

## Conversion of Decimals into Percentage

Convert 0.2 into percentage.

$$\begin{aligned} 0.2 &= \frac{2}{10} \\ &= \frac{2 \times 10}{10 \times 10} \\ &= \frac{20}{100} \\ &= 20\% \end{aligned}$$

## Conversion of Percentage into Decimals



71% of the earth is water. How can we write this percentage in decimals?

Portion of water on the earth =  $71\% = \frac{71}{100} = 0.71$

Similarly,

$$2\% = \frac{2}{100} = 0.02$$

$$40\% = \frac{40}{100} = 0.4$$



In an annual examination of Social Studies, 30% questions are based on mapping skills. If there are 20 questions altogether, find the number of questions based on mapping skills.

Total questions = 20

Questions based on map skills = 30% of 20

$$= \frac{30}{100} \times 20 = 6$$

So, the number of questions based on map skills are 6.



### Key Fact

To find the required percentage of a quantity or a number, divide the given percentage by 100 and multiply by the total quantity or number.



### Try Yourself

What percentage of the earth is land?



Ask the students to visit the nearby market, guide them about the percentage discount on various items. Then ask them to find the discounted price of those items.

A factory produced 850 masks in a day. 72% masks are blue. Find the number of blue masks produced by the factory in a day.

$$\begin{aligned}\text{Total number of blue masks} &= 850 \\ &= 72\% \text{ of } 850\end{aligned}$$

$$\text{Number of blue masks} = \frac{72}{100} \times 850 = 612$$

The factory produced 612 blue masks in a day.

Try It!

Challenge



20% of an amount is 350 rupees. Find:

- (i) 1% of the amount.
- (ii) 100 % of the amount.
- (iii) 1 000 % of the amount.



Try Yourself

What is 62% of 62?  
What is 5% of 50?



## Exercise 7

1. Express the following in percentage:

- |                     |                     |                     |                     |                     |
|---------------------|---------------------|---------------------|---------------------|---------------------|
| a) $\frac{4}{100}$  | b) $\frac{35}{100}$ | c) $\frac{76}{100}$ | d) $\frac{12}{100}$ | e) $\frac{28}{100}$ |
| f) $\frac{47}{100}$ | g) $\frac{45}{100}$ | h) $\frac{66}{100}$ | i) $\frac{89}{100}$ | j) $\frac{1}{100}$  |

2. Convert the following percentages into fractions:

- |        |        |        |        |        |
|--------|--------|--------|--------|--------|
| a) 13% | b) 24% | c) 46% | d) 55% | e) 68% |
| f) 72% | g) 87% | h) 98% | i) 11% | j) 10% |

3. Convert the following percentages into decimals:

- |        |        |        |        |        |
|--------|--------|--------|--------|--------|
| a) 15% | b) 26% | c) 47% | d) 52% | e) 63% |
| f) 74% | g) 85% | h) 96% | i) 17% | j) 18% |



4. Convert the following fractions into percentage:

a)  $\frac{1}{10}$

b)  $\frac{2}{5}$

c)  $\frac{4}{10}$

d)  $\frac{9}{25}$

e)  $\frac{3}{20}$

f)  $\frac{21}{50}$

g)  $\frac{1}{5}$

h)  $\frac{7}{20}$

i)  $\frac{9}{10}$

j)  $\frac{6}{25}$

5. Convert the following decimals into percentage:

a) 0.06

b) 0.14

c) 0.23

d) 0.34

e) 0.43

f) 0.55

g) 0.63

h) 0.71

i) 0.98

j) 0.3

6. Sajid scored 365 marks out of 500. What percentage did he score?

7. There are 40 students in a class. If 5% are absent on Monday, find:

(a) the number of absent students.

(b) the number of present students.

8. In an exam, 450 students appeared. 25% got first division, 55% got second division and the rest just passed the exam. Find the number of students who just passed the exam.

9. 12% of apples in a basket are red. Write this percentage in fraction and decimal.

10. A tank can hold 85 litres of water. It's 30% filled. What percentage of the tank is empty? Write the answer in decimal and fraction.

### I Have Learnt to:

- compare numbers up to 3-digit with
- 2-decimal places using signs  $<$ ,  $>$  or  $=$ .
- arrange numbers up to 3-digit numbers with 2-decimal places in ascending and descending order.
- add and subtract in 4-digit numbers up to 3-decimal places.
- multiply a 3-digit number up to 2-decimal places by 10, 100, and 1 000

#### Vocabulary

- Decimal
- Fraction
- Decimal Point
- Percentage
- Decimal place
- Estimation
- Round-off

- multiply a 3-digit number up to 2-decimal places by a 3-digit number up to 2-decimal places.
- divide a 3-digit number up to 2-decimal places by 10, 100, and 1 000.
- divide a 3-digit numbers up to 2-decimal places by a whole number up to 2-digit.
- divide a 3-digit number up to 2-decimal places by a 2-digit number up to 1-decimal place.
- convert fractions to decimals using division.
- solving real life situations involving division of 3-digit numbers up to 2-decimal places.
- round off a 4-digit number up to 3-decimal places to the nearest tenth or hundredth.
- estimate sum or difference of the numbers (up to 4-digit).
- recognize percentage as a special kind of fraction.
- convert percentage to fraction and to decimal number and vice versa (only for numbers without decimal part i.e. 35%, 75% etc.).
- solve real life situations involving percentages.

### Review Exercise

- Choose the correct options and fill in the blanks.
  - While putting \_\_\_\_\_ at the right of a decimal does not effect its value.
 

i) 100	ii) 0	iii) 1	iv) 10
--------	-------	--------	--------
  - When we multiply a decimal by 100, we move decimal point 2 places to the \_\_\_\_\_.
 

i) left	ii) down	iii) up	iv) right
---------	----------	---------	-----------
  - We represent percentage by the symbol \_\_\_\_\_.
 

i) $\leq$	ii) $\phi$	iii) $\div$	iv) %
-----------	------------	-------------	-------
  - 20% of 540 is \_\_\_\_\_.
 

i) 37	ii) 108	iii) 27	iv) 270
-------	---------	---------	---------
  - Percentage is a special kind of fraction whose denominator is always \_\_\_\_\_.
 

i) 1	ii) 10	iii) 100	iv) 1 000
------	--------	----------	-----------

2. Compare the following decimals using the correct symbol ( $>$ ,  $<$  or  $=$ ):

a)  $0.5$  \_\_\_\_\_  $0.8$

b)  $1.8$  \_\_\_\_\_  $1.4$

c)  $45.67$  \_\_\_\_\_  $45.77$

d)  $7.78$  \_\_\_\_\_  $7.70$

e)  $1.56$  \_\_\_\_\_  $1.56$

f)  $34.23$  \_\_\_\_\_  $62.42$

3. Solve the following:

a)  $5.242 + 9.003$

b)  $3.622 + 22.971$

c)  $4.32 + 90.16$

d)  $13.12 + 86.57$

e)  $58.57 + 6.118$

f)  $4.561 + 27.16$

g)  $92.93 - 31.33$

h)  $8.25 - 4.97$

i)  $4.63 - 1.21$

j)  $22.92 - 2.001$

k)  $6.119 - 1.55$

l)  $20.36 - 6.211$

4. Ahmed wants to buy a chocolate which costs is Rs. 98.46. He has

Rs. 52.25. How much more money does he need to buy chocolate?

5. Omar bought two rolls of tape. The first roll has 16.38 metres of tape and the second roll has 56.82 metres of tape. Find:

a) how much tape was there in both of the rolls altogether?

b) which roll has more tape and how much?

6. In a fabric warehouse, there was 43.5 metres of coloured cloth. If it is cut into equal pieces of 1.5 metres, then:

a) how many pieces of cloth will be obtained?

b) what will be the total length of 12 pieces of cloth of length 1.5 metres?

7. Solve the following:

a)  $32.855 \times 10$

b)  $4.39 \times 100$

c)  $5.98 \times 1\ 000$

d)  $6.54 \times 21$

e)  $4.14 \times 43$

f)  $7.17 \times 6.5$

g)  $69.7 \times 2.31$

h)  $2.19 \times 4.87$

i)  $4.13 \times 6.12$

j)  $82.6 \div 100$

k)  $3.12 \div 1.3$

l)  $4.21 \div 2.5$

8. Estimate the sum and difference of the given numbers. Then verify your result.

a)  $63.11 + 2.809$

b)  $74.1 + 3.9$

c)  $521.2 + 479.8$

d)  $74.92 - 36.02$

e)  $324.6 - 241.6$

f)  $888.8 - 479.2$



9. Round-off the following decimals to the nearest tenths and hundredths.

Decimals	Rounded-off up to 1 decimal place (nearest tenths)	Rounded-off up to 2 decimal places (nearest hundredths)
a) 2.2342		
b) 3.1723		
c) 5.3671		
d) 9.5191		

10. Complete the table.

Fractions	Decimals	Percent
a) $\frac{21}{50}$		
b)		82%
c) $\frac{7}{25}$		
d)	0.65	
e)		25%

11. Junaid spent Rs 432 out of Rs 600. What is the percentage of the total amount spent by Junaid? Write the answer in fraction and decimals.
12. There are 32 students in a class. If 25% students wear glasses, find:
- the number of students who wear glasses?
  - how many students do not wear glasses?
13. A Mathematics paper has 20 questions out of which 60% are based on "Numbers and Operations".
- How many questions are based on "Numbers and Operations"?
  - Write the number of remaining questions in fraction and decimal.

# Unit 5

## Distance and Time

### Learning Outcomes

After completing this unit, you will be able to:

- Convert measures given in
  - kilometres into metres and vice versa.
  - metres into centimetres and vice versa.
  - Centimetres into millimetres and vice versa.
- Solve real life situations involving conversion, addition and subtraction of measures of distance.
- Convert:
  - hours into minutes and vice versa.
  - minutes into seconds and vice versa.
- Convert:
  - years into months and vice versa.
  - months into days and vice versa.
  - weeks into days and vice versa.
- Add and subtract intervals of time in hours and minutes with carrying and borrowing.
- Solve real life situations involving conversion, addition and subtraction of intervals of time.



Farhan participated in a cycle race in his school. He has to cover a distance of 15 kilometres to win the race. How many metres are there in 15 kilometres?

## Conversion of Units of Distance

### Conversion of Kilometres into Metres



Children are going to Murree from Islamabad for recreational trip. They cover the distance of 55 km. How many metres do they cover?



As 1 km = 1 000 m

So, to find the distance in metres we will multiply 55 km by 1 000.

$$\begin{aligned} 55 \text{ km} &= 55 \times 1\,000 \text{ m} \\ &= 55\,000 \text{ m} \end{aligned}$$

We convert 56 kilometres 450 metres into metres.  
First convert 56 kilometres into metres and then add 450 in it.

$$\begin{aligned} 56 \text{ km } 450 \text{ m} &= 56 \text{ km} + 450 \text{ m} \\ &= 56 \times 1\,000 \text{ m} + 450 \text{ m} \\ &= 56\,000 \text{ m} + 450 \text{ m} \\ &= 56\,450 \text{ m} \end{aligned}$$



### Try Yourself

Nangaparbat is the ninth highest mountain in the world. Its height is 8 kilometres 126 metres. What will be its height in metres?



## Conversion of Metres into Kilometres



I go for walk daily. The distance of my home to the park is 2 000 metres. I want to find this distance in kilometres.



To find this distance in kilometres, we will divide 2 000 by 1 000.



$$\begin{aligned} 2\ 000\ \text{m} &= 2\ 000 \div 1\ 000\ \text{km} \\ &= 2\ \text{km} \end{aligned}$$

So, the distance from the home to the park is 2 km.

Convert 9 800 metres to kilometres and metres.

$$\begin{aligned} 9\ 800\ \text{m} &= 9\ 000\text{m} + 800\text{m} \\ &= \frac{9\ 000}{1\ 000}\ \text{km} + 800\text{m} \\ &= 9\ \text{km} + 800\text{m} \\ &= 9\ \text{km}\ 800\text{m} \end{aligned}$$



### Key Fact

- To convert kilometres into metre, multiply by 1 000.
- To convert metres into kilometres, divide by 1 000.

$$1\ \text{km} = 1\ 000\ \text{m}$$

$$1\ \text{m} = \frac{1}{1\ 000}\ \text{km}$$



### Try Yourself

Convert the following distances into kilometres and metres.

- i) 5 000 m    ii) 2 002 m    iii) 8 976 m



Make groups of students. Give one group the flash cards of kilometres and ask them to convert it into metres. Give the other groups the flash cards of metres and ask them to convert into kilometres.

## Conversion of Metres into Centimetres



The height of Minar-e-Pakistan is 70m. What will be its height in centimetres?



To find the height of Minar-e-Pakistan in centimetres, multiply 70 m by 100.

$$\begin{aligned} 70 \text{ m} &= 70 \times 100 \text{ cm} \\ &= 7\,000 \text{ cm} \end{aligned}$$

So, the height of Minar-e-Pakistan will be 7 000 cm



### Try Yourself

A tree is 7.5 metres high. What will be its height in centimetres?

Convert 38 m 78 cm in centimetres only.

To convert 38 m 78 cm into centimetres, first convert 38 metres into centimetres and then add 78 in it.



$$\begin{aligned} 38 \text{ m } 78 \text{ cm} &= 38 \text{ m} + 78 \text{ cm} \\ &= 38 \times 100 \text{ cm} + 78 \text{ cm} \\ &= 3\,800 \text{ cm} + 78 \text{ cm} \\ &= 3\,878 \text{ cm} \end{aligned}$$

## Conversion of Centimetres into Metres



The height of a cupboard is 200 centimetres. What will be its height in metres?

To find the height of the cupboard in metres, we will divide by 100.



$$\begin{aligned} 200 \text{ cm} &= 200 \div 100 \text{ m} \\ &= 200 \times \frac{1}{100} \text{ m} \\ &= 2 \text{ m} \end{aligned}$$

So, the height of the cupboard will be 2m.



### Key Fact

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

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

- To convert metres into centimetres, multiply by 100.
- To convert centimetres into metres, divide by 100.

Let's convert 585 cm into metres and centimetres:

$$\begin{aligned} 585 \text{ cm} &= 500 \text{ cm} + 85 \text{ cm} \\ &= \frac{500}{100} \text{ m} + 85 \text{ cm} \\ &= 5 \text{ m} + 85 \text{ cm} \\ &= 5 \text{ m } 85 \text{ cm} \end{aligned}$$



### Try Yourself

Convert the following distances into metres:

- i) 670 cm      ii) 409 cm      iii) 900 cm



Make groups of students. Give one group the flash cards of metres and ask them to convert it into centimetres. Give the other groups the flash cards of centimetres and ask them to convert into metres.



## Conversion of Centimetres into Millimetres



The length of Ahmer's lunch box is 15 cm. What will be its length in millimetres?



To find the length of lunch box in millimetres, we will multiply 15 cm by 10.



$$\begin{aligned} 15 \text{ cm} &= 15 \times 10 \\ &= 150 \text{ mm} \end{aligned}$$

So, the length of the lunch box will be 150 mm.

Convert 89 centimetres 44 millimetres into millimetres.



To convert 89 centimetres 44 millimetres into millimetres, first convert 89 centimetres into millimetres and then add 44 millimetres in it.

$$\begin{aligned} 89 \text{ cm } 44 \text{ mm} &= 89 \times 10 \text{ mm} + 44 \text{ mm} \\ &= 890 \text{ mm} + 44 \text{ mm} \\ &= 934 \text{ mm} \end{aligned}$$



### Try Yourself

Ahmed buys a toy car which is 24 cm long. What will be its length in millimetres?

## Conversion of Millimetres into Centimetres



I bought a picture frame. Its length is 60 millimetre. If I want to find its length in centimetres what will I do?

To find the length of the picture frame in cm, I will divide its length by 10.

$$\begin{aligned} 60 \text{ mm} &= 60 \div 10 \text{ cm} \\ &= 60 \times \frac{1}{10} \text{ cm} \\ &= 6 \text{ cm} \end{aligned}$$



So, the length of picture frame is 6cm.



### Key Fact

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

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

- To convert centimetres into millimetres, multiply by 10.
- To convert millimetres into centimetres, divide by 10.

Convert 18 millimetres into centimetres and millimetres.

$$\begin{aligned} 18 \text{ mm} &= 10 \text{ mm} + 8 \text{ mm} \\ &= \frac{10}{10} \text{ cm} + 8 \text{ mm} \\ &= 1 \text{ cm} + 8 \text{ mm} \\ &= 1 \text{ cm } 8 \text{ mm} \end{aligned}$$



### Try Yourself

Convert the following distances into centimetres:

- (i) 20 mm      (ii) 78 mm      (iii) 98 mm



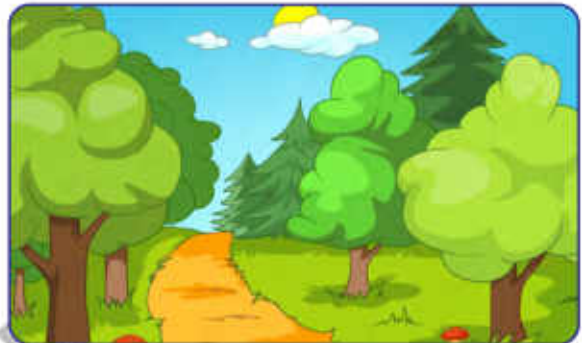
Make groups of students. Give one group the flash cards of centimetres and ask them to convert it into millimetres. Give the other groups the flash cards of millimetres and ask them to convert into centimetres.

## Addition and Subtraction of Distance/length



Subhan walks 2 kilometres 670 metres on Saturday and 3 kilometres 490 metres on Sunday. What is the total distance he covers in metres both the days?

To find the distance covered in 2 days in metres, first we will add both the distances and then convert it into metres.



### Key Fact

To add units of distance, always add same units. Add km in km, m in m, cm in cm and mm in mm.

Distance covered on Saturday = 2 km 670 m

Distance covered on Sunday = + 3 km 490 m

Total distance covered in both the days = 6 km 160 m

So, Subhan walks for 6km 160m in both the days.

Now, to convert this distance into metres first we will convert kilometres into metres and then add 160 metres in it.

$$\begin{aligned}
 6 \text{ km } 160 \text{ m} &= 6 \text{ km} + 160 \text{ m} \\
 &= 6 \times 1000\text{m} + 160 \text{ m} \\
 &= 6000 \text{ m} + 160 \text{ m} \\
 &= 6160 \text{ m}
 \end{aligned}$$



Make two groups of students and give ask them to create real life situations involving addition and subtraction of units of distance. Then ask the other groups to solve them.





Petronas Twin towers in Malaysia are 452m height. While Burj Khalifa in Dubai is 828 metres high. What is the difference between their heights?



To find the difference, we will subtract their heights.



Height of Burj Khalifa	=	828 m
Height of Petronas Towers	=	452 m
Difference between heights	=	376 m



### Try Yourself

Solve the following:

- 670 m – 450 m
- 83 km 219 m – 51 km 340 m
- 32 cm 3 mm – 9 cm 4 mm

So, the difference between the heights of Petronas Twin Tower and Burj Khalifa is 376 m.



### Exercise 1

1. Convert the following units of distance as directed:

- |                          |                         |
|--------------------------|-------------------------|
| a) 34 km into m          | b) 74 km 930 m into m   |
| c) 1970 m into km and m  | d) 5890 m into km and m |
| e) 67 m into cm          | f) 650 m 46 cm into cm  |
| g) 840 cm into m and cm  | h) 107 cm into mm       |
| i) 99 cm 6 mm into mm    | j) 70 mm into cm        |
| k) 485 mm into cm and mm | l) 900 m into cm        |

2. To celebrate the independence day, Madeeha bought 4m 35 cm green colour cloth to stitch green shirt. For shawl and trouser, she bought 6m 79 cm white colour cloth. How many centimetres of cloth did she buy altogether?
3. Ahmad bought 140 cm ribbon to pack the gift box. How many millimetre ribbon he bought?
4. The lengths of the two ropes are 17 cm 9 mm and 80 cm 6 mm.
  - a) What is the difference between the length of two ropes?
  - b) What is the total length of two ropes in millimetres?
5. In a hospital, two halls are constructed for patients, where medical aid will be give to them. The length of one hall is 276 m 20 cm and the length of the other hall is 689 m 98 cm. what is the total length of both halls?
6. The distance between Ahmer's house to Masjid is 4 km 196 m, the distance between Ali's house to Masjid is 5 km 298 m. Whose house is nearer to the Masjid and by how much?
7. The park near Waleed's house is 2 km 117 m long and the park near Maheen's house is 3 km 214 m long. What is the difference between the length of two parks in metres?

## Conversion of Units of Time

### Conversion of Hours into Minutes



Farhan completes a science project in 4 hours. In how many minutes does he complete the project?

To find the time duration of the project in minutes, we will multiply 4 hours by 60.

$$4 \text{ hr} = 4 \times 60 \text{ min} = 240 \text{ min}$$



Convert 12 hours 45 minutes into minutes.



To convert 12 hours 45 minutes into minutes, first we will convert 12 hours into minutes and then add 45 minutes in it.

$$\begin{aligned} 12 \text{ hr } 45 \text{ min} &= 12 \text{ hr} + 45 \text{ min} \\ &= 12 \times 60 \text{ min} + 45 \text{ min} \\ &= 720 \text{ min} + 45 \text{ min} \\ &= 765 \text{ min} \end{aligned}$$

### Conversion of Minutes into Hours

A doctor performs his duty for 480 minutes daily. How many hours does he work daily?



To find this time in hours, we will divide the minutes by 60.

$$\begin{aligned} 480 \text{ min} &= 480 \div 60 \text{ hr} \\ &= \frac{480}{60} \text{ hr} = 8 \text{ hr} \end{aligned}$$

So, the doctor works 8 hours daily.



#### Key Fact

$$\begin{aligned} 1 \text{ hr} &= 60 \text{ min} \\ 1 \text{ min} &= \frac{1}{60} \text{ hr} \end{aligned}$$

- To convert hours into minutes, multiply by 60.
- To convert minutes into hours, divide by 60.



Make groups of the students. Give one groups the flash cards of minutes and ask them to convert into hours. Give the other group the flash cards of hours and ask them to convert into minutes.



Convert 5 280 minutes into hours.

$$\begin{aligned} 5\,280 \text{ min} &= 5\,280 \div 60 \text{ hr} \\ &= 5\,280 \times \frac{1}{60} \text{ hr} \\ &= 88 \text{ hr} \end{aligned}$$



### Try Yourself

Convert the following minutes into hours:

- i) 380 min                      ii) 720 min  
iii) 440 min

## Conversion of Minutes into Seconds



Aadil finishes his lunch in 25 minutes. In how many seconds does he finish his lunch?



To convert 25 minutes into seconds, multiply minutes by 60.



$$\begin{aligned} 25 \text{ min} &= 25 \times 60 \text{ sec} \\ &= 1\,500 \text{ sec} \end{aligned}$$

So, Aadil finishes his lunch in 1 500 seconds.



### Key Fact

$$1 \text{ min} = 60 \text{ sec}$$

$$1 \text{ sec} = \frac{1}{60} \text{ min}$$

- To convert minutes into seconds, multiply by 60.
- To convert seconds into minutes, divided by 60.

Convert 120 minutes 59 seconds into seconds.

$$\begin{aligned} 120 \text{ min } 59 \text{ sec} &= 120 \text{ min} + 59 \text{ sec} \\ &= 120 \times 60 \text{ sec} + 59 \text{ sec} \\ &= 7200 \text{ sec} + 59 \text{ sec} \\ &= 7259 \text{ sec} \end{aligned}$$



### Try Yourself

Convert 120 minutes 59 seconds into seconds.

## Conversion of Seconds into Minutes



To avoid Coronavirus, hands must be washed for at least 20 seconds. For how many minutes the hands must be washed?



To convert seconds into minutes, divide seconds by 60.



Let divide 20 seconds by 60

$$\begin{aligned} 20 \text{ sec} &= 20 \div 60 \text{ min} \\ &= 20 \times \frac{1}{60} \text{ min} \end{aligned}$$

$$20 \text{ sec} = 0.33 \text{ min}$$

So, the required time to wash hands is 0.33 min.

Convert 300 seconds into minutes.

$$\begin{aligned} 300 \text{ sec} &= 300 \div 60 \text{ min} \\ &= 300 \times \frac{1}{60} \text{ min} \\ &= 5 \text{ min} \end{aligned}$$



### Try Yourself

Convert the following into seconds:

- i) 220 min    ii) 540 min    iii) 720 min

So, there are 5 minutes in 300 seconds.



Divide students in two groups. Give flash cards of minutes to one group and ask them to convert it into seconds. Give the flash cards of seconds to other group and ask them to convert into minutes.

## Conversion of Hours into Days

Convert 240 hours into days.

$$\begin{aligned} 240 \text{ hr} &= 240 \div 24 \\ &= 10 \text{ days} \end{aligned}$$

## Conversion of Days into Hours

Convert 5 days into hours.

To convert days into hours, multiply by 24.

$$\begin{aligned} 5 \text{ days} &= 5 \times 24 \text{ hr} \\ &= 120 \text{ hr} \end{aligned}$$

## Conversion of Weeks into Days



A gardener plants the seed. After 2 weeks, a small plant comes out. Find in how many days the plant came out?

To convert weeks into days, multiply number of weeks by 7.

$$\begin{aligned} 2 \text{ weeks} &= 2 \times 7 \text{ days} \\ &= 14 \text{ days} \end{aligned}$$

It takes 14 days for the plant to grow.



Convert 6 weeks 3 days into days.



To convert 6 weeks 3 days into days, first convert 6 weeks into days and then add 3 days in it.



$$\begin{aligned}
 6 \text{ weeks } 3 \text{ days} &= 6 \text{ weeks} + 3 \text{ days} \\
 &= 6 \times 7 \text{ days} + 3 \text{ days} \\
 &= 42 \text{ days} + 3 \text{ days} \\
 &= 45 \text{ days}
 \end{aligned}$$



### Try Yourself

Toy factory manufactures 4 568 toys in 12 weeks and 6 days. In how many days does it manufactures these toys?

## Conversion of Days into Weeks



Hamid goes to Islamabad for 21 days. How many weeks does he spend in Islamabad?

For this, we will divide 21 by 7.



$$\begin{aligned}
 21 \text{ days} &= 21 \div 7 \text{ weeks} \\
 &= 21 \times \frac{1}{7} \text{ weeks} \\
 &= 3 \text{ weeks}
 \end{aligned}$$

So, Hamid spends 3 weeks in Islamabad.



### Key Fact

$$1 \text{ week} = 7 \text{ days}$$

$$1 \text{ day} = \frac{1}{7} \text{ week}$$

- To convert weeks into days, multiply by 7.
- To convert days into weeks, divide by 7.

Convert 420 days into weeks.

$$\begin{aligned}
 420 \text{ days} &= 420 \div 7 \text{ weeks} \\
 &= 420 \times \frac{1}{7} \text{ weeks} \\
 &= 60 \text{ weeks}
 \end{aligned}$$



### Try Yourself

February has 28 days except in the leap year. How many weeks are there in February?



Divide the students into two groups. Give flash cards of weeks to one group and ask them to convert into days. Give flash cards of days to the other group and ask them to convert into weeks.

## Conversion of Months into Days



Mubeen needs 11 months to construct a house. Calculate how much time will be required for construction in days?

To convert months into days, multiply by 30.

$$\begin{aligned} 11 \text{ months} &= 11 \times 30 \text{ days} \\ &= 330 \text{ days} \end{aligned}$$

So, 330 days will be required to construct the house.

Convert 12 months and 17 days into days.

To convert 12 months 17 days into days, first convert 12 months into days and then add 17 days in it.



$$\begin{aligned} 12 \text{ months } 17 \text{ days} &= 12 \text{ months} + 17 \text{ days} \\ &= 12 \times 30 \text{ days} + 17 \text{ days} \\ &= 360 \text{ days} + 17 \text{ days} \\ &= 377 \text{ days} \end{aligned}$$



### Try Yourself

Imran completes a storybook in 2 months. In how many days does he complete the storybook?

## Conversion of Days into Months



An author writes a book in 90 days. In how many months does he write the book?

Divide 90 days by 30.

$$\begin{aligned} 90 \text{ days} &= 90 \div 30 \text{ months} \\ &= 90 \times \frac{1}{30} \\ &= 3 \text{ months} \end{aligned}$$

So, the author writes the book in 3 months.



### Key Fact

1 month = 30 days

1 day =  $\frac{1}{30}$  month

- To convert months into days, multiply by 30.
- To convert days into months, divide by 30.

Convert 660 days into months.

$$\begin{aligned} 660 \text{ days} &= 660 \div 30 \text{ months} \\ &= 660 \times \frac{1}{30} \\ &= 22 \text{ months} \end{aligned}$$



### Try Yourself

Convert the following into months:  
i) 520 days ii) 15 days iii) 30 days

## Conversion of Years into Months



Ahmad completes a project in 3 years. In how many months does he complete this project?

To convert 3 years into months, we will multiply 3 years by 12.



Divide the students into two groups. Give flash cards of months to one group and ask them to convert into days. Give flash cards of days to other group and ask them to convert into months.



Convert 3 years into months by multiplying 3 with 12.

$$\begin{aligned} 3 \text{ years} &= 3 \times 12 \text{ months} \\ &= 36 \text{ months} \end{aligned}$$

So, he completes the project in 36 months.

Convert 15 years 7 months into months.



To convert 15 years 7 months into months, first convert 15 years into months and then add 7 months in it.

$$15 \text{ years } 7 \text{ months} = 15 \text{ years} + 7 \text{ months}$$



### Try Yourself

Tahir works in a factory for 5 years. For how many months does he work in the factory?

$$= 15 \times 12 \text{ months} + 7 \text{ months}$$

$$= 180 \text{ months} + 7 \text{ months}$$

$$= 187 \text{ months}$$

## Conversion of Months into Years



The government is constructing homes for people and this project will be completed in 18 months. In how many years will the government complete the project?



Divide 18 months by 12 to convert it into years.

$$\begin{aligned} 18 \text{ months} &= 18 \div 12 \text{ years} \\ &= 18 \times \frac{1}{12} \\ &= 1.5 \text{ years} \end{aligned}$$

The government will complete this project in 1.5 years.



Divide the students into two groups. Give flash cards of months to one group and ask them to convert into years. Give flash cards of years to other group and ask them to convert into months.

**Key Fact**

$$1 \text{ year} = 12 \text{ months}$$

$$1 \text{ month} = \frac{1}{12} \text{ year}$$

- To convert years into months, multiply by 12.
- To convert months into years, divide by 12.

Convert 120 months into years.

$$120 \text{ months} = 120 \div 12 \text{ years}$$

$$= 120 \times \frac{1}{12}$$

$$= 10 \text{ years}$$

So, the number of years in 120 months is 10 years.

**Try Yourself**

Ahmad is 18 years old.  
Find his age in months.

**Exercise 2**

1. Convert the given units of time as directed:

- |                            |                             |
|----------------------------|-----------------------------|
| a) 45 hr into min          | e) 64 min into sec          |
| b) 240 hr 56 min into min  | f) 180 min into sec         |
| c) 960 min into hr         | g) 544 sec into min and sec |
| d) 440 min into hr and min | h) 600 sec into min         |

2. Convert the following as directed:

- |                                     |                                |
|-------------------------------------|--------------------------------|
| (a) 56 years into months            | f) 12 weeks 6 days into days   |
| (b) 34 years 10 months into months  | g) 49 days into weeks          |
| (c) 48 months into years            | h) 180 days into months        |
| (d) 56 months into years and months | i) 67 months into days         |
| (e) 78 weeks into days              | j) 44 months 29 days into days |



## Addition and Subtraction of Units of Time

### Addition of Units of Time



Hadia bakes a cake in 45 minutes 28 seconds and a Pizza in 55 minutes 34 seconds. In how many seconds does she bake both the items?

Add the time she takes for baking the two items.

$$\begin{array}{r}
 \text{Time to bake the cake} = 45 \text{ min } 28 \text{ sec} \\
 \text{Time to bake the pizza} = + 55 \text{ min } 34 \text{ sec} \\
 \hline
 \text{Total time} = 101 \text{ min } 02 \text{ sec}
 \end{array}$$



#### Key Fact

1 minute = 60 seconds, if the sum of the seconds is 60 or more than 60, we add one minute at minutes column for every 60 seconds and write the remaining seconds at the seconds column.

So, Hadia bakes both items in 101 minutes and 2 seconds. Now to convert this time duration into seconds, first we will convert 101 minutes into seconds and then add 2 seconds in it.

$$\begin{aligned}
 101 \text{ min } 2 \text{ sec} &= 101 \text{ min} + 2 \text{ sec} \\
 &= 101 \times 60 \text{ sec} + 2 \text{ sec} \\
 &= 6\,060 \text{ sec} + 2 \text{ sec} \\
 &= 6\,062 \text{ sec}
 \end{aligned}$$



#### Key Fact

To add the units of time, always add the same units together.

### Subtraction of Units of Time



Ahmad spends 15 weeks 5 days in his grandmother's home and 6 weeks 6 days in his aunt's home. How many more days does he spend in his grandmother's home?

To find how much more time he spends in his grandmother's home, we will subtract.





$$\begin{array}{r}
 \text{Days spent in grandmother's home} = 15^{\textcircled{4}} \text{ weeks } 5^{\textcircled{7}} \text{ days} \\
 \text{Days spent in Aunt's home} = -6 \text{ weeks } 6 \text{ days} \\
 \hline
 \text{Difference} = 8 \text{ weeks } 6 \text{ days}
 \end{array}$$

**Key Fact**

1 week = 7 days  
when we borrow  
one week to days,  
we add 7 at days  
column.

Ahmad spends 8 weeks 6 days more in his grandmother's home than in his aunt's home.

To convert 8 weeks 6 days into days, first we will convert weeks into days and add 6 days in it.

$$\begin{aligned}
 8 \text{ weeks } 6 \text{ days} &= 8 \text{ weeks} + 6 \text{ days} \\
 &= 8 \times 7 \text{ days} + 6 \text{ days} \\
 &= 56 \text{ days} + 6 \text{ days} \\
 &= 62 \text{ days}
 \end{aligned}$$

**Key Fact**

To subtract the units of time,  
always subtract the same units.

**Try Yourself**

Subtract the given units of time

- 3 years, 12 years 6 months
- 8 hours 56 minutes, 7 hours 12 minutes

So, Ahmad spends 62 more days in his grandmother's home.

**Exercise 3**

1. Solve the following:

- 3 hr 20 min + 5 hr 43 min
- 13 min 12 sec + 15 min 19 sec
- 33 years 8 months + 40 years 11 months
- 2 weeks 3 days + 8 weeks 1 day
- 117 months + 7 months
- 8 months 12 days + 2 months 14 days

2. Solve the following:

- 16 hr 49min – 3 hr 53 min
- 44 min 44 sec – 36 min 16 sec
- 8 weeks 1 day – 2 weeks 3 days
- 17 months – 10 months 12 days
- 40 months 28 days – 38 months 17 days



Give flash cards of units of time to the students and ask them to add and subtract. Also ask them to convert the units.

3. A train takes 5 hours 56 minutes to travel from Multan to Lahore and 6 hours 22 minutes to travel from Lahore to Rawalpindi. How much time does it take to travel from Multan to Rawalpindi?
4. To complete one Science project, Hammad takes 2 weeks and 5 days and to complete another project he takes 1 week and 6 days. Which project takes more time and how much?
5. Kamal's age is 10 years 5 months old and his friend's age is 11 years and 8 months. What is the difference between their ages in months?
6. Umer takes 3 hours 12 minutes to complete Maths homework sums and 1 hour 50 minutes to complete English homework.
  - a) How much time does he take to complete both tasks in minutes?
  - b) In which subject, does he spend more time and how much more?

Conversion Table	
1 km	1000 m
1 m	100 cm
1 cm	10 mm
1 hr	60 min
1 min	60 sec
1 week	7 days
1 month	30 days
1 year	12 months

Conversion Table	
1 m	$\frac{1}{1000}$ km
1 cm	$\frac{1}{100}$ m
1 mm	$\frac{1}{10}$ cm
1 min	$\frac{1}{60}$ hr
1 sec	$\frac{1}{60}$ min
1 day	$\frac{1}{7}$ weeks
1 day	$\frac{1}{30}$ months
1 month	$\frac{1}{12}$ years

### I Have Learnt to:

- convert measures given in:
  - kilometres into metres and vice versa
  - metres into centimetres and vice versa
  - centimetres into millimetres and vice versa.
- solve real life situations involving conversion, addition and subtraction of measures of distance.

Vocabulary	
• Seconds	• Distance
• Days	• Metre
• Years	• Months
• Time	• Weeks

- convert:
  - hours into minutes and vice versa
  - minutes into seconds and vice versa
- convert:
  - years into months and vice versa
  - months into days and vice versa
  - weeks into days and vice versa
- add and subtract intervals of time in hours and minutes with carrying and borrowing.
- solve real life situations involving conversion, addition and subtraction of intervals of time.

### Vocabulary

- |               |              |
|---------------|--------------|
| • Conversion  | • Centimetre |
| • Addition    | • Millimetre |
| • Subtraction | • Hours      |
| • Kilometre   | • Minutes    |

## Review Exercise



1. Choose the correct options and fill in the blanks.

a) There are \_\_\_\_\_ metres in 2 kilometres.

- i) 500                      ii) 1 000                      iii) 200                      iv) 2 000

b) To measure \_\_\_\_\_ hours, minutes and seconds are used.

- i) time                      ii) distance                      iii) area                      iv) length

c) There are \_\_\_\_\_ months in  $\frac{1}{2}$  year.

- i) 6                      ii) 12                      iii) 9                      iv) 5

d) There are \_\_\_\_\_ days in 10 months.

- i) 300                      ii) 30                      iii) 15                      iv) 45

e) There are \_\_\_\_\_ minutes in 5 hours.

- i) 60                      ii) 300                      iii) 200                      iv) 50

f) There are \_\_\_\_\_ days in 7 weeks.

- i) 49                      ii) 42                      iii) 7                      iv) 14



2. Convert the following:
- a) 52 km into m
  - b) 21 km 103 m into m
  - c) 1050 m into km
  - d) 6000 m into km
  - e) 198 m into cm
  - f) 500 m 66 cm into cm
  - g) 640 cm into m
  - h) 98 cm into mm
3. Convert the following:
- a) 22 hr 66 min into min
  - b) 360 min into hr
  - c) 580 min into hr and min
  - d) 64 min into sec
  - e) 795 sec into min and sec
  - f) 198 sec into min
4. Convert the following:
- a) 78 years into months
  - b) 14 years 6 months into months
  - c) 26 months into years and months
  - d) 9 weeks 2 days into days
  - e) 35 days into weeks
  - f) 420 days into months
5. Solve the following:
- a) 6 hr 52 min + 9 hr 12 min
  - b) 46 min 46 sec + 11 min 10 sec
  - c) 66 years 9 months + 22 years 7 months
  - d) 34 min 20 sec – 12 min 55 sec
  - e) 6 weeks 5 days + 11 weeks 5 days
  - f) 49 months 19 days + 55 months
  - g) 33 months 15 days – 22 months 18 days
  - h) 20 weeks 5 days – 15 weeks 6 days
6. The length of two ropes are 15m 13 cm and 12 m 42 cm respectively.
- a) What is the total length of two ropes?
  - b) What is the difference between their lengths?
7. To stitch one shirt, a tailor takes 3 hours 45 minutes and to stitch the other shirt, he takes 2 hours and 21 minutes.
- a) For which shirt does he take more time and how much?
  - b) How much time does he take to stitch both the shirts altogether?

# Unit 6

## Unitary Method

### Learning Outcomes

After completing this unit, you will be able to:

- Calculate the value of many objects of the same kind when the value of one of these objects is given.
- Calculate the value of one object of the same kind when value of many of these objects are given.
- Calculate the value of many objects of the same kind when the value of some of these is given.



The price of 5kg vegetables is Rs 400. Find the price of 13 kg vegetables.

## Unitary Method



For a science experiment, the students were divided into 8 groups and each group was given one magnifying glass. If the price of 1 magnifying glass is Rs 245, find the cost of 8 such glasses.



We can find price of 8 magnifying glasses by multiplying price of one magnifying with 8.

$$\text{Price of 1 magnifying glass} = \text{Rs } 245$$

$$\begin{aligned} \text{Price of 8 magnifying glass} &= \text{Rs } 8 \times 245 \\ &= \text{Rs } 1\,960 \end{aligned}$$

So, price of 8 magnifying glasses is Rs 1 960.



### Key Fact

To find the price or value of more than one items, we multiply the price of one item by the number of required items.

If the price of a pencil is Rs 10. What will be the price of 15 pencils?

$$\text{Price of 1 pencil} = \text{Rs } 10$$

$$\begin{aligned} \text{Price of 15 pencils} &= \text{Rs } 15 \times 10 \\ &= \text{Rs } 150 \end{aligned}$$

So, price of 15 pencils will be Rs 150.



The cost of 20 chairs is Rs 7 240. How can we find the cost of 1 such chair?

We can find the price of 1 chair by dividing the total price by 20.

$$\text{Total price of 20 chairs} = \text{Rs } 7\,240$$

$$\begin{aligned} \text{Price of 1 chair} &= \text{Rs } 7\,240 \div 20 \\ &= \text{Rs } 362 \end{aligned}$$

So, the price of 1 chair is Rs 362.





In a mango orchard, there are 576 trees in 32 identical rows. How many trees will be there in 1 row?

Total number of trees = 576  
 Number of rows = 32  
 Number of trees in 1 row =  $576 \div 32$   
 = 18  
 So, 18 trees will be in 1 row.



### Key Fact

- When the value of one item is known, the value of many items of the same kind can be found by multiplication.
- When the value of many items of the same kind is known, then the price of one item can be found by division.

### Try It!



Visit the nearby market with your parents. Make a list of price of 5 or many items. Then by the help of these prices, find the price of multiple items of the same kind.



## Exercise 1

1. The price of 1 geometry box is Rs. 76. Find out the price of 26 such geometry boxes.
2. If the price of one ice cream is Rs. 55, find out the price of 17 such ice-creams.
3. If the price of a popcorn pack is Rs. 37, find out the price of 71 such popcorn packs.
4. A bag weighs 21 kg. What will be the weight of 15 such bags?
5. The capacity of 15 identical buses is 555 passengers. What will be the capacity of 1 bus?
6. The price of 26 kg sugar is Rs. 1 170. What will be the price of 1 kg of sugar?
7. If the rent of a house for 8 months is Rs. 145 680, find out the rent of the house for 1 month.
8. The cost of 35 registers is Rs. 5 075. Find out the cost of 1 register.

## Unitary Method



Father bought 12 tubelights for the home which cost Rs 6 900 altogether. What will be the price of 7 such tubelights?



Find the price of 1 tubelight by division, then Multiply the price of a tubelight by 7 to find the price of 7 tubelights.



$$\begin{aligned} \text{Price of 12 tubelights} &= \text{Rs } 6\,900 \\ \text{Price of 1 tubelight} &= \text{Rs } 6\,900 \div 12 \\ &= \text{Rs } 575 \\ \text{Price of 7 tubelights} &= \text{Rs } 575 \times 7 \\ &= \text{Rs } 4\,025 \end{aligned}$$

So, the price of 7 tubelights will be Rs 4 025.

There are 2 940 pages in 30 notebooks. How many pages will be there in 14 such notebooks?

$$\begin{aligned} \text{Number of pages in 30 notebooks} &= 2\,940 \\ \text{Number of pages in 1 notebook} &= 2\,940 \div 30 \\ &= 98 \\ \text{Number of pages in 14 notebooks} &= 98 \times 14 \\ &= 1\,372 \end{aligned}$$



So, there will be 1 372 pages in 14 notebooks.



### Key Fact

By using unitary method, we find out the value of one unit and further use it to find the value of multiple units.



By using the prices of daily life objects, explain the concept of unitary method.



## Exercise 2

1. There are 4 900 markers in 50 boxes. How many markers will be there in 75 such boxes?
2. The price of 10 mobile phones is Rs 348 290. What will be the price of 29 mobile phones of the same model?
3. 40 books weigh 88 kg. What is the weight of 6 such books?
4. A train travels 6 136 km in 52 hours. How much distance will it cover at the same speed in 45 hours?
5. Amir buys 3 computers for Rs 838 155. What will be the cost of 52 such computers?
6. If the fare for 34 km is Rs 1 190, what will be the fare for 48 km?
7. 19 pairs of shoes cost Rs 23 750. What will be the price of 65 such pairs?

### I Have Learnt to:



- calculate the value of many objects of the same kind when the value of one of these objects is given.
- calculate the value of one object of the same kind when the value of many of these objects are given.
- calculate the value of many objects of the same kind when the value of some of these is given.

### Vocabulary

- Unitary Method
- Price
- Items
- Value

### Review Exercise



1. Choose the correct options and fill in the blanks.
  - a) The price of a book is Rs 250, the price of 5 books will be Rs \_\_\_\_\_.
    - i) 50
    - ii) 1 000
    - iii) 1 250
    - iv) 2 500
  - b) The price of 11 carpets is Rs 35805, the price of 1 carpet will be Rs \_\_\_\_\_.
    - i) 3 855
    - ii) 3 055
    - iii) 2 355
    - iv) 3 255



- c) The price of a book is Rs 555. The price of 10 books will be Rs \_\_\_\_\_.  
i) 2 550            ii) 5 050            iii) 3 250            iv) 5 550
- d) The price of 6 oranges is Rs 48. The price of 72 oranges will be Rs \_\_\_\_\_.  
i) 567            ii) 96            iii) 112            iv) 576
- e) The price of 3 chairs is Rs 645. The price of 16 chairs will be Rs \_\_\_\_\_.  
i) 3 040            ii) 3 004            iii) 3 440            iv) 3 404
2. The price of a storybook is Rs. 440. Find out the price of 15 such storybooks.
3. If the price of 16 school bags is Rs. 24000, find out the price of 1 such bag.
4. 425 pearls were used to make a necklace, find:  
a) how many pearls will be used to make 25 necklaces?  
b) how many pearls will be used to make 100 necklaces?
5. If the price of 5 washing machines is Rs 92 465, then find:  
a) the price of 24 such washing machines.  
b) the price of 10 such washing machines.

# Unit 7

# Geometry

## Learning Outcomes

After completing this unit, you will be able to:

- Recognize straight and reflex angle.
- Recognize the standard units for measuring angles is  $1^\circ$ , which is defined as  $\frac{1}{360}$  of a complete revolution.
- 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.
- Use protractor and ruler to construct:
  - A right angle
  - A straight angle
  - Reflex angles of different measures
- Describe adjacent, complementary and supplementary angles.
- 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 triangles).
- Use protractor and ruler to construct a triangle when:
  - two angles and their included side is given.
  - two sides and included angle is given.
- Measure the lengths of the remaining sides and angles of the triangle.
- Recognize the 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.
- Use protractor and ruler to construct square and rectangle when lengths of sides are given.
- Recognize different types of symmetry (Reflective and Rotational) in 2-D figures.
- Identify lines of symmetry for given 2-D figures.
- Find point of rotation and order of rotational symmetry of given 2-D figures.
- Identify cubes, cuboids and pyramids from their nets.



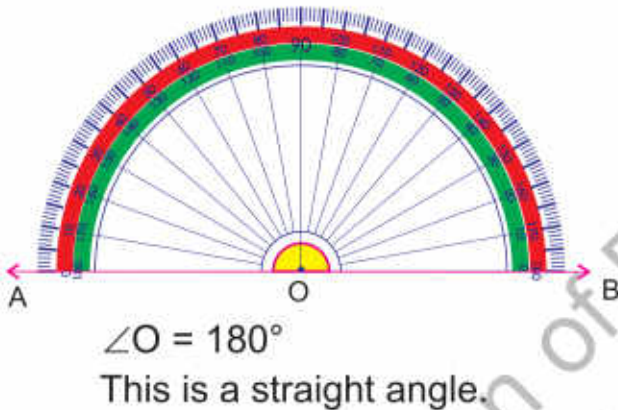
Hamad visits the hill station. He saw the reflection of mountain in the water which looks same as the mountain. Can you tell what is the relation between the mountain and its reflection?

# Angles

We know that there exists different angles in different objects around us. I have a paper fan. If I open it straight then tell which angle will be made?



After opening it straight, both sides of the paper fan will be in front of each other. The angle which will make between them is called straight angle and it is of  $180^\circ$ .

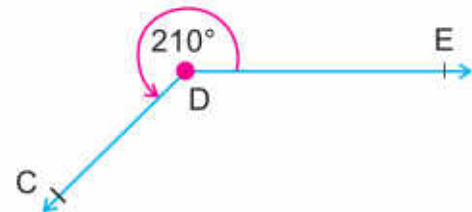


### Key Fact

The unit to measure the angle is degree ( $^\circ$ ). OA is a ray, when this ray completes one part of the whole revolution, then we can say that the angle between ray OA and the next point is of  $1^\circ$ .

An angle of measure  $180^\circ$  is called straight angle.

This  $\angle D$  is greater than  $180^\circ$  but smaller than a complete rotation which is  $360^\circ$ . Such angles are called reflex angles.



### Key Fact

The standard unit of measuring angle is degree and written as  $^\circ$ .  
The angle is represented by ' $\angle$ '.



Make a right angle using cardboard and then use it as a model angle to compare with the other angles.



## Construction of Angles by Using Protractor

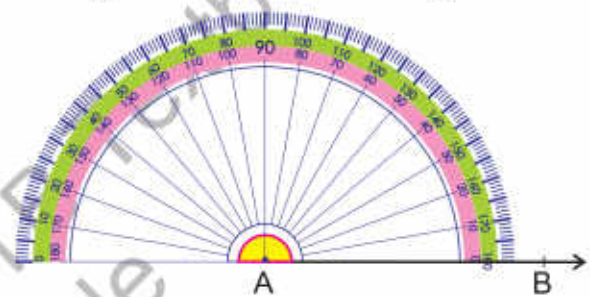


We construct an angle  $BAC = 90^\circ$  by using protractor.

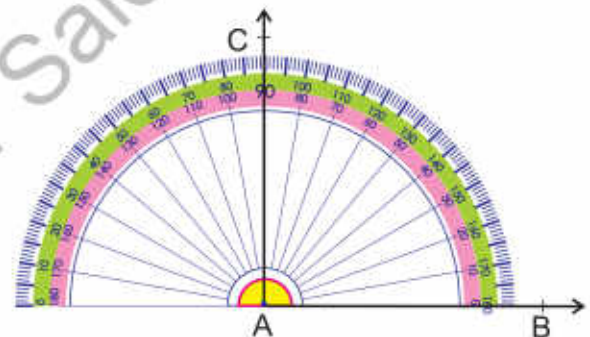
i) Draw a ray AB.



ii) Place the protractor on the ray AB such that the centre point of protractor is exactly at point A and the baseline of the protractor is aligned with the arm AB.



iii) Read the inner scale on the protractor and mark a point C at  $90^\circ$ .

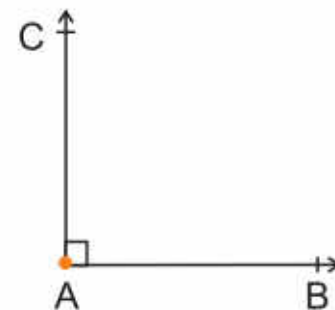


iv) Remove the protractor and join A to C.

Thus,  $\angle A = 90^\circ$  is the required right angle.

$\angle A$  can also be written as  $\angle CAB$  or  $\angle BAC$ .

The letter A should remain between the other letters.



### Try Yourself

How many  $30^\circ$  angles are there in a right angle?

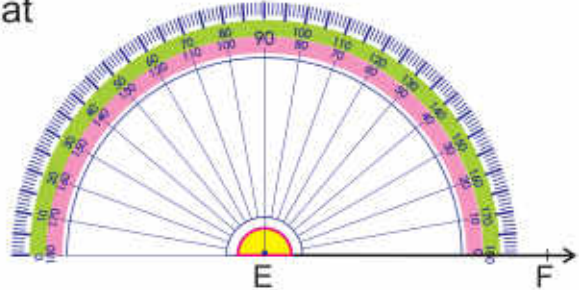


Construct  $\angle DEF = 180^\circ$  by using protractor.

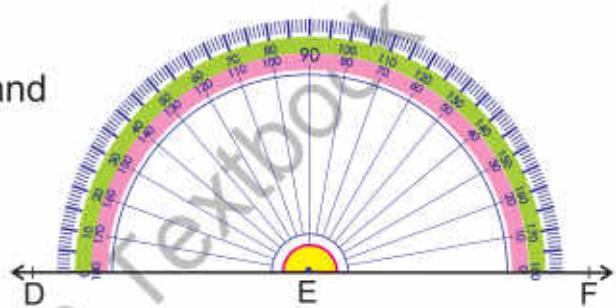
i) Draw a ray EF.



- ii) Place the protractor on the ray EF such that the centre point of protractor is exactly at point E and the baseline of the protractor is aligned with the arm EF.



- iii) Read the inner scale on the protractor and mark a point D at  $180^\circ$ .



- iv) Remove the protractor and join D to E.



Thus,  $\angle E = 180^\circ$  is the required straight angle.



**Try Yourself**

1. How many right angles are there in a straight angle?
2. How many straight angles are there in a complete rotation?

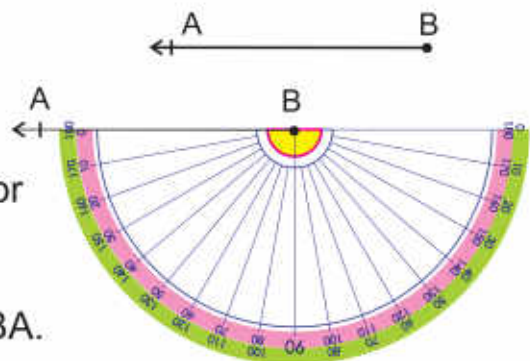


Construct  $\angle ABC = 285^\circ$  by using protractor.

To construct a reflex angle of  $285^\circ$ , first we subtract the reflex angle from  $360^\circ$  and then draw the resulting angle, below the ray.

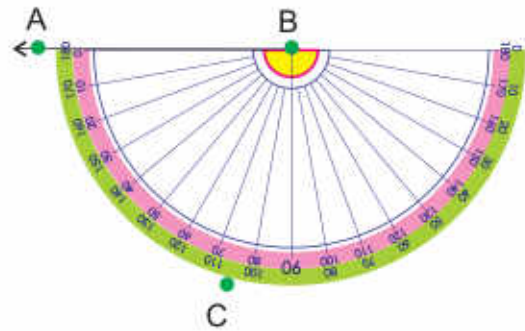
$$360^\circ - 285^\circ = 75^\circ$$

- i) Draw a ray BA.
- ii) Place the protractor upside down on ray BA, so that the centre of the protractor is exactly at point B and the baseline of the protractor is aligned with the arm BA.

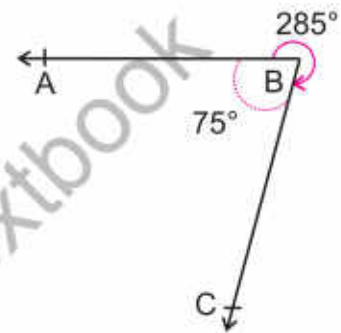




iii) Read the inner scale on the protractor and mark a point C at  $75^\circ$ .



iv) Remove the protractor and join B to C.



Thus,  $\angle B = 285^\circ$  is the required reflex angle.

## Pairs of Angles

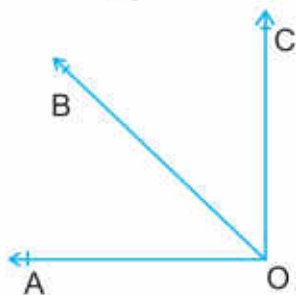
### Adjacent angles



Adjacent angles are two angles that have a common vertex and a common side. Look at the hands of the given clock that are making two adjacent angles.



The hour hand, the minute hand and the second hand are making two angles. The second hand is the common arm of both the angles. The centre of the clock is the common vertex of these two angles.



Ask the students to find adjacent angles in different objects around them.

Angle AOB is adjacent to angle BOC. Their common arm is OB and the common vertex is O.





**Key Fact**

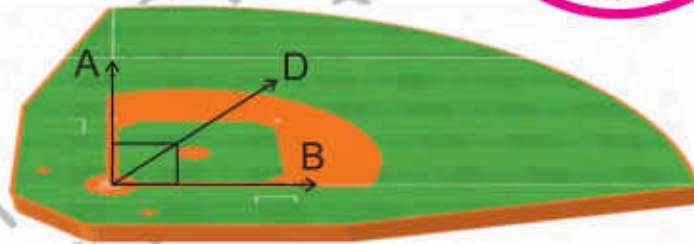
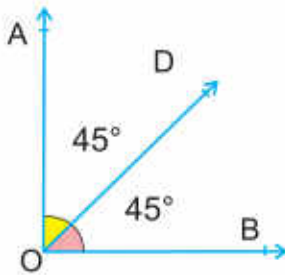
Two angles are called adjacent angles if:

- they have a common arm.
- they are on the opposite side of the common arm.
- they have a common vertex.

**Complementary Angles**



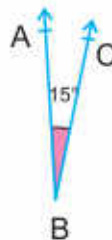
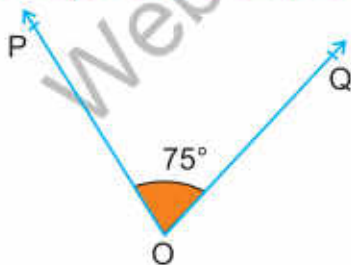
Look at the hands of the given clock. They are making angles and their sum is  $90^\circ$ . The pair of these angles are showing complementary angles.



The  $\angle AOD$  and  $\angle DOB$  on the ground are complementary angles

$$\angle AOD + \angle DOB = 45^\circ + 45^\circ = 90^\circ$$

**Non-Adjacent Complementary Angles**



$$\angle O + \angle B = 75^\circ + 15^\circ = 90^\circ$$



**Key Fact**

Two angles are called complementary angles if their sum is  $90^\circ$ . One angle is the complement of the other angle. They may be adjacent or non-adjacent.



**Try Yourself**

Can two right angles be the complementary angles of each other? Explain your answer.

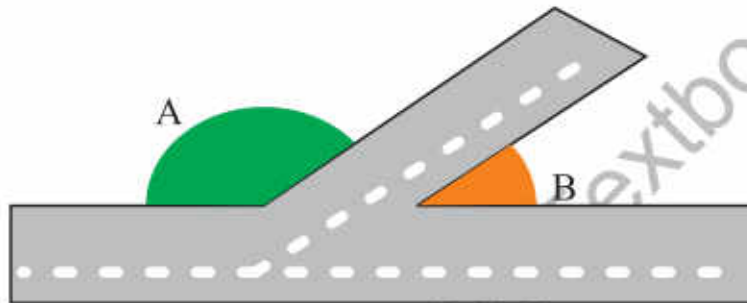
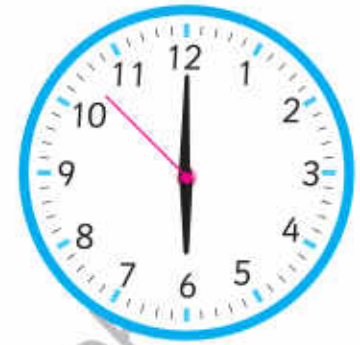


Ask the students to find complementary angles in the objects around them.

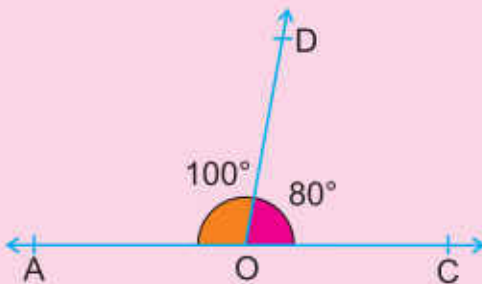
## Supplementary Angles



Two angles are called supplementary angles, if their sum is  $180^\circ$ . They may be adjacent or non-adjacent.

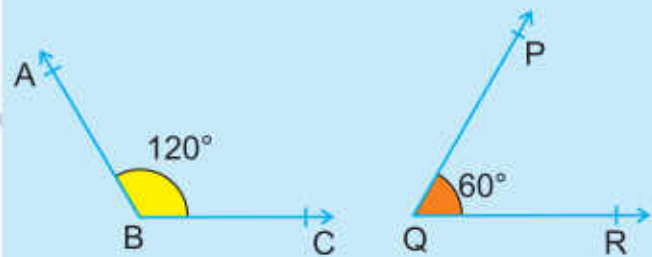


The angles i.e.  $\angle A$  and  $\angle B$  are called supplementary angles.



$$\angle AOD + \angle DOC = 100^\circ + 80^\circ = 180^\circ$$

Adjacent Supplementary Angles



$$\angle ABC + \angle PQR = 120^\circ + 60^\circ = 180^\circ$$

Non-Adjacent Supplementary Angles



### Try Yourself

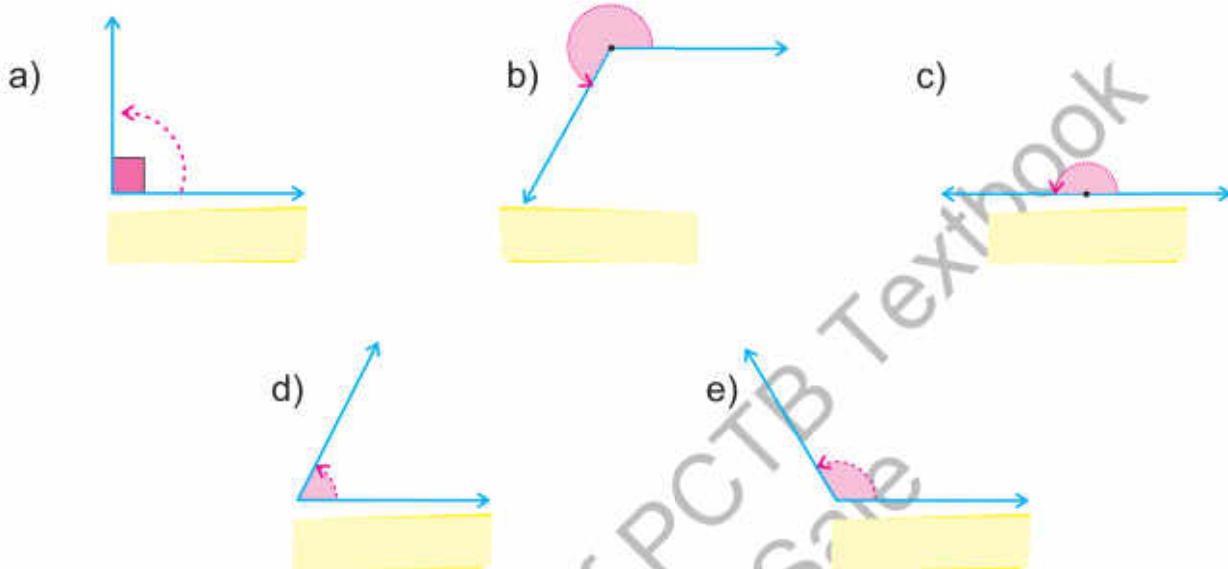
Can two straight angles be the supplementary angles of each other?  
Explain your answer.



Ask the students to find supplementary angles in the objects around them.

 **Exercise 1**

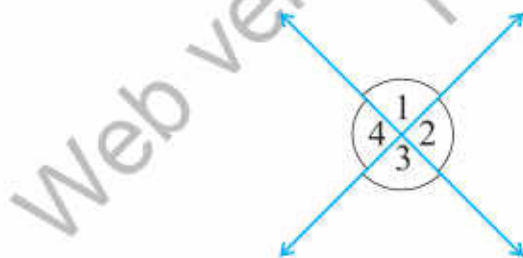
1. Draw a right angle by using card board and compare it with the given angles and indicate their types.



2. Use the protractor to draw the given angles.

- a)  $35^\circ$    b)  $45^\circ$    c)  $240^\circ$    d)  $180^\circ$    e)  $90^\circ$    f)  $60^\circ$    g)  $300^\circ$    h)  $155^\circ$

3. Identify adjacent angles from the given angles:



4. Find the supplements of the following:

- a)  $98^\circ$    b)  $180^\circ$    c)  $115^\circ$    d)  $3^\circ$    e)  $78^\circ$    f)  $135^\circ$    g)  $90^\circ$

5. Find the complements of the following:

- a)  $12^\circ$    b)  $88^\circ$    c)  $90^\circ$    d)  $10^\circ$    e)  $62^\circ$    f)  $40^\circ$    g)  $70^\circ$



# Triangle



There is a sign board in front of our school. What is the shape of this board?



This board is in triangular shape as it has three sides. A simple closed figure having three sides and three angles is called a triangle.

Types of Triangles with respect to their Sides

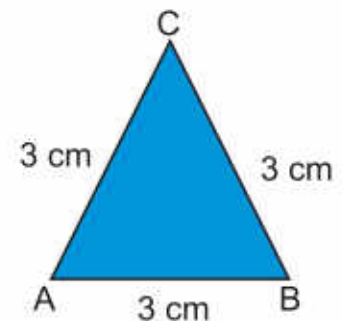
## Equilateral Triangle



All the sides of the given triangle are equal in length.

$$\text{As, } AB = BC = CA = 3 \text{ cm}$$

So, it is an equilateral triangle.

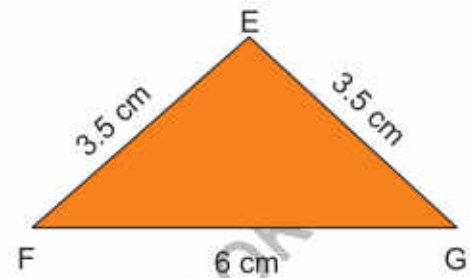


A triangle in which all the three sides are equal is called an equilateral triangle. All angle of an equilateral triangle are equal to  $60^\circ$ .

## Isosceles Triangle



Two sides of the given triangle are equal in length.  
As,  $EF = EG = 3.5 \text{ cm}$   
So, this is an isosceles triangle.

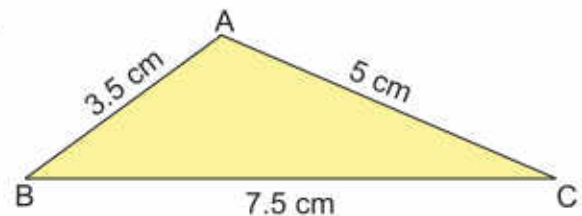


A triangle in which two sides are equal, is called an isosceles triangle.  
Two base angles of an isosceles are equal in measure.

## Scalene Triangle



All the sides of the given triangle are different in length.  
As,  $AB \neq BC \neq CA$   
So, It is a scalene triangle.



A triangle having all sides of different measure is called a scalene triangle. All angles in a scalene triangle are different in measure.



### Try Yourself

Is every equilateral triangle an isosceles triangle?  
Explain your answer.



Give the cut-outs of different types of triangles to the students and ask them to sort them with respect to their sides.

## Types of Triangles with respect to their Angles

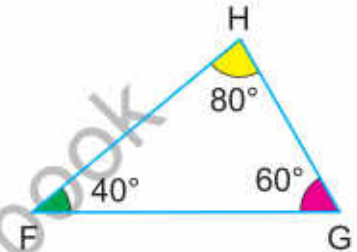
### Acute Angled Triangle



All the angles of the given triangle FGH are acute.

$$\text{As, } \angle F = 40^\circ, \angle G = 60^\circ, \angle H = 80^\circ$$

So, this is an acute angled triangle.



#### Key Fact

A triangle in which all angles are acute i.e.  $< 90^\circ$ , is called an acute angled-triangle.

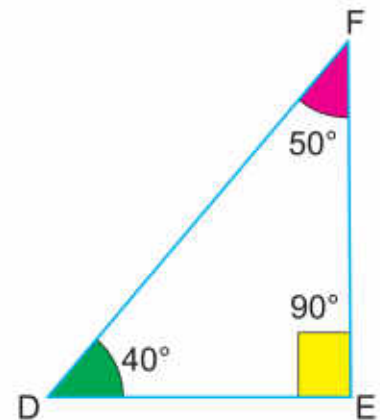
### Right Angled Triangle



One angle in the given triangle is a right angle.

$$\text{As, } \angle E = 90^\circ$$

So, this is a right angled-triangle.



#### Key Fact

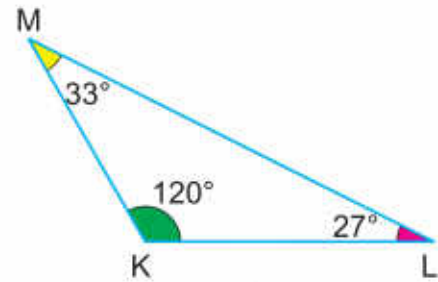
A triangle in which one angle is right angle ( $90^\circ$ ) is called a right-angled triangle.



### Obtuse Angled Triangle



One angle in the given triangle LKM is obtuse. As,  $\angle K = 120^\circ$  This is an obtuse angled triangle.



A triangle in which one angle is obtuse i.e.  $> 90^\circ$  is called an obtuse angled-triangle.

### Construction of Triangle

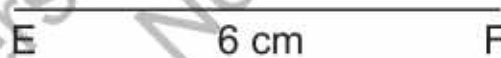
#### Construction of Triangle when 2 angles and included side is given

Construct a triangle EFG in which

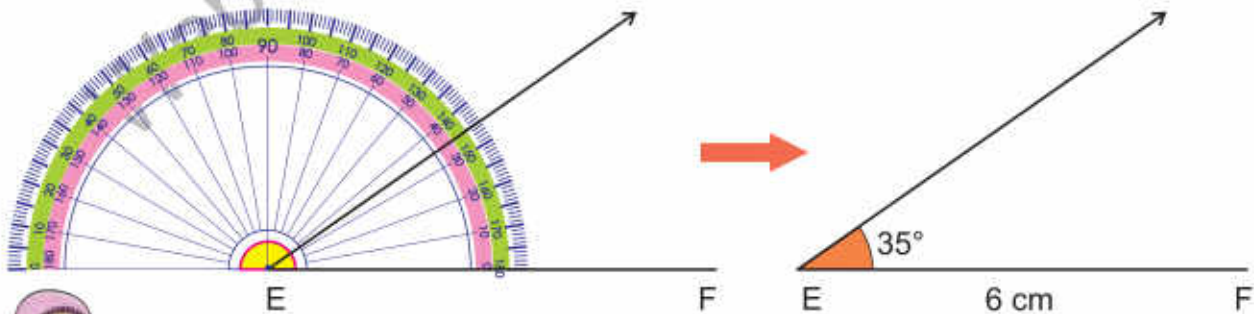
$EF = 6\text{ cm}$ ,  $\angle E = 35^\circ$  and  $\angle F = 70^\circ$ .

Also find the measurement of the remaining sides and angle.

i) Draw a line segment  $EF = 6\text{ cm}$  by using ruler.



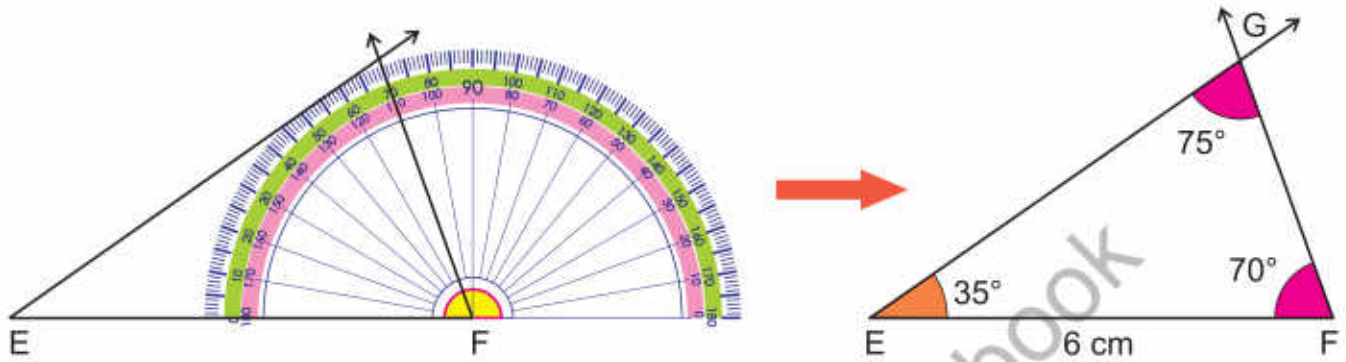
ii) Draw an angle of  $35^\circ$  at point E by using protractor.



#### Key Fact

Triangle is represented by the symbol  $\Delta$ .  
Sum of the interior angles of a triangle is  $180^\circ$ .

iii) Similarly, by using a protractor, draw another angle of  $70^\circ$  at point F. The two drawn rays intersect at point G.



So, EFG is the required triangle.

Now, calculate angle G.

$$\angle G = 180^\circ - (35^\circ + 70^\circ) = 180^\circ - 105^\circ = 75^\circ$$



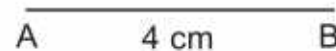
**Try Yourself**

Measure EG and FG by using ruler.

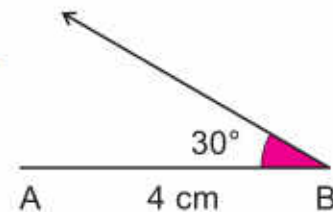
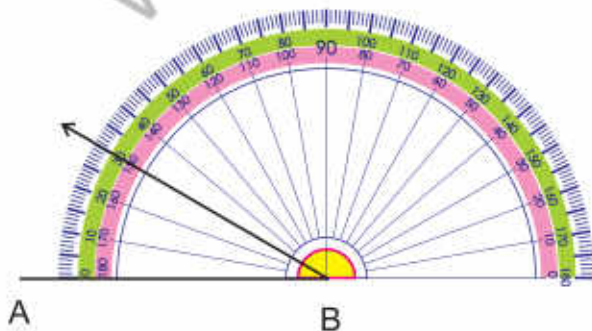
**Construction of Triangle when 2 sides and included angle is given**

Construct a triangle ABC in which  $AB = 4\text{cm}$ ,  $\angle B = 30^\circ$  and  $BC = 3\text{cm}$

i) By using ruler, draw a line segment  $AB = 4\text{ cm}$

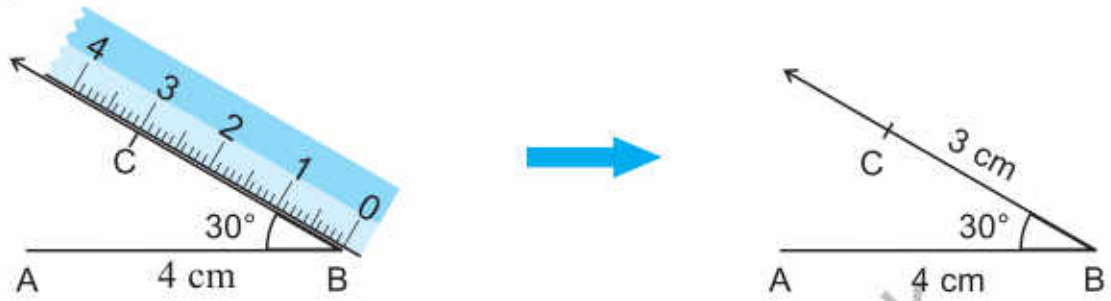


ii) Use a protractor, to draw an angle of  $30^\circ$  at point B.

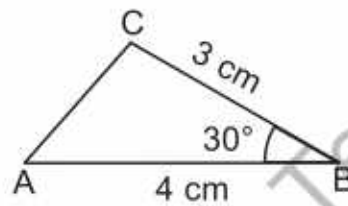


Use board geometry box and construct the triangles step by step. Ask the students to follow you and construct it on their notebooks.

iii) Mark a point C on the arm of  $30^\circ$  such that  $BC = 3\text{cm}$ .



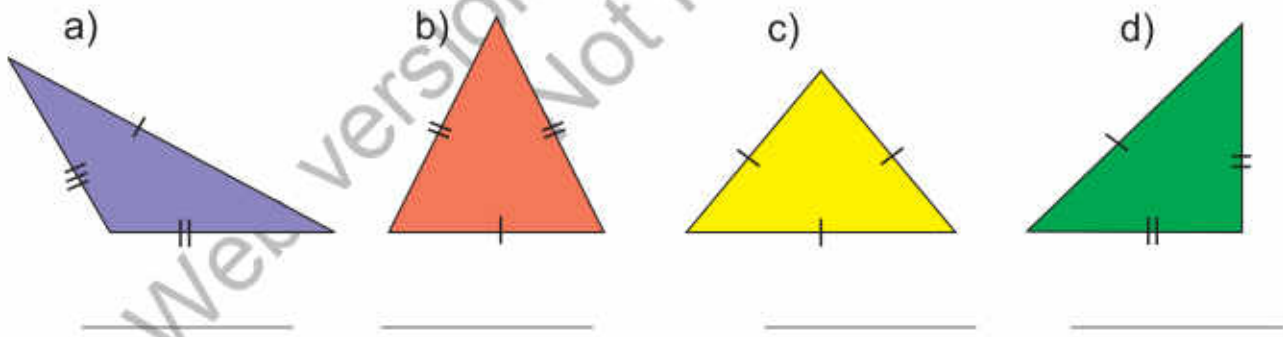
iv) Use ruler to Join A to C.



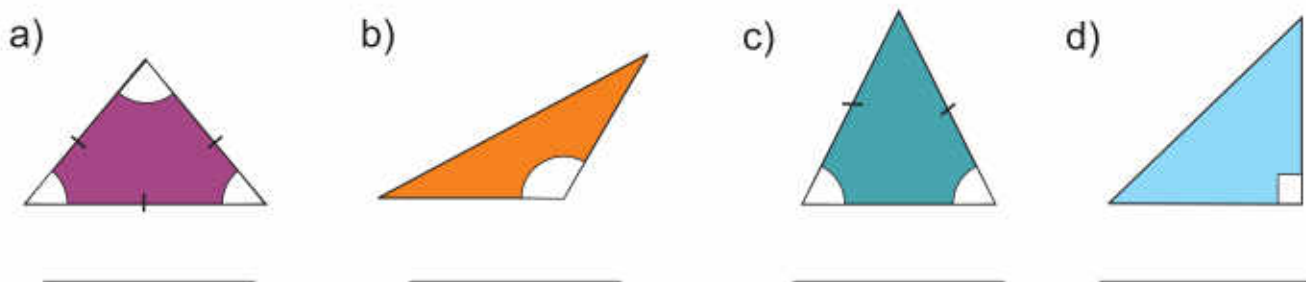
Thus,  $\triangle ABC$  is the required triangle.

### Exercise 2

1. Identify these triangles with respect to their sides.



2. Identify these triangles with respect to their angles.



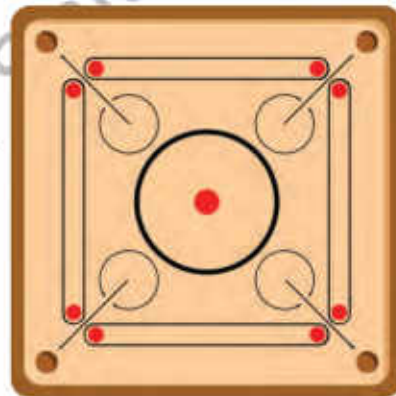


3. Draw a triangle ABC in which,  $\angle A = 75^\circ$ ,  $AB = 4$  cm and  $\angle B = 55^\circ$ .
4. Draw a triangle LMN in which,  $\angle L = 60^\circ$ ,  $LM = 5.5$  cm and  $\angle M = 30^\circ$ .
5. Draw a triangle JKL in which,  $KL = 4$  cm,  $JK = 3.2$  cm and  $\angle K = 30^\circ$ .
6. Draw a triangle XYZ in which,  $YZ = 7.3$ cm,  $XY = 3.5$  cm and  $\angle Y = 40^\circ$ .

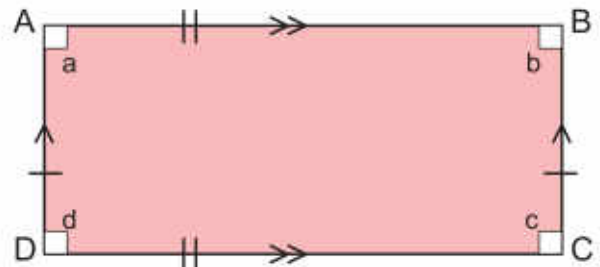
## Quadrilaterals



There are various objects around us which have 4 sides. What do we call these shapes?



Shapes which have four sides and four angles are called quadrilaterals.



ABCD is a quadrilateral. AB, BC, CD and DA are its four sides.  $\angle a$ ,  $\angle b$ ,  $\angle c$  and  $\angle d$  are its four angles.

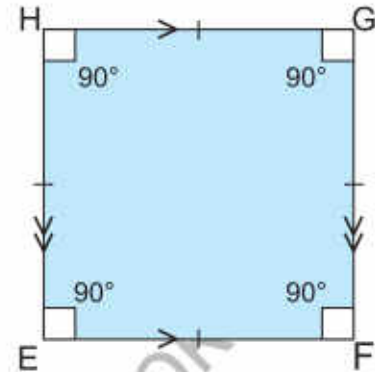
## Types of Quadrilaterals

### Square

A quadrilateral having four equal sides and four right angles is called a square.

As, EFGH is a square.

$$EF = HG = EH = FG$$



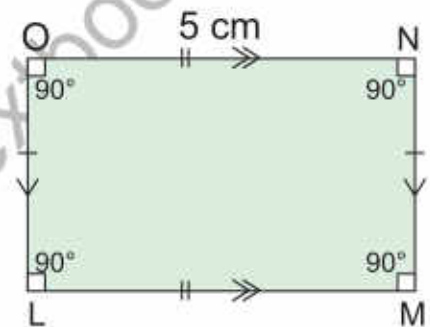
### Rectangle

A quadrilateral having two pairs of parallel sides are equal in length, is called rectangle. In rectangle, all the angles are of  $90^\circ$ .

As, LMNO is a rectangle

$$LM = ON, LO = MN$$

$$LM \parallel ON, LO \parallel MN$$



### Parallelogram

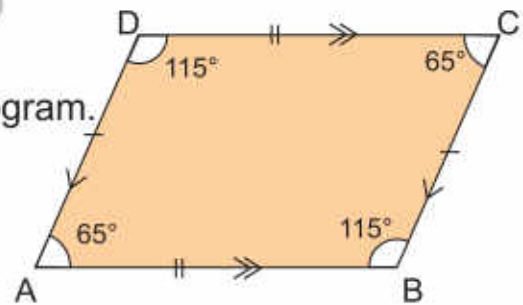
A quadrilateral having two pairs of parallel sides and opposite angles are equal, is called parallelogram.

But none of the angles is right angle.

As, ABCD is a parallelogram.

$$AB = DC, AD = BC$$

$$AB \parallel DC, AD \parallel BC$$



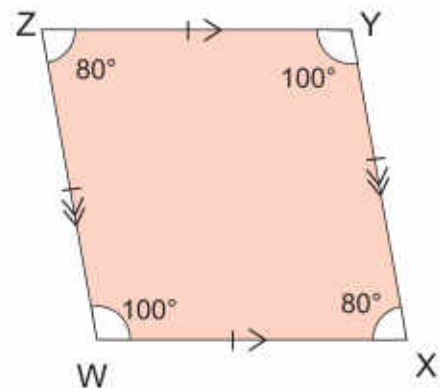
### Rhombus

A quadrilateral having all sides are equal and parallel, is called a rhombus. In rhombus, opposite angles are equal but not right angle.

WXYZ is a rhombus.

$$WX = ZY, WZ = XY$$

$$WX \parallel ZY, WZ \parallel XY$$

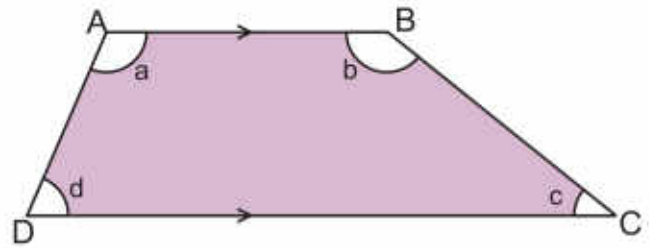


Divide the student in groups. Ask each group to compare any two quadrilaterals and write their properties.

### Trapezium

A quadrilateral having only one pair of parallel sides, is called a trapezium. ABCD is a trapezium.

$$AB \parallel DC$$

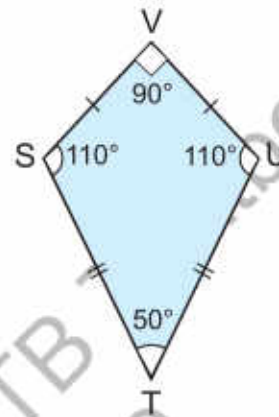


### Kite

A quadrilateral having two equal pairs of adjacent sides, is called a kite.

As, STUV is a trapezium.

$$SV = UV, ST = UT$$

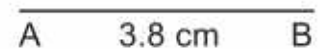


## Construction of a Square and a Rectangle

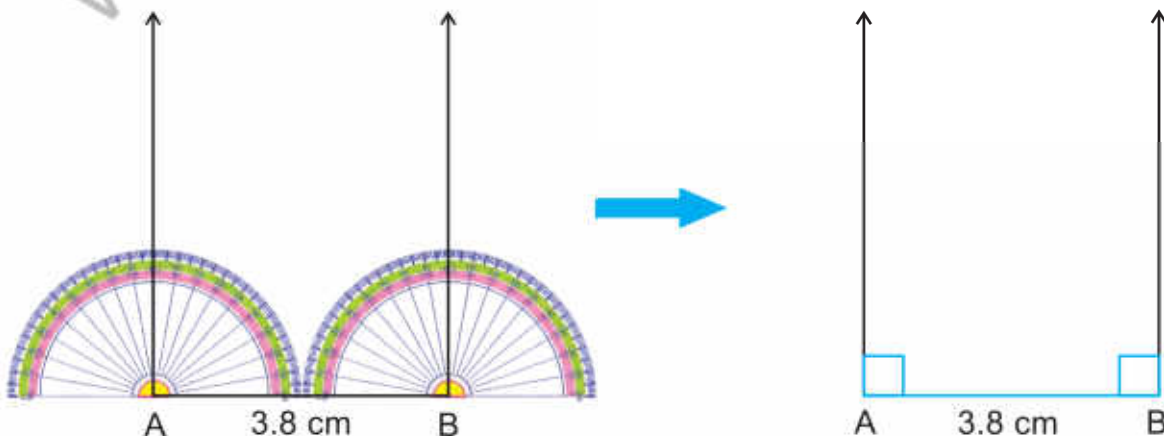
### Construction of a square

Construct a square ABCD whose length of a side is 3.8 cm.

- i) Draw a line segment  $AB = 3.8$  cm.

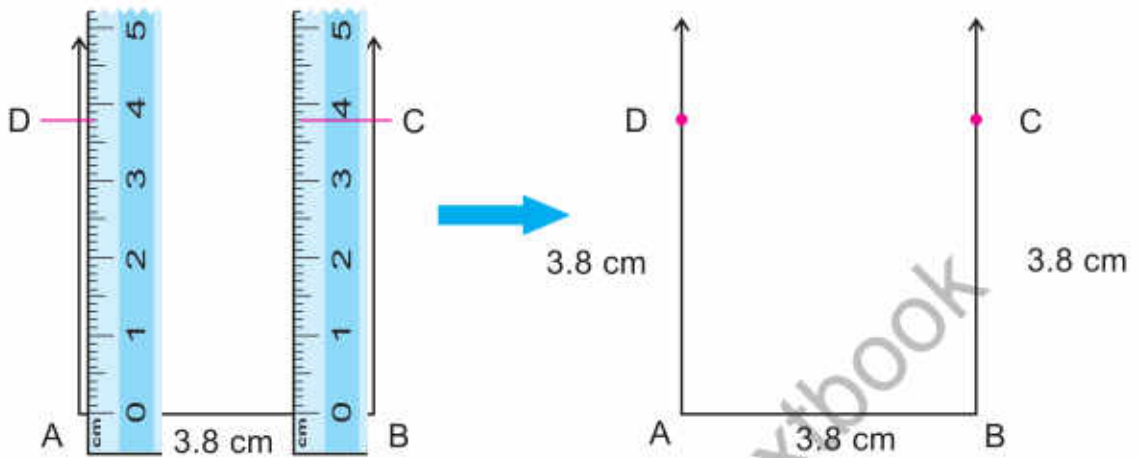


- ii) By using a protractor draw right angles at point A and B.



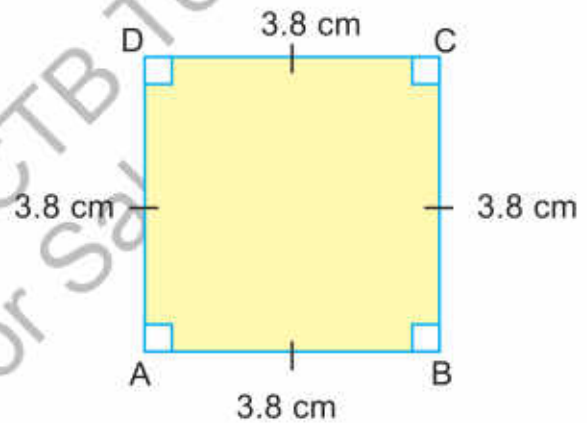


iii) Mark points D and C such that  $AD = BC = 3.8$  cm.



iv) Join point C to D

So, ABCD is the required square.

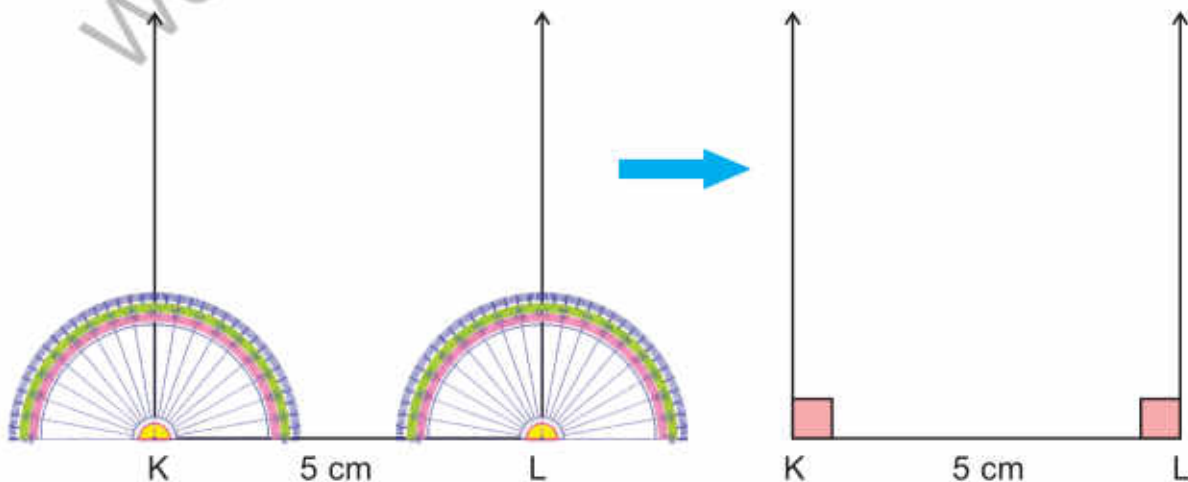
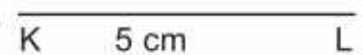


### Construction of a rectangle

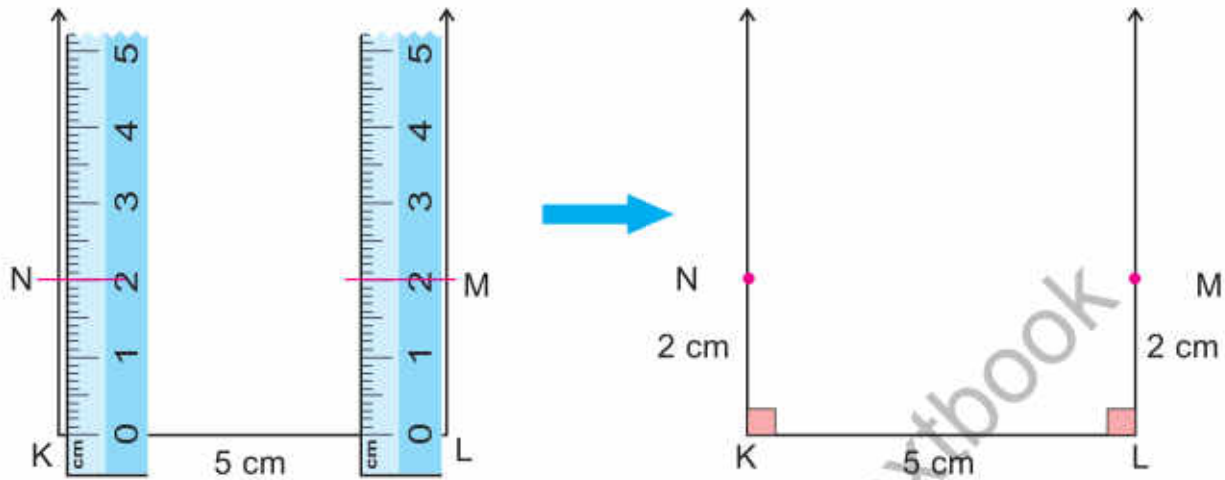
Construct a rectangle KLMN whose length is 5 cm and width is 2 cm.

i) Draw a line segment  $KL = 5$  cm.

ii) By using a protractor draw  $90^\circ$  angles at point K and L.

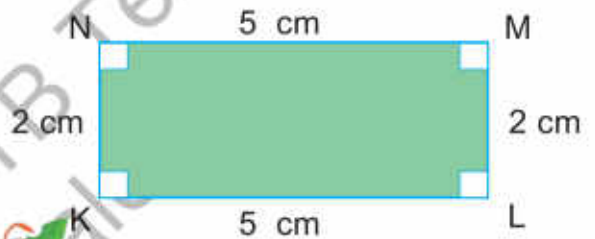


iii) Mark points M and N such that  $LM = KN = 2\text{ cm}$ .



iv) Join point M to N.

Thus, KLMN is the required rectangle.



Try It!

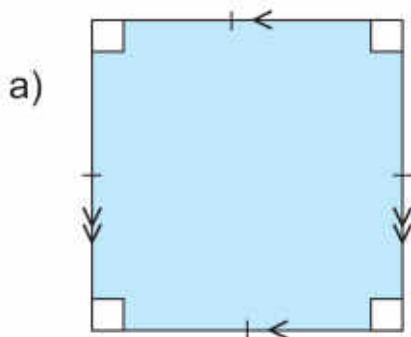
Challenge

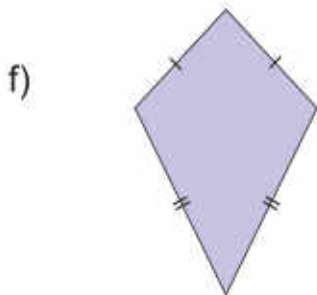
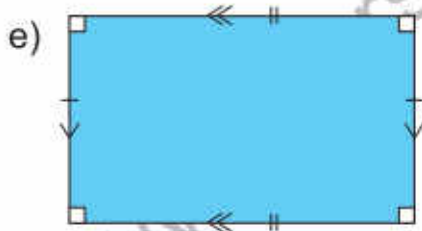
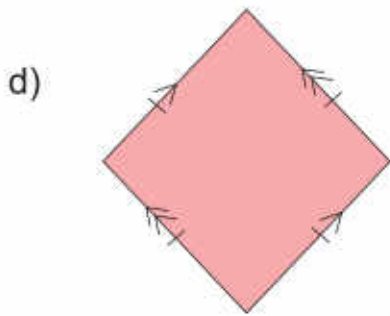
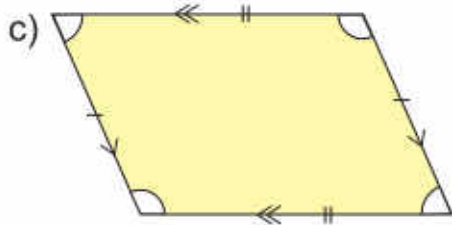
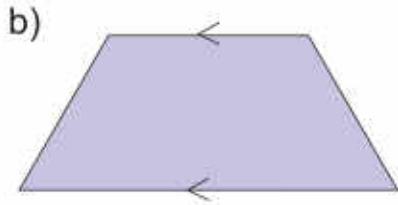


Is every square a rectangle? Is every rectangle a square? Is every rhombus a parallelogram? Is every parallelogram a rhombus? Explain your answers.

### Exercise 3

1. Label the following quadrilaterals and describe at least two properties of each (in terms of sides and angles):







2. Draw squares according to the given lengths by using protractor and ruler.

- |           |           |           |           |
|-----------|-----------|-----------|-----------|
| a) 3.4 cm | b) 5 cm   | c) 7.2 cm | d) 4 cm   |
| e) 6.3 cm | f) 5.5 cm | g) 8.9 cm | h) 3.3 cm |

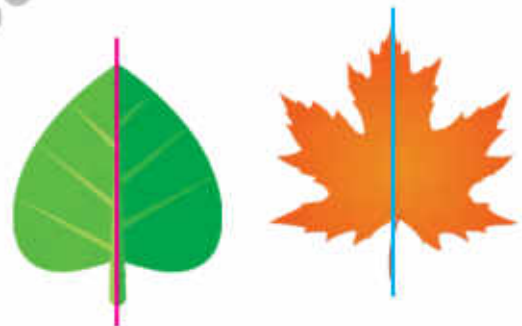
3. Draw rectangles by using protractor and ruler according to the given lengths and widths.

- |                   |                 |
|-------------------|-----------------|
| a) 7 cm, 5 cm     | b) 8 cm, 4.4 cm |
| c) 6.6 cm, 3.4 cm | d) 8.5 cm, 5 cm |
| e) 6 cm, 3.2 cm   | f) 9 cm, 5.2 cm |

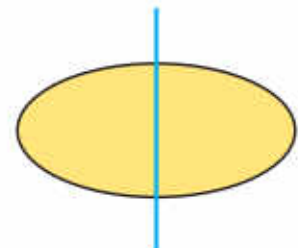
## Symmetry



I have two different types of leaves pasted on my notebook. I have observed that the left and right sides of the leaves are exactly same. If we fold the leaf about the mid wain one half will exactly fit the other half.

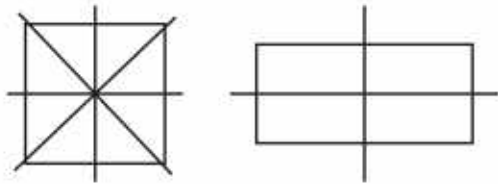


Observe these figures. They have reflective symmetry in them. The blue line is the line of symmetry which is dividing the shapes into two parts.



The symmetry of figure about its line of symmetry may be tested by folding it along that line. If the figure is symmetrical, the part to the left of the line will fit exactly on to the part of right of the line and vice versa. This is called reflective symmetry.

A figure may have more than one line of symmetry, for example a square has four lines of symmetry and the rectangle has two lines of symmetry.



**Try Yourself**

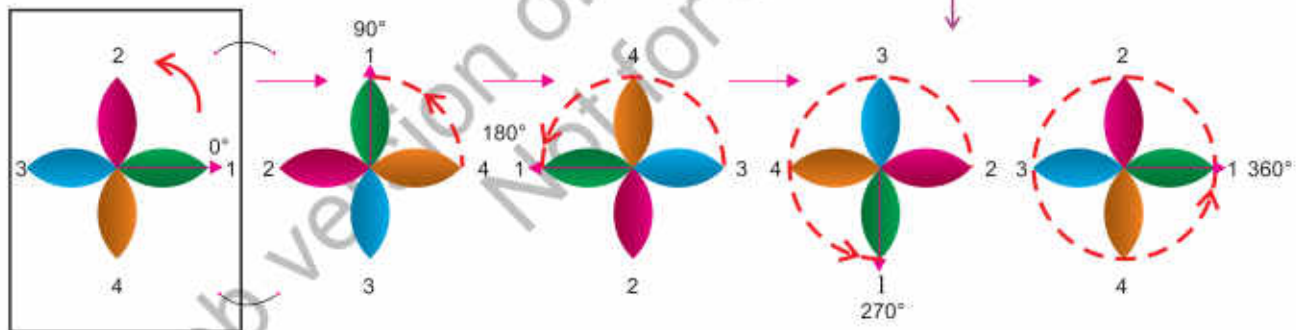
Does the shapes have reflective symmetry?  
Explain your answer.



A part from reflective symmetry, there is another type of symmetry which is called rotational symmetry.

A complete revolution has 4 rotations of  $90^\circ$ .

Let's observe this shape.



We can see that when it is rotated around its centre, it is an angle of  $90^\circ$  looks exactly the same 4 times. It means it has a rotational symmetry and the order of its rotational symmetry is 4.

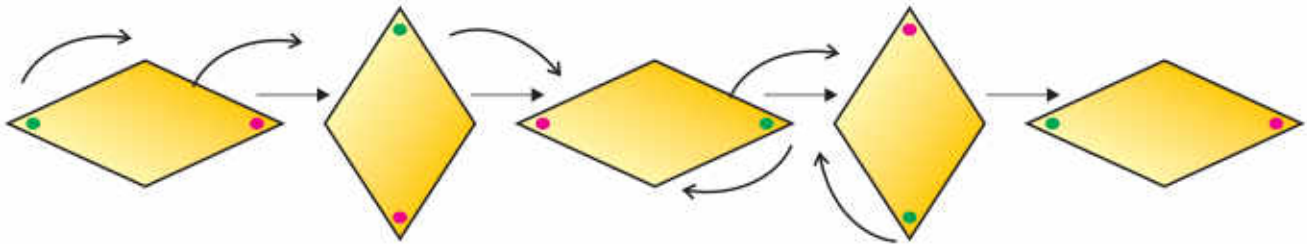


**Key Fact**

The number of times a shape looks exactly the same is called the order of its rotational symmetry. The centre of the shape is called the centre of rotation.

A figure will have rotational symmetry if it is rotated about its centre point and looks exactly the same at least two times during the full rotation.

Now, observe at the following figures:



We can see that when the shape is rotated about its centre, it looks exactly the same twice. It means it has a rotational symmetry of order 2.



**Try Yourself**

Do these shapes have rotational symmetry? Explain your answer.



Look at the following:

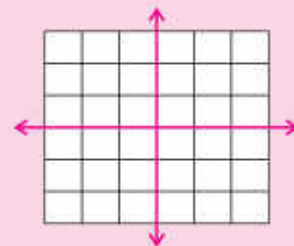


When it is rotated about its centre, it looks exactly the same only once. It means, there is no rotational symmetry.



**Try It!**

Colour the given boxes in such a way that the shape becomes symmetrical along the horizontal and vertical lines.

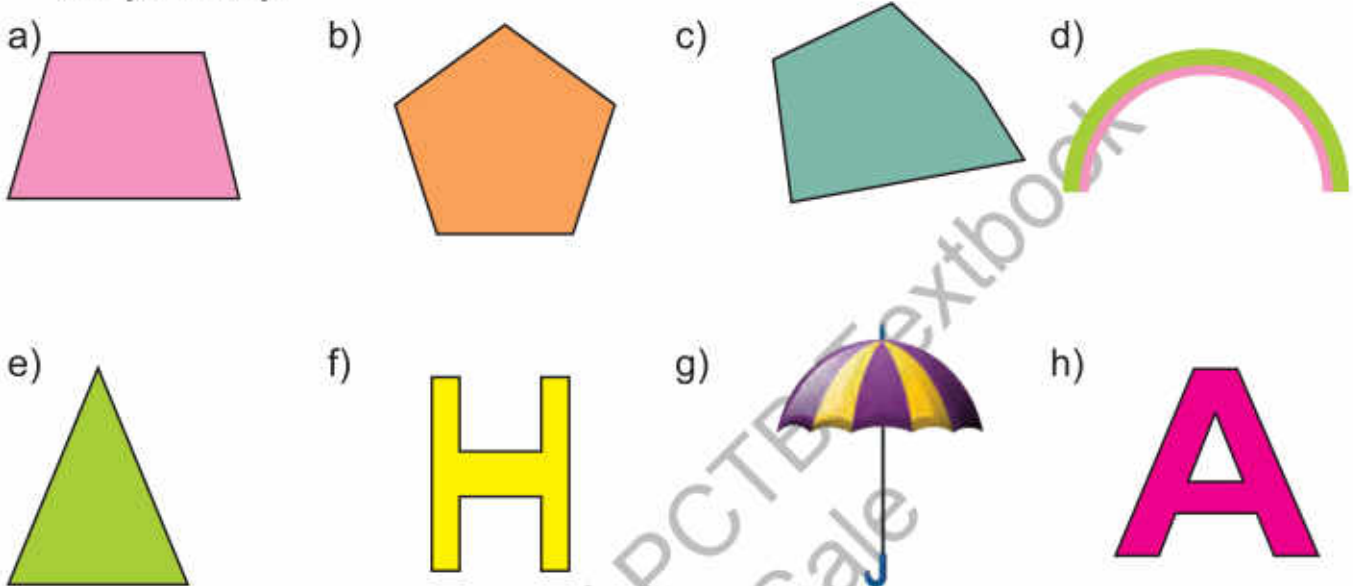


Ask the students to cut different shapes using a cardboard. Then ask them to identify shapes with reflective symmetry and rotational symmetry.

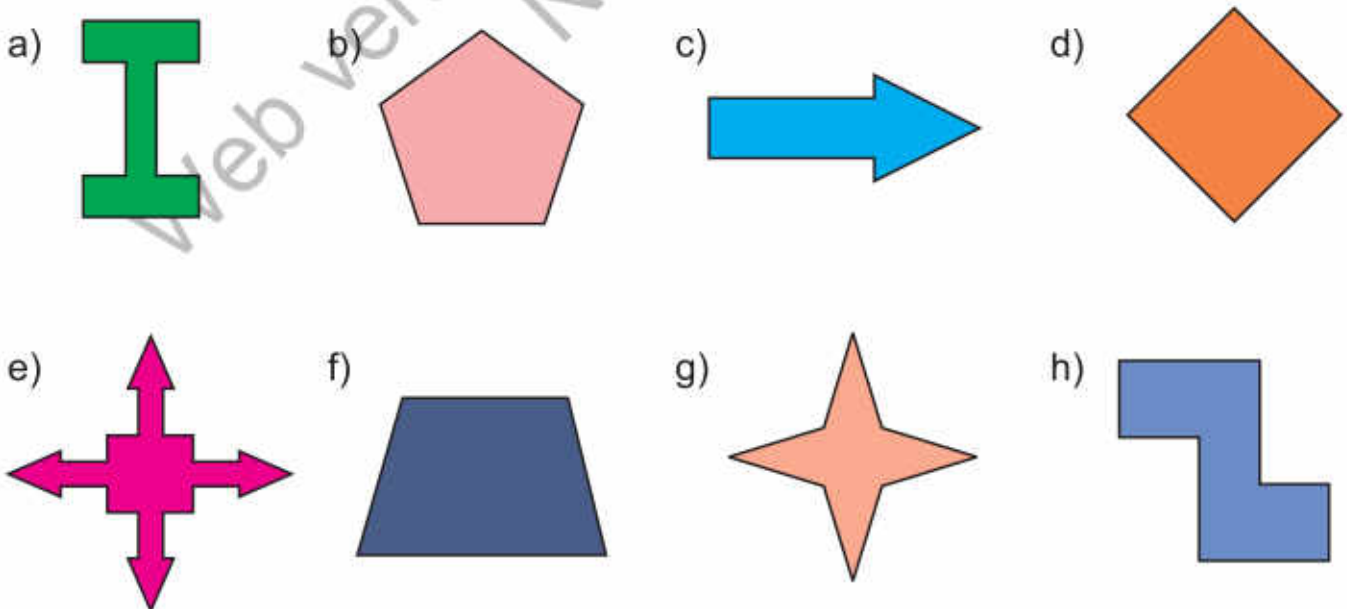


 **Exercise 4**

1. Encircle the figures which have reflective symmetry. Also draw their line of symmetry.



2. Encircle the figures having rotational symmetry. Also write the order of their rotation and mark their centre of rotation.



## Nets of 3-D Shapes



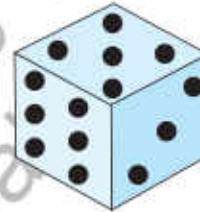
I want to make a dice by using cardboard to play with my friends. How can I make it?



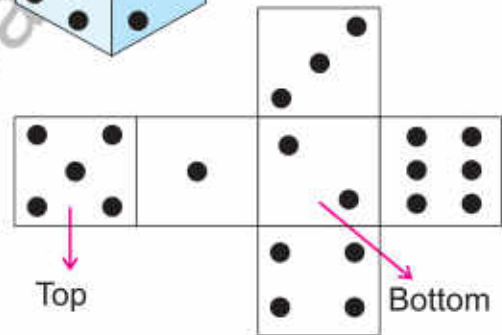
Dice is a cube which is a 3-dimensional solid shape. All 3-dimensional solids are made up of different 2-dimensional shapes.



If we separate out all the sides of a cube, then we can see that it is made of 6 similar squares. These squares make the net of a cube.



We can see that dice is a 3-dimensional shape which can be unfolded in a specific pattern to get 6 2-dimensional surfaces.



### Key Fact

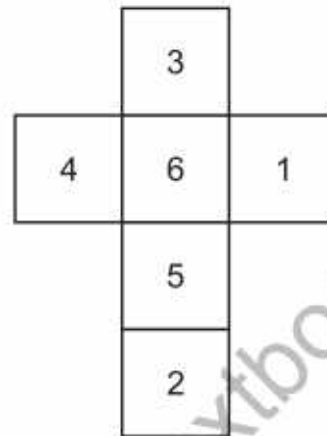
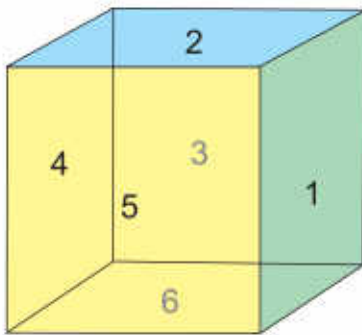
- A net is a 2-dimensional shape which can be folded in a specific pattern to get a 3-dimensional solid.
- 3-dimensional solid can have more than one possible nets.



### Try Yourself

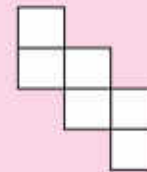
Make at least three to four solid shapes and describe their properties.

Look at the given figures. On the left side there is a cube and on the right side there is the net of the cube. It is made of 6 squares.



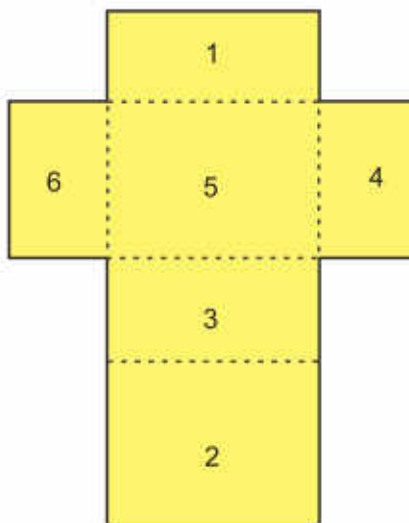
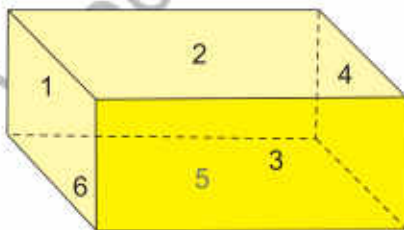
**Try Yourself**

Tell if the given net is the net of a cube or not?



Observe the net of a cuboid.

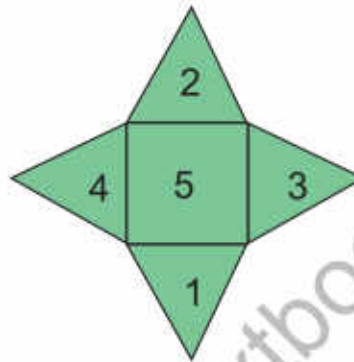
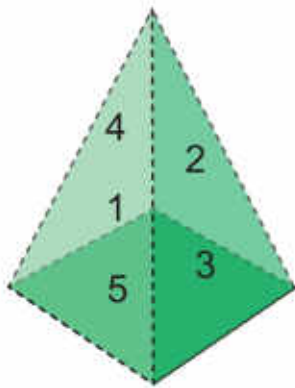
On the left side, there is a cuboid and on the right side there is the net of the cuboid. It is made of 6 rectangles.



Divide the students into groups and provide them papers in different colours. Ask them to cut these papers to make three dimensional solids and observe their nets.



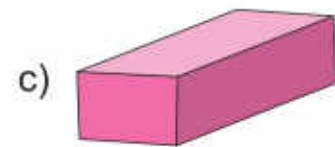
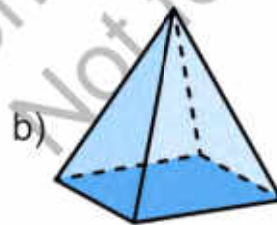
Look at the given figure. On the left side there is a square based pyramid and on the right side there is the net of the pyramid. It is made of 4 triangles and 1 square.



Net of a square pyramid

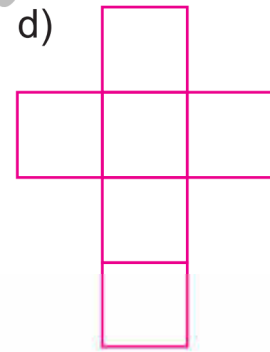
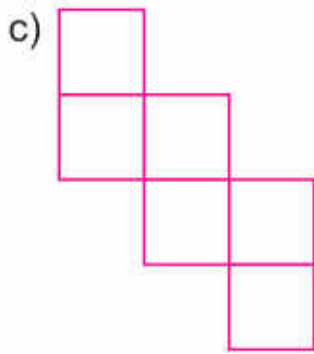
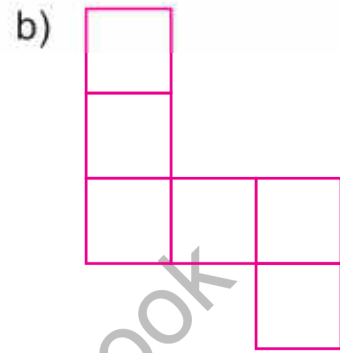
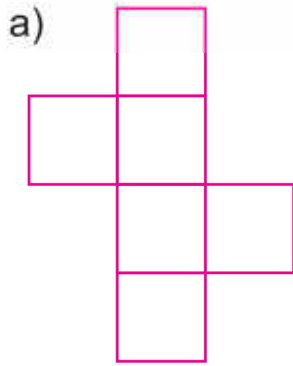
 **Exercise 5**

1. Write the names of these figures. Also write the number and name of faces.

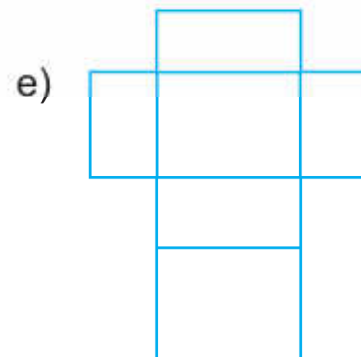
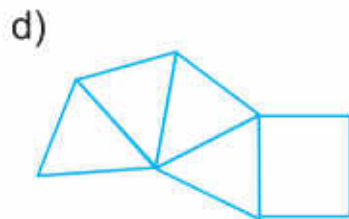
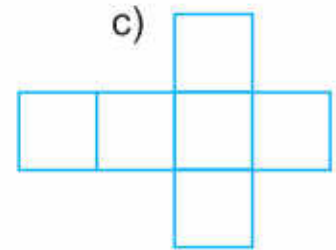
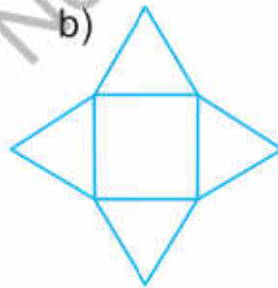
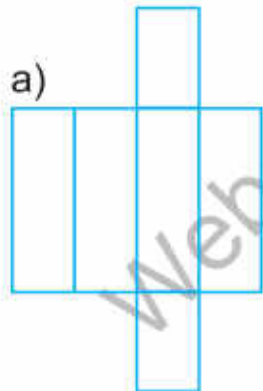


Name of 3-D shape	a)	b)	c)
Number of faces			
Names of faces			

2. Identify the nets of cube and colour them.



3. Observe these nets and identify the 3-D solid they are made of.



## I Have Learnt to:



- recognize straight and reflex angle.
- recognize the standard units for measuring angles is  $1^\circ$ , which is defined as  $\frac{1}{360^\circ}$  of a complete revolution.
- identify, describing and estimating 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.
- use protractor and ruler to construct:
  - a right angle
  - a straight angle
  - reflex angles of different measures
- describe adjacent, complementary and supplementary angles.
- identify and describing triangles with respect to their sides. (isosceles, equilateral, and scalene).
- identify and describing triangles with respect to their angles. (Acute angled triangle, Obtuse angled triangle and right-angled triangles).
- use protractor and ruler to construct a triangle when:
  - two angles and their included side is given.
  - two sides and included angle is given.
- measure the lengths of the remaining sides and angles of the triangle.
- recognize the kinds of quadrilateral (square, rectangle, parallelogram, rhombus, trapezium, and kite).

### Vocabulary





- Right angle
- Acute angle
- Reflex angle
- Adjacent angles
- Complementary angles
- Supplementary angles
- Triangle
- Equilateral Triangle
- Isosceles Triangle
- Scalene Triangle
- Acute Angled Triangle
- Obtuse Angled Triangle
- Right Angled Triangle
- Quadrilaterals
- Symmetry
- Nets
- Parallelogram
- Rhombus
- Pyramids



- 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.
- use protractor and ruler to construct square and rectangle when lengths of sides are given.
- recognize different types of symmetry (Reflective and Rotational) in 2-D figures.
- identify lines of symmetry for given 2-D figures.
- find point of rotation and order of rotational symmetry of given 2-D figures
- identify cubes, cuboids and pyramids from their nets.
- describe and make 3-D objects (cubes, cuboids, cylinder, cone, sphere, pyramids).


### Review Exercise



- Choose the correct options and fill in the blanks.
  - Which of these is a reflex angle?
    - $375^\circ$
    - $215^\circ$
    - $180^\circ$
    - $90^\circ$
  - The supplement of  $20^\circ$  is:
    - $160^\circ$
    - $40^\circ$
    - $70^\circ$
    - $80^\circ$
  - Sum of two right angles is equal to:
    - Reflex angle
    - Straight angle
    - Acute angle
    - Obtuse angled
  - Two angles will be called supplementary angles if their sum is equal to :
    - $180^\circ$
    - $90^\circ$
    - $360^\circ$
    - $100^\circ$
  - Which of the following shapes is not a quadrilateral?
    - 
    - 
    - 
    - 
  - A triangle in which its \_\_\_\_\_ sides are equal, is called an isosceles triangle.
    - 1
    - 2
    - 3
    - 4

g) Which of the following is not the net of a cube?



h) The order of the rotational symmetry of the shape  is:

- i) 1                      ii) 2                      iii) 3                      iv) 4

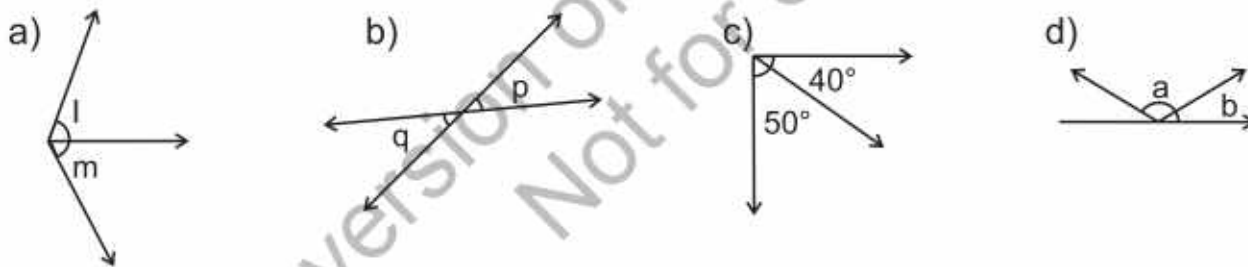
i) Which of the following is showing adjacent angles?



2. Draw these angles by using protractor and ruler.

- a)  $35^\circ$                   b)  $45^\circ$                       c)  $240^\circ$                       d)  $180^\circ$   
 e)  $90^\circ$                   f)  $60^\circ$                       g)  $300^\circ$                       h)  $155^\circ$

3. Identify the adjacent angles.



4. Make 5 pairs of each complementary and supplementary angles.

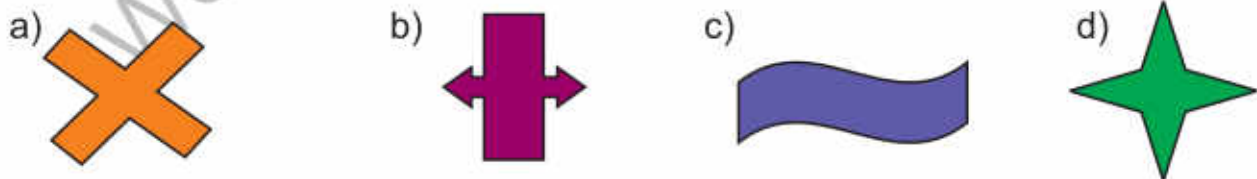
Complementary Angles		
a)	_____ + _____	= _____
b)	_____ + _____	= _____
c)	_____ + _____	= _____
d)	_____ + _____	= _____
e)	_____ + _____	= _____

Supplementary Angles		
a)	_____ + _____	= _____
b)	_____ + _____	= _____
c)	_____ + _____	= _____
d)	_____ + _____	= _____
e)	_____ + _____	= _____

5. How many types of triangles are there with respect to their sides and angles?
6. Draw a triangle IJK in which,  $\angle I = 70^\circ$ ,  $IJ = 6.8$  cm and  $\angle J = 28^\circ$ .
7. Draw a triangle PQR in which,  $QR = 3.3$ cm,  $PQ = 5.2$  cm and  $\angle PQR = 75^\circ$ .
8. Draw squares according to the given lengths with the help of protractor and ruler.
  - a) 4 cm
  - b) 5.1 cm
  - c) 3.6 cm
  - d) 4.9 cm
9. Draw rectangles with the help of protractor and ruler according to the given lengths and widths.
  - a)  $l = 4$  cm,  $w = 3.4$  cm
  - b)  $l = 5$  cm,  $w = 3$  cm
  - c)  $l = 6.6$  cm,  $w = 4.2$  cm
  - d)  $l = 7$  cm,  $w = 2.4$  cm
10. Encircle the figures which have reflective symmetry. Also draw their line of symmetry.



11. Encircle the figures having rotational symmetry. Also write the order of their rotation and mark their centre of rotation.



12. Use cardboard to make nets of various solids. Also write the number of their faces and the shape. Then fold them and verify whether you have created the correct net or not.



# Unit 8

## Perimeter and Area

### Learning Outcomes

After completing this unit, you will be able to:

- Differentiate between perimeter and area of a square and rectangular region.
- Identify the units for measurement of perimeter and area.
- Find and apply formulas to find perimeter and area of a square and rectangular region.
- Solve real life situations involving perimeter and area of square and rectangular regions.



Wooden fence is to be fixed around a rectangular park. If you know the length and width of the park how can you find the required length of the fence?

## Area and Perimeter

Sara and Raza are in the same school. There is a playground in their school.



Do you know what is the shape of our playground? If a wall is to be constructed around the playground, what will be its total length?



The playground is square shaped because its length and width are equal. The length of the wall around it will be equal to its perimeter.



Area

Perimeter

### Area

- The space covered by the surface of any 2-dimensional shape is called its area.
- The units to measure the area are  $m^2$  (squared metres) and  $cm^2$  (squared centimetres) etc. (like  $15cm^2$ ,  $24m^2$  etc.)
- Example: The space inside the boundary of a park.

### Perimeter

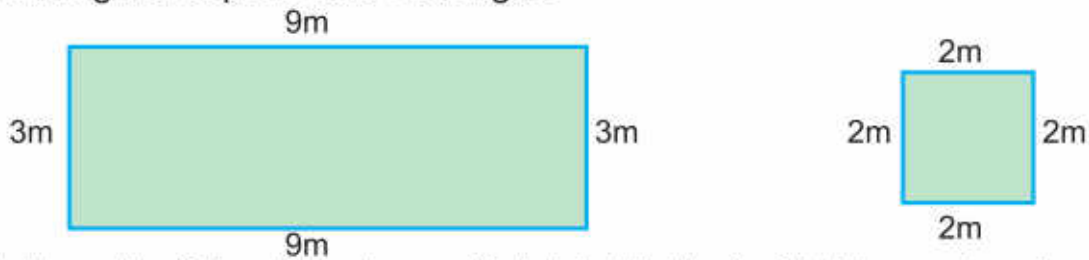
- The total length of the boundary of a closed region is called its perimeter.
- The units to measure the perimeter are m (metres), and cm (centimetres) etc. (like 15cm, 24cm etc.)
- Example: The length of the fence around a region, the total length of a photo frame.



Ask the students to draw squares and rectangles of different measurement on the notebook, use blue colour to show its perimeter and green colour to show its area.



Observe the given square and rectangle.



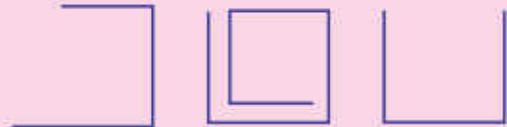
The total length of the boundary which highlighted with blue colour is called their perimeter.

While the green portion, surrounded by their boundaries is called their area.



**Try Yourself**

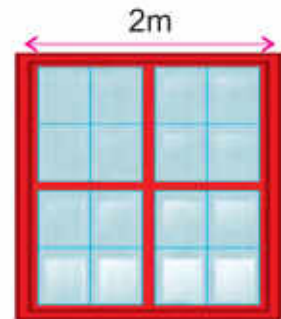
Can we calculate the area and perimeter of the given figures? Give reason to support your answer.



**Perimeter of a Square**



The window of our classroom is square shaped and length of one side is 2 metres. How can we find its perimeter?



**Key Fact**

The lengths of all sides of a square are equal.

We can find its perimeter by adding the length of one side of the window 4 times or by multiplying length of one side with 4.



Perimeter of a square =  $4 \times$  length of one side

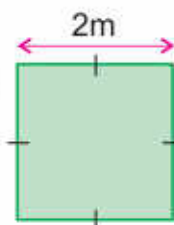
If we represent the length of the square by  $\ell$ , then:

Perimeter of a square =  $4 \times \ell$

The length of one side of the window = 2 m

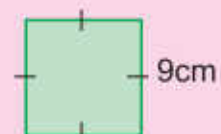
Perimeter of window =  $4 \times 2 \text{ m} = 8 \text{ m}$

So, the perimeter of the window is 8m.



**Try Yourself**

Find the perimeter of the given squared shape.





Usman has a square shaped picture frame with length of one side is 22.5cm. Find the perimeter of the frame.

$$\begin{aligned}\text{Perimeter of squared frame} &= 4 \times \text{length of one side} \\ &= 4 \times 22.5 \text{ cm} \\ &= 90 \text{ cm}\end{aligned}$$

So, the perimeter of the picture frame is 90 cm.



### Key Fact

Perimeter of a square  
=  $4 \times$  length of one side



### Try Yourself

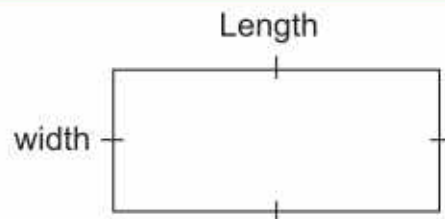
- Draw a square with the perimeter of 12 centimetres.
- A square shaped ground is 20 metre long. If a person takes 5 rounds of the ground, how much total distance does he cover?

## Perimeter of a Rectangle

The length of a book is 26 cm and its width is 19.5 cm. How can we find the perimeter of the book?



We can find its perimeter by adding measurements of all sides.



If we denote length of the rectangle with ' $l$ ' and width with ' $w$ ', then:

$$\text{Perimeter of rectangle} = l + l + w + w$$

or

$$\begin{aligned}\text{Perimeter of rectangle} &= 2l + 2w \\ &= 2(l + w)\end{aligned}$$



Ask the students to look around, identify square shaped objects and find their perimeter by using the formula.

$$\begin{aligned}
 \text{Perimeter of rectangle} &= 2(\ell + w) \\
 &= 2(26\text{cm} + 19.5\text{cm}) \\
 &= 2(45.5)\text{ cm} \\
 &= 91\text{ cm}
 \end{aligned}$$

So, perimeter of the book is 91 cm.



### Try Yourself

Measure the length and width of your teachers table and find its perimeter by using the formula.



### Key Fact

$$\begin{aligned}
 \text{Perimeter of rectangle} &= 2(\text{length} + \text{width}) \\
 &= 2(\ell + w)
 \end{aligned}$$

**A rectangular pool is 10 metre long and 7.3 metre wide. Find the perimeter of the pool.**

$$\begin{aligned}
 \text{Length of the pool} &= 10\text{m} \\
 \text{Width of the pool} &= 7.3\text{m} \\
 \text{Perimeter of rectangle} &= 2(\ell + w) \\
 \text{Perimeter of the pool} &= 2(10\text{m} + 7.3\text{m}) \\
 &= 2(17.3)\text{m} = 34.6\text{m}
 \end{aligned}$$

So, the perimeter of the pool is 34.6m.

**The length of a rectangular garden is 21 metres and its width is 16 metres. If the rate of fencing is Rs.170 per metre, find the cost of fencing around it.**

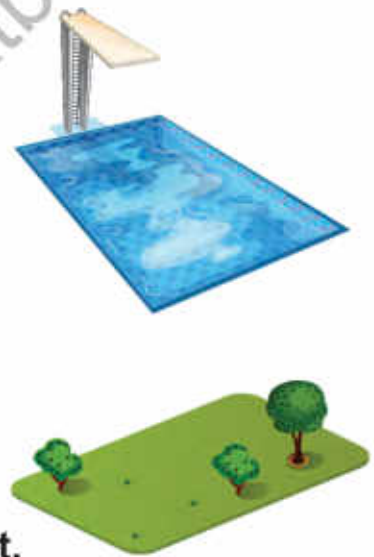
$$\begin{aligned}
 \text{Perimeter of the garden} &= 2(\ell + w) \\
 &= 2(21 + 16) \\
 &= 2(37) = 74\text{m} \\
 \text{Cost of 1 metre of fencing} &= \text{Rs } 170 \\
 \text{Cost of 74 metres of fencing} &= 74 \times \text{Rs } 170 \\
 &= \text{Rs } 12\,580
 \end{aligned}$$

So, the cost of fencing is Rs 12 580.



### Try Yourself

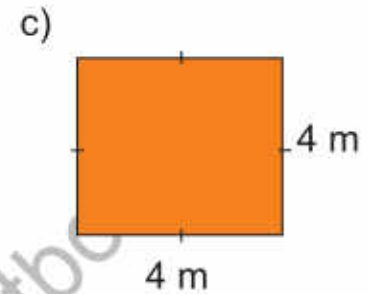
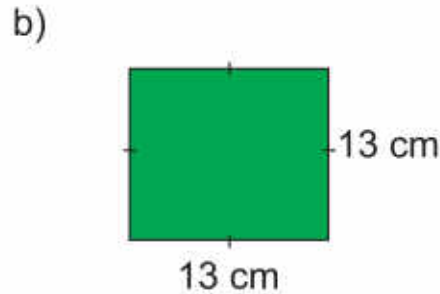
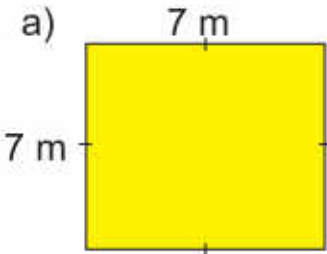
The perimeter of a rectangular field is 66 metres. If the length of this field is 15 metres, then find the width of the field. Also tell the cost of putting barbed wire around the field if the rate is Rs 220 per metre.



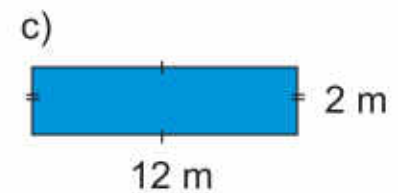
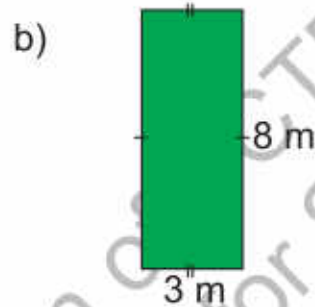
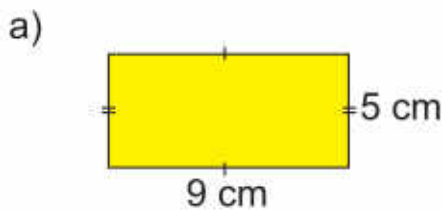
Ask to students to find rectangular objects in their classroom, measure their lengths and width and find the perimeter of each object.

 **Exercise 1**

1. Find the perimeter of the given squares.

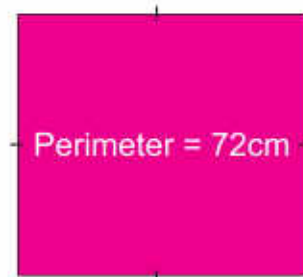


2. Find the perimeter of the given rectangles.



3. If the length of a square shaped crop field is 29m, what will be its perimeter?

4. The perimeter of a square shape is 72 cm. What will be its length?



5. Find the perimeter of the squares of the given lengths by using formula.

- a) 5 cm      b) 12 cm      c) 6 m      d) 19 cm      e) 26 m      f) 2.5 cm  
 g) 9.7 m      h) 15 m      i) 16.6 cm      j) 10 m      k) 7.1 cm      l) 2.7 cm

6. Find the perimeter of the rectangles of the given lengths and widths by using formula.

- a)  $l = 3 \text{ cm}, w = 2 \text{ cm}$       b)  $l = 5.3 \text{ m}, w = 2.2 \text{ m}$       c)  $l = 6 \text{ cm}, w = 4 \text{ cm}$   
 d)  $l = 9 \text{ m}, w = 1.2 \text{ m}$       e)  $l = 10 \text{ m}, w = 5.9 \text{ m}$       f)  $l = 15 \text{ cm}, w = 12 \text{ cm}$



7. Children are playing in a square shaped playground. If the length of the playground is 12 metres, find its perimeter.
8. Harris wants to find out the perimeter of the square shaped notice board in his classroom. If the length of one side of the notice board is 2.5 metres, find the perimeter of the notice board.
9. If a rectangular room is 10.8 metres long and 8.8 metres wide. Find the perimeter of the room.
10. Nadia has a rectangular frame. The frame is 12 cm long and 8 cm wide. Nadia wants to put a ribbon around the frame.
- Find the required length of the ribbon.
  - What will be the total cost of ribbon if 1 metre of it costs Rs.5.
11. A building is 128 metres long and 96.5 metres wide.
- Find out its perimeter
  - Find the total cost for the construction of boundary wall around this building if the rate of construction of wall is Rs. 470 per metre.

**Hint**

By multiplying the cost of the ribbon per metre with the perimeter of the frame will determine the total cost of the ribbon.

## Area of a Square



My room is square shaped. Its length is 11 metres. How can I find its area?



We can find the area of a square shaped room by multiplying its length with width.



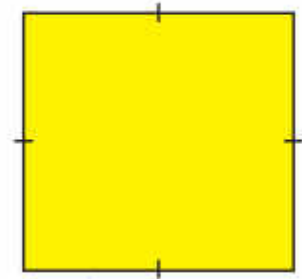
Ask the students to look around for square shaped objects and then find their area.

If we denote length of a side of the square by " $l$ " then:

Area of a square = length of a side  $\times$  length of the side

Length of the room = 11 m

$$\begin{aligned} \text{Area of the room} &= l \times l \\ &= 11 \times 11 \text{ m}^2 \\ &= 121 \text{ m}^2 \end{aligned}$$



**Key Fact**

$$\begin{aligned} \text{Area of square} &= \text{length} \times \text{length} \\ &= l \times l \end{aligned}$$

A square mirror has a length of 42 cm. What is its area?



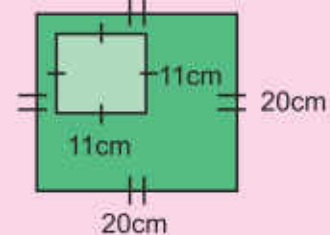
$$\begin{aligned} \text{Length of one side } (l) &= 42\text{cm} \\ \text{Area of the mirror} &= l \times l \\ &= 42\text{cm} \times 42\text{cm} \\ &= 1\,764 \text{ cm}^2 \end{aligned}$$

So, the area of the mirror is 1 764 cm<sup>2</sup>.



**Try Yourself**

Find the area of the coloured portion in the given figure.



**Area of a Rectangle**



The playground of my school has a rectangular flower bed with length is 7.5 metres and width of 4 metres. How can we find its area?



Ask the students to look for rectangular objects in their classroom, measures their length and width.



The area of a rectangle can be found by multiplying its length with its width. If we denote the length of the rectangle by " $l$ " and width by " $w$ ", then:

Area of rectangle = Length  $\times$  Width

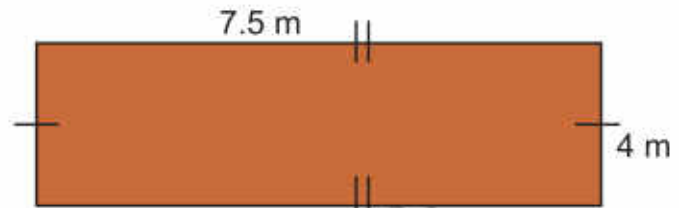
Area of rectangle =  $l \times w$

Length of the flower bed = 7.5m

Width of the flower bed = 4m

Area of the flower bed =  $7.5 \times 4\text{m}^2$   
 $= 30\text{m}^2$

So, the area of the flower bed is  $30\text{m}^2$ .



**Try Yourself**

Measure the length and width of your classroom. Then find the cost of tiling your classroom if the rate of tiling is Rs 455  $\text{m}^2$ .



**Key Fact**

Area of rectangle = length  $\times$  width  
 $= l \times w$

A rectangular hospital has a perimeter equals to 294 metres. If its length is 85 metre, find its area.

$$\begin{aligned} \text{Perimeter of rectangle} &= 2(l + w) \\ 294\text{m} &= 2(l + w) \\ 294\text{m} &= 2(85 + w) \\ 294\text{m} &= 170\text{m} + 2w \\ 294\text{m} - 170 &= 2w \\ 124 &= 2w \\ 124 \div 2 &= w \\ 62\text{m} &= w \end{aligned}$$

Area of rectangle =  $l \times w$

Area of hospital =  $85\text{m} \times 62\text{m}$

Area of hospital =  $5270\text{m}^2$

So, the area of the hospital is  $5270\text{m}^2$ .



**Try Yourself**

Draw two rectangles with different areas but same perimeters. Draw a square and a rectangle with same areas and perimeters.

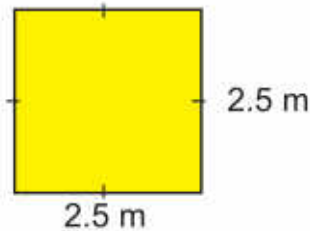




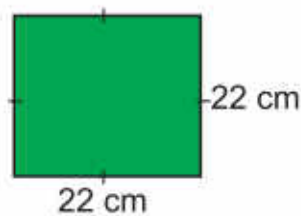
## Exercise 2

1. Find the area of the given squares.

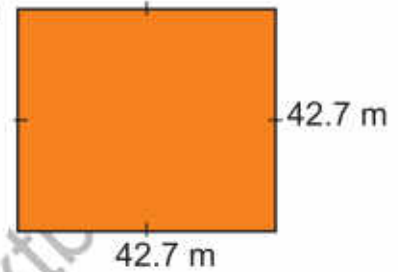
a)



b)

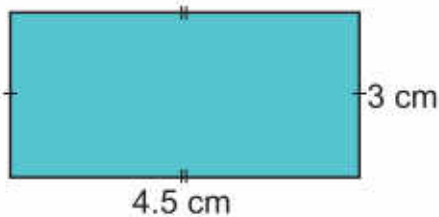


c)

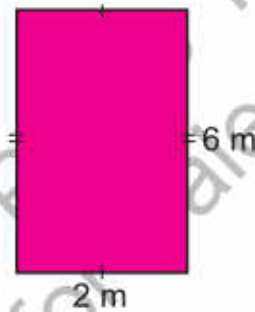


2. Find the area of the given rectangles.

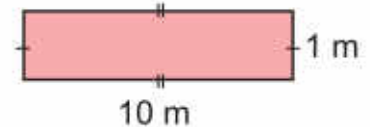
a)



b)



c)



3. The area of a rectangle is  $96\text{m}^2$ . If its width is 3m, then find its length.

4. Find the area of the squares of the given lengths by using formula.

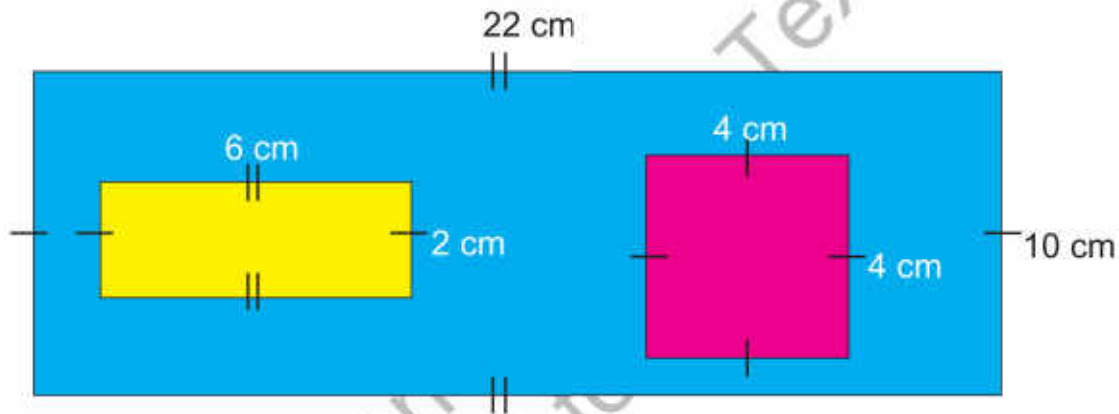
- |          |           |          |           |
|----------|-----------|----------|-----------|
| a) 4.5 m | b) 9.3 cm | c) 8.8 m | d) 15 cm  |
| e) 13 cm | f) 3 m    | g) 6 m   | h) 2.9 m  |
| l) 5 cm  | j) 9.2 m  | k) 14 m  | l) 1.1 cm |

5. Find the area of the rectangles of the given lengths and widths by using formula.

- |  |   |
|--|---|
| a) $\ell = 5\text{ cm}$ , $w = 1.9\text{ cm}$  | b) $\ell = 4\text{ m}$ , $w = 3\text{ m}$   |
| c) $\ell = 6\text{ cm}$ , $w = 4\text{ cm}$    | d) $\ell = 7\text{ cm}$ , $w = 5\text{ cm}$ |
| e) $\ell = 10.5\text{ cm}$ , $w = 9\text{ cm}$ | f) $\ell = 20\text{ m}$ , $w = 17\text{ m}$ |

6. A rectangular shaped ground has a length of 122m and width 108m. Find the area of the ground.

7. The area of a school's main gate is  $19.55\text{m}^2$ .
- If the width of the gate is 2.3m, then find its length.
  - Find the cost of painting the gate if the rate of painting is Rs.275 per  $\text{m}^2$ .
8. Area of a Masjid is  $27540\text{m}^2$  and its length is 255m. Find:
- The perimeter of the Masjid.
  - The cost of carpeting the Masjid, if the rate of carpeting is Rs 275 per  $\text{m}^2$ .
9. Find the area of the blue part.



**I Have Learnt to:**



- differentiate between perimeter and area of a square and rectangular region.
- identify the units for measurement of perimeter and area.
- find and applying formulas to find perimeter and area of a square and rectangular region
- solve real life situations involving perimeter and area of square and rectangular regions.

**Vocabulary**

- Perimeter
- Area
- Square
- Rectangle
- Unit
- Formula
- Region
- Measurement
- Rectangular
- Width

## Review Exercise



1. Choose the correct options and fill in the blanks.

a) If the length of a rectangle is 4 cm and width is 3.4 cm, then its perimeter will be equal to \_\_\_\_\_.

- i) 11.4 cm      ii) 7.4 cm      iii) 14.8 cm      iv) 10.8 cm

b) Formula to find the perimeter of the square is:

- i)  $4 + l$       ii)  $4 - l$       iii)  $4l$       iv)  $l \times l$

c) The formula to find the perimeter of the rectangle is:

- i)  $2(l + w)$       ii)  $2l + w$       iii)  $l + 2w$       iv)  $l + w$

d) Area of a rectangle is  $45\text{m}^2$ . If its length is 15 m then its width is:

- i) 6m      ii) 3m      iii) 5m      iv) 15m

e) The formula to find the area of the square is:

- i)  $l \times l$       ii)  $2(l + w)$       iii)  $l + 2w$       iv)  $4l$

f) The formula to find the area of the rectangle is:

- i)  $l \times w$       ii)  $2(l + w)$       iii)  $l + 2w$       iv)  $4l$

g) If the perimeter of the rectangle is 34 cm and we increase its length by 2 cm then there will be difference of \_\_\_\_\_ cm in its perimeter.

- i) 2      ii) 4      iii) 8      iv) 6

h) If the length of one side of the square is 14 cm, then its perimeter will be \_\_\_\_\_.

- i) 14 cm      ii) 56 cm      iii) 256 cm      iv) 28 cm



2. Find the perimeter and area of the squares of the given lengths by using formula.
- a) 8.2 cm                      b) 2.6 m                      c) 12.8 m                      d) 7.9 cm  
e) 16 cm                        f) 4.3 m                      g) 5.7 m                      h) 11 cm
3. Find the perimeter and area of the rectangles of the given lengths and widths by using formula.
- a)  $\ell = 6$  cm,  $w = 3.4$  cm                      b)  $\ell = 1.2$  m,  $w = 0.3$  m  
c)  $\ell = 10$  cm,  $w = 13$  cm                      d)  $\ell = 17$  cm,  $w = 8.5$  cm
4. The perimeter of a book is 100 cm. If its width is 22 cm, find its length.
5. Laiba wants tiling for the floor of her kitchen. If the length of the kitchen is 3 metres and width is 2.5 metres then find the area of the kitchen.
6. The length of the fence around a square shaped garden is 24m. Find the length of the garden.
7. Daniya took a 42 cm long ribbon and made a rectangle with it. If the length of the rectangle is 15 cm, then find its width.
8. Find the area of the carrom board whose perimeter is 40 cm.

# Unit 9

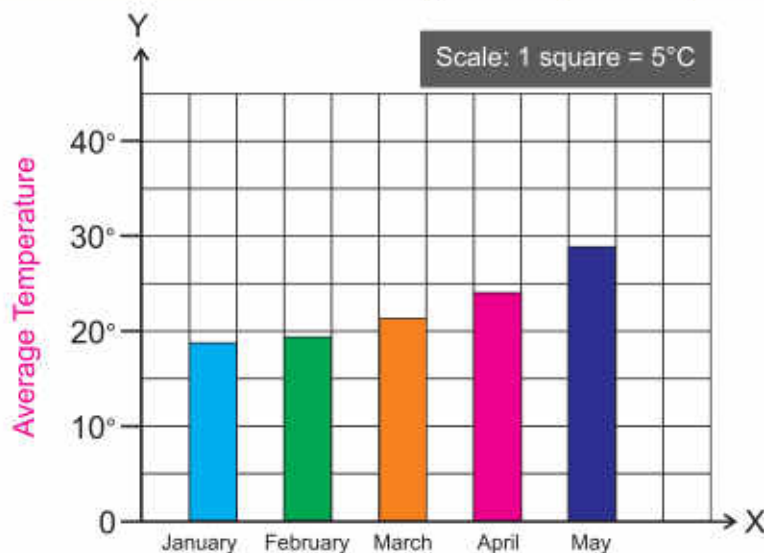
## Data Handling

### Learning Outcomes

After completing this unit, you will be able to:

- Find and describe average of given quantities in the data.
- Solve real life situations involving average.
- Organize the given data using bar graph.
- Read and interpret a bar graph given in horizontal and vertical form.
- Draw horizontal and vertical bar graphs for given data.
- Solve real life situations using data presented in bar graphs.

Months	January	February	March	April	May
Average Temperature	18°C	19°C	21°C	24°C	28°C



Umair draw a graph of monthly average temperature for the first 5 months of 2020. Is this graph correct? If not then identify the mistake and correct it.

# Average



We went to the seaside yesterday. I collected 16 seashells, my brother collected 12 seashells and my sister collected 11 seashells. How can we divide these seashells equally among us?



We will find the total number of collected seashells then divide the total number of seashells by the number of persons.



## Key Fact

To find the average of the given quantities, we find the sum of the quantities and divide this sum by the number of quantities.

$$\text{Average} = \frac{\text{Sum of quantities}}{\text{Number of quantities}}$$

$$\begin{aligned} \text{Total number of the seashells} &= 16 + 12 + 11 \\ &= 39 \end{aligned}$$

$$\text{Number of persons} = 3$$

$$\text{Number of seashells each person will get} = \frac{39}{3}$$

$$\begin{array}{r} 13 \\ 3 \overline{) 39} \\ \underline{-3} \phantom{0} \\ 09 \\ \underline{-9} \\ 0 \end{array} = 13$$



## Try Yourself

Find the average of 13, 34, 16 and 28.

Every person will get 13 seashells. We can say that 13 is the average of 16, 12 and 11. The average can be equal to one of the values.



The length of 5 ropes is 2.4 m, 0.9 m, 1.6 m, 4.4 m and 3m respectively. Find the average length of these ropes.



$$\text{Average} = \frac{\text{Sum of the lengths}}{\text{Number of the ropes}}$$

$$\text{Average} = \frac{2.4 + 0.9 + 1.6 + 4.4 + 3}{5}$$

$$\text{Average} = \frac{12.3}{5}$$

$$\text{Average} = 2.46 \text{ m}$$

So, the average length of the rope is 2.46m.

In the annual exams, Ali got an average of 78 marks in 7 subjects. Find the total marks he got.



$$\text{Average marks obtained} = \frac{\text{Total marks obtained}}{\text{Number of subjects}}$$

$$\begin{aligned} \text{Total marks obtained} &= \text{Average marks obtained} \times \text{Number of subjects} \\ &= 78 \times 7 \\ &= 546 \end{aligned}$$

So, Ali got 546 marks in 7 subjects.



### Try Yourself

Find the average of 11, 23, 37, 55 and 82.

If the sum of quantities is 1 840 and their average is 115, then find the number of quantities.

$$\text{Average} = \frac{\text{Sum of quantities}}{\text{Number of quantities}}$$

$$\text{Number of quantities} = \frac{\text{Sum of quantities}}{\text{Average}}$$

$$\text{Number of quantities} = \frac{1\ 840}{115} = 16$$



### Try Yourself

If the average of 40 quantities is 215, then find the sum of the quantities.



Divide the students into groups and ask them to measure the height of each of their group member and find their average height. Also compare their average with the other groups.

**Try Yourself**

Find the number of quantities, if their sum is 5200 and their average is 650.

**Challenge**

Yousaf took 4 mathematics test in 4 weeks. The average marks he got in these 4 tests is 62. If he scored 80 marks in the test taken on the fifth week. Find out the new average of his total marks for the five weeks overall.

**Exercise 1**

- Find the average of the following:
  - 4, 13, 25, 32, 42, 52
  - 12kg, 16kg, 26kg, 42kg
  - 10cm, 13cm, 17cm, 16cm, 19cm
  - 5l, 15l, 30l, 25l, 40l
- Munir recites 9, 11, 12, 10 and 8 A'yah of The Holy Quran in 5 days respectively. Find the average number of A'yah she recites in one day.
- Saad has 16, Amna has 20, Sara has 15 and Ahmad has 9 pencils. Find the average of pencils.
- The average number of students in 18 schools situated in a city is 1 150. Find the total number of students in these schools altogether.
- On an average, Maryam baked 27 cakes for a bakery in 11 months. What is the total number of cakes that she baked?
- A factory hired a total of 1 240 labourers in 4 years. Find the average number of labourers hired in a year.
- The runs scored by the students of a class in a cricket match are given below.

Students	Aimen	Haniya	Marwa	Sara	Nadia	Saba	Amna
Runs	21	52	54	33	37	47	28

Find the average runs of the students.



## Organize the Data using a Bar Graph

### Drawing a Bar Graph



The following table shows the details of the marks obtained out of the 10 marks in the Mathematics test during last 4 months. I want to show it in a bar graph. What will be the procedure?

Months	September	October	November	December
Obtained marks	8	6	10	9

The following method is used to draw a bar graph.

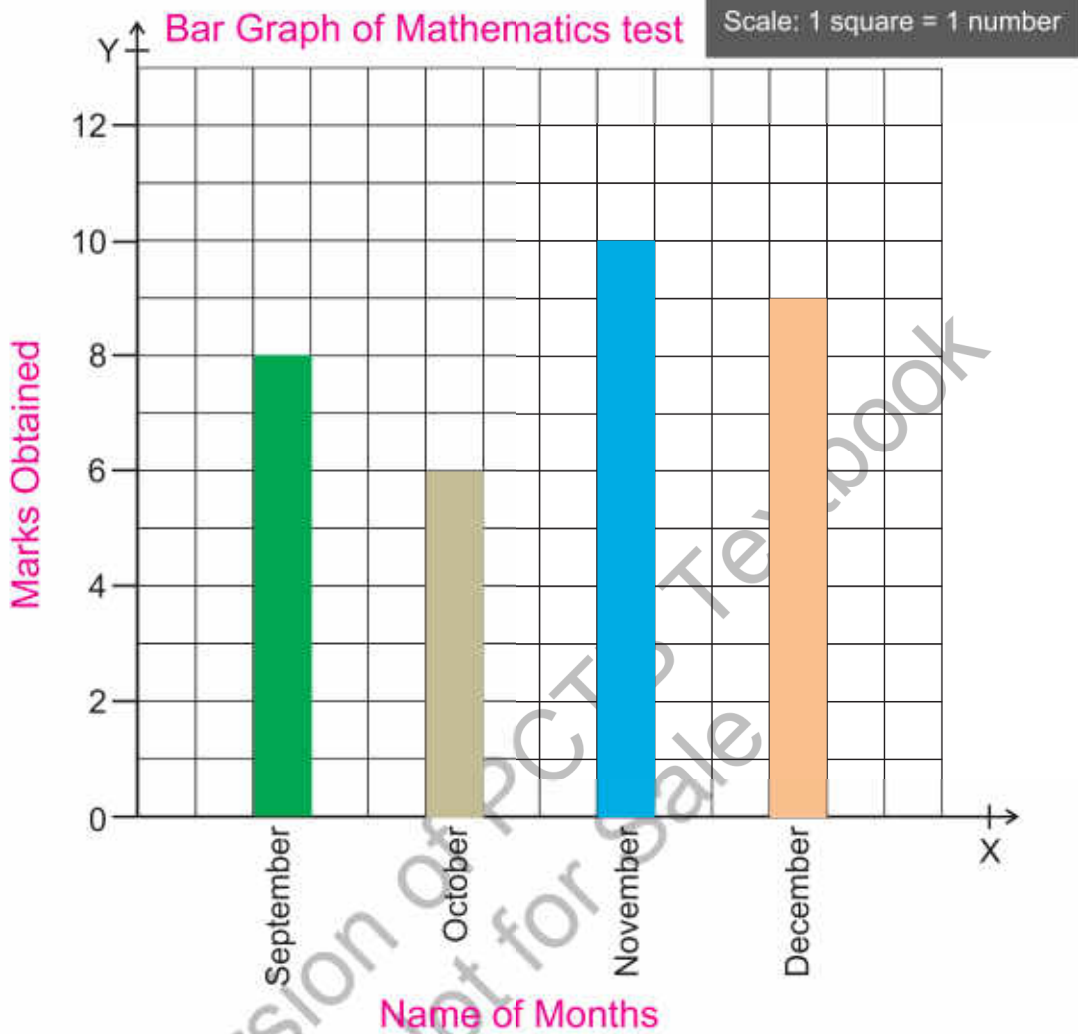


- Mark the horizontal line as X-axis and the vertical line as Y-axis.
- Write the name of the months on the X-axis and the marks obtained on the Y-axis.
- One square with Y-axis represents 1 mark.
- 8 marks were obtained in September. So, we will colour 8 squares along the Y-axis.
- Similarly, 6 marks were obtained in October. So, we will colour 6 squares along the Y-axis.
- Complete the bar graph by colouring the number of squares for the marks obtained in all the months.



Ask the students to take a survey in the school. For example the favourite subjects of the students, favourite food, favourite hobbies etc. Ask them to organise this data using bar graph.





**Key Fact**

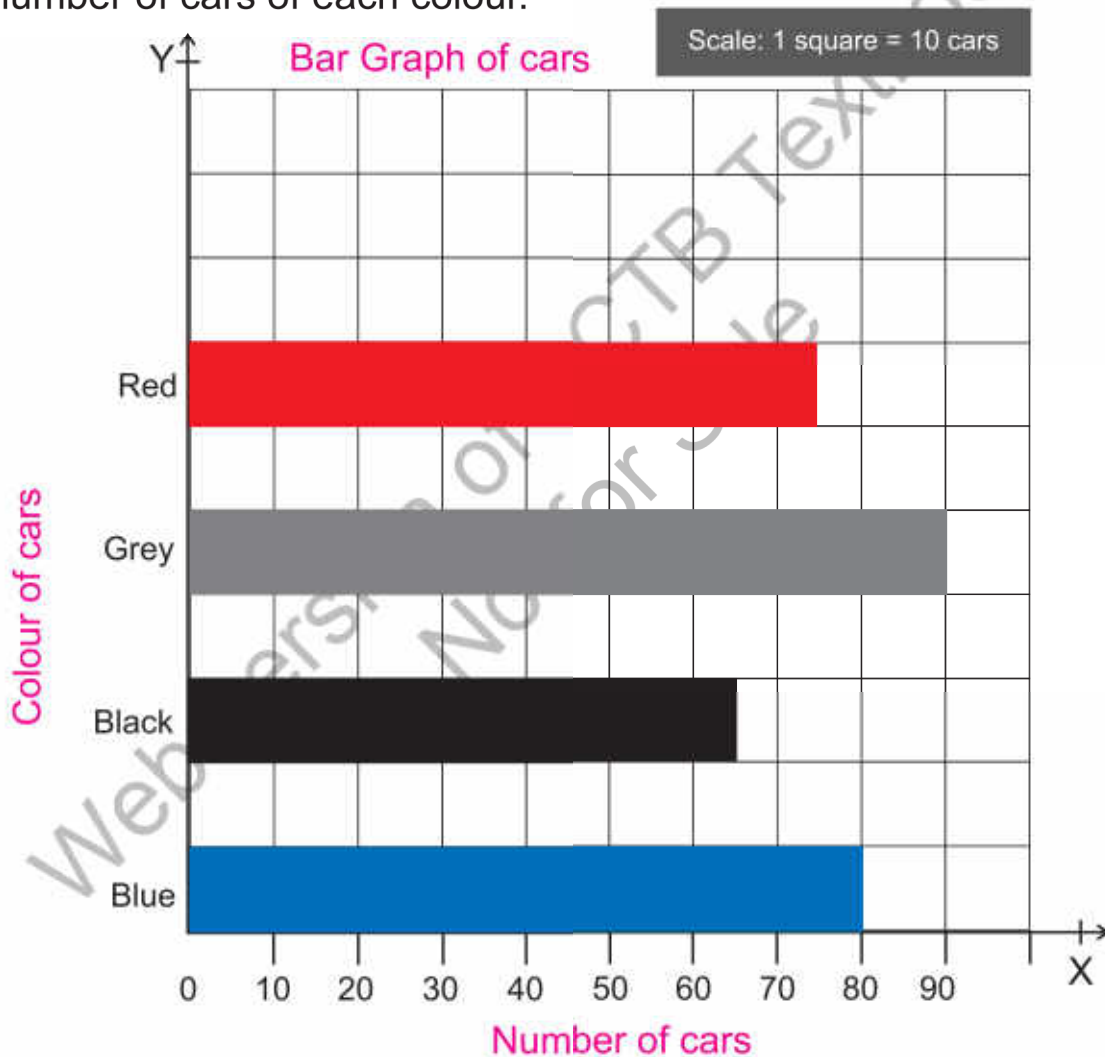
- In a bar graph, the width of each bar is same.
- The bar graph given above is a vertical bar graph. Similarly, we can draw a horizontal bar graph.

The given table shows the number of cars of different colours in a car parking during a month. Represent this data in a horizontal bar graph.



Colour of cars	Blue	Black	Grey	Red
Number of cars	80	65	90	75

- Mark the horizontal line as X-axis and the vertical line as Y-axis.
- Write the number of cars on the X-axis and the colours of cars on the Y-axis.
- One square with X-axis represents 10 cars.
- Complete the bar graph by colouring the number of squares for the number of cars of each colour.



Record the information about the favourite hobby of your classmates in a table. Then organize it with the help of horizontal bar graph.

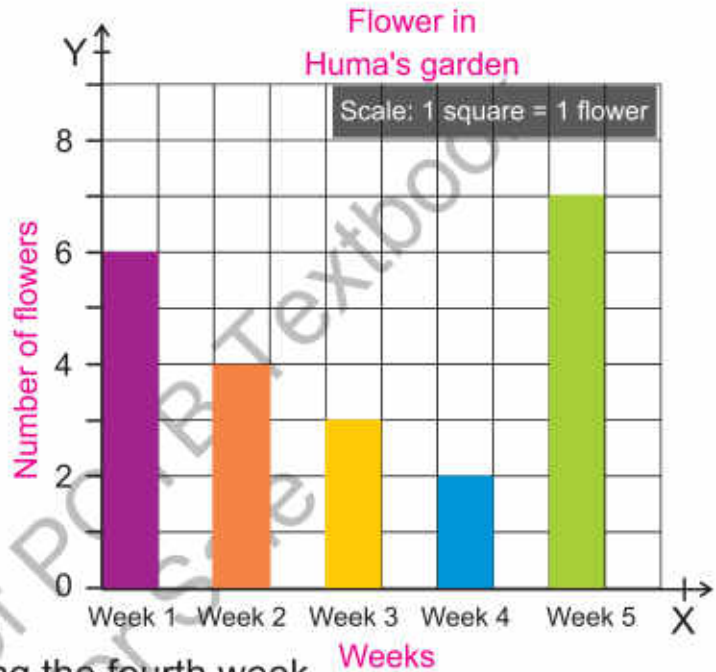
## Reading a Bar Graph



The given bar graph shows the number of flowers that bloomed in Huma's garden during five weeks.

The graph shows:

- 6 flowers bloomed during the first week.
- 4 flowers bloomed during the second week.
- 3 flowers bloomed during the third week.
- 2 flowers bloomed during the fourth week.
- 7 flowers bloomed during the fifth week.
- The maximum flowers bloomed during the fifth week.
- Minimum flowers bloomed during the fourth week.



Let's find the answer of the given question by observing the given bar graph.





- In which year did the factory produce the most pairs of shoes? (2015)
- In which year did the factory produce the least pairs of shoes? (2013)
- In which years the factory made 20000 pairs of shoes? (2011 and 2012)
- How many less pairs of shoes were produced in 2011 than in 2015?  
 $25\ 000 - 20\ 000 = 5\ 000$  (Pair of shoes)
- In which 2 years, the difference in the number of shoes in the factory is 10 000? (2013 and 2015)
- How many pairs of shoes did the factory produce in these 5 years?  
 $(20000+20000+15000+22500+25000) = 102,500$  pairs of shoes.



## Exercise 2

1. Saba asked about the most favourite fruit of each student in her class. The details of the answers are shown in the given table. Draw a horizontal bar graph of this data.

Favourite fruit	Strawberry	Apple	Banana	Mango
Number of students	5	4	8	9

2. The statistics of patients visiting a hospital during 5 months is given below. Draw a vertical bar of the given data.

Months	February	March	April	May	June
Number of patients	2	6	10	12	15

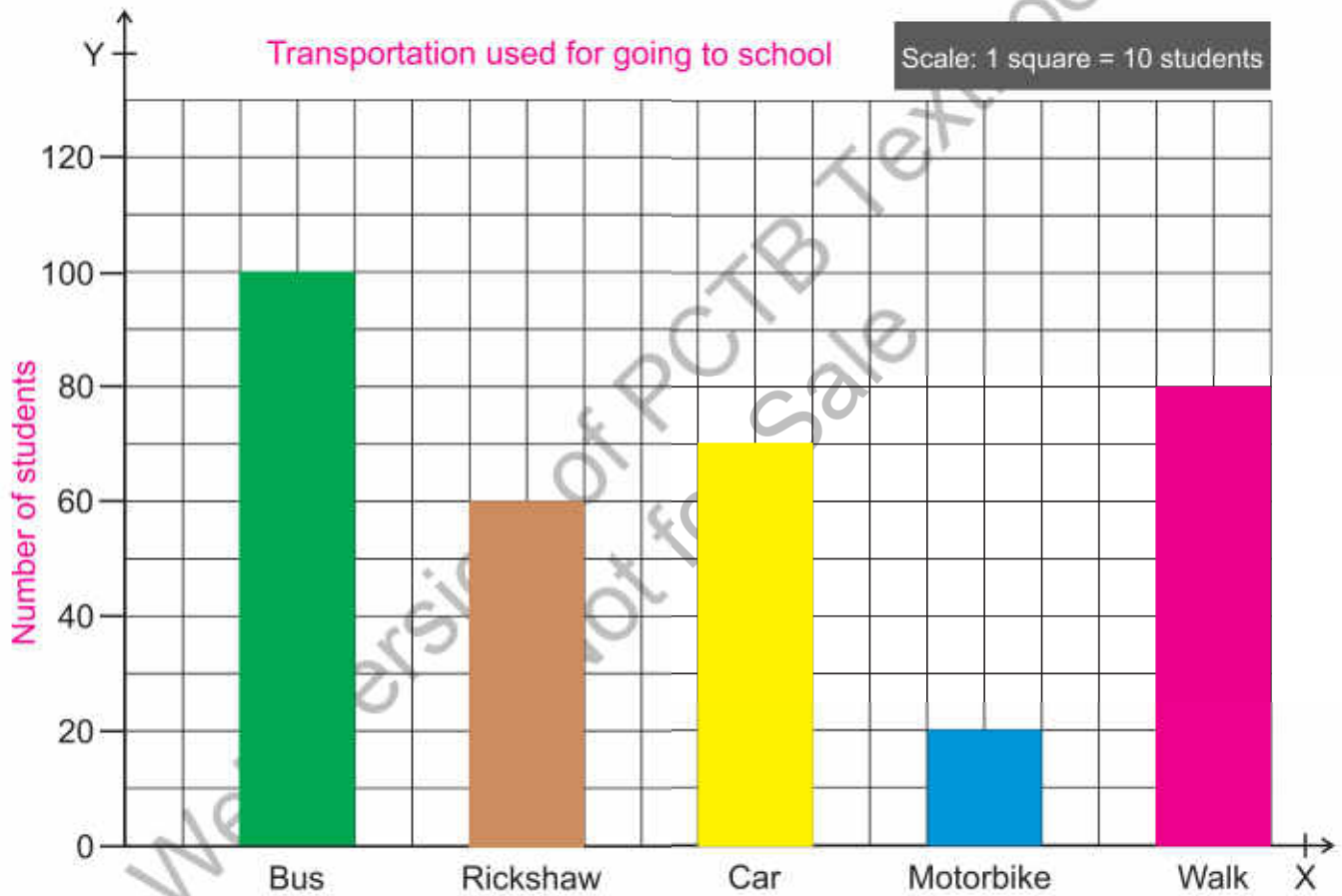
3. During a visit to a zoo the children saw different number of animals whose detail is given below. Draw its vertical bar graph.

Animals	Lion	Elephant	Monkey	Cheeta	Snake	Giraffe	Zebra
Number of animals	4	2	8	3	12	6	10

4. In the following table the values of temperature in Lahore during a week of August are given. Draw a horizontal bar graph.

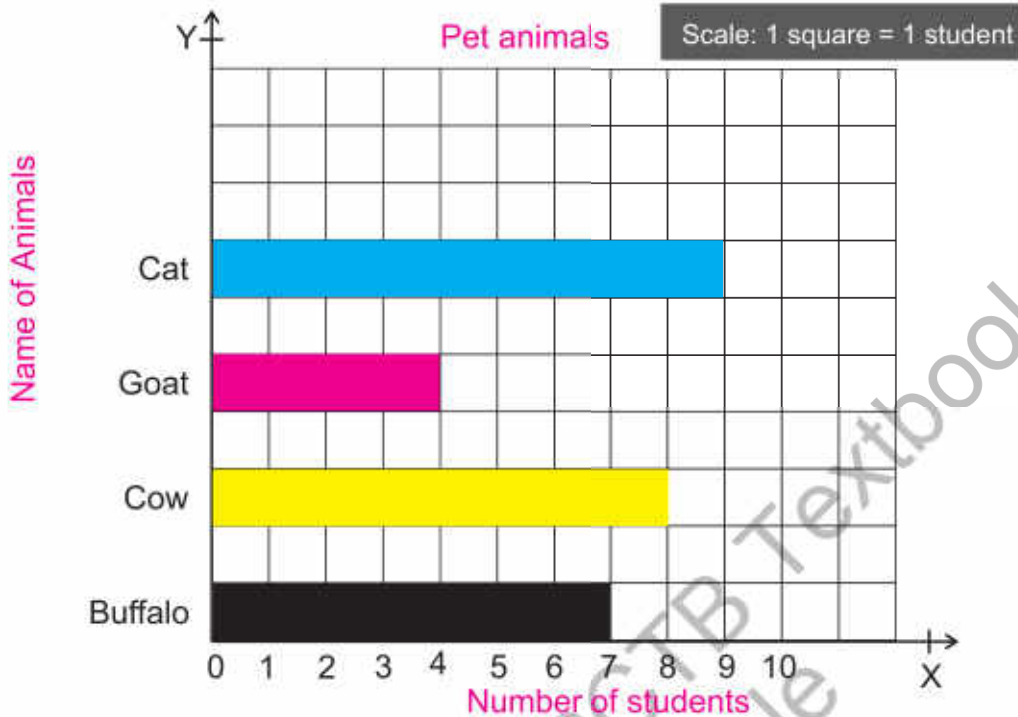
Days of week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Temperature (°C)	32	33	30	32	36	40	38

5. Study the graph carefully to answer the given questions.



- How many students come to school by car?
- Is the number of students coming to school on motorbikes less than those coming by rickshaw? If yes, then how much less?
- Which means of transport do the most students use and what is the number of students coming to school by this means of transport?
- What is the total number of students coming by car, rickshaw and bus altogether?
- Tell the number of students coming to school on foot.

6. Study the graph carefully to answer the given questions



- (a) How many students have cat as a pet?
- (b) How many students have goat as a pet?
- (c) Which is the most popular pet?
- (d) In total, how many students have a pet at home?
- (e) If the total number of students in the class is 35, find out how many students do not have any pets in their home?

**I Have Learnt to:**



- find and describing average of given quantities in the data.
- solve real life situations involving average.
- organize the given data using bar graph.
- read and interpreting a bar graph given in horizontal and vertical form.
- draw horizontal and vertical bar graphs for given data.
- solve real life situations using data presented in bar graphs.

**Vocabulary**

- Average
- Data
- Bar Graph
- Horizontal Bar Graph
- Vertical Bar Graph

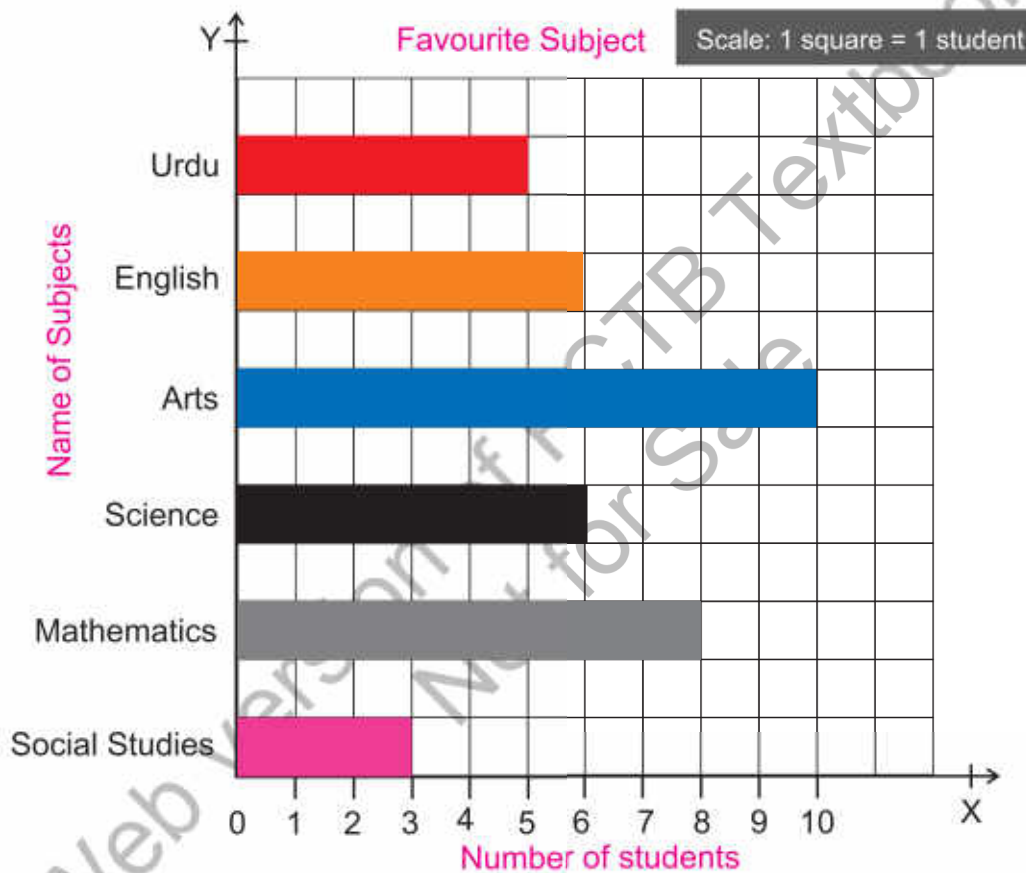


## Review Exercise



- Choose the correct options and fill in the blanks:
  - The average of a number of items can be found by \_\_\_\_\_.
    - Dividing sum of items by number of items
    - Adding sum of items and number of items
    - Multiplying sum of items by number of items
    - Subtracting sum of items from number of items
  - If a student got 19, 21, 22, 24 and 19 marks in different subjects in the monthly test, his average marks will be \_\_\_\_\_.
    - 19
    - 21
    - 22
    - 25
  - To find the sum of the given items whose average is known, the formula is used:
    - sum of items = average of items + number of items
    - sum of items = average of items – number of items
    - sum of items = average of items  $\times$  number of items
    - sum of items =  $\frac{\text{average of items}}{\text{number of items}}$
  - If the sum of some quantities is 600 and the average is 50, then number of quantities will be \_\_\_\_\_.
    - 15
    - 12
    - 10
    - 5
  - Ahmed jumped 12 time in a minute, 9 times in second minute and 15 time in third minute. What will be the average of number of jumps Ahmed did \_\_\_\_\_.
    - 9
    - 11
    - 12
    - 15
- A labourer earned Rs.1 200 on the first day, Rs.1 000 on the second day, Rs.1 500 on the third day, Rs.1 300 on the fourth day and Rs.1 200 on the fifth day. Find out how many rupees he earned on average in five days?
- Find out the average of six odd numbers from 1 to 11 and also find the average of six even numbers from 2 to 12. Tell which of these two average is greater in value, the even one or odd one?

4. A pharmacy earned a profit of Rs.50 000 in the first month, Rs.62 000 in the second month, Rs.68 000 in the third month, Rs.78 000 in the fourth month and Rs. 65 000 in the fifth month. Draw a vertical bar graph of the profit of the company for the five months.
5. The students of class-5 were asked to vote for their most favourite subjects. The following bar graph shows their responses. Read the graph carefully to answer the given questions.



- (a) How many students like Science and Mathematics?
- (b) How many students like Arts?
- (c) How many more students like Mathematics than science as their favourite subject?
- (d) Which subjects are liked by the same number of students and what is their number?
- (e) Study the graph to find out the total number of students in class-5.
- (f) Tell the most favourite and the least favourite subject of class-5 students.



## قومی ترانہ

پاک سرزمین شاد باد      کشورِ حسین شاد باد  
تُو نشانِ عزمِ عالی شان      ارضِ پاکستان  
مرکزِ یقین شاد باد  
پاک سرزمین کا نظام      قُوّتِ اُخُوّتِ عوام  
قوم ، ملک ، سلطنت      پابندہ تابندہ باد  
شاد باد منزلِ مُراد  
پرچمِ ستارہ و ہلال      رہبرِ ترقی و کمال  
ترجمانِ ماضی، شانِ حال      جانِ استقبال  
سایۂ خدائے ذوالجلال

