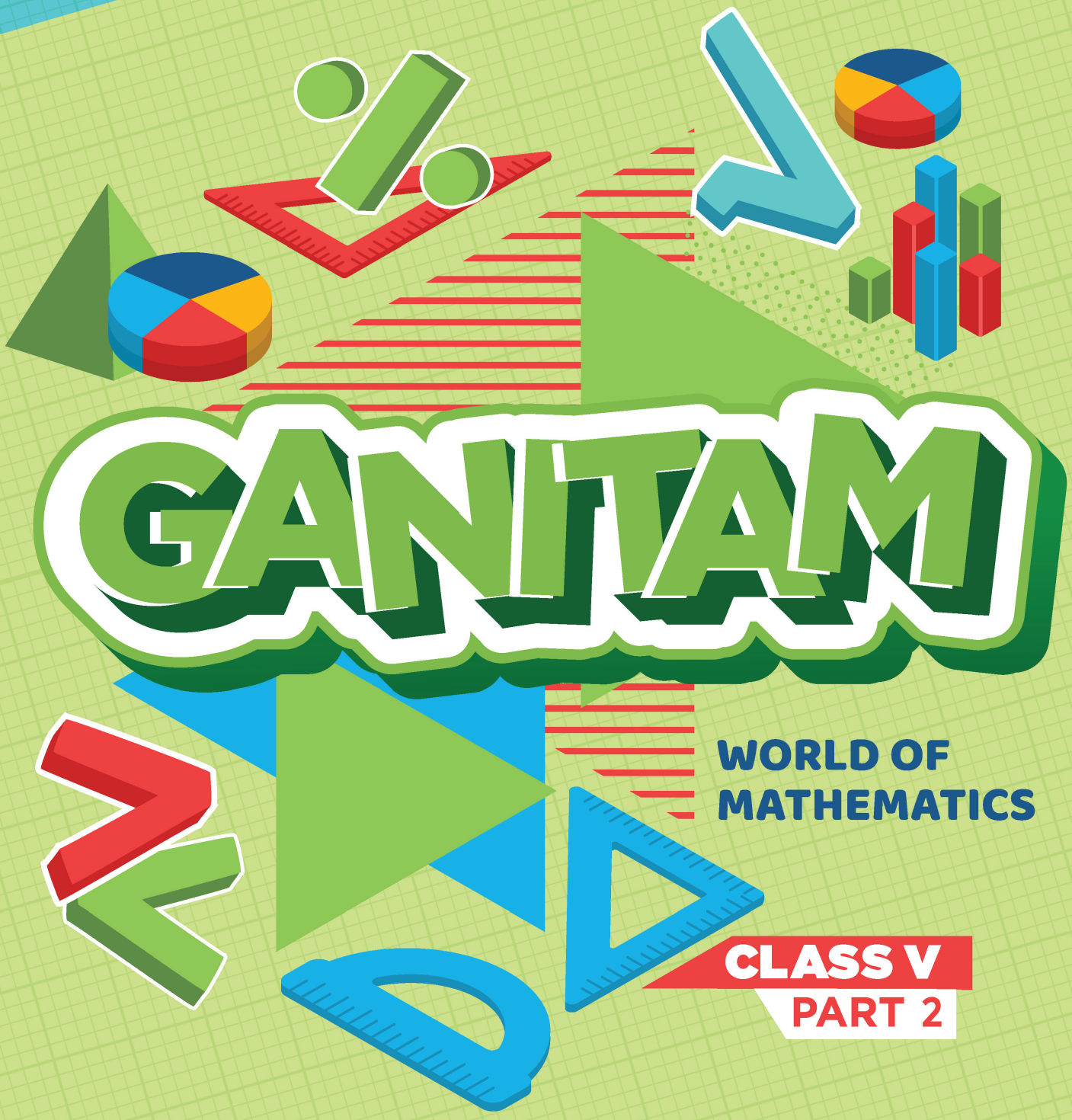

GANITAM

WORLD OF MATHEMATICS

CLASS V
PART 2

Name:

School:

Ganitam

The World of Mathematics

Part II

Ganitam

The World of Mathematics

Second Edition published in 2024

MRP ₹ 200/-

Preface

Ganitam – The World of Mathematics

Mathematics builds hope. It helps us believe that every problem has a solution.

Education imparted in classrooms should be linked to life outside school. Hence the knowledge and skills acquired in school should help children understand the world around them better, and thereby contribute towards its betterment. This series of books on Mathematics titled "Ganitam-The World of Mathematics", has been prepared with that thought on our minds. The book has been designed in such a way that it enhances inquisitiveness in children by encouraging them to ask questions and seek answers rather than just learn what is listed in the books.

The content has been carefully curated, so that it reflects the rich cultural diversity of our motherland Bharat, enabling the child to intuitively understand the unifying values that bond the citizens of this great country together. Thus, the book will help a child gain various skills required for the 21st century and be a universal citizen with a passion for following Indian values.

The core content of the book originates from the Vedas which provide the key concepts of Mathematics. For example, the sutra एकाधिकेन पूर्वेण(Ekaadhikena Purvena) indicates an interesting mathematical application. Great ancient Indian scholars like Acharya Aryabhatta, Brahmagupta, Bhaskaracharya, Pingala, Mahavira, and more contemporary ones like Srinivasa Ramanujan along with their counterparts from other parts of the world, have further developed this body of knowledge. Numerous teachers from the DAV Group of Schools, with their decades of rich experience, have compiled the existing knowledge in a child-friendly form.

 Considering the social orientation of the organization, we have consciously ensured that the cost of the textbook is affordable without

compromising on the quality of paper/print. Also, the e-copy of the entire book will always be downloadable for free from our website – davchennai.org/publications.

This is the first version of the book and could contain not only omissions, but also areas of improvement. We request the reader to excuse us for the omissions, but please do bring to our notice any feedback for correction and improvement in subsequent versions. We will remain grateful to you for your support and feedback.

Lastly, before signing off, we would like to express our profound gratitude to Almighty for guidance and encouragement in this endeavour. As the great mathematician, Srinivasa Ramanujan, rightly said - **"An equation for me has no meaning unless it expresses a thought of God."**

Chennai | June 2024

Secretary
Tamil Nadu Arya Samaj Edu. Society

Acknowledgements

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Academic Furtherance

Dr. V. Padma, Former Dean, Academic Research

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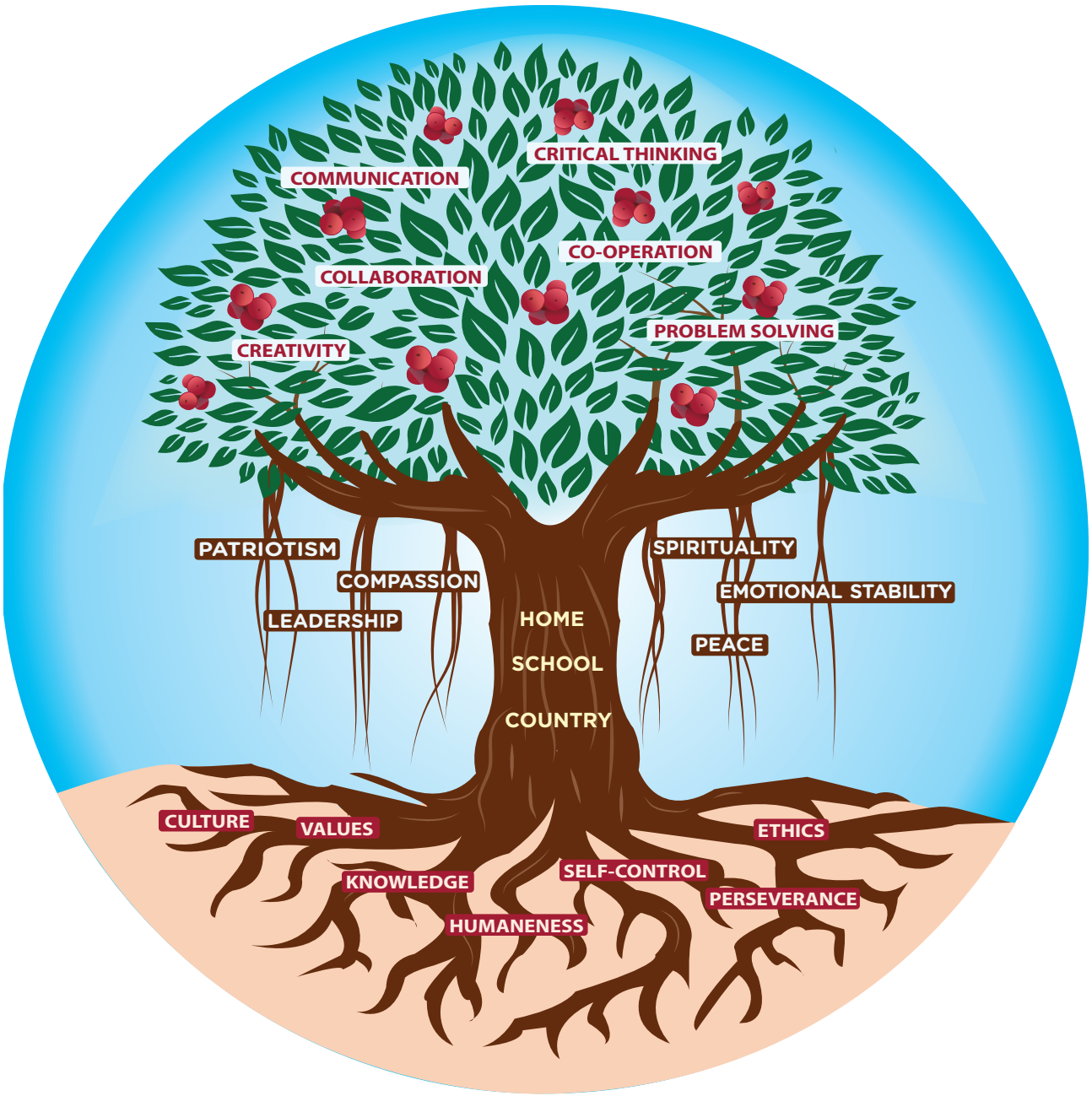


Contents

6 FRACTIONS

Learning outcomes

At the end of this lesson, children will be able to:

- Understand fractions of a whole or a collection.
- List equivalent fractions of a given fraction
- Simplify fractions to its lowest term
- Compare, arrange like and unlike fractions in ascending and descending order.
- Add and subtract like and unlike fractions
- Apply the skills to solve real life problems

Recapitulate

Raji and Rama were taking a walk in the garden. They experienced the pleasant smell of freshly bloomed flowers as it was spring. They found 6 pretty flowers in a row of plants. To their surprise, 3 were pink and the rest were yellow.

Raji said half of the flowers are yellow

Rama said half of the flowers are pink.

Who is correct? _____

DO YOU KNOW

The word fraction comes from the Latin word 'fractio' which means 'to break'

The line that separates the numerator and the denominator is called a fractional bar or 'vinculum'. It is also the tissue that connects the tendon to the bone of a finger or a toe.

Part of a whole or a collection

In $\frac{3}{7}$, Numerator is 3 and Denominator is 7

Fractions

Equivalent Fractions

Two or more fractions that have the same value

Examples: $\frac{1}{3}, \frac{2}{6}, \frac{3}{9}$

Kinds/Types of Fractions

Like fractions:
Fractions that have the same denominator.

Examples : $\frac{1}{7}, \frac{5}{7}, \frac{3}{7}$

Unlike fractions:
Fractions that have different denominators.

Examples: $\frac{1}{9}, \frac{6}{11}, \frac{2}{3}$

Kinds/Types of Fractions

Proper fractions:
Numerator is less than the denominator.

Examples: $\frac{2}{7}$

Unit fractions:
Fractions with '1' as numerator.

Examples: $\frac{1}{3}, \frac{1}{8}$

Improper fractions:
Numerator is greater than or equal to denominator.

Examples: $\frac{5}{4}, \frac{7}{7}$

Mixed Numbers:
Combination of a whole number and a proper fraction.

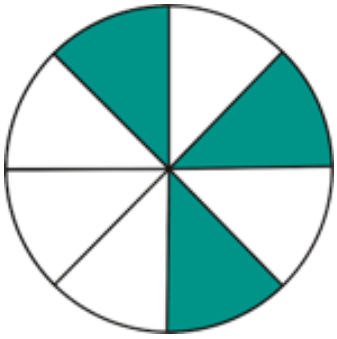
Examples: $2\frac{1}{11}, 3\frac{2}{13}$

Try these

1. Write the fraction of the coloured part:

a) 

b) 

c) 

d) 

2. Find the value:

a) $\frac{5}{6}$ of 36

b) $\frac{2}{9}$ of 81

c) $\frac{3}{4}$ of a day in hours

d) $\frac{1}{5}$ of a non-leap year in days

e) $\frac{7}{16}$ of 64

f) $\frac{8}{15}$ of an hour in minutes

3. Write any three equivalent fractions for:

a) $\frac{2}{5}$ b) $\frac{40}{60}$ c) $\frac{3}{7}$ d) $\frac{44}{88}$ e) $\frac{35}{77}$

4. Fill in the blanks with < , > or =:

a) $\frac{3}{17} \bigcirc \frac{16}{17}$ b) $\frac{11}{8} \bigcirc \frac{7}{8}$ c) $1\frac{5}{12} \bigcirc \frac{11}{12}$ d) $\frac{3}{14} \bigcirc \frac{6}{14}$

5. Arrange in ascending order:

a) $\frac{7}{16}, \frac{9}{16}, \frac{3}{16}, \frac{8}{16}$ b) $\frac{2}{9}, \frac{8}{9}, \frac{1}{9}, \frac{7}{9}$ c) $\frac{8}{25}, \frac{4}{25}, \frac{11}{25}, \frac{3}{25}$

6. Arrange in descending order:

a) $\frac{1}{12}, \frac{7}{12}, \frac{5}{12}, \frac{3}{12}$ b) $\frac{7}{8}, \frac{11}{8}, \frac{3}{8}, \frac{5}{8}$ c) $\frac{8}{5}, \frac{2}{5}, \frac{9}{5}, \frac{3}{5}$

7. Add and express the sum in its lowest term:

a) $\frac{4}{13} + \frac{2}{13}$ b) $\frac{5}{9} + \frac{1}{9}$ c) $\frac{12}{21} + \frac{6}{21} + \frac{3}{21}$ d) $\frac{7}{11} + \frac{6}{11} + \frac{9}{11}$

8. Subtract and express the sum in its lowest term:

a) $\frac{19}{23} - \frac{4}{23}$ b) $\frac{8}{13} - \frac{5}{13}$ c) $\frac{7}{13} - \frac{4}{13}$ d) $\frac{21}{25} - \frac{16}{25}$

9. Group the given fractions into proper fraction, improper fraction, unit fraction and mixed number:

$\frac{7}{3}, \frac{5}{7}, \frac{1}{9}, 14\frac{3}{5}, \frac{1}{8}, 3\frac{1}{2}, \frac{6}{10}, \frac{40}{11}$

Proper fractions	Improper fractions	Unit fractions	Mixed numbers

10. Convert the following improper fractions into mixed numbers:

a) $\frac{37}{5}$ b) $\frac{89}{7}$ c) $\frac{11}{3}$ d) $\frac{19}{2}$ e) $\frac{64}{13}$ f) $\frac{72}{17}$

11. Convert the following mixed numbers into improper fractions

a) $8\frac{5}{7}$ b) $11\frac{3}{8}$ c) $6\frac{7}{10}$ d) $4\frac{1}{2}$ e) $9\frac{2}{19}$ f) $1\frac{4}{111}$

12. Ram and Raj played 30 games of chess. Of the 30 games, Ram won 8 while Raj won 14. The rest of the games were drawn. What fraction of the games were:

a) won by Ram?

b) won by Raj?

c) How many games were not won or lost?

13. Kajal and Kayal took 90 turns each at hitting a target. If one-ninth of Kajal's and two-ninths of Kayal's hits were on target, find the number of successful hits for each.

14. A music CD has 15 songs. Five songs are ballads while seven songs are dance tracks. The remaining songs were of different genre. What fraction of songs were of a different genre?

15. In a day, Ashutosh walks $\frac{8}{17}$ km to school, $\frac{6}{17}$ km to karate class and $\frac{3}{17}$ km back to his home. What is the total distance that he walks everyday?

Equivalent Fractions

Look at the fractional strips

$\frac{1}{2}$

$\frac{2}{4}$

$\frac{3}{6}$

$\frac{4}{8}$

$\frac{5}{10}$

Observe the picture. The shaded portion in all the above strips are the same.

So, $\frac{1}{2}=\frac{2}{4}=\frac{3}{6}=\frac{4}{8}=\frac{5}{10}$

These fractions are called equivalent fractions.

Equivalent fractions are fractions that represent the same value.

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

Equivalent fractions can be found by

(a) Multiplying the numerator and denominator by the same number.

$\frac{2 \times 2}{5 \times 2} = \frac{4}{10}$; $\frac{2 \times 4}{5 \times 4} = \frac{8}{20}$

$\frac{4}{10}$, $\frac{8}{20}$ are equivalent fractions of $\frac{2}{5}$

(b) Dividing the numerator and denominator by the same number.

$\frac{24 \div 2}{36 \div 2} = \frac{12}{18}$ $\frac{24 \div 3}{36 \div 3} = \frac{8}{12}$ $\frac{24 \div 6}{36 \div 6} = \frac{4}{6}$

$\frac{12}{18}$, $\frac{8}{12}$, $\frac{4}{6}$ are equivalent fractions of $\frac{24}{36}$

Example: Find an equivalent fraction of $\frac{4}{7}$ with 28 as denominator

$\frac{4}{7} = \frac{\square}{28}$

To get the denominator 28, we have to multiply the denominator 7 by 4 (7 x 4 = 28)

Therefore, the numerator of the equivalent fraction will be 4 x 4 = 16

So, $\frac{4}{7} = \frac{16}{28}$

Checking equivalent fractions:

Dadi (Grandmother in Punjabi) made stuffed paratha for Raghu and Veeru.

Raghu ate $\frac{1}{3}$ of the paratha.

Veeru ate $\frac{4}{12}$ of the paratha.

Let us check whether both of them ate equal portions.

Let us use the method of cross multiplication.

If the cross-products are equal, the fractions are equivalent.

$\frac{1}{3}$ $\frac{4}{12}$

1 x 12 3 x 4

12 = 12

Since the cross products are equal, the fractions are equivalent.

So, Raghu and Veeru ate equal portions of the paratha.

Example : Check whether $\frac{3}{7}$ and $\frac{9}{24}$ are equivalent.

$\frac{3}{7}$ $\frac{9}{24}$

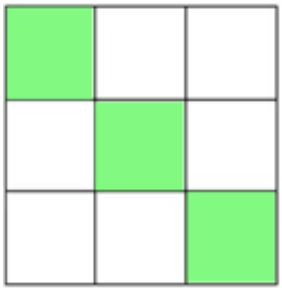
3 x 24 7 x 9

72 ≠ 63

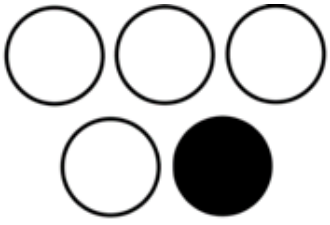
Since the cross products are unequal, $\frac{3}{7}$ and $\frac{9}{24}$ are not equivalent.

EXERCISE 6.1

1. Write two equivalent fractions for the coloured part:

a) 

$\frac{\square}{\square} = \frac{\square}{\square}$

b) 

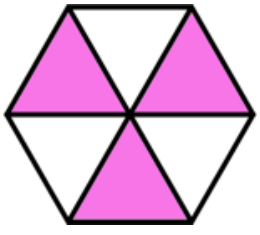
$\frac{\square}{\square} = \frac{\square}{\square}$

c) 

$\frac{\square}{\square} = \frac{\square}{\square}$

d) 

$\frac{\square}{\square} = \frac{\square}{\square}$

e) 

$\frac{\square}{\square} = \frac{\square}{\square}$

f) 

$\frac{\square}{\square} = \frac{\square}{\square}$

2. Find the first four equivalent fractions for each of the following:

a) $\frac{3}{4}$ b) $\frac{2}{5}$ c) $\frac{11}{12}$ d) $\frac{7}{10}$ e) $\frac{4}{7}$ f) $\frac{8}{25}$

3. Find two equivalent fractions by division

a) $\frac{36}{42}$ b) $\frac{52}{91}$ c) $\frac{60}{72}$ d) $\frac{32}{36}$ e) $\frac{15}{45}$ f) $\frac{34}{68}$

4. Fill in the blanks to make the fractions equivalent:

a) $\frac{1}{9}=\frac{\square}{18}$ b) $\frac{2}{3}=\frac{10}{\square}$ c) $\frac{8}{17}=\frac{56}{\square}$ d) $\frac{6}{24}=\frac{\square}{120}$

e) $\frac{5}{7}=\frac{\square}{21}$ f) $\frac{\square}{5}=\frac{14}{35}$ g) $\frac{3}{13}=\frac{18}{\square}$ h) $\frac{9}{25}=\frac{\square}{75}$

5. Check if the fractions are equivalent. Put a ✓ for equivalent and ✘ for not equivalent.

a) $\frac{4}{11}=\frac{16}{44}$ ☐ b) $\frac{3}{5}=\frac{6}{12}$ ☐ c) $\frac{9}{12}=\frac{3}{4}$ ☐

d) $\frac{4}{7}=\frac{15}{27}$ ☐ e) $\frac{5}{20}=\frac{3}{12}$ ☐ f) $\frac{18}{40}=\frac{9}{24}$ ☐

Fractions In The Lowest Terms

If the numerator and denominator have 1 as the only common factor, it is a fraction in its lowest terms.

Example:

In the fraction $\frac{9}{15}$, the numerator and the denominator have a common factor other than 1. It's 3

$\frac{9}{15}$ can be reduced by dividing the numerator and the denominator by 3.

$\frac{3}{5}$ cannot be reduced any further, as 3 and 5 have only 1 as their common factor.

So, $\frac{3}{5}$ is in its lowest term.

Converting a Fraction to its Lowest Term

If we divide the numerator and the denominator of a fraction by their HCF (Highest Common Factor), then the fraction will be reduced to its lowest terms in a single step.

Examples

a) $\frac{16}{24}$

HCF of 16 and 24 is 8

$\therefore \frac{16 \div 8}{24 \div 8} = \frac{2}{3}$

2	24
2	12
2	6
3	3
	1

2	16
2	8
2	4
2	2
	1

b) $\frac{35}{45}$

HCF of 35 and 45 is 5

$\therefore \frac{35 \div 5}{45 \div 5} = \frac{7}{9}$

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

$16 = 2 \times 2 \times 2 \times 2$

H.C.F= 2 x 2 x 2 = 8

EXERCISE 6.2

1. Reduce the fraction to its lowest terms:

a) $\frac{10}{40}$ b) $\frac{14}{35}$ c) $\frac{36}{64}$ d) $\frac{21}{39}$ e) $\frac{55}{80}$ f) $\frac{7}{91}$

g) $\frac{42}{54}$ h) $\frac{19}{76}$ i) $\frac{30}{34}$ j) $\frac{15}{75}$ k) $\frac{18}{90}$ l) $\frac{13}{117}$

DO YOU KNOW

The ancient Egyptians used only unit fractions (i.e.) fractions that have 1 as their numerator. They converted all fractions into unit fractions for calculations. Do you think that the practice should have continued? Discuss.

Comparing and Ordering Fractions

Sashi ate two-sixths of a watermelon and Shyam ate three-sixths of it. Who ate a bigger share of the watermelon?

Let us compare the fractions to find out who ate more?

Since $\frac{2}{6}$ and $\frac{3}{6}$ are like fractions, we compare the numerators. The fraction that has the greater numerator is the greater fraction. Thus $\frac{3}{6} > \frac{2}{6}$ (i.e.) Shyam ate the bigger portion.

a) Now let us see how to **compare unlike fractions.**

Ram ate $\frac{3}{12}$ of a chocolate while Uma ate $\frac{5}{6}$ of it. Who ate less?

$\frac{3}{12}$ and $\frac{5}{6}$ are unlike fractions.

We can compare $\frac{3}{12}$ and $\frac{5}{6}$ in two ways.

Method 1: By cross multiplication $\frac{3}{12}$ $\frac{5}{6}$

Since 18 is less than 60,

$\frac{3}{12} < \frac{5}{6}$

Method 2: By converting them into like fractions.

$\frac{5}{6}$ can be converted into a fraction with denominator 12.

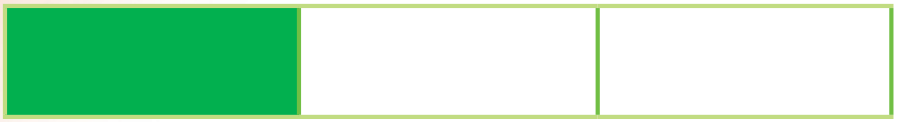
$\frac{5}{6} = \frac{10}{12}$

Now let us compare $\frac{3}{12}$ and $\frac{10}{12}$. Since 3 is lesser than 10,

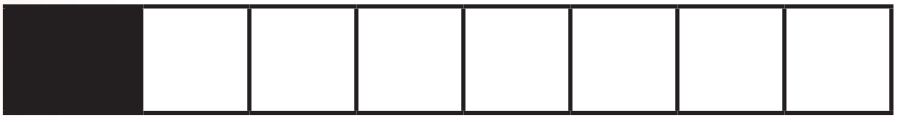
$$\frac{3}{12} < \frac{10}{12} \text{ or } \frac{3}{12} < \frac{5}{6}$$

Now let us look at a situation, where the **fractions have the same numerator.**

If two fractions have the same numerator, the fraction with the smaller denominator is greater.



$\frac{1}{3}$



$\frac{1}{8}$

Look at the two strips of equal size. We can clearly see that the shaded part of the first strip is greater than the shaded part of the second strip.

Hence, $\frac{1}{3} > \frac{1}{8}$

Example: Which fraction in the following pairs is smaller?

a) $\frac{7}{12}$, $\frac{7}{17}$ b) $\frac{9}{19}$, $\frac{9}{15}$

Solution:

a) As the numerators are the same, we compare the denominators.

We have $12 < 17$

So, $\frac{7}{12} > \frac{7}{17}$

$\frac{7}{17}$ is smaller.

b) As the numerators are the same, we compare the denominators.

We have $19 > 15$

So, $\frac{9}{19} < \frac{9}{15}$

$\frac{9}{19}$ is smaller.

Example: Arrange the following in ascending order:

$\frac{8}{11}$, $\frac{8}{16}$, $\frac{8}{10}$, $\frac{8}{13}$

Solution: As the numerators are the same, we compare the denominators.

We have, $16 > 13 > 11 > 10$

So, $\frac{8}{16} < \frac{8}{13} < \frac{8}{11} < \frac{8}{10}$

(b) Comparison of unlike fractions by converting into like fractions.

To compare unlike fractions, first convert them into like fractions, then compare the resulting fractions.

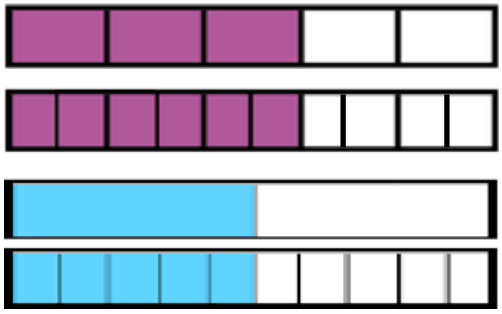
So, we have to first find equivalent fractions with the same denominator.

Example: Compare $\frac{3}{5}$ and $\frac{1}{2}$

Method – 1:

Equivalent fractions of $\frac{3}{5}, \frac{6}{10}, \frac{9}{15}, \frac{12}{20}, \frac{15}{25}$

Equivalent fractions of $\frac{1}{2}, \frac{2}{4}, \frac{3}{6}, \frac{4}{8}, \frac{5}{10}$



$\frac{6}{10}$ and $\frac{5}{10}$ are like fractions.

$6 > 5$

So, $\frac{6}{10} > \frac{5}{10}$ Therefore, $\frac{3}{5} > \frac{1}{2}$

Ans. $\frac{3}{5} > \frac{1}{2}$ or $\frac{1}{2} < \frac{3}{5}$

Alternate Method

Example: Compare $\frac{3}{8}$ and $\frac{2}{7}$

Step1: Find the LCM of the denominators.

LCM of 8 and 7 is $8 \times 7 = 56$

Step2: Convert the fractions into equivalent fractions with denominator 56

$\frac{3 \times 7}{8 \times 7} = \frac{21}{56}$; $\frac{2 \times 8}{7 \times 8} = \frac{16}{56}$

Note : 8 and 7 are co-prime numbers

Step3: Compare the equivalent fractions.

$\frac{21}{56} > \frac{16}{56}$

So, $\frac{3}{8} > \frac{2}{7}$

Co-prime numbers are set of numbers whose H.C.F is 1.
Two consecutive numbers are always co-prime.

(c) Comparison of unlike fractions by cross multiplication.

In this method, we cross multiply the two fractions. The fraction on the side of the greater product is greater.

Example: Compare $\frac{7}{8}$ and $\frac{9}{11}$

We cross multiply the two fractions.

$7 \times 11 \quad 8 \times 9$

$77 > 72$

$77 > 72$, so, $\frac{7}{8} > \frac{9}{11}$

Example: Arrange $\frac{2}{5}, \frac{5}{6}, \frac{1}{3}$ and $\frac{1}{2}$ in ascending order

L.C.M. of 5, 6, 3 and 2 is 30.

$\frac{2 \times 6}{5 \times 6} = \frac{12}{30}$; $\frac{1 \times 10}{3 \times 10} = \frac{10}{30}$

$\frac{5 \times 5}{6 \times 5} = \frac{25}{30}$; $\frac{1 \times 15}{2 \times 15} = \frac{15}{30}$

$\frac{10}{30} < \frac{12}{30} < \frac{15}{30} < \frac{25}{30}$ So, $\frac{1}{3} < \frac{2}{5} < \frac{1}{2} < \frac{5}{6}$

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

L.C.M= 2 x 5 x 3 = 30

EXERCISE 6.3

1. Fill in the circles with < , > or = , to make the statements true.

a) $\frac{7}{15} \bigcirc \frac{4}{13}$ d) $\frac{16}{5} \bigcirc \frac{11}{2}$ g) $\frac{6}{8} \bigcirc \frac{8}{5}$

b) $\frac{3}{12} \bigcirc \frac{1}{4}$ e) $\frac{1}{3} \bigcirc \frac{3}{8}$ h) $\frac{5}{8} \bigcirc \frac{1}{5}$

c) $\frac{5}{11} \bigcirc \frac{5}{12}$ f) $\frac{7}{8} \bigcirc \frac{14}{16}$ i) $\frac{9}{19} \bigcirc \frac{9}{13}$

2. Arrange in ascending order:

a) $\frac{1}{12}, \frac{5}{6}, \frac{3}{8}, \frac{1}{4}$ b) $\frac{7}{18}, \frac{4}{9}, \frac{2}{3}, \frac{1}{2}$ c) $\frac{7}{11}, \frac{7}{29}, \frac{7}{9}, \frac{7}{19}$

d) $\frac{1}{5}, \frac{1}{2}, \frac{3}{4}, \frac{7}{8}$ e) $\frac{1}{3}, \frac{1}{4}, \frac{4}{5}, \frac{5}{6}$ f) $\frac{8}{21}, \frac{3}{7}, \frac{1}{3}, \frac{1}{9}$

3. Arrange in descending order

a) $\frac{2}{8}, \frac{6}{4}, \frac{1}{2}, \frac{5}{12}$ b) $\frac{2}{7}, \frac{11}{35}, \frac{9}{14}, \frac{13}{28}$ c) $\frac{11}{18}, \frac{11}{19}, \frac{11}{20}, \frac{11}{17}$

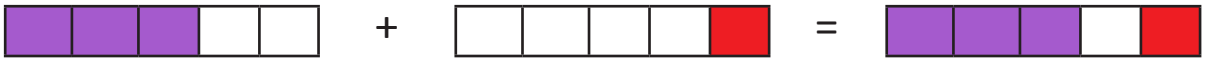
d) $\frac{7}{12}, \frac{13}{18}, \frac{17}{24}, \frac{8}{15}$ e) $\frac{4}{5}, \frac{7}{10}, \frac{17}{20}, \frac{11}{15}$ f) $\frac{5}{6}, \frac{7}{15}, \frac{2}{60}, \frac{19}{30}$

4)Preeti and Sonia eat cookies from a jar. Preeti ate $\frac{3}{16}$ of the cookies and Sonia ate $\frac{2}{9}$ of the cookies. Who ate more?

Addition of Fractions

Addition of like fractions

While adding like fractions, just add the numerators. The denominator remains the same.



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

Addition of unlike fractions

To add unlike fractions, convert the unlike fractions to like fractions.

To convert the unlike fractions to like fractions:

a) Find the L.C.M. of the denominators.

b) Convert the unlike fractions to equivalent fractions with L.C.M. as the denominator.

c) Now, you have like fractions.

d) Add the numerators, the denominator would be the LCM.

Example 1: Add $\frac{1}{3} + \frac{2}{7}$

Step1: Find the L.C.M. of 3 and 7. It is 21.

Step2: Convert the given unlike fractions to like fractions with denominator 21.

$$\frac{1 \times 7}{3 \times 7} = \frac{7}{21} \qquad \frac{2 \times 3}{7 \times 3} = \frac{6}{21}$$

Step3: Add the like fractions $\frac{7}{21} + \frac{6}{21} = \frac{7+6}{21} = \frac{13}{21}$

So if you look carefully, you would have noticed that the unlike fractions $\frac{1}{3}$ and $\frac{2}{7}$ have been converted to $\frac{7}{21}$ and $\frac{6}{21}$ (like fractions and equivalent fractions of $\frac{1}{3}$ and $\frac{2}{7}$ respectively)

Since $\frac{13}{21}$ is already in its lowest term and it is a proper fraction,

$$\frac{1}{3} + \frac{2}{7} = \frac{13}{21}$$

Example 2: Add $\frac{7}{12} + \frac{3}{5}$

Step1: Find the L.C.M. of 12 and 5. It is 60.

Step2: Convert the given unlike fractions to like fractions with denominator 60

$$\frac{7 \times 5}{12 \times 5} = \frac{35}{60}$$

$$\frac{3 \times 12}{5 \times 12} = \frac{36}{60}$$

Step3: Add the like fractions $\frac{35}{60} + \frac{36}{60} = \frac{35 + 36}{60} = \frac{71}{60}$

Step 4: As $\frac{71}{60}$ is an improper fraction convert to mixed fraction

$$\frac{71}{60} = 1\ \frac{11}{60}$$

$$\begin{array}{r} 1 \\ 60\overline{)\ 7\ 1} \\ -\ 6\ 0 \\ \hline 1\ 1 \end{array}$$

Dividend → 71

Divisor → 60

Quotient → 1

Remainder → 11

EXERCISE 6.4

1. Add the fractions and write the answer in its lowest terms:

a) $\frac{6}{9} + \frac{1}{2}$ b) $\frac{5}{9} + \frac{1}{3}$ c) $\frac{2}{12} + \frac{2}{4}$ d) $\frac{2}{7} + \frac{1}{4}$

e) $\frac{1}{2} + \frac{8}{11}$ f) $\frac{2}{5} + \frac{1}{8}$ g) $\frac{4}{10} + \frac{4}{5}$ h) $\frac{3}{7} + \frac{5}{6}$

i) $\frac{2}{5}+\frac{1}{10}$ j) $\frac{11}{21}+\frac{23}{42}$ k) $\frac{19}{28}+\frac{9}{56}$ l) $\frac{9}{11}+\frac{7}{20}$

m) $\frac{4}{15}+\frac{1}{6}$ n) $\frac{7}{27}+\frac{8}{18}$ o) $\frac{7}{12}+\frac{5}{18}$ p) $\frac{12}{35}+\frac{3}{70}$

3. Veda spent $\frac{1}{2}$ of her pocket money on a book and $\frac{1}{4}$ on a new pen. What fraction of her pocket money has she spent?
4. Anu ate $\frac{1}{3}$ of a melon while her brother ate $\frac{2}{5}$ of the melon. How much melon have they eaten together?
5. Amit did $\frac{3}{7}$ of his homework on Saturday and $\frac{1}{3}$ of it on Sunday. How much of the homework did he do over the weekend?
6. Hema walked $\frac{1}{2}$ a kilometre and jogged $\frac{3}{4}$ of a kilometre. How far did she go in all?

Addition of mixed numbers

Addition of mixed numbers can be done in two ways:

Method-1

Step1: Add the whole numbers

Step2: Add the fractions

Step3: Add the whole number and fraction

Example : Add: $2\frac{1}{5}+3\frac{1}{6}$

Step1: $2 + 3 = 5$

Step2: $\frac{1}{5}+\frac{1}{6}=\frac{1\times 6}{5\times 6}+\frac{1\times 5}{6\times 5}=\frac{6}{30}+\frac{5}{30}=\frac{11}{30}$

Step3: Add $5+\frac{11}{30}=5\frac{11}{30}$

$$2\frac{1}{5}+3\frac{1}{6}=5\frac{11}{30}$$

Alternate Method (Convert to improper fractions and add)
Step1: Convert the mixed numbers to improper fractions
Step2: Add the improper fractions
Step3: Convert to mixed number

Example : Add: $3\frac{1}{2} + 1\frac{2}{3}$

Step 1: $3\frac{1}{2} = \frac{7}{2}$; $1\frac{2}{3} = \frac{5}{3}$

Step 2: $\frac{7}{2} + \frac{5}{3} = \frac{7 \times 3}{2 \times 3} + \frac{5 \times 2}{3 \times 2} = \frac{21}{6} + \frac{10}{6} = \frac{31}{6}$

Step 3: $\frac{31}{6} = 5\frac{1}{6}$

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

Note : L.C.M of 2 and 3 is 6

EXERCISE 6.5

1. Add the fractions and write the answer in its lowest terms:

a) $3\frac{2}{5} + 2\frac{1}{3}$ b) $6\frac{5}{11} + 4\frac{1}{4}$ c) $5\frac{4}{15} + 7\frac{1}{6}$ d) $9\frac{1}{12} + 6\frac{1}{3}$

e) $8\frac{1}{6} + 9\frac{3}{5}$ f) $1\frac{3}{8} + 3\frac{3}{4}$ g) $2\frac{1}{7} + 9\frac{3}{13}$ h) $4\frac{3}{11} + 3\frac{3}{7}$

2. There are $3\frac{2}{3}$ metres of blue ribbon and $5\frac{1}{2}$ metres of red ribbon.

What length of ribbon is there in all?

3. Kala bought $2\frac{3}{4}$ litres of groundnut oil. She also bought $1\frac{1}{5}$ litres of gingelly oil.

Find the quantity of oil she bought.

Subtraction of Fractions

Subtraction of Like Fractions

While subtracting like fractions, subtract the numerators. The denominator remains the same.

$$\frac{5}{7} - \frac{2}{7} = \frac{3}{7}$$

Subtraction of Unlike Fractions

While subtracting unlike fractions, first convert the unlike fractions to like fractions.

To convert unlike fractions to like fractions:

a) Find the L.C.M of their denominators.

b) Convert the unlike fractions to equivalent fractions with the L.C.M as their denominator.

c) Subtract the numerators. The denominator will be the LCM. Check if the difference is a proper fraction, in its lowest term.

d) If not simplify and/or convert to a mixed numeral.

Example: Subtract $\frac{5}{6} - \frac{3}{5}$

Step1: Find the L.C.M of 6 and 5. It is 30.

Step2: Convert unlike fractions to like fractions with denominator 30

$$\frac{5 \times 5}{6 \times 5} = \frac{25}{30} \qquad \frac{3 \times 6}{5 \times 6} = \frac{18}{30}$$

Step3: Subtract the like fractions: $\frac{25}{30} - \frac{18}{30} = \frac{25 - 18}{30} = \frac{7}{30}$

Step4: $\frac{7}{30}$ is already in its lowest terms and it is a proper fraction.

So, $\frac{5}{6} - \frac{3}{5} = \frac{7}{30}$

EXERCISE 6.6

1. Subtract:

a) $\frac{1}{2} - \frac{1}{5}$ b) $\frac{16}{25} - \frac{1}{3}$ c) $\frac{5}{6} - \frac{1}{3}$ d) $\frac{3}{4} - \frac{1}{2}$

e) $\frac{7}{10} - \frac{1}{4}$ f) $\frac{2}{3} - \frac{1}{2}$ g) $\frac{7}{10} - \frac{2}{5}$ h) $\frac{8}{11} - \frac{3}{10}$

2 Krithika bought 3 litres of milk in the morning.

There was $\frac{5}{8}$ litres of it left in the evening.

How much was used during the day?

3. A recipe requires $\frac{2}{5}$ cup of milk and $\frac{1}{3}$ cup of cream.

How much more milk than cream is required?

Subtraction of mixed numbers

Subtraction of mixed numbers can be done by converting the mixed number to improper fraction and then subtracting

Example: Subtract: $4\frac{2}{3} - 2\frac{3}{4}$

Step1: $4\frac{2}{3} = \frac{14}{3}$; $2\frac{3}{4} = \frac{11}{4}$

Step2: $\frac{14}{3} - \frac{11}{4} = \frac{14 \times 4}{3 \times 4} - \frac{11 \times 3}{4 \times 3} = \frac{56}{12} - \frac{33}{12} = \frac{23}{12}$

Step3: $\frac{23}{12} = 1\frac{11}{12}$

$4\frac{2}{3} - 2\frac{3}{4} = 1\frac{11}{12}$

EXERCISE 6.7

1. Subtract the fractions and write the answer in its lowest terms:

a) $11\frac{1}{8} - 2\frac{7}{9}$ b) $5 - 3\frac{7}{10}$ c) $9\frac{3}{16} - 4\frac{1}{12}$ d) $14\frac{5}{9} - 6\frac{7}{15}$

e) $4\frac{8}{60} - 3\frac{7}{12}$ f) $4\frac{2}{5} - 3\frac{1}{2}$ g) $7\frac{9}{22} - 5\frac{7}{11}$ h) $6\frac{1}{3} - 2\frac{1}{4}$

2. Kareena studied for $7\frac{1}{3}$ hours in the first week and $3\frac{3}{4}$ hours the next week. Which week did she study longer? How much longer did she study in that week?

3. If $2\frac{2}{3}$ metres is cut from a bundle of cloth which is $6\frac{1}{2}$ metres long, how much cloth is left in the bundle?

4. Arun and Balu ran a 100 m race. Arun clocked $17\frac{1}{4}$ seconds and Balu clocked $15\frac{3}{4}$ seconds. Who won the race and what is the difference in time that they have taken to reach the goal post?

5. A vessel had $3\frac{1}{2}$ litres of milk. A cat drank $\frac{3}{4}$ litres. How much milk was left in the vessel?

Subject Intergration Activity

Nithya was preparing for her EVS exam. She was reading the lesson on 'Fruits and Nutrition'. Fruits play a vital role in growth and well being of human body. The colour of fruits appetises children and adults. The lesson on fruits motivated her to have fruit salad.

To her surprise, her mother had stored her favourite fruits in the refrigerator. She washed the fruits, cut and kept them ready. But she didn't know the amount of fruits to be added to make the salad. Her mother advised her to take a cup and measure the fruits according to her wish.

She decided to prepare two different salads. One for her and one for her brother.

Nithya's red salad	Nithish's yellow salad
2 cups of watermelon	2 cups of muskmelon
1 cup of strawberry	2 cups of banana
1 cup of apple	1 cup of mango
1 cup of plum	1 cup of papaya
	1 cup of pineapple

Questions:

1. What fraction of the fruits was strawberry in Nithya's salad?
2. What fraction of the fruits was banana in Nithish's salad?
3. The fraction of papaya and pineapple in Nithish's salad was _____ cups.
4. What would be your preference for different fruits if given a chance to prepare a fruit salad?. (Express the quantity in cups)

Facts to know

History suggests that the first recorded evidence of the use of fractions dates back to 2000 BC in Egypt, where fractions were used to calculate taxes. The land belonging to an individual was divided into sections, and each section was taxed a certain amount. The same idea was adopted by the rest of the world for various purposes.

The shutter speed of a camera is measured in fraction of a second. The setting of this is important to capture perfect photographs. Usually a still image is captured at a shutter speed of $\frac{1}{100}^{th}$ of a second. For objects in motion, we set a faster shutter speed of about $\frac{1}{1000}^{th}$ of a second to avoid blur images.

Worksheet

1. Find the following:

   a) $\frac{9}{11}$ of 44 b) $\frac{3}{9}$ of 45 c) $\frac{6}{5}$ of 50 d) $\frac{3}{7}$ of 49

2. Find four equivalent fractions of the following:

   a) $\frac{3}{4}$ b) $\frac{12}{20}$ c) $\frac{5}{6}$ d) $\frac{7}{8}$

3. Convert the following improper fractions into mixed fractions:

   a) $\frac{16}{3}$ b) $\frac{25}{4}$ c) $\frac{35}{11}$ d) $\frac{48}{13}$

4. Convert the following mixed fractions into improper fractions:

   a) $1\frac{3}{5}$ b) $3\frac{2}{6}$ c) $6\frac{2}{9}$ d) $5\frac{4}{9}$

5. Which of the following fractions is greater?

   a) $\frac{2}{3}$ or $\frac{3}{4}$ b) $\frac{3}{4}$ or $\frac{4}{5}$ c) $\frac{4}{7}$ or $\frac{8}{15}$ d) $\frac{3}{8}$ or $\frac{3}{10}$

6. Reduce the following fractions to their lowest terms:

   a) $\frac{25}{45}$ b) $\frac{12}{60}$ c) $\frac{24}{90}$ d) $\frac{80}{112}$

7. Solve:

a) $\frac{5}{8} + \frac{7}{12}$ b) $\frac{3}{5} + \frac{6}{11} + \frac{7}{12}$ c) $\frac{3}{4} - \frac{7}{15}$ d) $\frac{8}{14} + \frac{4}{20}$

e) $\frac{5}{8} + \frac{3}{4} + \frac{2}{5}$ f) $\frac{5}{7} - \frac{1}{12}$ g) $9 - \frac{3}{5}$ h) $2 + 3\frac{1}{4} + 2\frac{2}{7}$

i) $\frac{9}{6} - \frac{3}{4}$ j) $\frac{1}{2} - \frac{1}{3}$ k) $2\frac{1}{20} + 3\frac{3}{30}$ l) $\frac{3}{4} - \frac{7}{12}$

8. Rina walked $\frac{3}{7}$ km on Monday and $\frac{2}{5}$ km on Tuesday. How many kilometres did she walk in two days?

9. What should be added to $\frac{1}{4}$ to get $\frac{3}{4}$?

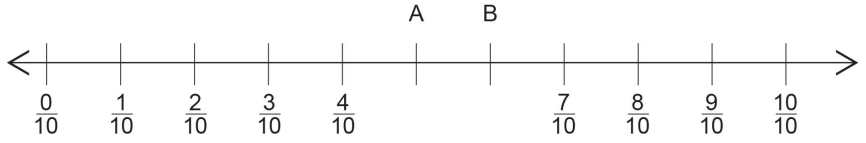
10. A number subtracted from $\frac{1}{4}$ gives $\frac{1}{6}$. What is the number?

11. Ram bought $\frac{3}{5}$ m of wire and Shyam bought $\frac{3}{4}$ m of wire. What is the total length of wire they bought?

12. Tejus had 35 sweets. He gives one-fifth of the sweets to Jeswin and two-sevenths of the sweets to Sundar. How many sweets are left with Tejus?

13. Observe the number line and answer the following.

a) A + B = ? b) 1 – B = ?



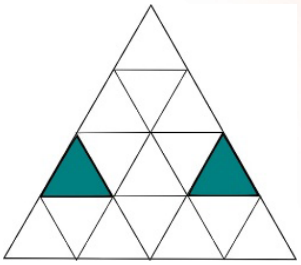
14. Compare $\frac{5}{6} - \frac{1}{2}$ and $\frac{3}{4} - \frac{2}{3}$

15. Nitu did $\frac{1}{2}$ of a work yesterday and one-third of it today. How much work will she have to do tomorrow to complete it?

16. If $\frac{1}{20} + \frac{1}{30} + \frac{1}{12} = \frac{x}{y}$, then find $x + y$ = ?

17. Kavita spends three-fifths of her income on house hold expenses one - sevenths on personal expenses and saves the rest. If her monthly income is ₹ 35000, find her monthly savings.

18. Anushka drew the following figure on a piece of paper. What fraction of the figure is unshaded?



19. Find the values of J and K from the table:

Figure	Shaded Fraction
	J
	K

Higher Order Thinking Skills

1) In an auditorium, $\frac{1}{6}$ of the students are fifth graders, $\frac{1}{3}$ are fourth graders and $\frac{1}{4}$ of the remaining students are second graders. If there are 96 students in the auditorium, how many second graders are there?

2) In a cricket match, the performance of two bowlers was as follows:

   Bowler A gave 53 runs in 9 overs.

   Bowler B gave 27 runs in 5 overs.

   Whose performance was better?

3) Write the numbers from 1 to 15. What fractions of them are

   a) Even numbers
   b) Prime numbers
   c) Odd numbers
   d) Numbers greater than 10

Logical Reasoning

1) The ice cream parlour is 2 blocks east of the gym. The dosa stall is 1 block west of the ice cream parlour. The position of the gym is _____ to the dosa stall

   a) 1 block West

   b) 1 block East

   c) 2 blocks West

   d) 2 blocks East

2) Statement 1: A plastic bottle is useless.

   Statement 2: Useless things are a waste.

   Statement 3: A plastic bottle is a waste.

   If the first two statements are true, the third statement is _____

   a) False b) Uncertain c) True

3) Swarna has an alphabet set with a board and letters to be stuck on it. The set has five pieces of each letter that is, there are five A's, five B's, five C's and so on. Swarna has made some words with these letter-pieces on her board. They are

PINEAPPLE	MANGO
ORANGE	GRAPES

   Which of the following words can Swarna make with the remaining letters?

   a) BANANA

   b) APPLE

   c) GUAVA

   d) RASPBERRY

DECIMALS

Learning outcomes

At the end of this lesson, students will be able to:

Convert fractions with 10, 100 and 1000 as denominators into decimal numbers. Place decimal numbers in the place value chart.

Write the fractional and the decimal expansion of decimal numbers.

Compare decimals, arrange them in ascending and descending order.

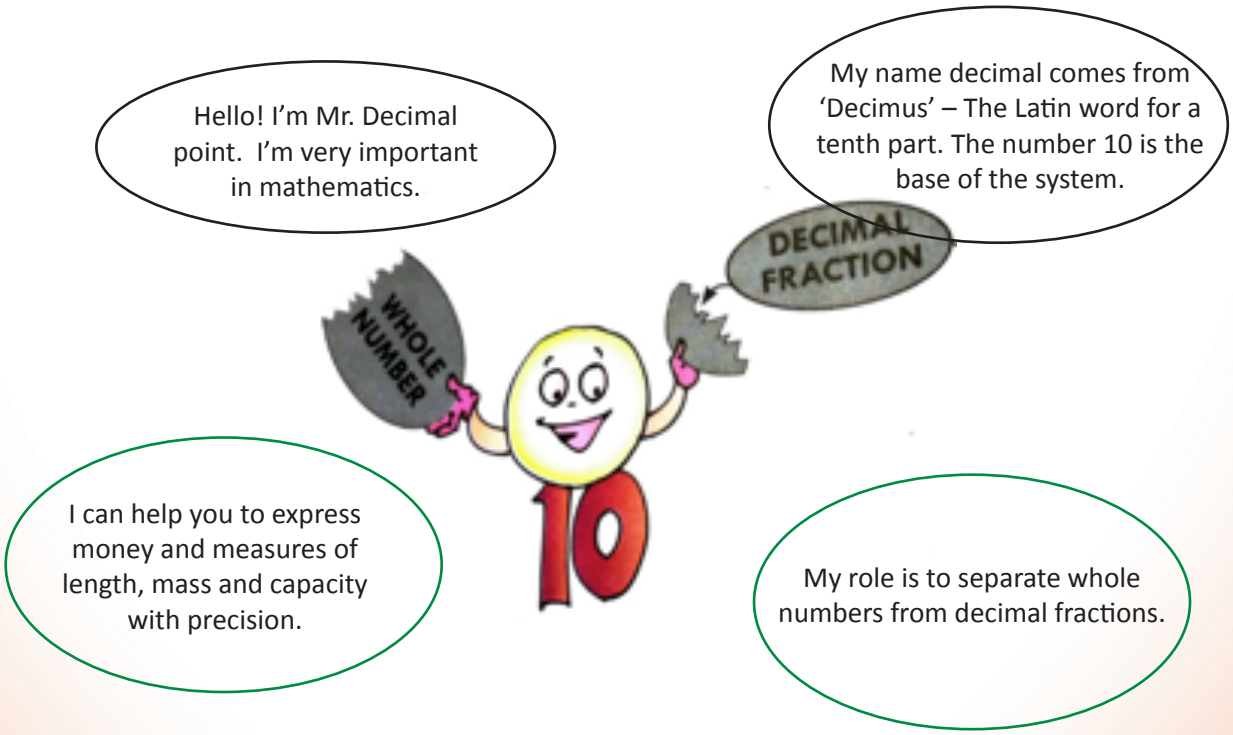
Identify equivalent, like and unlike decimals.

Add and subtract decimals.

Multiply decimals by 10, 100, 1000 and by whole numbers.

Divide decimals by 10, 100, 1000 and by whole numbers

Understanding Decimals



When we write numbers, we arrange them according to their place values. For example, when we write three thousand two hundred fifty eight we arrange it as

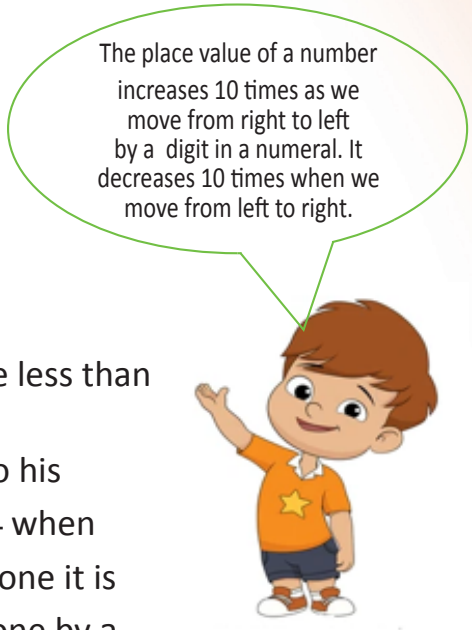
Th	H	T	O
3	2	5	8

8 is in the ones place = 8 (8 x 1)

5 is in the tens place = 50 (5 x 10)

2 is in the hundreds place = 200 (2 x 100)

3 is in the thousands place = 3000 (3 x 1000



Let us explore whether a digit could have a place value less than one?

Arun had an orange with 10 peels. He gave one peel to his friend. $\frac{1}{10}$ of the orange was given to his friend. $\frac{1}{10}$ when written as a decimal becomes 0.1. Since it is less than one it is separated from the number that is one or more than one by a point called the decimal point.

Vijay bought a bar of chocolate that had 100 equal parts. If you receive one part of it, how much would you have got?

One part of it would be $\frac{1}{100}$. In decimal, it is 0.01.

The first place after the decimal point is one - tenth ($\frac{1}{10}$).

The next place is ten times less than one - tenth which is $\frac{1}{100}$ and so on.

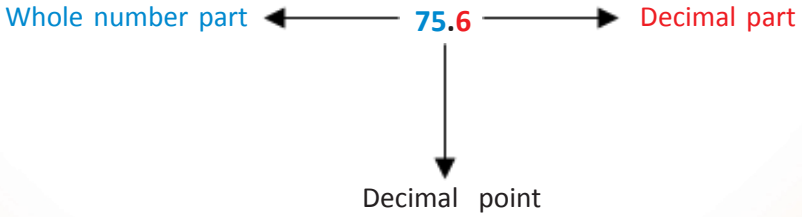
Representing decimal fractions:

Parts of a decimal number

A decimal number consists of two parts – the whole number part or an integral part and a decimal part. They are separated by a decimal point. The digits before the decimal point form the whole number part and the digits after the point form the decimal part.

The decimal part of the number, when written as a fraction always has a multiple of 10 as the denominator.

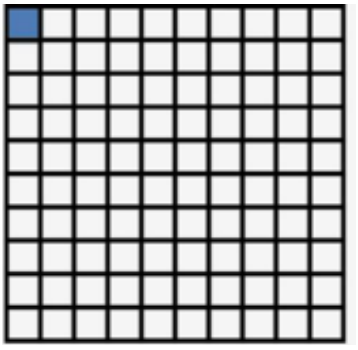
Consider the number 75.6



Tenths

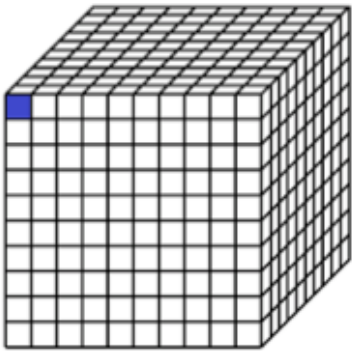
If a whole is divided into 10 equal parts, each part is one-tenth. It is written in fraction as $\frac{1}{10}$

Hundredths:



If a whole is divided into 100 equal parts, each part is one-hundredth. It is written in fraction as $\frac{1}{100}$

Thousandths:



If a whole is divided into 1000 equal parts, each part is one-thousandth. It is written in fraction as $\frac{1}{1000}$

Reading decimals

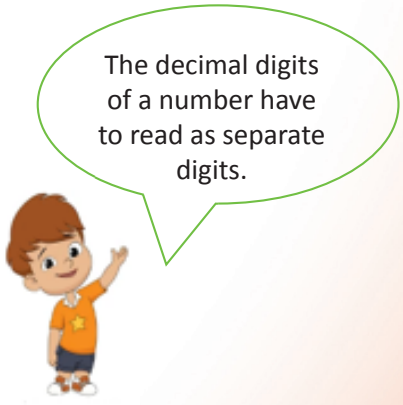
- Read the whole number part as a whole number.
- In the decimal part read each digit separately.

6 2 5 . 3 2 8

It is read as Six hundred twenty five point three two eight.

We can also read it as

Six hundred twenty five and 328 thousandths



Read the following statements

The price of petrol on a particular day in a city was ₹ 102.50

A train travels a distance of 756.92km in 5 hours.

Navin finished a 100m race in 48.356 seconds.

Our normal body temperature is 98.4° F.

- **Place-value chart:**

Let us try to place the above numbers in the place value chart

Hundreds (100)	Tens (10)	Ones (1)	Decimal point	Tenth $\frac{1}{10}$	Hundredth $\frac{1}{100}$	Thousandth $\frac{1}{1000}$	Decimal number
1	0	2	●	5	0		102.50
7	5	6	●	9	2		756.92
	4	8	●	3	5	6	48.356
	9	8	●	4			98.4

Converting fractions with denominators 10, 100, 1000 into decimals

The number of digits after the decimal point is equal to the number of zeroes in the denominator of the corresponding fraction.

Examples:

$\frac{8}{10} = 0.8$

$\frac{3}{100} = 0.03$

$\frac{5}{1000} = 0.005$

Converting decimals into fractions

Examples:

$0.4 = \frac{4}{10}$ (as 4 is in the tenth place)

$0.07 = \frac{7}{100}$ (as 7 is in the hundredth place)

$0.309 = \frac{309}{1000}$ (The number of digits after the decimal point is 3. Hence the denominator is 1000)

$1.5 = 1\frac{5}{10} = \frac{15}{10}$ (The whole number is 1, and 5 is in the tenths place. Hence it is $1\frac{5}{10}$)

Convert decimals into fractions and reduce it to the lowest term

$0.08 = \frac{8}{100} \div \frac{4}{4} = \frac{2}{25}$

Hint: 8 and 100 are divisible by 1, 2, and 4 Since 4 is the HCF, let us divide by 4.

$1.4 = \frac{14}{10} \div \frac{2}{2} = \frac{7}{5}$

Hint: 14 and 10 are divisible by 2. Since 2 is the HCF, let us divide by 2.

$0.125 = \frac{125}{1000} \div \frac{5}{5} = \frac{25}{200} \div \frac{5}{5} = \frac{5}{40} \div \frac{5}{5} = \frac{1}{8}$

(or)

$0.125 = \frac{125}{1000} \div \frac{125}{125} = \frac{1}{8}$

Hint: 125 and 1000 are divisible by 1, 5, 25 and 125. Since 125 is the HCF, let us divide by 125.

Conversion of fractions into decimals

Fractions can be converted into equivalent fractions with denominator 10, 100 or 1000.

Example 1: $\frac{1}{2} = \frac{1 \times 5}{2 \times 5} = \frac{5}{10} = 0.5$

(To make the denominator 10,we multiply by 5)

Example 2: $\frac{19}{25} = \frac{19 \times 4}{25 \times 4} = \frac{76}{100} = 0.76$

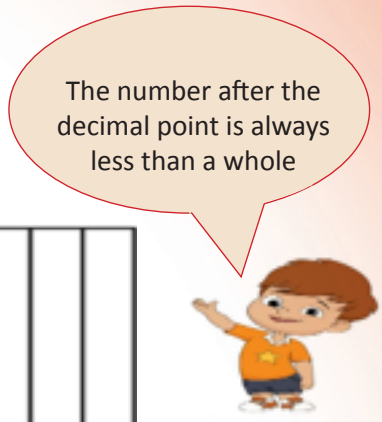
(To make the denominator 100, we multiply by 4)

Example 3: $\frac{5}{8} = \frac{5 \times 125}{8 \times 125} = \frac{625}{1000} = 0.625$

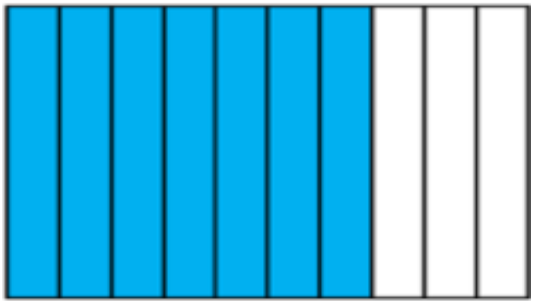
(To make the denominator 1000, we multiply by 125)

Note: Any whole number can be written as a decimal number. Example: 14 = 14.0

Combining Whole Number and Decimal Numbers



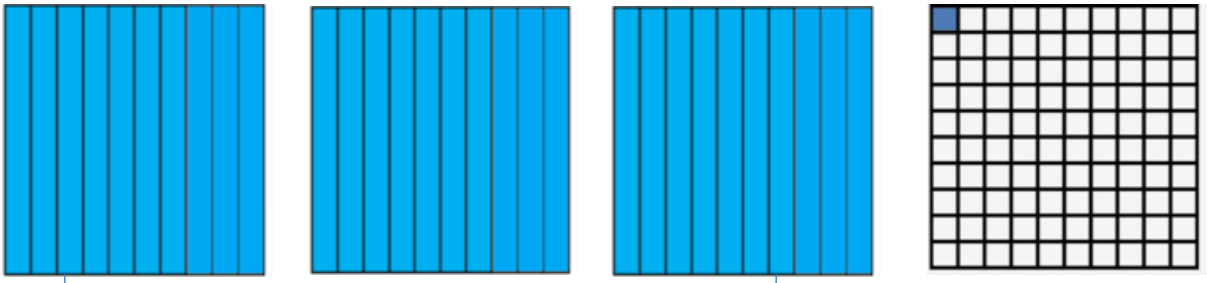
Example 1



$\frac{10}{10} = 1$ $\frac{7}{10}$

$1\ \frac{7}{10}$ is written as 1.7 and it is read as 'one point seven'

Example 2



$3 + \frac{1}{100} = 3\ \frac{1}{100} = 3.01$

3.01 is read as 'Three point zero one'

Place value of the digits in a decimal number

753.128

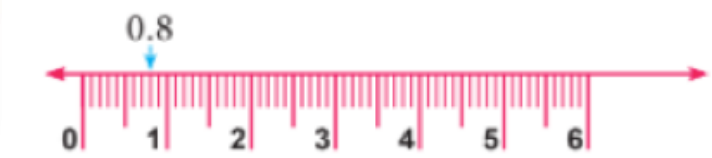
Place value of whole number	Place value of the decimal
Place value of 7 = 7 x 100 = 700	Place value of 1 = $1 \times \frac{1}{10} = \frac{1}{10} = 0.1$
Place value of 5 = 5 x 10 = 50	Place value of 2 = $2 \times \frac{1}{100} = \frac{2}{100} = 0.02$
Place value of 3 = 3 x 1 = 3	Place value of 8 = $8 \times \frac{1}{1000} = \frac{8}{1000} = 0.008$

Representing Decimal numbers on the Number Line:

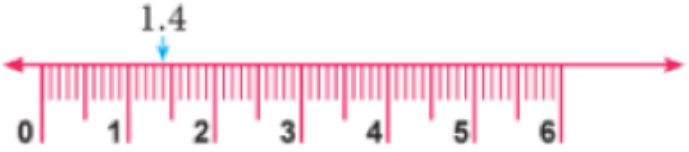
Example

Consider the number 0.8. Draw a number line and divide the intervals between any two whole numbers into ten equal parts. We know that 0.8 is more than 0 and less than 1. Take 8 parts as shown below.

Now 0.8 lies between 0 and 1.



Can we represent 1.4 on the number line? Let us see now. 1.4 has one as the whole and four tenths in it. So it lies between 1 and 2. It is marked on the number line as shown below.



EXERCISE 7.1

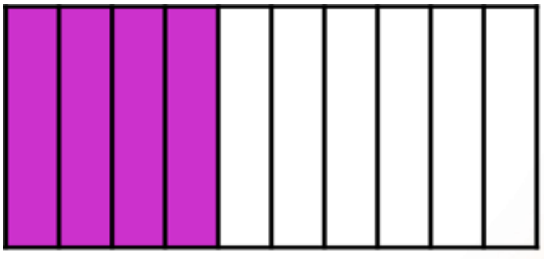
1. Mark the following on the number line.
   a. 0.4 b. 1.8 c. 2.5 d. 0.9 e. 3.0 f. 0.6
2. Identify any two decimal numbers between 3 and 4.
3. Write any number which is greater than 1 and less than 2.

EXERCISE 7.2

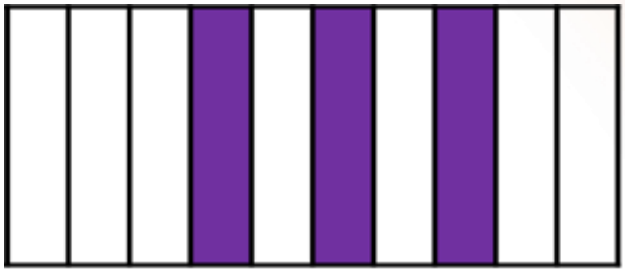
1. Write the fraction and decimal of the coloured part.

a.

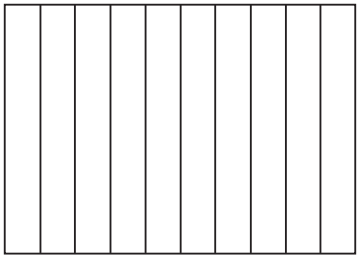
b.



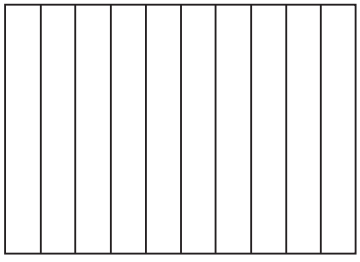
c. 

d. 

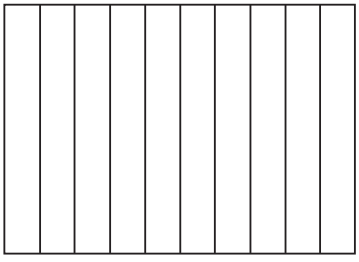
2. Colour to show the given decimals.

a. 

0.9

b. 

$\frac{5}{10}$

c. 

0.2

3. Write the place of the coloured digit

a) 5.62 b) 99.023 c) 1001.101 d) 37.445 e) 0.009

f) 16.4 g) 253.238 h) 7.777 i) 88.005 j) 364.58

4. Write the place value of the coloured digit

a) 4.2 b) 19.57 c) 246.403 d) 0.004 e) 8.851

f) 217.92 g) 97.203 h) 292.84 i) 98.517 j) 6318.6

5. Complete the table:

Number	Thousands	Hundreds	Tens	Ones	Decimal Point	Tenth	Hundredth	Thousandth
12.43								
516.14								
8089.413								
1.118								
34.070								

6. Express as decimals:

a. $\frac{14}{10}$ b. $\frac{3}{10}$ c. $\frac{58}{1000}$ d. $\frac{6}{10}$ e. $\frac{23}{100}$

f. $\frac{89}{1000}$ g. $\frac{305}{100}$ h. $\frac{4}{1000}$ i. $\frac{38675}{100}$ j. $\frac{1004}{10}$

7. Express as fractions

a) 0.3 b) 5.8 c) 6.7 d) 0.4 e) 1.6

f) 0.07 g) 17.06 h) 7.325 i) 0.19 j) 3.78

k) 0.001 l) 3.142 m) 3.46 n) 928.51 o) 111.1

8. Convert the given fractions into decimals.

a. $3\frac{3}{100}$ b. $7\frac{24}{100}$ c. $1\frac{13}{10}$ d. $4\frac{29}{1000}$ e. $\frac{3187}{100}$

f. $2\frac{4}{10}$ g. $\frac{679}{100}$ h. $8\frac{14}{100}$ i. $19\frac{5}{1000}$ j. $25\frac{8}{100}$

9. Convert the decimals into fractions and reduce it to its lowest term.

a. 0.88 b. 2.6 c. 0.450 d. 0.12 e. 0.036

10. Convert the given fraction into decimal.

a. $\frac{2}{20}$ b. $\frac{17}{50}$ c. $\frac{63}{125}$ d. $\frac{12}{25}$ e. $\frac{29}{40}$ f. $\frac{5}{8}$

Expanded Form of Decimals

The place value chart of the decimal 456.398 is

Hundreds	Tens	Ones	Decimal point	Tenths	Hundredths	Thousandths
4	5	6	.	3	9	8

The expanded form of the number can be written as

$456.398 = 400 + 50 + 6 + \frac{3}{10} + \frac{9}{100} + \frac{8}{1000}$ (fractional expansion)

$= 400 + 50 + 6 + 0.3 + 0.09 + 0.008$ (decimal expansion)

EXERCISE 7.3

1. Write the fractional and decimal expansion for the following:

a) 0.28 b) 9.24 c) $3\frac{2}{10}$ d) $75\frac{18}{100}$ e) $150\frac{150}{1000}$

f) 225.608 g) $47\frac{7}{100}$ h) $\frac{9}{1000}$ i) 99.009 j) $321\frac{15}{1000}$

2. Write as decimals:

a) $30 + 9 + \frac{7}{10} + \frac{1}{100} + \frac{2}{1000}$

b) $200 + 8 + 0.6 + 0.004$

c) $5000 + 1 + \frac{9}{100} + \frac{6}{1000}$

d) $\frac{3}{10} + \frac{5}{100} + \frac{8}{1000}$

e) $6 + \frac{4}{1000}$

f) $11 + 0.01 + 0.1$

g) $70 + 4 + \frac{3}{1000}$

h) $\frac{11}{1000} + 5$

i) $90 + 2 + \frac{7}{1000} + \frac{1}{100}$

j) $400 + 0.8 + 6 + 0.003 + 0.02$

Like and Unlike Decimals:

Decimals with the same number of decimal places are called **like decimals.**

Example: 0.9 , 1.1, 896.7 and 25.6 have the same number of decimal places. So they are like decimals.

Decimals with different number of decimal places are called **unlike decimals.**

Example: 6.53 , 34.8 and 607.957 have different decimal places. So they are called unlike decimals.

Equivalent Decimals

Different decimals having the same value are called equivalent decimals.

To find equivalent decimals, we add one or more zeroes to the extreme right of the decimal part.

$\frac{5}{10} = 0.5$

$\frac{50}{100} = 0.50$

You can see from the figure that 0.5 = 0.50

Decimals that have the same value are called equivalent decimals.

Similarly 0.5 = 0.50 = 0.500

Thus the annexed zeroes in a decimal do not change its value. Adding or removing zeroes at the end does not change the value of the decimal.

Example: 24.75, 24.750 and 24.7500 are equivalent decimals.

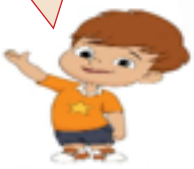
Converting unlike decimals to like decimals:

6.5 and 0.26 are unlike decimals.

You know that 6.5 = 6.50

Now both 6.50 and 0.26 have two decimal places.

They are like decimals.



EXERCISE 7.4

1. Write true or false:

   a) 5.600 = 5.6 b) 2.006 = 2.6 c) 0.001 = 0.1 d) 39.005 = 39.5

   e) 0.100 = 0.1 f) 10.000 = 10 g) 7.8 = 7.080 h) 4.4 = 0.44

2. Fill in the blanks with equivalent decimals:

   a) 0.7 = 0.70 = _____. b) 8.5 = ____ = 8.500 c) ____ = 0.90 = 0.900

   d) 17.8 = _____ = _____ e) 226.2 = _____ f) ____ = 1.1 = 1.10

   g) _____ = _____ = 4.75 h) _____ = 3.08 = ___ i) _____ = 4.0 = 4.00

3. Convert the following sets into like decimals:

   a) 56.3, 7.17 b) 0.402, 31.22 c) 36.17, 361.9

   d) 7.2, 13.14, 23.246 e) 3.8, 3.08, 3.008 f) 36.36, 431.431, 8.8

Ordering of Decimals

You can use your knowledge of comparing fractions to make rules for comparing decimals.

$3\frac{1}{10} > 2\frac{1}{10} > 1\frac{1}{10}$	3.1 > 2.1 > 1.1	The number with the bigger whole number is greater.
$\frac{3}{10} > \frac{2}{10} > \frac{1}{10}$	0.3 > 0.2 > 0.1	If the whole number part is the same, the decimal with the bigger digit in the tenth place is bigger.

Therefore, to compare decimals:

1. Convert the decimals into like decimals.
2. First compare the whole number part.
3. If they are the same, compare the tenth digit. If they are also the same compare the hundredth digit and so on.

Example 1: Insert the correct sign (>, < or =)

a) 0.44 ___ 0.3

(Hint :They are unlike decimals, so convert into like decimals and then compare.)

0.44 > 0.30

b) 1.8 ___ 10.82

(Hint :Since the whole numbers are different, compare and insert the sign.)

1.8 < 10.82

Example 2: Vinay and Reema went to the market to buy fruits.

Vinay bought 3.7 kg of pomegranate while Reema bought 3.25 kg of apples.

Whose fruits weighed more?

To compare 3.7 and 3.25, we need to convert them to like decimals first.

Unlike decimal: 3.7 , 3.25

Like decimal: 3.70 , 3.25

So, 3.70 > 3.25

Vinay's fruits weighed more than Reema's.

Example 3: Arrange in ascending order 0.7, 0.702, 0.25, 0.53

They are unlike decimals, so convert into like decimals and then compare.

0.700, 0.702, 0.250, 0.530

Ascending order is 0.250 < 0.530 < 0.700 < 0.702

Example 4: Arrange in descending order 7.80, 18.10, 8.18, 1.08

Since the whole numbers are different, compare them and arrange in descending order.

Descending order is 18.10 > 8.18 > 7.80 > 1.08

EXERCISE 7.5

1. Fill in with < , > or = sign:

   a) 0.2 _____ 0.9 b) 5 _____ 5.5 c) 0.18 _____ 1.8

   d) 21.06 _____ 21.6 e) 1.1 _____ 1.100 f) 7.4 ____ 7.04

2. Arrange in ascending order:

   a. 1.5, 0.93, 1.93, 0.53

   b. 2.67, 2.76, 2.66, 2.06

   c. 16.09, 16.69, 16.9, 16.090

   d. 30.33, 30.033, 30.3, 30.333

3. Arrange in descending order:

   a. 0.555, 0.55 , 0.5 , 0.055

   b. 1, 1.1 , 1.9 , 0.99

   c. 17.09 , 1.709 , 17 , 17.009

   d. 10.24 , 1.024 , 10.204 10

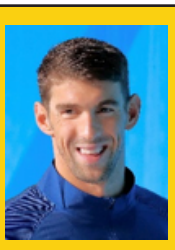
4. Which is greater 0.1 or 0.100?

5. Raju weighs 50.5 kg and Rajan weighs 50.05 kg. Who weighs more?

6. During a medical inspection, the heights of four children were recorded. Arrange the children in ascending order of their heights.

   Narmada: 125 cm, Naveen: 125.4 cm, Vidya: 124.5 cm, Varun: 125.7 cm

DO YOU KNOW



Michael Fred Phelps II was an American competitive swimmer. He was the most successful and the most decorated Olympian of all time with 28 medals. Phelps also holds the all-time record for Olympic gold medals with 23 in his account.

In the 2001 U.S. spring nationals, he became the youngest world-record holder when he posted 1 min 54.92 sec in the 200-metre butterfly race. He accomplished this when he was just 15 years old.

Event	Time	Pool Length	Age	Competition	Date
Men 400 Freestyle	03:59.16	25m	15	FINA Swimming World Cup 2000-2001	28/01/2001
Men 800 Freestyle	08:06.70	25m	15	FINA Swimming World Cup 2000-2001	28/01/2001
Men 1500 Freestyle	15:29.40	25m	15	FINA Swimming World Cup 2000-2001	28/01/2001

Addition and subtraction of decimals

Addition and subtraction of decimals is just like addition and subtraction of whole numbers. But be careful while writing the numbers.

1. First change the decimals into like decimals.
2. Write them such that the **decimals points are placed one below the other.**
3. Begin adding from the extreme right of the decimal number.
4. Regroup while adding the same way as in whole numbers.
5. In the sum/difference place the decimal point immediately after you complete the operation for decimals.

Example 1: Add 43.08, 5.932 and 187.6

Convert the decimals into like decimals with 3 decimal places and then add.

Change to like decimal by writing zeroes on the right to convert unlike decimals to like decimals and then add/subtract. Look at the largest number of digits in the decimal to do it.

43.08 → 4 3.0 8 0

5.932 → 5.9 3 2

187.6 → + 1 8 7.6 0 0

2 3 6. 6 1 2 Answer: 236.612

Example 2: Subtract 38.136 from 66.32.

Convert 38.136 and 66.32 to like decimals with three decimal places and then subtract.

66.32 → 6 6 . 3 2 0

38.136 → - 3 8 . 1 3 6

2 8 . 1 8 4 Answer : 28.184

Common mistakes!

Look at the addition 34 + 5.67 done by three students. Put a tick on the right answer. Can you point out the mistake in the wrong answer?

1)	3.4	2)	34	3)	34.00
+	5.67	+	5.67	+	5.67
	9.07		3967		39.67

DO YOU KNOW

Bhaskara II (AD 1114 – 1185) or Bhaskaracharya was a great Indian Mathematician. He was born in Bijapur, Karnataka. He was the first to explain the complete and systematic use of the decimal number system.

EXERCISE 7.6

1. Add:

a) 3.5 and 5.6	b) 6.66 and 5.34	c) 17.46 and 19.59
d) 0.345 and 0.794	e) 18.456 and 28.389	f) 9.999 and 1.111
g) 7.505 , 6.505 and 7.404	h) 5.634, 6.88 and 23.9	i) 10 , 1.01 and 10.001

2. Subtract:

a) 39.5 and 32.6	b) 1 and 0.098	c) 5.8 and 4.3
d) 20 and 19.937	e) 0.03 and 0.002	f) 15.3 and 9.872
g) 42 and 39.09	h) 0.32 and 0.135	i) 5 and 3.008

3. Applications in real life:

a) Sonu bought a T-shirt for ₹ 367.85, a pair of trousers for ₹ 789.75 and a bag for ₹ 650. How much did he spend in all?

b) By how much is 0.2 greater than 0.002?

c) The sum of two decimal numbers is 36.95. If one decimal number is 18.26, find the other number.

d) Find the sum of 8.96 and 3.854 and subtract 0.896 from the sum.

e) My school is at a distance of 9.25 km from my house. I cover a distance of 7.75 km by bus and the remaining distance on foot. How far do I cover on foot?

f) What is to be subtracted from 436 to get 328.213?

g) Ram bought a book for ₹ 36.25, a pen for ₹ 9.50 and a ruler for ₹ 5.75. How much did he spend in all?

h) A man earned ₹ 55.25 on the first day, ₹ 60.75 on the second day and ₹ 57.50 on the third day. How much money did he earn in three days?

i) A shopkeeper had 204.850 kg of rice in his shop. He sold 150.900 kg of rice. How much rice was left in the shop?

j) What is to be added to the difference of 50.91 and 10.146 to get 100?

k) A tanker of capacity 500 litres has 342.8 litres of oil. How much more oil is required to fill the tanker?

l) Mrs. Aravind bought 7.25 m of a dress material for her elder daughter and 5.75 m for her younger one. How many metres of dress material did she buy?

m) Amit went for a picnic by bus. He had to travel 25km to reach his destination. After travelling 16.750km, the bus broke down. How much more distance has he to travel to reach the destination?

n) Vijay has three iron rods of length 5.72 m, 8.9 m and 7.78 m. What is the total length of the three rods?

Life Skills

Sanjeev, a student of class 5 wrote these facts about himself. But he forgot to put the decimal point. Mark the decimal point, so that the fact makes sense.

- I am about 100 years old.
- My height is 1105 cm.
- My weight is 255 kg.
- I drink 25 litres of water every day.
- The lemonade I drank today cost ₹ 990.
- There are 300 students in my section.

Multiplying by 10

To multiply a decimal by 10, move the decimal point by one place to the right.

1.42 X 10 = 1 4 .2 = 14.2 (Or)

Multiply by 10 and place the decimal point according to the number of decimal places in the multiplicand.

1.42 x 10 = 14.20 = 14.2

Multiplying by 100

To multiply a decimal by 100, move the decimal point by two places to the right.

1.42 X 100 = 1 42.0 = 142 (Or)

Multiply by 100 and place the decimal point according to the number of decimal places in the multiplicand.

3.5 X 100 = 350.0 = 350

Multiplying by 1000

To multiply a decimal by 1000, move the decimal point by three places to the right.

0.125 X 1000 = 125 .0 = 125 (Or)

Multiply by 1000 and place the decimal point according to the number of decimal places in the multiplicand.

1.7 X 1000 = 1700.0 = 1700

EXERCISE 7.7

1. Find the product

a) 1.63 x 10 = _____ b) 7.638 x 100 = _____ c) 5.942 x 1000 = _____

d) 317.5 x 10 = _____ e) 54.75 x 100 = _____ f) 2.94 x 1000 = _____

g) 0.045 x 10 = _____ h) 0.08 x 100 = _____ i) 1.4 x 1000 = _____

2. Fill in the blanks

1. 12.1 x _____ = 121 2. 0.09 x _____= 9 3. 1.75 x _____ = 1750

4. 0.235 x ___ = 235 5. 7.95 x ____ = 795 6. 4.6 x ___ = 46

Dividing Decimals by 10, 100, 1000, ...

Dividing by 10

To divide a decimal by 10, move the decimal point by one place to the left.

64.5 ÷ 10 = 6.45 = 6.45

Dividing by 100

To divide a decimal by 100, move the decimal point by two places to the left.

64.5 ÷ 100 = 0. 64 5 = 0.645

7 ÷ 100 = 0.07 = 0.07

Dividing by 1000

To divide a decimal by 1000, move the decimal point by three places to the left.

64.5 ÷ 1000 =0. 064 5 = 0.0645

Application of decimals

Decimals are useful to express distance, length, weight and capacity accurately.

Money

₹ 1 = 100 p

Therefore, 1 p = $\frac{1}{100}$ rupee = 0.01 rupee = ₹ 0.01

5 p = 5/100 rupee = 0.05 rupee = ₹ 0.05 ; Thus, 5 rupee 25 paise is written as ₹ 5.25

Length

100 centimetres = 1 metre; Therefore, 1 cm = $\frac{1}{100}$ m = 0.01 m

Similarly, 1000 metres = 1 kilometre; 1 m = $\frac{1}{1000}$ km = 0.001 km

Weight

1000 grams = 1 kilogram; Therefore, 1 g = $\frac{1}{1000}$ kg = 0.001 kg

Capacity

1000 millilitre = 1 litre; Therefore, 1 mL = $\frac{1}{1000}$ L = 0.001 L

EXERCISE 7.8

1) Dividing by 10, 100, 1000

a) 2.4 ÷ 10 = _____ b) 11.11 ÷ 100 = _____ c) 5942 ÷ 1000 = _____

d) 89.5 ÷ 10 = _____ e) 83.2 ÷ 100 = _____ f) 294 ÷ 1000 = _____

g) 0.66 ÷ 10 = _____ h) 0.007 ÷ 100 = _____ i) 33.3 ÷ 1000 = _____

Multiplication of Decimals by whole numbers

Anurag needs to buy 3 pencils for his exam. If each pencil costs ₹ 5.25, how much will he have to pay?

5.25 + 5.25 + 5.25 = 15.75

That is 3 x 5.25 = 15.75

Let's see some more examples

0.2 + 0.2 + 0.2 + 0.2 = 4 x 0.2 = 0.8

0.8 + 0.8 + 0.8 + 0.8 = 4 x 0.8 = 3.2

We can see that

- When a decimal number is multiplied by a whole number, the number of decimal places in the product equals the sum of the number of decimal places in the multiplier and multiplicand
- While counting the digits in the product to place the decimal point, start from the extreme right.

Example: Multiply 4.38 by 39

- Multiply as with whole numbers ignoring the decimal point.
- Count the number of decimal places in the factors. It is 2
- Place the decimal point such that the product has 2 decimal places

```
  4.38   (2 decimal places)
x  39
------
  3942
 13140
------
 170.82  (Place the decimal point )
```

Therefore 4.38 x 39 = 170.82

EXERCISE 7.9

1. Insert the decimal point at the correct place in the product given:

   a. 29.6 x 8 = 2368 b. 2.5 x 11 = 27.5 c. 4.81 x 6 = 2886

   d.1.01 x 9 = 909 e.5.23 x 7 = 3661 f. 52.5 x 3 = 1575

2. Multiply only the first one. Use the rules of decimals to find the product of the others in the series.

   a. 325 x 8 — 32.5 x 8 — 3.25 x 8 — 0.325 x 8

   b. 1742 x 6 — 17.42 x 6 — 1.742 x 6 — 0.1742 x 6

3. Find the product:

   a. 6.3 x 9 b. 15.4 x 8 c. 10.01 x 4

   d. 25.7 x 5 e. 56.12 x 32 f. 8.7 x 11

   g. 3.15 x 75 h. 2.34 x 20 i. 4376.3 x 6

Division of decimals by a whole number:

Nine friends bought 4.86 kg of sweets and shared it among themselves equally.

$4.86 \div 9 = ?$

Dividing a decimal number by a whole number is just like normal division, except for placing the decimal point.

```
       0. 5  4
     9|4. 8  6
     - 0
       4  8
     - 4  5
          3  6
        - 3  6
             0
```

The divisor is a whole number. So divide directly

Insert the decimal point immediately after you complete the whole number division.

Answer: **0.54**

Each friend got 0.54 kg of sweets.

Example:

Aravind bought 16 pencils for ₹ 44.80. What is the cost of one pencil?

Cost of 16 pencils = ₹ 44.80

Cost of 1 pencil =₹ 44.80 ÷ 16

```
          2. 8 0
    16 | 4 4. 8 0
    -    3 2
         1 2 8
    -    1 2 8
             0 0
              -0
               0
```

(Place the decimal point in the quotient before you start dividing the decimal part)

Proceed with the steps of division ignoring the decimal point.

Cost of 1 pencil = ₹ 2.80

Remainders while dividing decimals:

Let's look at 497.4 ÷ 8 as an example.

Divide the same way you would divide with whole numbers

To keep going, you'll need to add a zero to the end of 497.4. Remember, you can annex zeroes to the end of a decimal.

```
    62.1
 8)497.4
  - 48
     17
   - 16
      14
     - 8
       6
```

497.4 = 497.40 = 497.400; Annex a zero and keep dividing until there is no remainder.

So, 497.4 ÷ 8 = 62.175

```
   62.175
8)497.400
 - 48
   17
 - 16
    14
  - 8
     60
   - 56
      40
    - 40
       0
```

Recurring Decimals

Recurring Decimal numbers are those numbers that keep on repeating the same value after a decimal point.

Eg. 1/3 = 0.33333.....

(3 repeats forever)

EXERCISE 7.10

1. Divide the following:

   a. 3.50 ÷ 2 b. 1.33 ÷ 7 c. 4.35 ÷ 3 d. 1.80 ÷ 5

   e. 82.17 ÷ 9 f. 27.52 ÷ 4 g. 4.8 ÷ 12 h. 18.6 ÷ 6

2. Divide until you get zero as the remainder:

   a. 32.4 ÷ 5 b. 2.1 ÷ 4 c. 9.03 ÷ 6 d. 31.3 ÷ 5

   e.7.4 ÷ 4 f. 5.2 ÷ 8 g. 9.15 ÷ 2 h. 90.44 ÷ 7

3. Applications in real life:

a) A ball costs ₹ 8.75. How much will 4 such balls cost?

b) Akash and 14 of his friends went to a Fun Park. The cost of a ticket was ₹ 25.50. How much money do they have to pay for the entry tickets?

c) Dharma had gone with 2 of his friends to meet his grandfather. His grandfather gave them ₹ 120.30 to divide between themselves equally. How much was each child's share?

d) Mrs. Vikrant runs around a park 5 times and covers a distance of 4.5 km. How much distance does she cover in one round?

e) A winning team for the march past scored 8.7, 6.2 and 9.25 points from three different judges. What was their average score?

f) A toy car costs ₹ 250.50 and a toy truck costs ₹ 325.75. Bharat bought 6 of each as prizes for his stall at the fete. How much did he spend on them?

Higher Order Thinking Skills:

I. Choose the correct answer:

1) Sixty seven and twenty three hundredths is.

a) 67.23 b) 6.723 c) 0.6723 d) 6723.0

2) $2\frac{1}{2}$ can be represented as.

a) 21 b) 2 c) 2.5 d) 0.25

3) The value of 929.5 ÷100 is _____.

a) 92.95 b) 929.5 c) 929.05 d) 9.295

4) The value of 2.1143 x 10 is _____.

a) 0.21143 b) 21.143 c) 2114.3 d) 2.11430

5) Find the missing number if 500.5 x _____ = 5005

a) 10 b) 100 c) 1000 d) 10000

6) Fill in the correct sign: 395.0 _____ 395

a) > b) < c) = d) None

7) Identify the least number.

a) 1.305 b) 1.35 c) 1.053 d) 1.53

8) In 5.809, the digit 9 is in the _____ place.

a) Ones b) tenths c) thousandths d) thousands

9) Which of the following is true?

a) 0.3 + 0.7 = 10.00 b) 0.30 + 0.70 = 1.00

c) 0.30 + 0.70 = 0.10 d) 0.3 + 0.7 = 1.10.

Subject Integration /Life Skills

1. The chart below shows the Indian rupee exchange rate of different foreign currencies on a particular day. Use the chart to answer the questions given below.

COUNTRY	CURRENCY	INDIAN RUPEES (INR)
Japan	1 Yen	₹ 0.56
U.S.A	1 Dollar	₹ 82.06
China	1 Yuan	₹ 11.43
U.K	1 Pound	₹ 92.84
France	1 Euro	₹ 81.21
Malaysia	1 Ringgit	₹ 17.51
Russia	1 Ruble	₹ 1.32

a) 100 U.S dollars = _____ rupees.

b) Convert into Indian rupee and compare. 1000 Pounds and 1000 Euros.

c) On his visit to Moscow, Ravinder bought a gift for 50 Rubles. What is its value in Indian Rupee?

d) Mr. X returns from China with 2000 Yuan and Mr. Y from Malaysia with 1000 Ringgits. Who has more money in Indian currency?

e) Amit buys a watch for 200 Yen in Japan. Convert the cost to Indian Rupee.

2. Nakul went to watch a motor sport tournament with his father. Read the information given in the table below and answer the questions that follow.

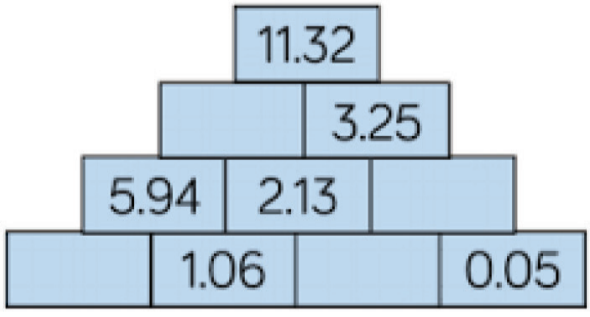
POSITION	DRIVER	TIME (IN MINUTES)
First	Kumar	53.9
Second	Ram	54.04
Third	Arjun	54.2
Fourth	Vishnu	54.27
Fifth	Venu	54.44
Sixth	Mohan	54.6
Seventh	Arun	54.86
Eighth	Kannan	55.6

1. Who was the winner and first runner up in the race?
2. How many minutes was Arjun behind the winner?
3. Which driver took exactly 0.4 minutes longer than Ram?
4. Find the difference in time taken by the third and the six driver.

Puzzle

Fill in the missing decimals

In this number pyramid, each number is calculated by adding the two numbers beneath.



Activity 1

1. A notice board in a grocery shop shows the rate of a few items. Use Bill A to find the cost of items in Bill B.

BILL A

ITEM	QUANTITY	PRICE
Toothpaste	3	₹ 154.50
Sugar	8 kg	₹ 200.00
Biscuits	5 packets	₹ 70.50
Detergent	2 kg	₹ 350.00
Soap	4	₹ 80.00
Rice	10 kg	₹ 650.00
Wheat flour	5 kg	₹ 185.50

BILL B

ITEM	QUANTITY	PRICE
Soap	2	
Rice	5 kg	
Detergent	1 kg	
Biscuits	4 packets	
Sugar	6 kg	
	Total	

Activity 2

Multiply or divide. Then cross out the answers in the boxes below. The letters that are not crossed out will give you the answer.

1.9 x 5 =	65.7 ÷ 9 =	6.5 x 83 =	1.33 ÷ 7 =
0.26 x 12 =	9.45 ÷ 9 =	1.25 x 9 =	13.76 ÷ 4 =
28.02 x 32 =	82.4 ÷ 8 =	0.305 x 6 =	93.5 ÷ 5 =
12.56 x 19 =	21.27 ÷ 3 =		

R 18.7	S 1.05	A 10.10	V 10.3	N 18.3	U 11.25	W 9.5	X 0.19
C 7.3	O 7.8	T 3.44	L 38.17	O 896.64	D 5.15	A 539.5	D 1.83
T 3.7	R 3.12	I 19.5	M 78.6	B 238.64	E 27.1	R 0.06	S 7.09

What is another name for a grandfather clock?

__ __ __ __ __ __ __ __ __

Applications in real life:

a) What will be the cost of 1 ice-cream if 9 ice creams cost ₹ 67.50?

b) Rainfall in the city on the last three days, of a month was recorded as 6.35 cm, 7.55 cm and 4.75 cm respectively. How much did it rain in the three days?

c) A cyclist covers 15.75 km in one hour. Had he cycled at the same speed, the entire one hour, what distance would he have covered in half an hour ?.

d) You get about 129 calories from 250 mL of milk. How many calories can be got from 1 L of it?

e) If a box of chocolates weighs 1.46 kg, find the weight of 5 such boxes.

f) How much diesel will be consumed by a generator in ¼ th of a day if 1.25 L is consumed in 1 hour?

g) The height of a staircase of 22 steps is 4.455 m. Find the height of each step if all the steps are of equal height.

h) Income of Ram for a week is ₹ 7225.75. What is his average daily income?

i) A measure of 43.75 m of cloth is needed to make 25 shirts of the same size. How much cloth will be needed to make (a) 1 shirt and (b) 13 shirts?

j) If 59 buckets of equal capacity can be filled with 560.5 litres of water, find the capacity of each bucket.

k) Which is lighter, and by how much 3.86 kg or 3.8 kg?

l) Which bucket has more water: Bucket A-12.82 litres or Bucket B-12.86 litres?

m) Ajith has ₹ 210.08 while Arjun has ₹ 210.80. Who has more money and by how much?

WORKSHEET A

1. Write the following fractions as decimals.

a. $\frac{4}{10}$ b. $\frac{3}{100}$ c. $\frac{16}{100}$ d. $\frac{145}{1000}$ e. $\frac{99}{1000}$

f. $\frac{38}{10}$ g. $\frac{63}{100}$ h. $\frac{47}{1000}$ i. $\frac{6}{1000}$ j. $\frac{256}{100}$

2. Write the following decimals as fractions.

a) 5.8 b) 0.9 c) 0.17 d) 0.123 e) 0.037

f) 0.004 g) 1.12 h) 0.058 i) 0.03 j) 4.82

3. From the given set, form three groups of like decimals.

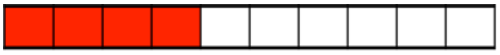
1.1, 2.54 , 1.08 , 0.879 , 2.305 , 4.6 , 3.45 , 23.4 , 0.99 , 1.95 , 0.7 , 6.566

4. Convert the given unlike decimals to like decimals.

a) 3.12, 8.1, 6.908 b) 55.9, 6.188, 4.88

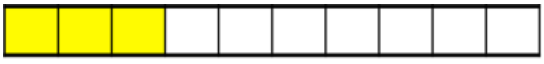
c) 224.0, 7.122, 19.3 d) 40.73, 8.8, 99.55

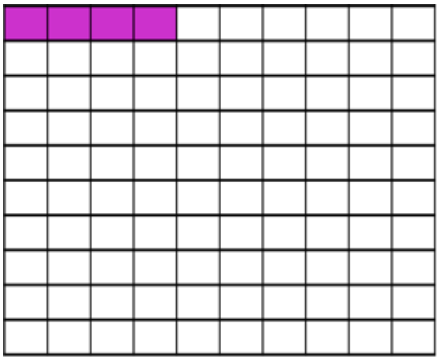
5. Write the shaded part as a fraction and as a decimal.

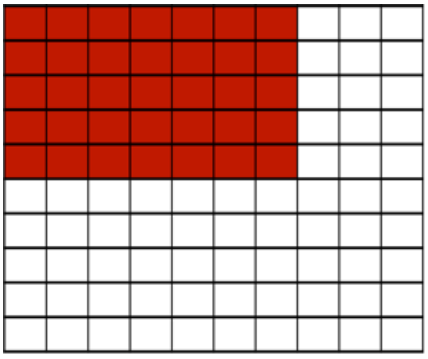
a. 

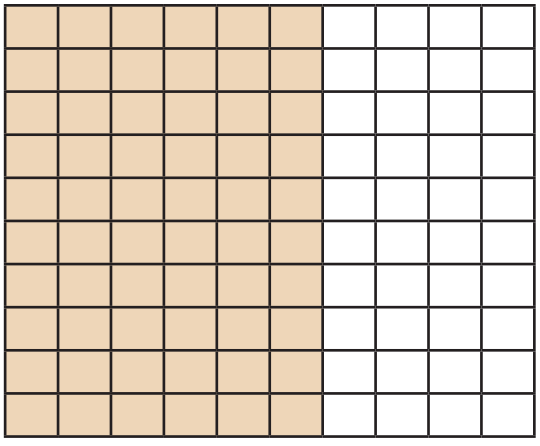
b. 

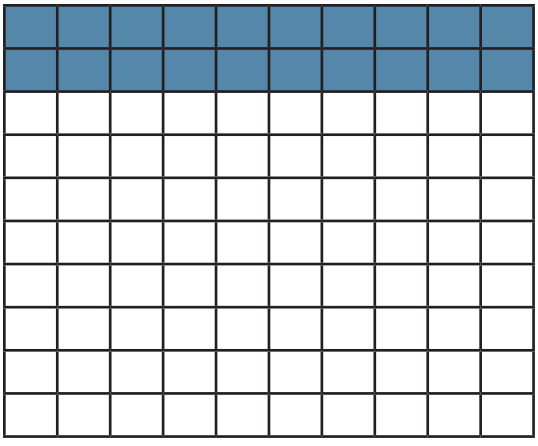
c. 

d. 

e. 

f. 

g 

h. 

6. Choose the correct answer:

a. In 7.867, the digit 6 is in the _____ place.

i) tenths ii) hundredths iii) ones iv) thousandths

b. The decimal form of $14\frac{7}{10}$ is _____.

i) 14.7 ii) 1.47 iii) 14.07 iv) 14.007

c. The value of 4.83 x 1000 = _____.

i) 4830 ii) 48.3 iii) 483 iv) 0.483

d. 2.4 ÷ 100 = _____.

i) 0.024 ii) 0.0024 iii) 0.24 iv) 240

e. 700 + 60 + 0.08 + 0.005 = _____

i) 760.085 ii) 76.850 iii) 7.6850 iv) 7685

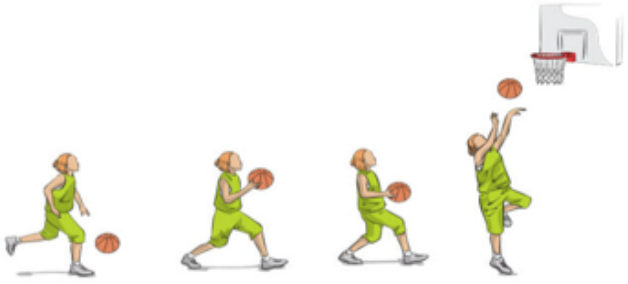
f. Fill in the box: ₹ 0.6 ☐ ₹ 0.006 is

i) > ii) < iii) =

g. 400 + 20 + 5 + 3/10 + 7/1000 is _____.

i) 425.307 ii) 4205.37 iii) 425.037 iv) 42537

SUBJECT INTEGRATION



Basketball is a team sport. Players advance the ball by bouncing it while walking or running to shoot a ball through a hoop elevated ten feet above the ground. It is usually played between 2 teams of 5 players each.

Basketball courts are of different sizes based on different levels. In the National basketball, the court is 94 by 50 feet (28.7 by 15.2 m). The baskets are always 3.05 m (10 feet) above the floor.

As for the basketball stadiums of India two of them must have a mention. Thyagaraja Stadium – Delhi named after the famous 19th century South Indian Poet - composer, happens to be North India's premier basketball stadium.

Sri Kanteerava Indoor stadium, Bengaluru known for its conic dome, has hosted several International tournaments, to mention one the FIBA world cup.

1. Write three equivalent decimals for the height of the hoop from the floor in metres.
2. Express the dimensions of the basketball court as fractions. Use the measurement given in m.
3. Find the area of the basketball court in feet.

WORKSHEET B

1. Form the greatest number less than 1 using digits 5, 8 and 9 only once.
2. 0.723 × 1000 = _____
3. Complete the given series:

   (i) 2.7, 3.2, 3.7, 4.2, _____, _____

   (ii) 5.73, 6.74, 7.75, _____, _____

   (iii) 89.051, 189.061, 289.071, _____, _____

4. Find the number:
   (i) 6 tenths more than 7.245
   (ii) 6 thousandths added to 18.023
   (iii) 8 tenths and 4 hundredths less than 7
   (iv) 1 tenths and 5 thousandths more than 9

5. Choose the right answer and fill in the blanks.

(a) 478.65 ÷ _____ = 47.865
(i) 10 (ii) 100 (iii) 1000 (iv) 1

(b) 137.85 × 10 = _____
(i) 13785 (ii) 13.785 (iii) 1378.5 (iv) 137.850

(c) 27.8 ÷ 100
(i) 2.78 (ii) 0.278 (iii) 278.0 (iv) 27.08

(d) 500.669 × 100
(i) 5.00669 (ii) 50.0669 (iii) 500.669 (iv) 50066.9

(e) 36.8 more than 145.67 is:
(i) 18.247 (ii) 171.4 (iii) 181.75 (iv) 182.47

(6) Solve: (i) 308.44 × 1000 (ii) 83.47 ÷ 5

(7) Write in fractions and expand:
(i) 239.4 (ii) 16.098 (iii) 702.65
(iv) 8.006 (v) 7000.848 (vi) 111.011

(8) Write in decimals and expand:

(i) $10 + 8 + \frac{4}{10} + \frac{7}{1000}$

(ii) $2000 + 200 + 0 + 2 + \frac{2}{10} + \frac{2}{100} + \frac{2}{1000}$

(iii) $500 + 70 + 1 + \frac{3}{100} + \frac{9}{1000}$

(iv) $80 + \frac{5}{10} + \frac{4}{1000}$

8. Compare and fill in with >, < or =:

(i) 13.6 _____ 1.36 (ii) 65.010 _____ 65.110

(iii) 209.008 _____ 210.007 (iv) 47.981 _____ 29.999

9. Fill in the blanks:

(i) 0.010 = _____ thousandths

(ii) 0.84 = _____ hundredths

(iii) 58 hundredths = _____ tenths + _____ hundredths

(iv) 27 tenths = 2 _____ + 7 _____

(v) Six and six thousandths = _____.

10. Write the place values of 8 in each decimal:

(i) 18.06 (ii) 71.081 (iii) 9.008

11. Arrange in ascending order:

(i) 2.01/ 2.001/ 2.003/ 2.0004 (ii) 345.05/ 34.08/ 345.009/ 123.123

12. Choose the unlike decimal fractions from the following pair:

(i) 12.6, 7.5 (ii) 4.67, 0.79 (iii) 67.123, 923.0123

13. Convert each of the following pairs or groups of unlike decimals into pairs or groups of like decimals:

(i) 8.52, 10.4 (ii) 7.8, 9.72 (iii) 16.1, 213.025

(iv) 3.8, 8.79, 8.039 (v) 201.007, 19.01

WORKSHEET C

1. Find the sum:

(i) ₹ 3.45 + ₹ 15.50 + ₹ 3.05

(ii) 7.25 m + 2.45 m + 12.75 m

(iii) 90.250 kg + 186.250 kg + 1001.750 kg + 98 kg

(iv) 35.280 L + 42.500 L + 8.700 L + 15 L

2. Add

(i) 66.01 and 33.09 (ii) 64.06 and 0.684

(iii) 0.818 and 8 (iv) 100.99, 1.25 and 23.56

(v) 317.99, 63.01 and 29 (vi) 0.06, 0.006 and 6

3. Subtract the following:

(i) 4.591 and 0.959 (ii) 100 and 51.91 (iii) 120 and 94.91

(iv) 12.376 from 13.88 (v) 12.09 from 15.889 (vi) 39.88 from 50

4. Solve

(i) 36.83 more than 16.1
(ii) Increase 7.86 by 1.209
(iii) 52.88 more than 14.76
(iv) Add 45 to 0.007
(v) 18.75 less than 24.08
(vi) 74.66 less than 105.752
(vii) Reduce 16.66 from 37.87
(viii) Take away 45.07 from 63.9

5. Fill in the blanks:

(i) 26.82 × 0 = _____
ii) 3.006 × 1 = _____
(iii) 44.05 × 10 = _____
(iv) 86.247 × 100 = _____
(v) 86.6 × _____ = 866
(vi) 98.23 × _____ = 982.3
(viii) 4.812 × _____ = 4.812
(viii) 61.18 × _____ = 0
(ix) _____ × 4.985 = 4.985
(x) _____ × 61.6 = 0

6. Find the product:

(i) 0.2 × 4
(ii) 4.32 × 51
(iii) 2.007 × 36
(iv) 19.35 × 10000
(v) 89.015 × 10
(vi) 4.34 × 100
(vii) 3.125 × 86
(viii) 8.7 × 100

7. Fill in the blanks:

(i) 13.1 ÷ _____ = 13.1
(ii) 5.01 ÷ 1 = _____
(iii) 7.9 ÷ 7.9 =_____
(iv) 18.65 ÷ _____ = 1
(v) _____ ÷ 8.6 = 0
(vi) 0 ÷ 17.3 = ____

8. Divide:

(i) 3.12 by 8
(ii) 12.675 by 3
(iii) 120.12 by 26
(iv) 8.016 by 24
(v) 1.335 by 15
(vi) 54.6 by 84

Logical Reasoning

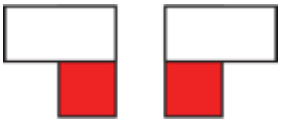
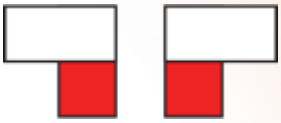
1. Read the given information carefully and answer the following question.

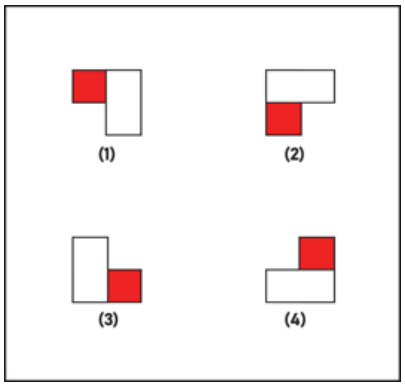
- Karan and Karthik like Maths but do not like Science.
- Karthik and Shiksha do not like Hindi but like English.
- Shiksha and Sonal like Maths and Science.
- Karan likes only one subject.
- Sonal does not like only English.

Which of the following subjects is liked by all the four students?

a) Maths
b) English
c) Hindi
d) Science

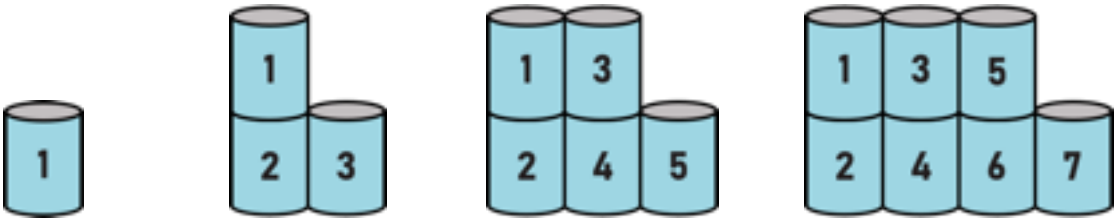
2. Select the shape that completes the pattern.

a)  b)  c)  ? d) 



a) Fig. 1
b) Fig. 2
c) Fig. 3
d) Fig. 4

3. The following sequence of patterns is formed with cans of drink.



Roy has 50 cans of a drink. He places the cans according to the above given sequence. What is the maximum number of cans that can be placed in the above sequence?

a) 1 b) 50 c) 49 d) 6

4. Prince has 3 strings. String P is twice as long as string Q. String R is 4/5 as long as string P. If string Q is 14.25 cm, then what is the total length of all the strings Prince has?

a) 64.50 cm b) 69.15 cm
c) 72.55 cm d) 65.55 cm

5. Karthik went to the amusement park with his wife and two children aged 5 years and 7 years. They entered at 10:30 a.m. and left at 1:30 p.m. How much did Karthik pay?

Entry fee per person	₹ 200
Charges for every half an hour or part thereof for each adult	₹ 90.25
Charges for every half an hour or part thereof for each child	₹ 45.25

a) ₹ 2256 b) ₹ 1884
c) ₹ 3154 d) ₹ 2426

TIME

Learning outcomes

At the end of this lesson, children will be able to:

Convert units of time (seconds, minutes and hours)

Convert 12-hour clock time into 24-hour clock time and vice versa

Add and Subtract time (years, months, weeks, days, hours, minutes & seconds)

Calculate time duration, finishing time & starting time.

Apply the skills to solve real life problems

Recapitulate

Time in real life:

Gone are the days of bullock cart when it was days on end to travel from one place to another. We are living in the age of science, where the marvels of science have made it possible to travel across the globe within a short span of time. Communication of information has become instantaneous, with the invention of various electronic devices.

Time is a resource that needs to be utilized effectively.

1. Write a.m. or p.m.
   a. I go for a walk at 6:00 _____ in the morning
   b. I go to bed at 10:00 _____
   c. My school ends at 2:00 _____
   d. My math class starts at 11:00 _____

2. Write the time according to 12-hour clock.
   a. Rajdhani express reaches the destination at 17:55 hours _____
   b. Shatabdi express starts at 06:00 hours _____
   c. Humsafar Express will reach the next station at 12:00 hours _____

3. Ritika's school begins at 8:30 a.m. and closes at 2:30 p.m. How long does the school function everyday?

DO YOU KNOW

There are 31556952 seconds in a year.

Apollo 11 took 3 days, 3 hours and 49 minutes to reach the moon.

Try these

1. Write the exact time as shown on the clocks in three different ways:

a)

_____

_____

_____

b)

_____

_____

_____

c)

_____

_____

_____

2. Answer the following questions:

a) Manisha boards a train at 6:30 am from Chennai and reaches Coimbatore at 2:30 pm. How long was the train journey?

b) A party was to start at 6:30 pm. Since all the guests were late, the party started 2 hours late. At what time did the party start?

c) A train left Delhi at 22:40 hours and reached Nagpur after 8 hours. At what time did it reached Nagpur?

d) An interview for civil services started at 9:15 am and ended at 3:15 pm. How long was the interview?

Conversion of time:

Remember:

1 minute = 60 seconds
1 hour = 60 minutes
1 day = 24 hours
1 week = 7 days
1 fortnight = 14 days (2 weeks)
1 year = 12 months
1 year = 365 days
1 leap year = 366 days
10 years = 1 decade
100 years = 1 century
1000 years = 1 milliennium

Bigger to smaller unit

1 hour = 60 minutes

To convert from hours to minutes, multiply by 60.

1 minute = 60 seconds

To convert from minutes to seconds, multiply by 60.

Examples:

a) Convert 4 hours into minutes:

1 hour = 60 minutes
4 hours = 4 x 60 minutes
= 240 minutes

b) Convert 10 minutes to seconds:

1 minute = 60 seconds
10 minutes = 10 x 60 seconds
= 600 seconds

c) Convert $7\frac{1}{4}$ hours to minutes

$7\frac{1}{4}$ hours = 7 hours + $\frac{1}{4}$ hours
= 7 hours + 15 minutes
= 7 x 60 minutes + 15 minutes
= 420 minutes + 15 minutes
= 435 minutes

d) Convert $5\frac{1}{2}$ minutes to seconds:

$5\frac{1}{2}$ minutes = 5 minutes + $\frac{1}{2}$ minute

= 5 minutes + 30 seconds

= 5 x 60 seconds + 30 seconds

= 300 seconds + 30 seconds

= 330 seconds

e) Convert 9 minutes 25 seconds to seconds

= 9 x 60 seconds + 25 seconds

= 540 seconds + 25 seconds

= 565 seconds

Think and Answer:

Calculate your age in hours.

Smaller to bigger unit

60 minutes = 1 hour

To convert from minutes to hours, divide by 60.

60 seconds = 1 minute

To convert from seconds to minutes, divide by 60.

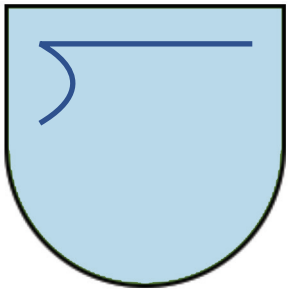
Examples:

a) Convert 240 minutes into hours:

60 minutes = 1 hour

240 minutes = 240 ÷ 60 hours

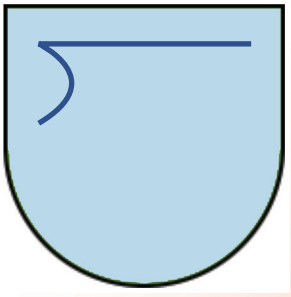
= _____ hours



b) Convert 650 minutes to hours:

650 minutes = 650 ÷ 60 hours

= _____ hours _____ minutes

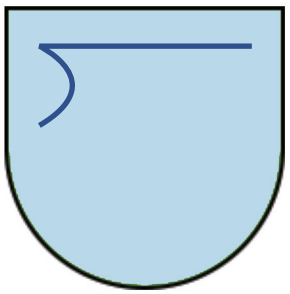


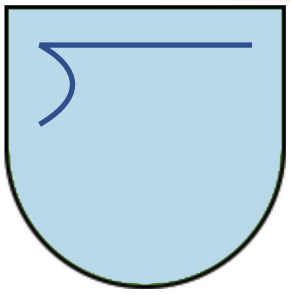
c) Convert 360 seconds into minutes

60 seconds = 1 minute

360 seconds = 360 ÷ 60 minutes

= _____ minutes





d) Convert 700 seconds to minutes:

700 seconds = 700 ÷ 60 minutes

= _____ minutes _____ seconds

EXERCISE 8.1

1. Convert into minutes:
   a) 14 hours
   b) 9 hours 2 minutes
   c) 6 hours 10 minutes
   d) 13 hours 45 minutes

2. Convert into hours and minutes:
   a) 500 minutes
   b) 2000 minutes
   c) 750 minutes
   d) 905 minutes

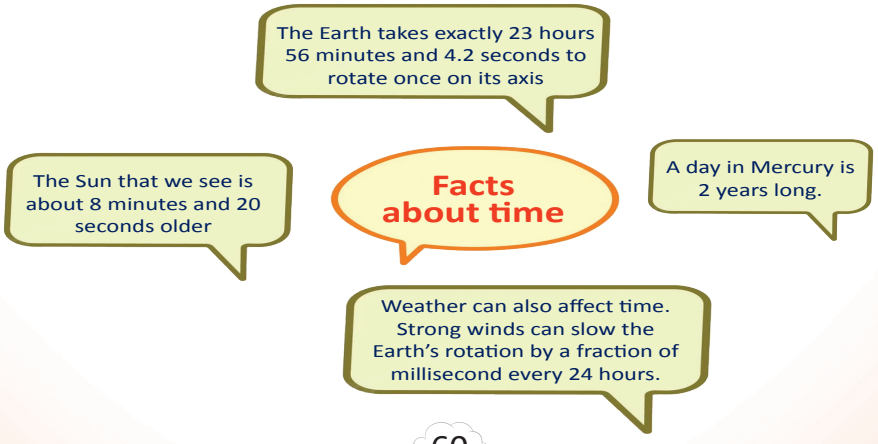
3. Convert into seconds:
   a) 8 minutes
   b) 14 minutes 15 seconds
   c) 7 minutes 35 seconds
   d) 20 minutes 32 seconds

4. Convert into minutes and seconds:
   a) 870 seconds
   b) 1040 seconds
   c) 965 seconds
   d) 1290 seconds

5. Manoj spends 420 minutes every week walking. How many hours does he walk every week?

6. A train stops at a station for 240 seconds. For how many minutes does it stop?

7. A television programme had 11 minutes of advertisements in it. How many seconds were the advertisements for?



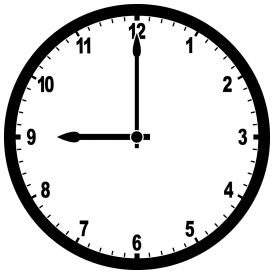
12-hour clock

A day has 24 hours. When the hour hand of the clock goes around the clock once, 12 hours have passed. The hour hand completes 2 rounds of the clock in a day.

A 12-hour clock shows the same time twice a day.

Use of a.m. and p.m.

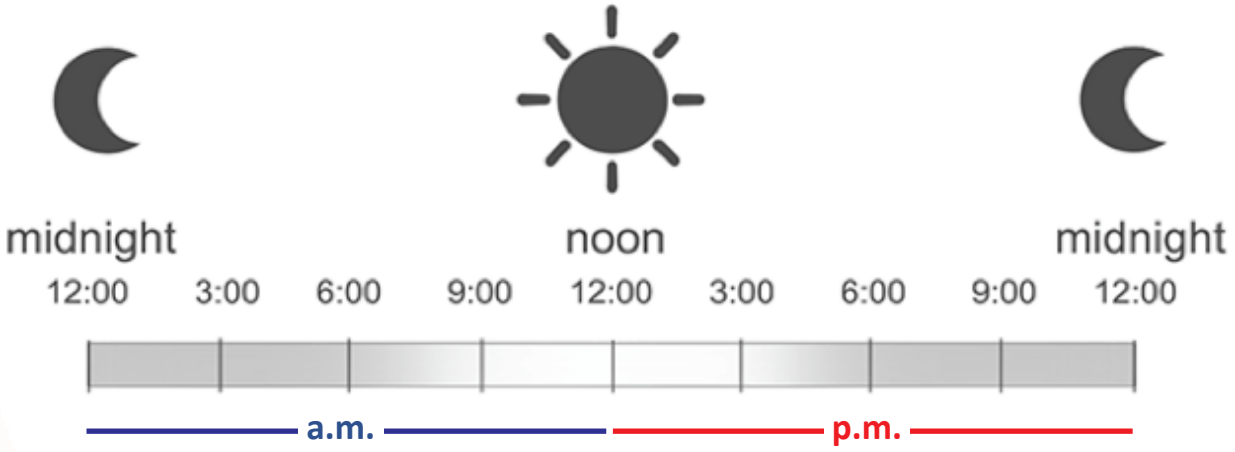
Mr. Anil had an appointment at 9:00. He reached the venue at 9:00 in the night. But he was informed that his appointment was at 9:00 in the morning!!!



a.m. or p.m. written after the time tells us whether the time is in the morning or in the evening.
a.m. – ante meridian
p.m. – post meridian

To know whether 9:00 means 9:00 in the morning or at night we use:

- a.m. for the time after 12:00 midnight and before 12:00 noon.
- p.m. for the time after 12:00 noon and before 12:00 midnight.



We do not write 12 a.m. or 12 p.m.
Instead we write 12 midnight and 12 noon to represent the night and day respectively.

24-hour clock

Representing time in the 24-hour format is commonly used in the world today. In this format, the day is divided into 24 hours, indicated by the hours passed since midnight from 0 to 23.

A digital clock is a 24 hour clock.

Airline, train time tables, shipping lines use 24-hour clock.

12-hour clock	24-hour clock
12:00 Midnight	00:00
12:30 AM	00:30
1:00 AM	01:00
2:00 AM	02:00
3:00 AM	03:00
4:00 AM	04:00
5:00 AM	05:00
6:00 AM	06:00
7:00 AM	07:00
8:00 AM	08:00
9:00 AM	09:00
10:00 AM	10:00
11:00 AM	11:00
12:00 Noon	12:00
1:00 PM	13:00
2:00 PM	14:00
3:00 PM	15:00
4:00 PM	16:00
5:00 PM	17:00
6:00 PM	18:00
7:00 PM	19:00
8:00 PM	20:00
9:00 PM	21:00
10:00 PM	22:00
11:00 PM	23:00

In this system of writing the time, there is no need to write a.m. or p.m. after the time

Conversion of 24-hour clock time to 12-hour clock time:

24-hour clock to 12-hour clock	
07 : 35 hours → 7 : 35 a.m.	12 : 01 hours → 12 : 01 a.m.
10 : 10 hours → 10 : 10 a.m.	15 : 20 hours → 3 : 20 p.m.
11 : 58 hours → 11 : 58 a.m.	21 : 40 hours → 9 : 40 p.m.
12 : 00 hours → 12 : 00 noon	00 : 00 hours → 12 : 00 midnight

Conversion of 12-hour clock time to 24-hour clock time:

12-hour clock to 24-hour clock	
05 : 30 p.m. → 7 : 35 hours	4 : 10 a.m. → 04 : 10 hours
12 : 05 a.m. → 00 : 05 hours	9 : 19 p.m. → 21 : 19 hours
8 : 25 p.m. → 20 : 25 hours	11 : 11 a.m. → 11 : 11 hours
12 : 00 noon → 12 : 00 hours	6 : 50 p.m. → 18 : 50 hours

EXERCISE 8.2

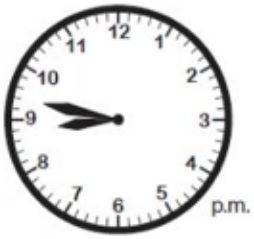
1. Convert to the other clock time:

a) 7:12 a.m. b) 2:43 p.m. c) 9:24 a.m. d) 6:39 p.m.

e) 22:05 hours f) 05:31 hours g) 23:56 hours h) 03:00 hours

2. Read the given analog clocks. Note the a.m. and p.m. given by its side.
Write the time in 24-hour format:

a) 

b) 

c) 

d) 

3. The flight to Delhi will depart at 3:45 p.m. Express this time in a 24-hour format.

Any mathematical operation has to be performed on similar units

Addition and Subtraction of time

Months and years

Example 1: 5 years 6 months + 3 years 8 months =?

	Years	Months
	5	6
+	3	8
	8	14

Step 1 : First add months 6 + 8 = 14 months

= 14 months > 1 year

Step 2 : 14 months = 12 months + 2 months

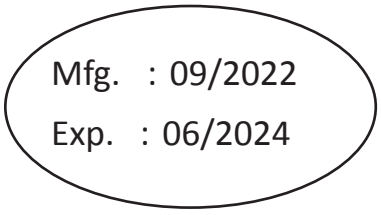
= 1 year + 2 months

	Years	Months
	1	
	5	6
+	3	8
	9	2

Step 3: Now add years 5 + 3 = 8

Step 4: = 5+3+1 = 9 years

So, 5 years 6 months + 3 years 8 months = 9 years 2 months



Example 2: Mrs. Kumar bought a bottle of syrup from medical shop. She showed the manufacturing date and expiry date marked on it to her son Nikil. She asked Nikil, the duration for which the syrup can be used?

Nikil was a very intelligent boy. So, he noted these dates in his notebook and calculated the difference as below:

Step1: First subtract months, but 6 < 9, so we borrow 1 year = 12 months from 24 years.

Step2: Now, we have 12 + 6 = 18 months and 18 – 9 = 9 months. Write the difference under month's column.

Step3: Since we have borrowed 1 year, we subtract year from 23 years left
(23 – 22 = 1), write the difference under years column.

		Years	Months
		23	18
Exp.		~~24~~	~~6~~
Mfg.	-	22	9
		1	9

Thus, Nikil said, "This syrup can be used for 1 year 9 months."

Mrs. Kumar is an aware consumer.

Hours and minutes

Example 1: 5 h 50 min + 1 h 45 min =?

Method 1:

5 hr 50 min = (5 × 60) min + 50 min
= 300 min + 50 min = 350 min
1 hr 45 min = (1 × 60) min + 45 min
= 60 min + 45 min = 105 min

So, 5 h 50 min + 1 h 45 min = 350 min + 105 min
= 455 min
= 7 h 35 min

Answer: 7 hours 35 minutes

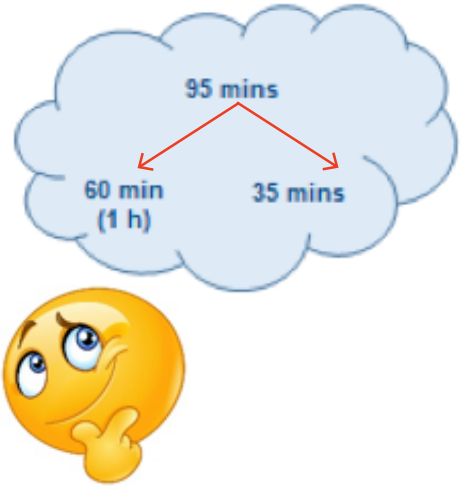
Method 2:

Add the hours: 5 h + 1 h = 6 h

Add the minutes: 50 min + 45 min = 95 min

95 minutes is the same as (1 hour 35 minutes)

So, 5 h 50 min + 1 h 45 min = 6 h + 95 min
= 6 h + 1 h + 35 min
= 7 h + 35 min



Answer: 7 hours 35 minutes

Method 3:

	1		
	5 h	50 min	
+	1 h	45 min	50 min + 45 min = 95 min
	7 h	35 min	(1 hour 35 minutes)

Weeks and months

Example 1: 7 weeks 4 days + 5 weeks + 4 days =?

	1	
	Weeks	Days
	7	4
+	5	4
	13	1

4 + 4 = 8 days
= 7 days + 1 day
= 1 week + 1 day

Example 2: Subtract 8 years 5 months from 12 years 3 months

	Years	Months	
	11	15	
	12	3	3 + 12 = 15 months
-	8	5	
	3	10	

EXERCISE 8.3

1. Add:
   a) 7 h 50 min + 4 h 25 min
   b) 3 h 40 min + 5 h 20 min
   c) 2 min 55 sec + 4 min 30 sec
   d) 15 min 28 sec + 12 min 42 sec
   e) 3 weeks 2 days + 1 week 5 days
   f) 5 weeks 6 days + 5 weeks 3 days
   g) 4 years 4months + 8 years 8 months
   h) 4 years 9 months + 6 years 4 months

2. Subtract:
   a) 4 h 35 min – 3 h 40 min
   b) 10 h – 8 h 20 min
   c) 12 min 10 sec – 4 min 55 sec
   d) 40 min 27 sec – 15 min 37 sec
   e) 4 weeks 3 days – 2 weeks 5 days
   f) 10 weeks – 5 weeks 3 days
   g) 8 years 4 months – 5 years 5 months
   h) 15 years – 4 years 6 months

3. Vishal was in ABC school for 8 years. While Manasi was in the same school for 5 years 9 months. Who was in this school for longer time and by how many years and months?

4. Kunal took leave from school for 1 week 3 days. He then extended it by 2 weeks 5 days. For how many days was Kunal on leave? (6 workings days in a week)

Time intervals

The time taken to carry out any activity is called the time interval or duration or elapsed time.

If the starting time and finishing time (ending time) of an activity is given, then to find the duration/time interval we use:

Duration = Finishing time – Starting time

If the starting time and duration of an activity is given, then to find the finishing time we use:

Finishing time = Starting time + Duration

If duration and the finishing time of an activity is given, then to find the starting time we use:

Starting time = Finishing time - Duration

Example1: Deepika's dance class started at 4:40 p.m. and ended at 6:18 p.m. How long was the class?

4:40 p.m. to 5:40 p.m. = 1 hour
5:40 p.m. to 6:00 p.m. = 20 minutes
6:00 p.m. to 6:18 p.m. = 18 minutes
Total time taken = 1 hour + 20 min + 18 mins
= 1 hour 38 minutes

	hours	mins
	5	78
	~~6~~	~~18~~
+	4	40
	1	**38**

Ans. Duration of the class is _____ .

Example2: Deepak studies for 3 hours 45 minutes everyday. He starts studying at 5:15 p.m. At what time does he finish?

	1	
	hours	mins
	5	15
+	3	45
	9	**00**

Ans: Deepak studies till 9:00 p.m.

EXERCISE 8.4

1. Complete the table:

	Starting time	Duration	Finishing time
a	1:05 p.m	4 hours 40 minutes	
b	11:15 a.m.	2 hours 45 minutes	
c		5 hours 15 minutes	6:00 p.m.
d		3 hours 20 minutes	3:20 a.m.

2. A boat started sailing at 11:40 a.m. and reached the other bank at 2:55 p.m, the same day. How long did it sail?
3. A power breakdown that started at 10:00 a.m, lasted for 5 hours 40 minutes. At what time did the power supply resume?
4. Anisha started to make a chart at 8:30 a.m. She needed 3 hours 32 minutes to complete it. At what time did she finish?
5. Rajan started practicing keyboard at 1:15 p.m. and completed it in 1 hour 50 minutes. What was the time when Rajan finished his practice?
6. Vamsi woke up at 5:30 a.m, after sleeping for 6 hours 45 minutes. At what time did he go to bed?
7. In a theatre, a drama that was on for $2\frac{1}{4}$ hrs, concluded at 7:00 p.m. At what time did the drama begin?

EXERCISE 8.5

1. What time will it be : a) 3 hours 50 minutes after 7:30 p.m.?
   b) 9 hours 40 minutes before 5:20 p.m.?
2. Find the interval between 8:25 a.m. and 3:10 p.m.
3. Find the time interval between snack break and lunch break of your school time.
4. Rohan started for his office at 7:45 a.m. and reached after 2 hours 20 minutes. At what time did he reach his office?
5. A primary school starts at 8:40 a.m. and closes at 2:30 p.m. Find the duration for which the school functions everyday.
6. A bus reached Kanchipuram from Chennai at 2:30 p.m. If the journey time was 2 hours 45 minutes, at what time did the bus start from Chennai?

7. The flight from Surat to Chennai left at 6:10 a.m. The duration of the flight was 2 hours 50 minutes. At what time did the flight reach Chennai?
8. Krishna sleeps at 10:30 p.m. and gets up at 5:15 a.m. How long does he sleep?
9. Shreya's music class begins at 5:20 p.m. If the class was for 1 hour 55 minutes, at what time does the class get over?
10. The Mumbai-Hyderabad train was to leave Mumbai at 6:45 p.m. It was delayed by 2 hours 20 minutes. At what time did it leave for Mumbai?
11. A train leaves Agra at 19:15 hours on Monday and reaches Marwar junction at 11:30 hours on Tuesday. How long would it take for the passengers of this train to reach Marwar from Agra?

Subject Integration Activity

The first known Olympics were held in the summer of 776 B.C. at Olympia, a place in southern Greece where people went for worship. Infact Olympics was created in honor of ancient Greece's God-Zeus, king of Gods.

The first Olympic games during modern era was held at Athens. Olympics is an international sports festival, held every four years. The time clocked by the winners in the finals of the 100 metre race at the Olympics for the past years are given below

Years	Name of The Athlete	Time (Seconds)
2004	Justin Gatlin (USA)	9.85
2008	Hussain Bolt (Jamaica)	9.69
2012	Hussain Bolt (Jamaica)	9.63
2016	Hussain Bolt (Jamaica)	9.81
2021	Lamont Marcell Jacobs (Italy)	9.80

Questions:

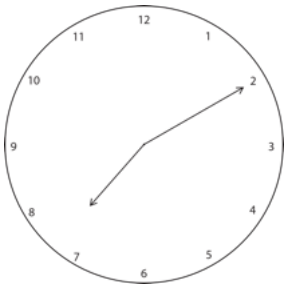
1. Who was the slowest amongst those listed above? What was the time taken by him to finish the race?
2. Convert the time taken in the year 2021 into minutes
3. What is the difference between the fastest and the slowest time clocked by Hussain Bolt?
4. Find the average time taken by Hussain Bolt in 2008, 2012 and 2016?
5. Who won the 100 m final Olympics more than once? In which year was he the fastest?
6. When and where would the next Olympics be held?

Worksheet

1. Convert the following into minutes:
   a) 8 hours b) 7 hours 35 minutes c) 13 hours 30 minutes
2. Convert the following into hours and minutes:
   a) 240 minutes b) 650 minutes c) 890 minutes
3. Write the time using 24-hour clock:
   a) 6:40 am b) 5:00 pm c) noon time
4. Write the time using 12-hour clock:
   a) 14:20 hours b) 09:40 hours c) 20:40 hours
5. Ramu's age is 8 years 5 months. Somu is 4 years 8 months older than Ramu. What is Somu's age?
6. Ritika's school was closed for 15 weeks. She went to Chandigarh for 4 weeks 3 days and to Manali for 3 weeks. She spent the rest of her holidays in Jammu. For how many weeks and days was she in Jammu?
7. Gopal was given 9 hours to complete his assignment. He completed it in 7 hours 25 minutes. How much time did he save?
8. Geeta reached Kanpur at 7:15 pm. If the journey by air took 45 minutes, at what time did she start?
9. Manushri started studying for her exam at 8:35 am. She studied for 4 hours 10 minutes. At what time did she complete her studies?
10. On some full moon nights the Earth blocks the light from the Sun from reaching the moon causing a lunar eclipse. In 2022, it occurred on 8th November from 17:32 IST to 18:18 IST. Find the duration of the eclipse.
11. Tiger, a puppy is 4 months old, his mother is 2 years 2 months older than him. Daisy, a kitten, is 3 months old. Her mother is 2 years 10 months old.
    a) Who is the oldest? _____
    b) How much younger is Daisy than her mother? _____
    c) What is the difference in age between the mothers of Tiger and Daisy? _____
12. A bus leaves for Chennai every 1.5 hours. The last bus left 20 minutes ago and the next bus is scheduled to leave at 4:30 pm. What is the time now?

Logical Reasoning

1) Analog clock in the car showed the following at start and at the end of the journey. The duration of the journey is _____



Started

Arrived at destination

a) 255 minutes b) 185 minutes c) 10500 seconds d) 1075 seconds

2) Watches A and B are in the same place displaying the time in 24–hour format.

A

B

i) Express the time shown in Watch B in 12–hour clock time.

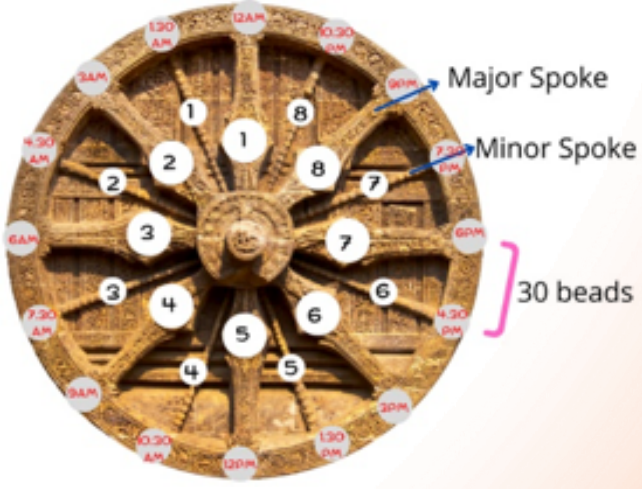
a) 12:57 a.m. b) 12:57 p.m. c) 12:57 a.m. d) 12:57 midnight

ii) By how much is Watch A faster than Watch B?

a) 50 minutes b) 50 seconds c) 10 minutes d) 10 seconds

Subject Integration

Calculating Time from Konark Chariot Wheels



The Konark temple built entirely in stone is in the form of a colossal chariot with twelve pairs of lavishly ornamented wheels drawn by seven richly caparisoned galloping horses.

Each of the 12 pairs of the wheels in Konark temple has 8 major spokes and 8 minor spokes. Major spokes are thick, more elaborately carved and much wider than the thin spokes.

When the Sun rises in the morning, the sun will be on the right side of the wheel creating a shadow at the spot marked 6 a.m. As the sun travels from east to west and reaches the peak during noon, the sun casts a shadow at the place marked 12 p.m.

By evening, when the Sun is about to set, the shadow will be at the spot marked 6 p.m.

Thus the wheel shows the time just like a clock. Ironically, the hour hand travels in the anti-clock wise direction!

Accuracy to a Minute!

There are 8 major spokes. The time interval between them is modern day 3 hours (3 hours = 1 Prahar in ancient days). They are again divided into halves called the minor spokes creating a section of 1.5 hours. There are 30 beads between each major and minor spokes which means that 1.5 hours (90 minutes) are further divided into 30 parts. Thus each bead represents 3 minutes.

When seen more carefully, we see that the beads are not circular, but slightly elongated at the sides. This creates 3 sections on the beads. Shadow can fall on the centre of the beads or on either side of it. This indication helps us to divide 3 minutes into 3 parts. Hence we can calculate time accurately to the minute.

Don't you think it is a great engineering feat to show the time using shadows?

1) What is the time indicated between 2 minor spokes?
2) What are the different ways by which the wheel could have been divided in whole hours to indicate the time?
3) Why do you think our forefathers divided the wheel into 8 equal parts?

MEASUREMENTS

Learning outcomes

At the end of this lesson, students will be able to

Know the units of length, mass, and capacity.

Convert higher units to lower units and vice versa

Add, subtract, multiply, and divide metric measures

Apply the skills to solve real-life problems involving length, mass, and capacity.

Warm-up:

I From the units given, identify the most appropriate one to know :

[mm, cm, m, km, gram, kg, mL, L]

a) The length of a mobile _____ 

b) The weight of a match stick _____ 

c) The capacity of a syringe _____ 

d) The weight of a wooden table _____ 

e) The capacity of water in a bucket _____ 

f) The distance between Mumbai and Kolkota - _____

II Fill in the Blanks

a) 8 m 34 cm = _____ cm

b) 3 km 585 m = _____m

c) 6070 m = ___km _____m

d) 9 L 200 mL = _____mL

e) 4 kg 60 g = _____g

f) 13 kg 350 g = _____ g

g) 1007 g = _____kg _____g

h) 499 cm = ___m ___ cm

i) 5022 L = ___L ____mL

j) 3 L 3 mL = _____mL.

Recall:

1 m = 100 cm	1 km = 1000 m	1 kg = 1000 g	1 L = 1000 mL
½ m = 50 cm	½ km = 500 m	½ kg = 500 g	½ L = 500 mL
¼ m = 25 cm	¼ km = 250 m	¼ kg = 250 g	¼ L = 250 mL
¾ m = 75 cm	¾ km = 750 m	¾ kg = 750 g	¾ L = 750 mL

III Express as fractions.

a) 500 m = ___ km

b) 2 L 250 mL = _____L

c) 6 kg 750 g = _____kg

d) 10 m 50cm = ____ m

e) $8\frac{1}{4}$ L = _____mL

f) $9\frac{1}{2}$ kg = _____g

Concept section

Measurement of length

Measuring small lengths

Acharya: Children, you know that the teeth of a comb are closely arranged. There is hardly any gap between them. If you have to measure the length between the teeth of a comb, what unit of measurement would you use? Centimetre, millimeter, or metre?

Student 1: Acharya since the gaps are very small, I think it is measured in millimetres.

Acharya: Yes, you are right! Can you give me some other examples where the unit of measure can be millimetres?

Student 2: Acharya grains of rice are too small.. Each grain of rice measures less than 1 cm. I guess the length would be 4 or 5 mm.

Student 3: The length of an ant!

Student 4 The length of the tip of our pen!

Acharya: Yes.. all your answers are right! Now let us learn the relationship between cm and mm.

When a centimetre is divided into 10 equal parts, each part is called a millimetre (mm).

1 cm = 10 mm

Since one-tenth of a cm is equal to 1 mm, we can write

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

EXERCISE 9.1

Place the objects on the scale shown below and write the measurements in cm and mm.

a) Length of a piece of chalk - _ _ _ _ _ _ _ _ _ _

b) Length of house key - _ _ _ _ _ _ _ _ _ _ _

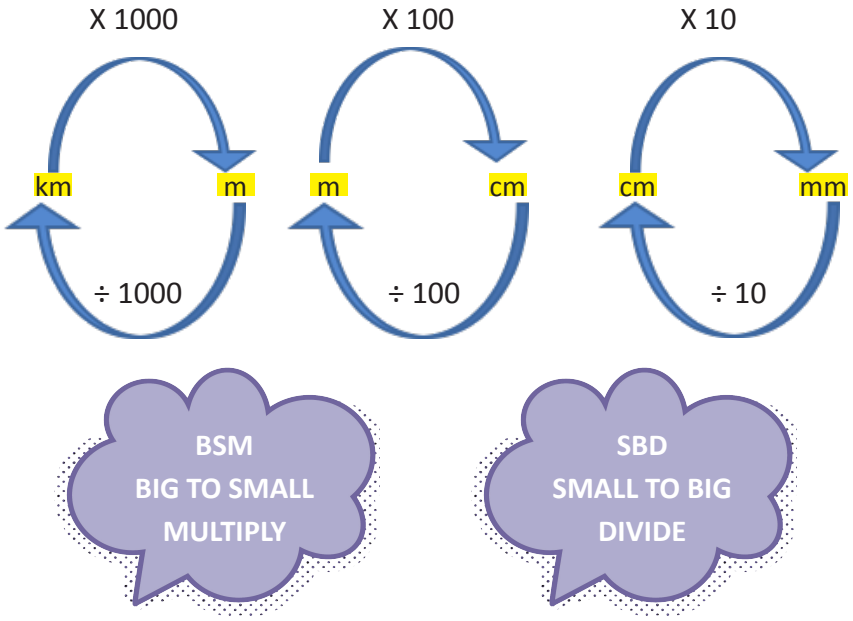
c) Length of your pencil - _ _ _ _ _ _ _ _ _

Relating different units of length.

- The standard unit of length is metre (m) 1 m = 100 cm
- The larger unit of length is kilometre (km) 1 km = 1000 m
- The smaller unit of length is millimetre (mm) 1 cm = 10 mm

Conversion of units.

- ❖ When we change bigger units to smaller units we have to multiply.
- ❖ When we change smaller units to bigger units we have to divide.



Examples : [Bigger units to smaller units]

4 cm = 4 x 10 mm = 40 mm [1 cm = 10 mm]

8 m = 8 x 100 cm = 800 cm [1 m = 100 cm]

5 km = 5 x 1000 m = 5000 m [1 km = 1000 m]

Examples : [Smaller units to bigger units]

30 mm = 30 ÷ 10 cm = 3 cm [1 mm = $\frac{1}{10}$ cm]

900 cm = 900 ÷ 100 m = 9 m [1 cm = $\frac{1}{100}$ m]

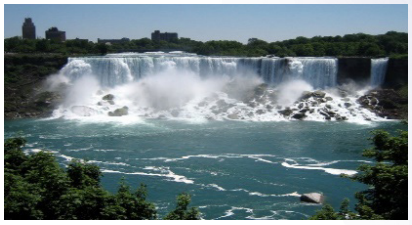
7000 m = 7000 ÷ 1000 km = 7 km [1 m = $\frac{1}{1000}$ km]

Examples :

1. 2mm = 2 ÷10 cm = 0.2 cm
2. 5 cm 3mm = 5 cm + 0.3 cm = 5.3 cm
3. 3 cm = 3 ÷100 m = 0.03 m
4. 8 m 4 cm = 8m + 0.04 m = 8.04 m
5. 4 m = 4 ÷1000 km = 0.004 km
6. 1 km 5m = 1 km + 0.005 km = 1.005 km.

Story sums

Example 1 :

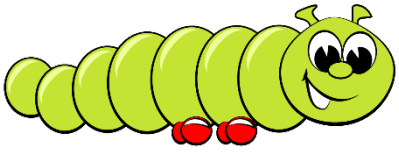


The height of the Niagara falls is 51 m. Write its height in km

Ans: Height of Niagara falls= 51 ÷ 1000 cm = 0.051km

Example 2 :

The length of an average adult caterpillar is 11.6 cm. Find the length of 10 such caterpillars, express the answer in m and cm.



Ans: Length of 7 caterpillars = 11.6 x 10

= 116 cm

= 1 m 16 cm

Example 3 :

A frog moves a distance of 2m 80 cm in one leap. What is the distance covered in

a) 90 such leaps.

b) Express the distance in (i) cm (ii) m iii) km.

Ans: Distance covered in 1 leap = 2 m 80 cm = 280 cm

Distance covered in 90 leaps = 280 cm x 90 = 25,200 cm

= 252 m

= 0.252 km

Example 4 :

Vinay walks 6725 m every day. Find the distance he walks in a week.

Express the answer in km and m.

Ans: Distance covered in a week = 6725 m x 7

= 47,075 m

= 47 km 75 m

Example 5 :

When 100 yoga mats are placed one above the other,

it is 31.75 cm high. Find the thickness of one yoga mat. Express it in mm.

Ans : The thickness of 100 yoga mats = 31.75 cm = 31.75 x 10

= 317.5 mm

Thickness of 1 yoga mat = 317.5 ÷ 100

= 3.175 mm

Yoga is a physical, mental and spiritual practice which originated in India. International Day of Yoga is celebrated annually on 21st June, since 2015.

Example 6 :

Bhuvana is 1.4 m tall. Her brother Bhavesh is 174 cm tall. Find the difference between their heights.

Ans: Bhuvana 's height = 1.4m = 1.4 x 100 cm = 140 cm

Bhavesh 's height = 174 cm

Difference between their heights = 174 – 140

= 34 cm

EXERCISE 9.2

1. Fill in the blanks.

a) Length of a tube light is 102 cm = _____m _____cm

b) Height of a Eucalyptus tree = 45 m = _____ cm

c) Length of a safety pin = 38 mm = _____cm _____mm

d) Distance between Agra and Delhi = 221 km = _____ m

e) Distance run by an athlete everyday = 17 km 50 m = _____m

f) 3 m 3 cm = _____ cm

g) 42 cm 4 mm = _____mm = ____cm

h) 8 km 70 m = _____m

i) 20 km 5 m = _____m = _____km

j) 0.31 km = _____m

k) 5900 m = ____ km

l) 0.67 m = _____ cm

m) 0.4 cm = ___ mm

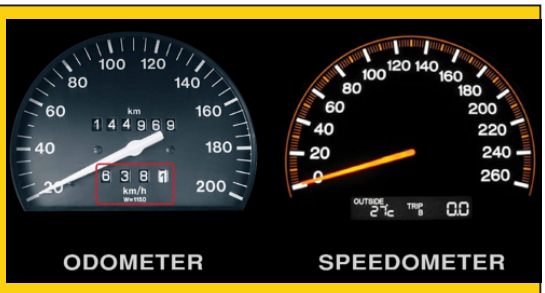
2) Complete the table

S. No	Length	In Bigger Units	In Smaller Units
1	34 km 30 m	34.030 km	34030 m
2	____m ____ cm	65.65 m	6565 cm
3	5 cm 7 mm		
4	___km ____m	12.8 km	12800 m
5	___cm ____mm	45.9 cm	

DO YOU KNOW

Odometer is an instrument attached to the vehicle to measure the distance travelled by the wheeled vehicle.

Speedometer measures and indicates the current speed of that particular vehicle.



The needle of which one reorients to zero when the vehicle stops (Speedometer / Odometer)

3) Deepa bought 4 m 70 cm of shirting cloth for her husband, 3 m 25 cm for her elder son and 2 m 50 cm for her younger son. Find the total length of shirting cloth bought by her.

4) Arun travels 2.3 km by bus and $\frac{3}{4}$ km by auto every day for work. Find the distance he travels in a day.

5) The length of a cricket pitch is 20.1 m. If Ashok runs 8 times between the wickets, find the distance he covers.

6) Manaswini used a 15 cm scale to measure the height of a cupboard in her bedroom, if the height of the cupboard is 165 cm how many times had she to use the scale for measuring it.

7) The height of a brick is 7.6 cm. If 14 bricks are placed one above the other find the total height of the pile.

8) Anu's plant grew 35.6 cm tall while Aparna's plant grew 8 mm more than Anu's. Find the height of Aparna's plant in cm.

Fact Corner

The longest bone in the human body is our thigh bone (Femur).

It is about 45 cm in length for an adult of average height.

The smallest bone in the human body, stapes, is located in the middle ear.

It's length is 3 mm.

Measurement of weight

The common units for measuring mass are gram(g) and kilogram (kg). While we use kilogram to measure the weight of very heavy objects, we use gram to measure the weight of lighter objects.

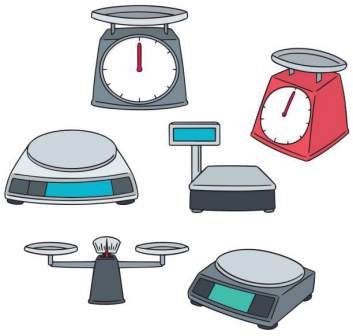
- ★ The standard unit of weight is gram (g)
- ★ The larger unit of weight is kilogram (kg)
- ★ The smaller unit of weight is a milligram (mg)

1000 mg = 1 g

1000 g = 1 kg

100 kg = 1 quintal

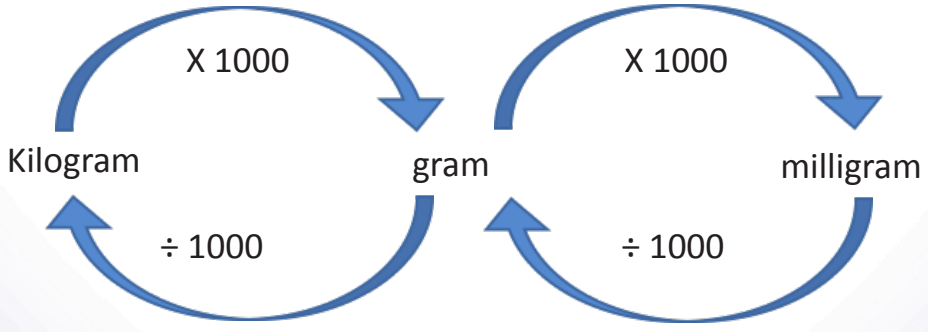
1000 kg = 1 tonne



We use various types of machines to measure weight. Common balance, spring balance and weighing machines.

Small weights are measured in grams and milligrams whereas larger ones are measured in kilogram.

- ★ To convert kilogram to gram we multiply by 1000 and to convert gram to kilogram we divide by 1000.



Conversion of units of weight

Examples

$1\text{ kg} = 1000\text{ g} \longrightarrow 1\text{ g} = \frac{1}{1000}\text{ kg}$

1) $400\text{ g} = \frac{400}{1000}\text{ kg} = 0.4\text{ kg}$

2) $367\text{ g} = \frac{367}{1000}\text{ kg} = 0.367\text{ kg}$

3) $28\text{ g} = \frac{28}{1000}\text{ kg} = 0.028\text{ kg}$

4) $7\text{ g} = \frac{7}{1000}\text{ kg} = 0.007\text{ kg}$

5) 3 kg 45 g = 3 kg + 0.045 kg = 3.045 kg

= 3000 g + 45 g = 3,045 g

Applications in real life

Example 1:

The weight of a cricket ball is 163 g. Express the weight in kg.

Ans: 163 ÷ 1000 = 0.163 kg

Example 2 :

The weight of a baby elephant is 116.2 kg.
Express the weight in grams.

Ans : 116.2 x 1000 = 1,16,200 g

Example 3 :

The weight of a pedestal fan is 9.5 kg. Find the weight of 9 such fans and give the answer in grams.

Ans: Weight of 9 fans = 9.5 x 9 = 85.5 kg

= 85.5 x 1000 g

= 85,500 g

Example 4 :

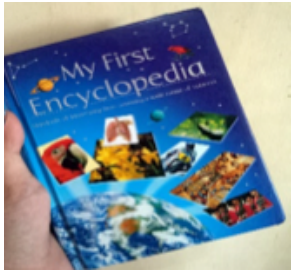
The weight of a one rupee coin is 4.85 grams.

Express the weight in kg.

Ans : 4.85 g = 4.85÷1000 = 0.00485 kg.

EXERCISE 9.3

Convert as directed

 Weight of cloth clips = 15.5 gram = _____kg	 Weight of sugar = 2.3 kg = _____g	 Weight of an apple = 116 g = _____kg
 Weight of a dog = 48.7 kg = _____ g	 Weight of ribbon = 75 g = _____kg	 Weight of Encyclopedia = 1496 g = _____ kg

EXERCISE 9.4

1. Fill in the blanks

a) 3 kg 453 g = _____ g = _____ kg

b) 4 kg 6 g = _____g = _____ kg

c) 18 kg 18 g = _____g = _____kg

d) 1 kg 10 g = _____ g = _____kg

e) 0.365 kg = _____kg _____g

f) 8.12 kg = _____kg _____ g

g) 0.093 kg = _____ kg _____g

h) 26.205 kg = _____kg _____ g

2 Solve

a) Ajay weighed $87\frac{1}{2}$ kg. He lost 9 kg 788 g by following his doctor's advice for diet and workouts. Find his present weight.

b) Aruna bought 2 kg 25 g of apples, $1\frac{3}{4}$ kg of oranges, 3 kg 5 g of mangoes to prepare fruit salad. Find the total weight of fruits she bought.

c) A lunch box weighs 346 g. How much will 6 such lunch boxes weigh? Express the weight in kg.

d) Akhil buys 2 kg of cashew nuts and repacks them in 8 packets measuring equal weights. Find the weight of cashew nuts in each packet.

Measurement of capacity

The quantity of a liquid is called its volume.

The volume of a liquid that a container can hold is its capacity.

To measure liquids we use the units of capacity.

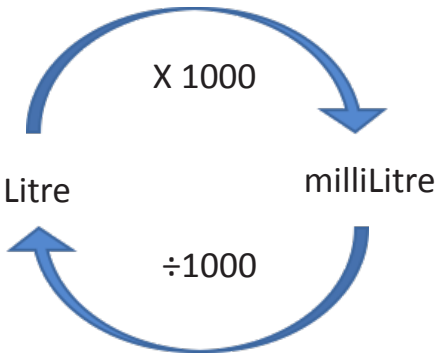
★ The standard unit of capacity is Litre (L)

★ The smaller unit of capacity is millilitre (mL)

★ The larger unit of capacity is kilolitre (kL)

1000 mL = 1L

1000 L = 1kL



Using decimals in measurements.

I Litre = 1000 mL $\longrightarrow$ 1 mL = $\frac{1}{1000}$ L = 0.001 L

1) 200 mL = 200/1000 L = 0.200 L = 0.2 L

2) 4 L 835 mL = 4 L + $\frac{835}{1000}$ L = 4.835 L

3) 6 L 26 mL = 6 L + $\frac{26}{1000}$ L = 6.026 L

Interconversion of units

Example 1:

The quantity of milk in a glass = 235 mL
To express it in litre = 235 ÷ 1000 L
= 0.235 mL

Example 2:

The capacity of cooking oil in a can = 3.520 L
To express it in millilitre = 3.520 x 1000 mL
= 3520 mL

Example 3:

The capacity of honey in a spoon = 6 mL
To express it in litre = 6 ÷1000 L
= 0.006 L

Example 4:

The capacity of paint in a tin = 7.75 L
To express it in millilitre = 7.75 x 1000 mL
= 7750 mL

EXERCISE 9.5

1. Fill in the blanks

a)  has 17 mL of nail polish. It would be _____ L

b) The capacity of tea in  is 2040mL. It measures _____L

c) The quantity of tender coconut in  is 220 mL = _____L

d) The  holds 14.5 litres. It's capacity is _____ mL

2. Fill in the blanks

a) 0.51 L = _____L _____mL = _____mL

b) 4.767 L = _____L _____mL = _____ mL

c) 8.009 L = _____L _____mL = _____ mL

d) 13L 6 mL = _____mL

e) 20.22 L = _____L _____mL

f) 9 L 30 mL =_____mL

g) 15.151 L = _____L _____mL

h) 66 L 7 mL = _____mL

i) 8.808 L = _____L _____mL= _____mL

j) 10.011 L=_____L _____mL = _____ mL

3. Solve

a) A painter bought 13 L 340 mL of red paint, 8 L 45 mL of yellow paint, and 6 L of green paint. Find the total amount of paint bought in litres.

b) A milkman had 20 L of milk in his milk can. He sold 7 1/4 L of milk and 4 L 890 mL of milk in two different places. Find the capacity of milk left.

c) A large juice contains 3.5 L of orange juice. If it is poured equally into 14 glasses find the quantity of juice in each glass.

d) A bike's fuel tank capacity is 10.5 L. Find the capacity of the tanks in 9 such bikes.

FACTS CORNER

The longest human chain (Maanav Shrinkhla) ever formed was at Bihar, India on January 19th, 2020 for the cause of protecting our environment. The human chain involved 5.16 crore people and measured a whopping length of 18,034 km !

4.Convert the measurements as given in brackets.

Twins Anand and Anandhi happened to see a large truck on their way to school.

The length of the truck was 1875 cm. (_____m) They later came to know that the capacity of the fuel tank was 16,625 Litres (_____mL) and it can carry weight up to 36 tonnes (_____ kg).

FACTS CORNER

Vande Bharat Express also known as Train 18 is a semi high speed, electric multiple-unit train operated by Indian Railways, to connect cities that are less then 800 km apart or take less then 10 hrs to travel with existing services.

It covers a distance of 752 km from Delhi to Varanasi in 8 hours.

The manufacturing and designing are done by Integral Coach Factory, Chennai which comes under the MAKE IN INDIA initiative.

Find out why the name Train 18 was given to Vande Bharat Express.

Lab Activity

1. Using the weighing machine in your Maths Lab find the weight of your Maths Reader GANITAM (Part 2) and write down the weight, in grams rounding off to the nearest tens.

2. Use a chart paper of length 40 cm and breadth 5 cm to draw circles of radius 2.5 cm touching each other as shown in the figure. Find the number of circles that can be drawn.

Thinking Skills

1) The total weight of 12 bottles of ghee is 5.4 kg. If each empty bottle weighs 50 g, what is the weight of the ghee in each bottle? Express the weight in grams

2) Pooja suffered from a severe cough. As per the doctor's prescription, she had to take 15 ml of cough syrup twice a day. Her mother bought a cough syrup of capacity of 0.3 L. She was advised to take the medicine for five days. If Pooja took the syrup regularly, find out

a. The quantity of syrup that was consumed

b. The quantity of syrup that was left.

c. For how many more days can the remaining syrup be consumed maintaining the same dosage?

Value-Based Question

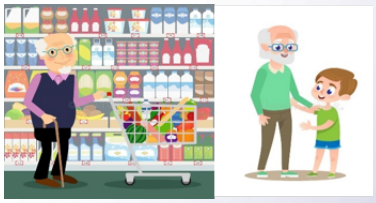
Aswin went to a supermarket with his Ajoba (Grandfather in Marati). Ajoba bought vegetables weighing 2 kg 570 g, fruits weighing 920 g, and provisions weighing 5 kg 190 g. Aswin noticed the heavy bags and offered to help Ajoba.

"Let me carry the vegetable and fruits bag, Ajoba ", he said.

a) find the total weight of the goods that Ajoba bought

b) find the weight carried by Aswin.

c) Do you help your grandparents? How do you do it?



Subject integration Activity

The daily nutrient requirements for 7 to 10 year olds is given below.

Protein	28.3 g
Calcium	550 mg
Iron	8.7 mg
Saturated fat	23.5 g
Salt	5g

a) Convert the amount of protein into milligrams.

b) Find the total amount of calcium and iron needed.

c) Which is required more for the body – Protein or calcium?

WORKSHEET

I. Choose the correct answer

1. A bicycle weighs about ____ kg.
   a) 0.24 b) 24 c) 2400 d) 0.4

2. A syringe can hold _____ litre of medicine.
   a) 0.015 b) 0.15 c) 1.5 d) 15

3. The height of a door is _____ cm.
   a) 20 b) 200 c) 2000 d) 0.2

4. The distance between Mumbai and Delhi is _____ km.
   a) 14.21 b) 1.421 c) 142.1 d) 1421

5. Which is the least?
   a) 0.5 L b) one thousandth of a litre
   c) One hundredth of a litre d) 5000 mL

II. Fill in the blanks

a) 3.6 m = _____ cm

b) 1289 g = _____kg

c) 0.08 L = _____mL

d) 57.57 km = _____m

e) 34 kg 505 g = _____kg

f) 9 m 98 cm = _____m

g) 60 L 22 mL = _____ L

h) 4 cm 5 mm = _____ cm

i) 82 km 3 m = _____ km

j) 65 m 6 cm = _____m

k) 7 kg 7 g = _____kg

l) 29 kg 92 g = _____ kg

III. Solve

1) Mala bought 4kg 230 g of potatoes, 3.65 kg of carrots, 4.4 kg of onions and $6\frac{1}{2}$ kg of beetroots. Find the total weight of the vegetables she bought.

2) From a paint box that had 5.26 litres of paint, 3945 mL was used. Find the volume of paint left.

3) Dr. Nirmal's clinic is 6 km 17 m away from his house. Find the total distance travelled by him in a week, if he takes the same route everyday and works on all days of the week.

4) At a celebration, if 4 L 545 mL of juice was consumed, 500mL was spilt and 1L 250mL was remaining, what was the quantity prepared ?

5) The weight of fruits bought by Sana was 4.8 kg. If one-quarter of it were apples, one - third of it were mangoes and the rest of it were bananas, find the weight of each.

6) The total weight of 8 computer chairs is 180 kg. Find the weight of one chair. Convert it into grams.

7) Mrs. Sudha gives 450 mL of a health drink to her sons Ajay and Vijay everyday. Vijay always drinks double the amount of what Ajay drinks, find the amount each drinks.

8) Add the following quantities.

   3 kg + 3500 g + 0.3 kg + 30.05 kg + $3\frac{1}{2}$ kg

9) Which is greater?

   202m x 5 (or) 11,500 m ÷ 100

10) Subtract 7.5 km from $10\frac{1}{4}$ km.

Higher Order Thinking Skills

1) A bottle of ink contains 0.375 L of ink. How many bottles are required to contain 13500 mL of ink?

2) A pile of books is 115.5 cm high. If each book is 35 mm thick, how many books are there?

Subject Integration Activity

The excess food prepared during photosynthesis is stored in the stem in a sugarcane plant. The stem thus becomes the edible part the plant.

After harvesting the sugarcane is sent to a sugar factory. The cane is crushed, the juice extracted, filtered and crystalised to get sugar. The sugar thus obtained is golden brown in colour.

The sugar obtained is subjected further chemical process to get the crystalline white sugar.

How much heavier is 1 bowl of sugar than 1 cup of sugar.

a) 190g b) 290g c) 210g d) 390g

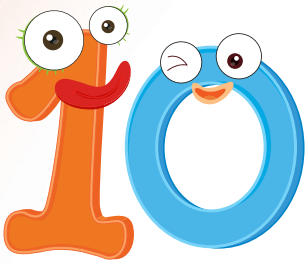
Airplane Fuel capacities

Aircraft	Fuel Capacity in litres
Airbus A380	323,546
Boeing 747	238,610
Boeing 777	181,283
Airbus 320	27,200

1. Express the fuel capacity of Airbus A380 in kilolitres.
2. Write in words the fuel capacity of Boeing 747.
3. What is the difference in fuel capacity of Airbus 380 and Airbus 320?

Logical Reasoning

1. Tower A is not shorter than Tower B. Tower B is not shorter than Tower C. Which Tower is the shortest?
   a) A b) B c) C d) Both B and C
2. Length of two rods are 9 feet and 6 feet. What is the smallest length that can be measured using either of the rods?
   a) 15 b) 3 c) 54 d) 18
3. Prasanth walked 25 km north from his house, then turned left, and walked 25 km. He then turned south and walked 40 km. He again turned right and walked 25 km. How far is he from his house?
   a) 15 km b) 50 km c) 65 km d) 0 km



PERIMETER AND AREA

Learning outcomes

At the end of this lesson, children will be able to:

- Find the perimeter of a square and rectangle by using formulae.
- Find the area of square and rectangle by using formulae.
- Find the area of irregular shapes using a grid paper.
- Apply the skills to solve real life problems.

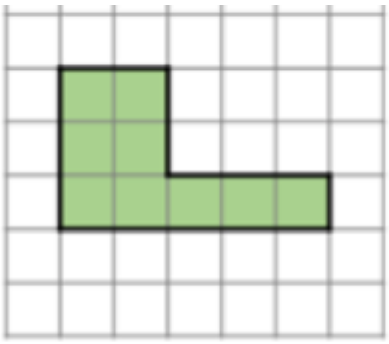
Perimeter:

The distance around a figure is called its perimeter.

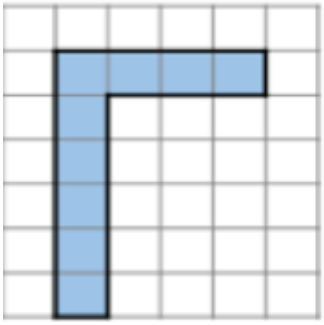
The perimeter of a closed figure is the length of its _____.

1. Find the perimeter of the following:

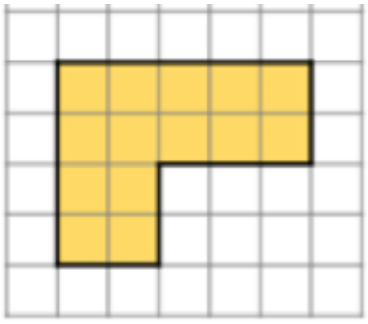
a)



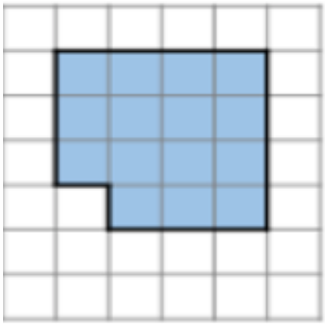
b)



c)

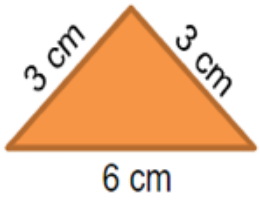


d)

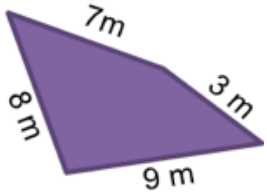


2. Find the perimeter of the following:

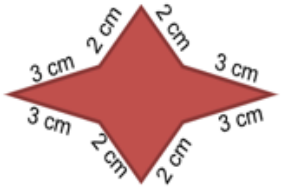
a)



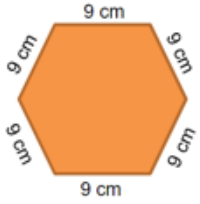
b)



c)



d)



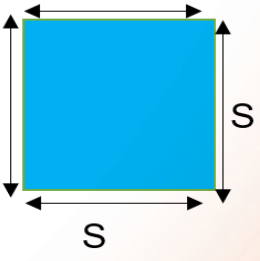
3. Devi has painted a picture of dimensions 6 cm by 8cm. Her mother gave her a pink ribbon to decorate it along the sides. What length of the ribbon will she require?

Concept Section:

Perimeter by formula:

Perimeter of a square:

Perimeter of a square is the sum of the length of its sides.



Perimeter of a square = (side + side + side + side) units

= 4 x side units

Perimeter of a square = 4 x side units

Example 1

Find the perimeter of a square handkerchief of side 16 cm.

Side = 16 cm

Perimeter of square = 4 x side units

= 4 x 16 cm

= 64 cm

The perimeter of the handkerchief is 64 cm.

Perimeter of a rectangle:

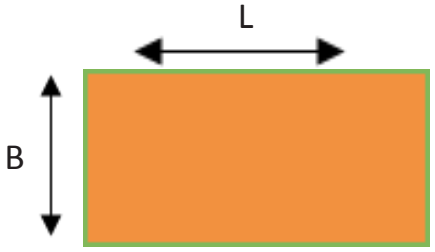
In a rectangle, the opposite sides are equal.

Perimeter of a rectangle = Length (L) + Breadth (B) + Length (L) + Breadth (B).

= L + B + L + B

= 2 L + 2 B

= 2 (L + B)



Perimeter of a rectangle = 2 (L + B) units

Example 2

Find the perimeter of a rectangular carpet 80 cm long and 40 cm wide.

Length = 80 cm , Breadth = 40 cm

Perimeter of the rectangle = 2 (L + B)

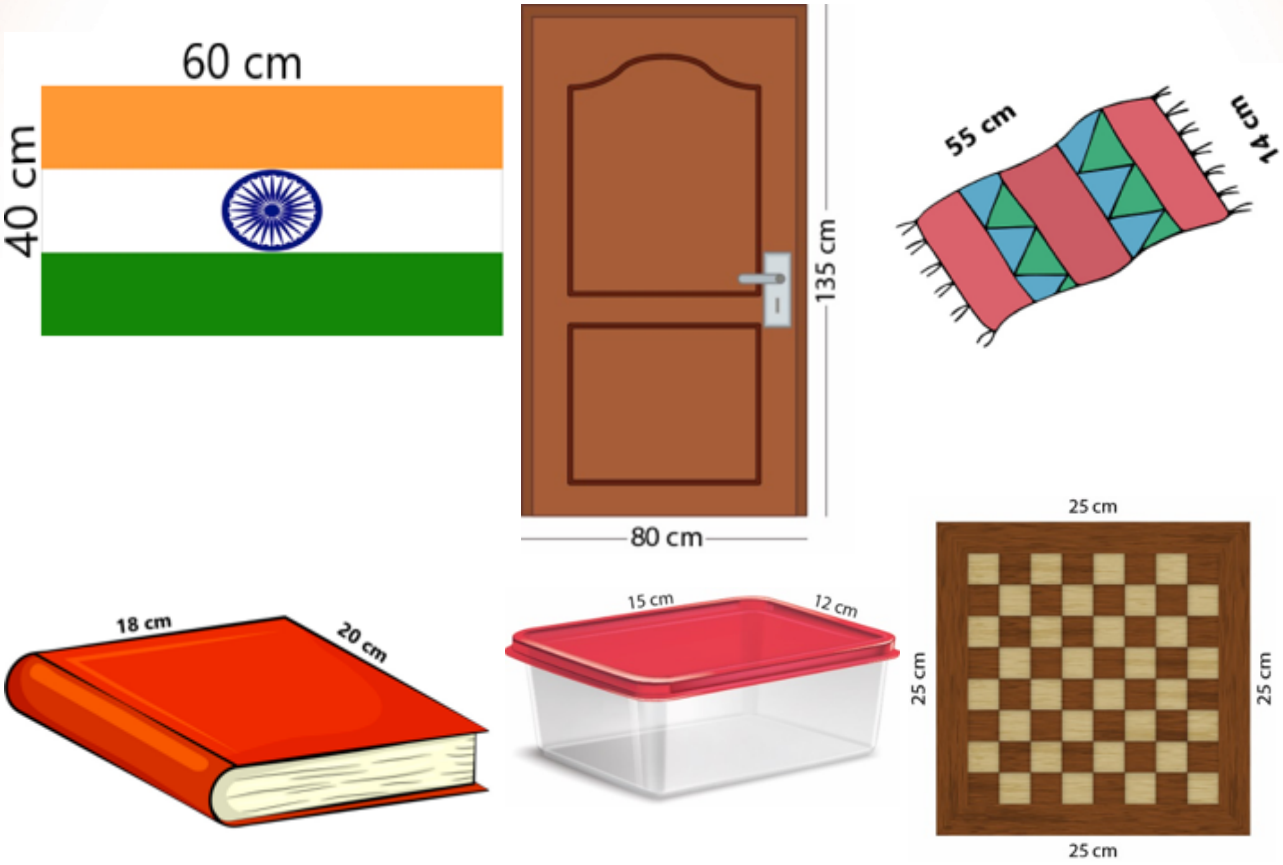
= 2 (80 + 40)

= 2 x 120 cm = 240 cm

Perimeter of the carpet is 240 cm.

EXERCISE 10.1

1. Find the perimeter of the following pictures using formula.



2. Find the perimeter of the rectangles using the formula.

Length (cm)	Breadth (cm)	Perimeter (cm)
40	30	
15	12	
20	15	
22	11	
80	50	

3. Find the perimeter of squares using formula:

Length of the sides (cm)	11	25	13	40	100
Perimeter (cm)					

4. Find the length of the sides of squares with the following perimeter:

a) 60 cm b) 80 cm c) 160 cm d) 200 cm e) 240 cm

5. Applications in real life.

a) A large rectangular solar panel that generates solar energy is 560 cm long and 450 cm wide. A frame needs to be built around the panel. What is the length of the frame that is required?

b) The perimeter of a square story book is 56 cm, what is the length of each side of the book?

c) During training, a team jogged thrice around the cricket ground. If the perimeter of the cricket ground is 800 m, What is the distance they covered?

d) A rectangular piece of land measured 7 m by 5 m. Each side is to be fenced with 4 rows of wires. What is the length of the wire needed?

e) A piece of string is 44 cm long. What will be the length of each side, if the string is used to form a square?

f) Find the cost of fencing a square park of side 250 m at the rate of ₹ 20 per meter.

g) Sweety runs around a square park of side 75 m twice. Arjun runs around a rectangular park with length of 60 m and breadth 45 m twice. Who covers more distance? By how much?

h) An athlete takes 10 rounds in a rectangular park, 50 m long and 25 m wide. Find the total distance covered by him.

AREA

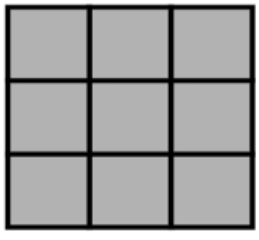
Look at the closed figures given below. All of them occupy some region of a flat surface. Can you tell which one occupies more area?

A B C

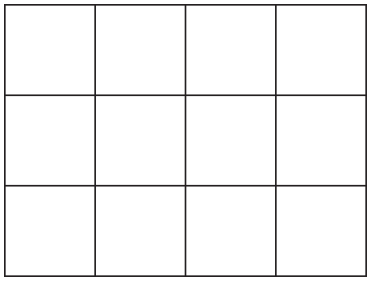
The amount of surface enclosed by a closed figure is called its area.

How do we measure area?

Look at these figures. They are made up of square tiles. Each square tile has a side of 1 cm. The number of 1 cm squares gives the area.



Area = 9 sq.cm



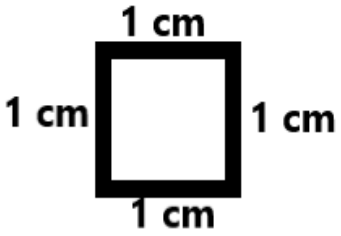
Area = 12 sq. cm

Unit of Area

This is a 1 centimeter square. Each side is 1 cm long.

Its area is 1 square centimeter or 1 sq.cm

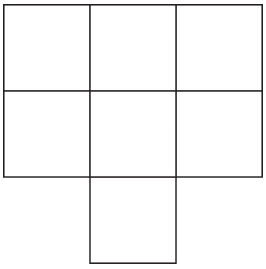
Area is measured in square units.



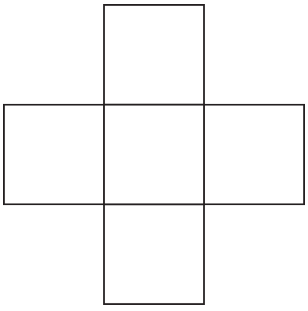
EXERCISE 10.2

1. Find the area of the following figures in square units.

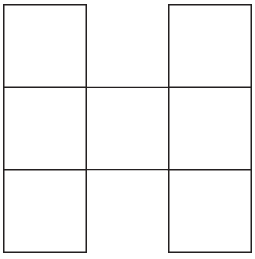
a.



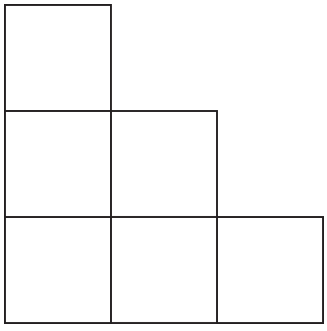
b.



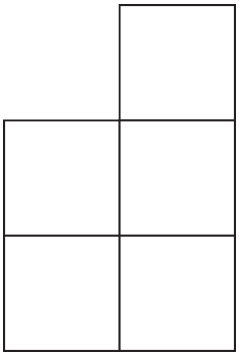
c.



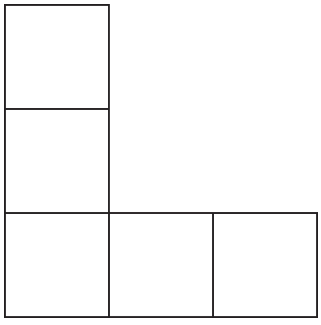
d.



e.



f.



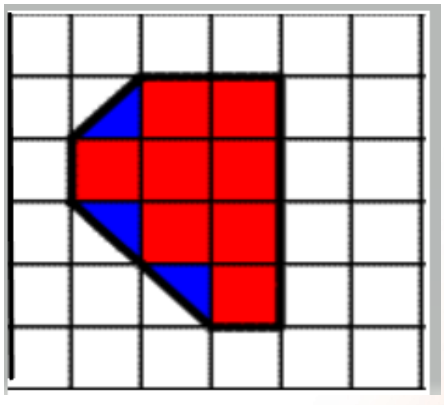
Using half-square units

This figure is made up of 8  and 3 half squares 

 Is 1 square unit.

Therefore,  is $\frac{1}{2}$ square unit.

 =  = 1 square unit.



Hence, the area of the figure is $9\frac{1}{2}$ square units.

Example

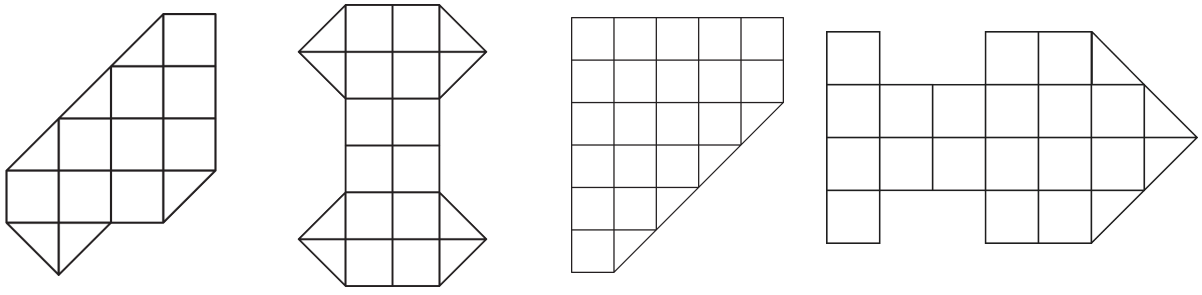
Number of unit squares = 8

Number of $\frac{1}{2}$ unit squares = 2 = 1 unit square.

Area = 9 square units.

EXERCISE 10.3

Find the area of each figure in square units



Area of Irregular Shapes

Irregular shapes have boundaries, which cannot be accurately measured. They can be drawn on a grid sheet.

In the given shape, you will notice that some of the squares inside the outline are full, some are less than half, some are more than half and some may be exactly half.

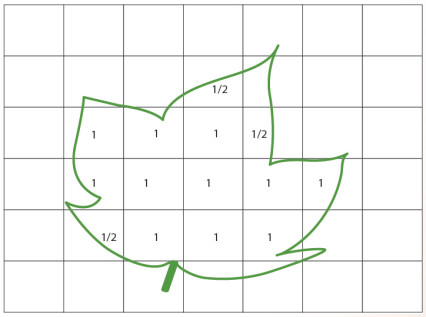
The area of each complete square is 1 sq. cm.

The area of a square, which is less than half, is ignored.

The area of a square which is more than half is counted as 1 sq. cm.

The area of exactly half square is counted as $\frac{1}{2}$ sq. cm.

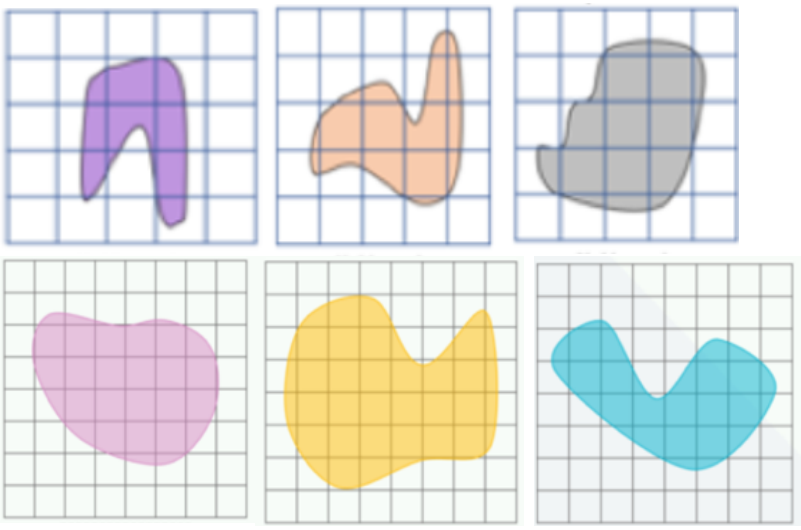
The area of the figure is approximately $12\frac{1}{2}$ sq. cm



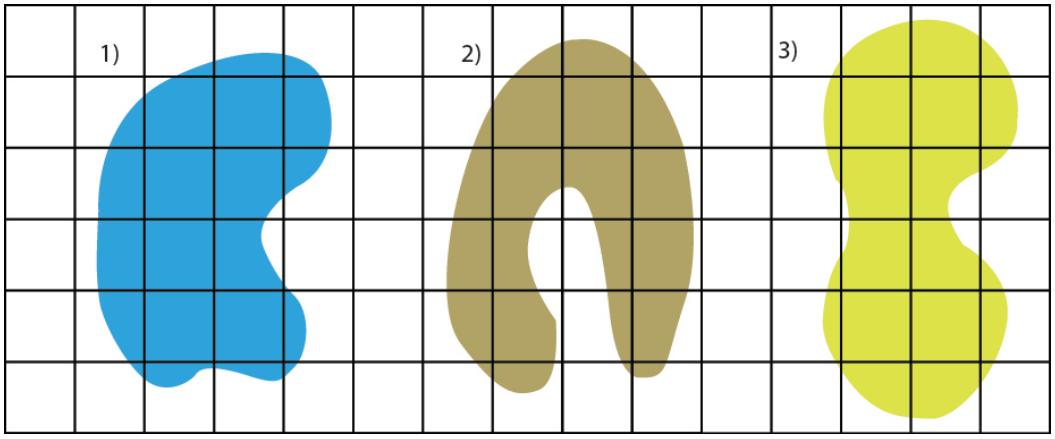
$12\frac{1}{2}$

EXERCISE 10.4

1. Find the approximate areas if the area of small square is 1 sq. cm.



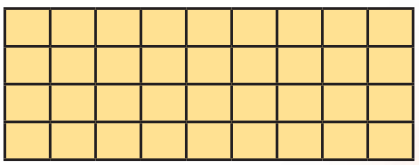
2. Find the area of each pond. Also, find which pond has greater area. (each small square represent 1 sq. m)



Area by formula

Area of rectangle

In this rectangle length (L) is 9 cm and breadth (B) is 4 cm.



Area by counting the squares is 36 sq. cm

Also, L x B = 9 cm x 4 cm

= 36 sq. cm

Hence, we can say that,

Area of a rectangle = length x breadth sq. unit

= L x B sq. unit

Area of a square

In this square there are 9 unit squares.

Area by counting the squares = 9 sq. cm

Also, side x side = 3 x 3 sq. cm

= 9 sq. cm

Hence,

Area of a square = side x side sq. unit

= S x S sq. unit

Example 1

Find the area of a rectangular poster 70 cm long and 50 cm wide.

Here, L= 70 cm , B = 50 cm

Area = L x B sq. cm

= 70 x 50 sq. cm

= 3500 sq. cm

Area of the rectangular poster is 3500 sq. cm.

Example 2

Find the area of a square stamp of side 4 cm.

Side = 4 cm

Area of the stamp = S x S sq. unit

= 4 x 4 sq. cm

= 16 sq. cm

Area of the square stamp = 16 sq. cm.

Example 3

Which is the bigger room? A square room of side 5 m or a rectangular room of length 6 m and breadth 4 m, by how much?

Solution

Area of the square room = S x S sq. unit

= 5 x 5 sq. m

= 25 sq. m

Area of the rectangular room = L x B sq. unit

= 6 x 4 sq. m

= 24 sq. m

Therefore the square room is bigger by 1 sq. m

Example 4

The length of a rectangular blanket is 4 m. If its area is 12 sq. m, find its breadth.

Solution

Area of the rectangular blanket = length x breadth

$$\text{Breadth} = \frac{\text{Area}}{\text{length}}$$

$$= \frac{12}{4} = 3 \text{ m.}$$

Therefore breadth of the rectangular blanket is 3 m.

Note that the length and breadth should always be expressed in the same unit . If the given units are not the same, then first express them in the same unit and then find the area.

Example 5

Square tiles of side 30 cm are to be fixed in a rectangular room 9 m long and 6 m broad. How many tiles will be required to cover the floor of the room?

Solution

Area of the rectangular room = L x B sq. unit

= 9 x 6 sq. m

= 900 x 600 sq. cm (since 1m = 100 cm)

= 540000 sq. cm

Area of the square tile = s x s sq. unit

= 30 x 30 sq. cm

= 900 sq. cm

$$\text{Number of tiles required} = \frac{\text{Area of the rectangular room}}{\text{Area of the square tile}}$$

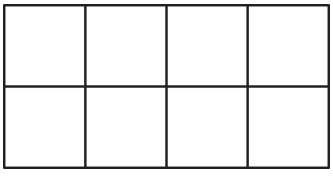
$$= \frac{540000}{900} = 600 \text{ tiles.}$$

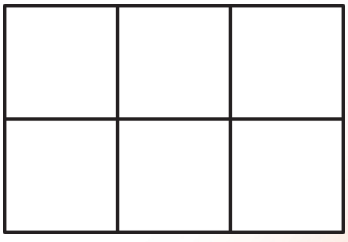
Therefore 600 tiles will be required to cover the floor of the room.

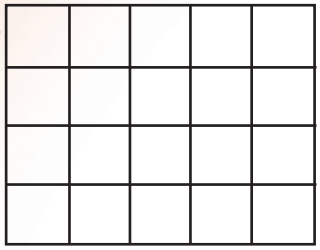
EXERCISE 10.4

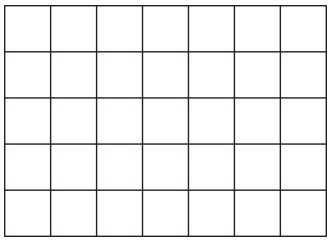
1. Find the area of the following if each small square is of side 1 unit

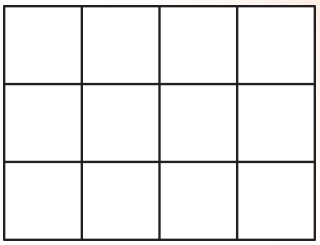
a. 

b. 

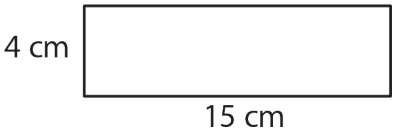
c. 

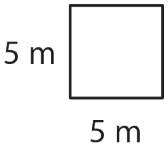
d. 

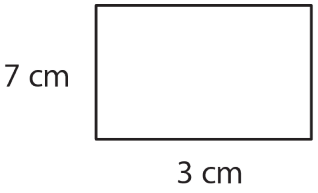
e. 

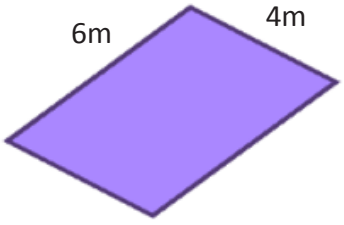
f. 

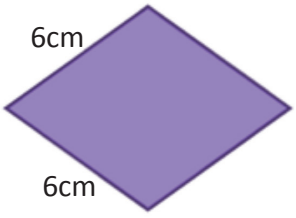
2. Find the area of the following figures by using formula:











3. Find the area of the square with the following lengths of sides.

a) 12 cm b. 25 m c. 20 cm d. 50 cm e. 15 m f. 100 m

4. Find the area of rectangles with the following measurements:

Length	Breadth	Area
5 cm	2 cm	
12 m	7 m	
50 cm	25 cm	
100 m	75 m	
150 m	110 m	
200 cm	170 cm	

5. Complete the table.

Length	Breadth	Area
6 cm		36 sq. cm
	13 cm	91 sq. cm
100 cm		5000 sq. cm
	20 m	400 sq. m
15 m		225 sq. m
	12 cm	240 sq. cm

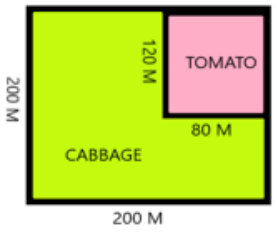
6. Applications in real life:

a) A TV screen measures 45 cm by 35 cm.
What is its area?

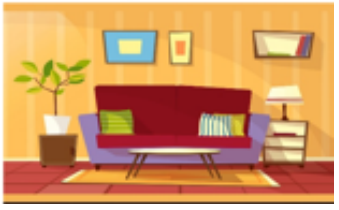
b) A farmer grows cabbages and tomatoes in two plots of land as shown in the picture. Find the area in which he grows

a) cabbage

b) tomato



c) Mr. Rahul wants to repair a hall of length 15 m and breadth 8 m. The repairs will cost ₹ 650 per sq. m. How much will he have to spend?



d) Mrs. Shyam has a square piece of cloth of side 100 cm. How many square pieces of cloth of side 25 cm can be cut from the cloth?

e) Smitha stays in a square room of side 11 m. Her sister stays in a rectangular room of length 12 m and breadth 8 m. Who stays in a bigger room?

f) A piece of land is 50 m long and 36 m wide. How many bushes can be raised in it, if 15 sqm of ground is allowed for each bush?

g) The length of a room is 550 cm and width 375 cm. Find the cost of paving the floor by slabs at the rate of ₹ 80 per sq. cm.

h) The perimeter of a square field is 200 m. Find its area.

i) Find the area of a rectangle of length 50 m and breadth 10 m.

Tick the correct answer. Identify the errors in the answers that are incorrect

a. 50 x 10 = 500 sq. m
b. 50 + 10 = 60 sq. m
c. 50 x 10 = 500 m

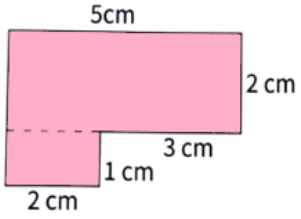
WORKSHEET

1. Complete the table

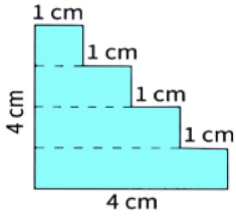
Shape	Length	Breadth	Perimeter	Area
Rectangle		16 m		320 sq. m
Rectangle	28 cm		70 cm	
Square			84 m	
Rectangle	50 m	20 m		1000sq. m
Square	4 m			16 sq. m

2. Find the perimeter and area of these figures: (Hint- Using the method of determining perimeter and area of squares and rectangles by formula)

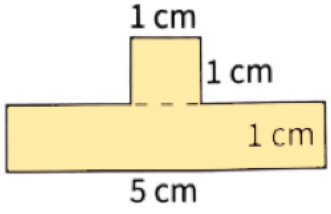
a)



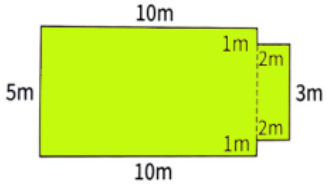
b)



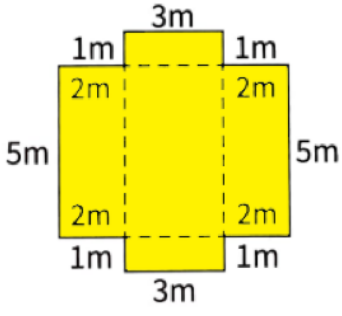
c)



d)

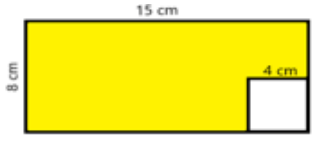


e)

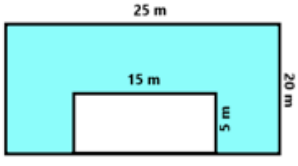


3. Calculate the area of the unshaded portion in the following figures:

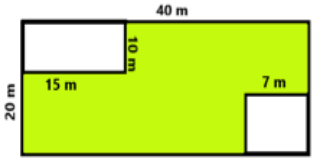
a)



b)



c)



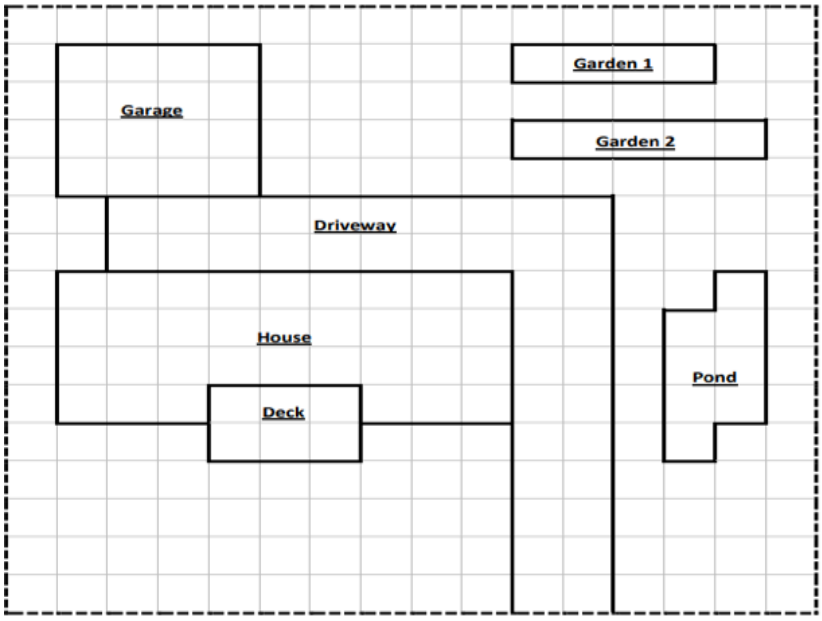
4. The breadth of the rectangle is half of its length. If the length is 40 cm, find the area of the rectangle.

5. Length of a rectangle is 5 cm more than its breadth. If the breadth is 30 cm, find the area of the rectangle.

6. A 14,000 sq. m plot is required for planting saplings. One square shaped ground of side 100 m and another rectangular ground of length 75 m and breadth 50 m are available. Are these two grounds together sufficient for the purpose? Justify

Activity

Each square represents 1 sq cm



1. What is the area of the house?
2. What is the area of the pond?
3. What is the total area of the gardens?
4. What is the area of the driveway?
5. Sushma wants a garage, that is 22 sq. m. How much area does she need more?
6. Draw on the plan to show where her new garage might best fit.

Higher Order Thinking Skills

I. Choose the correct answer:

1. What is the length of the side of a square park whose area is 64 sq. m?

a) 16 m b) 8 m c) 4 m d) 9 m

2. Perimeter of a rectangle = _____

a) L + B b) 2L + 2B c) L x B d) 2L x 2B

3. The area of a square is 121 sq. cm, then its perimeter is _____.

a) 11 cm b) 24 cm c) 44 cm d) 242 cm

4. Area is expressed in _____ units.

a) metre b) cubic c) square d) kilometre

5. A piece of string 28 cm long is bent to form a square, the area of the square formed is _____.

a) 49 sq. cm b) 14 sq. cm c) 49 cm d) 14 cm

6.A rectangular field measures 400 m by 100 m and a square field measures 200 m.

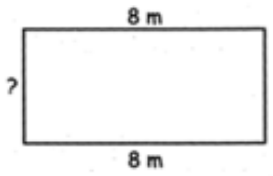
a) both have equal area b) rectangle field area is greater

c) square field area is greater d) none of these

7.Perimeter of a rectangle and square are equal. If the perimeter of the rectangle is 24 cm, find the area of the square.

a) 24 sq.cm b) 36 sq. cm c) 12 sq. cm d) 35 sq. cm

8. Find the missing side in the figure given if the perimeter of the figure is 28 m.



a) 12 m b) 3 m c) 9 m d) 6 m

9. The difference between the length and the breadth of a rectangle is 8 cm and the perimeter is 64 cm. Which of the following can be the length and breadth of this rectangle?

a) L = 12 cm, B = 4 cm b) L = 20 cm, B = 8 cm

c) L = 20 cm, B = 12 cm d) L = 12 cm, B = 8 cm

10. The area of a square is 100 sq. cm. If the sides of this square are increased by 10 cm then, what will be the area of the new square?

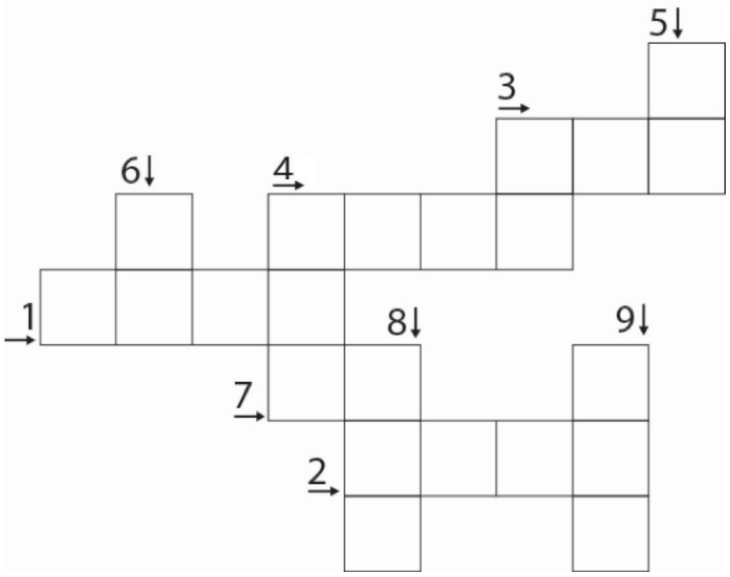
a) 800 sq. cm b) 600 sq. cm c) 200 sq. cm d) 400 sq. cm

II. Answer the following:

1. A room is 750 cm long and 850 cm wide. A square carpet of side 6 m is laid in the room. Find the area of the floor uncovered by the carpet.
2. The area of a rectangle is 144 sq. cm. If its breadth is 9 cm, find its length and perimeter.
3. The perimeter of a square wall is 88 m. Find the cost of painting the wall if the cost of painting is ₹ 15 sq. m.
4. The length of a rectangle is 3 m more than its breadth. If its breadth is 12 m, what is its length? Also, find its area.
5. The length of a garden is twice its breadth. If the breadth is 750 cm, then find the area of the garden. Also, find the cost of levelling the garden at ₹ 6 per sq. cm.
6. The floor of a room measures 12 m by 10 m. How many tiles will be required if each tile measures 2 m by 1 m. Also, find the cost of covering the floor with tiles, if the cost of a tile is ₹ 6.

Fun Time

Solve the puzzle by finding **perimeters** from the clues given in 'Down' and **areas** from the clues given in 'Across'.



Across

1. Rectangle of length 80 units and breadth 40 units.
2. Rectangle of length 45 units and breadth 42 units.
3. Rectangle of length 32 units and breadth 24 units.
4. 64 sq. units more than the square of side 50 units.
7. 1 sq. unit less than the square of side 5 units.

Down

5. Square of side 7 units.
6. 2 units more than the square of side 20 units.
8. Square of side 104 units.
9. 8 units more than the square of side 50 units.

Higher Order Thinking Skills

1) The length of a rectangular park is 120 m and breadth is 0.75 km. Find the perimeter of park in metres. It was decided to fence the park with two rounds of barbed wire. Find the cost of fencing the park if the barbed wire costs ₹ 3.30 per metre.

2) Yogesh is making a quilt from square pieces of cloth. He fits 12 pieces along one and 18 pieces along the other. How many pieces does he need?

Logical Reasoning

1. Removing which square does not change the perimeter of the original figure?

a) J b) K c) H d) F

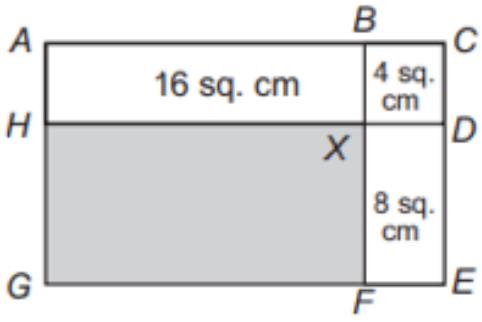
2. Rectangle ACEG below is divided into 4 parts. BCDX is square. What is the area of the shaded part?

a) 28 sq. cm

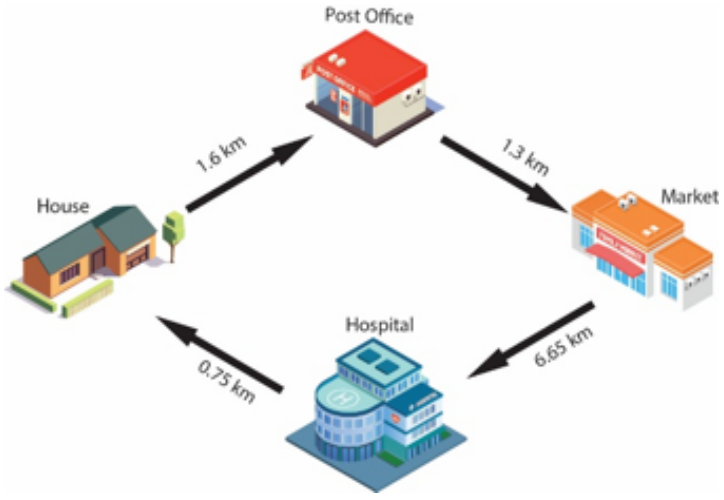
b) 32 sq. cm

c) 48 sq. cm

d) 64 sq. cm

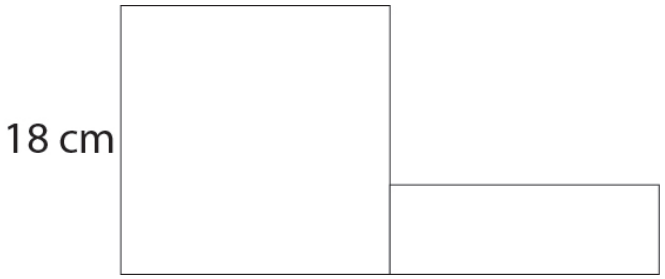


3. Rohan cycled from his house to the post office, then to the market, then to the hospital and then back to his house. The distances are marked in the given figure. What is the total distance covered by Rohan?



a) 12.5 km b) 11.4 km c) 9.53 km d) 10.3 km

4. The given figure is made up of a square and a rectangle. The breadth of the rectangle is $\frac{1}{3}$ the length of the edge of the square. If the area of the whole figure is 384 sq. cm, then find the length of the rectangle.

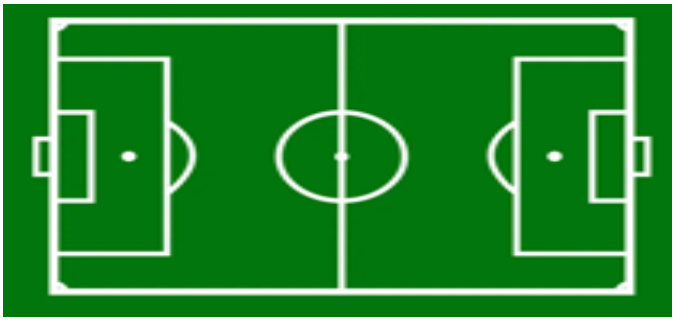


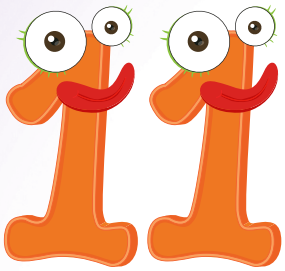
a) 12 cm b) 8 cm c) 10 cm d) 9 cm

Subject Integration Activity

The playing surface is also known as soccer field or football pitch. The pitch is rectangular in shape. The standard pitch is 105 metres bt 68 metres.

a. Find the perimeter and area of a standard football pitch.





GEOMETRY PART – 2

Learning outcomes

At the end of this lesson, children will be able to:

Identify an angle and name its parts

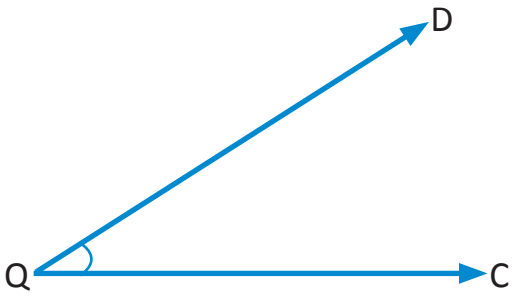
Identify the types of angles

Measure and draw angles using a protractor

Angles

Two rays with a common end point form an angle. In the given figure, point Q is the common end point of $\overrightarrow{QC}$ and $\overrightarrow{QD}$.

Thus $\angle DQC$, $\angle CQD$ is an angle.



The common end point (where 2 rays meet) is called the vertex of the angle. In the given figure Q is the vertex.

The rays forming an angle are called its arms or sides of the angle. In the given figure QC and QD are the arms of the angle.

The symbol $\angle$ is used to represent an angle

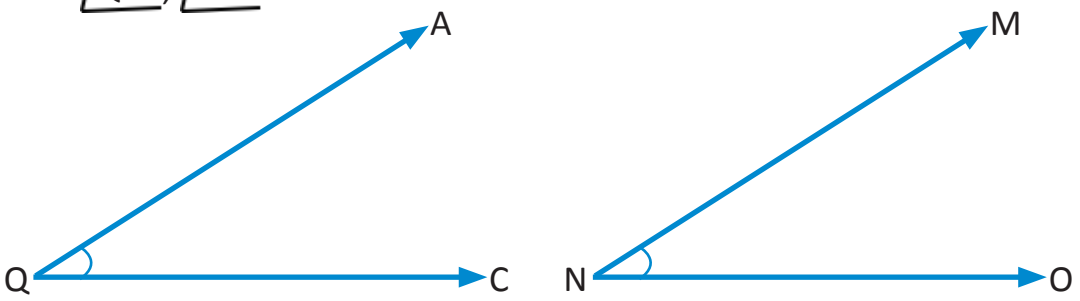
Naming an angle

An angle can be named in any one of the following ways.

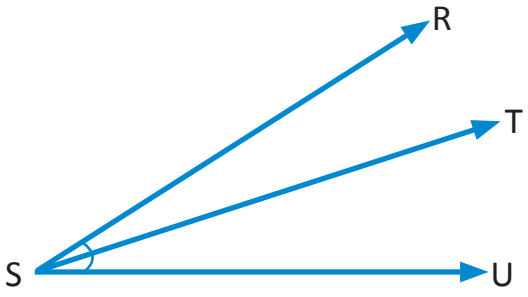
We can name an angle by using 3 letters of the English alphabet, such as $\angle DQC$, $\angle MNR$ etc.

The letter in the middle is the vertex of the angle.

We can also name an angle by the vertex only such as $\angle Q$, $\angle N$ etc.

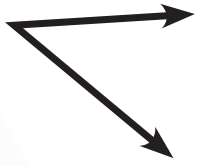


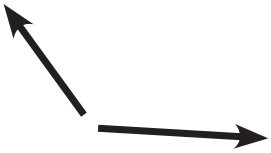
* There can be more than one angle at a given vertex.
  In the figure given below, we have 3 angles RST, TSU and RSU

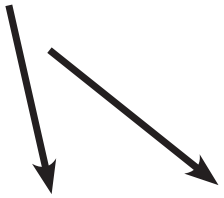


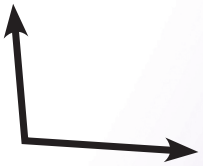
EXERCISE 11.1

1. Which of these figures represent an angle?

a) 

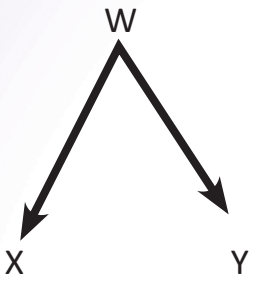
b) 

c) 

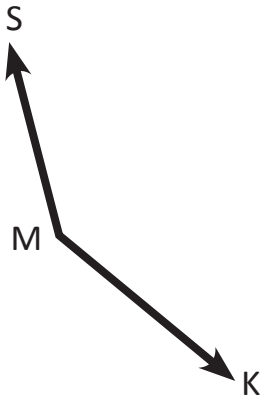
d) 

2. Name the angles shown below.

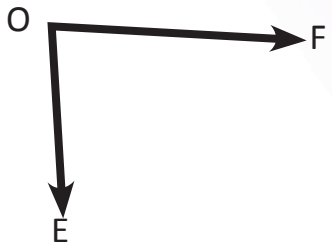
a.



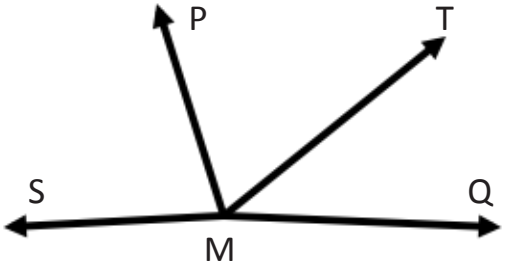
b.



c.

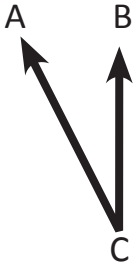


3. Name all the angles in the given figure.

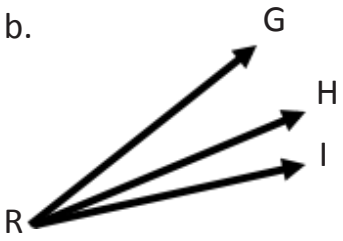


4. Name the vertices and arms of the angles formed.

a.



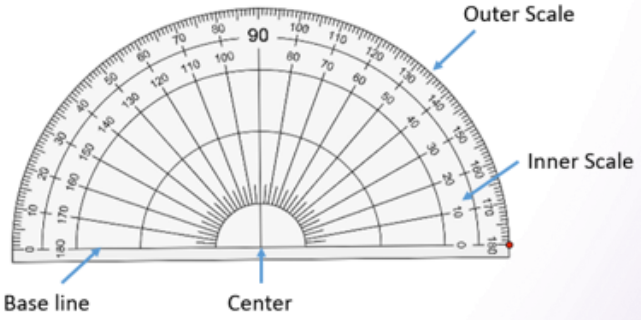
b.



c.

Measuring angles

* We measure angles in degrees. The symbol for degree is °. It is written as 30°, 90° and 135° etc.
* Protractor is used to measure an angle. It is semi-circular in shape. The mid-point of its baseline is called its centre point.



* A protractor has 2 scales of measurements that is, the inner and the outer scales.

* Angles from 0° to 180° are marked on both scales. The outer scale is read clockwise and the inner scale anticlockwise.

Let us measure $\angle ABC$ using a protractor.

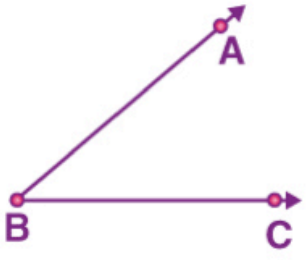
Follow the steps given below to measure the angle.

Step 1. Place the protractor above the line BC such that the midpoint of protractor is at point B.

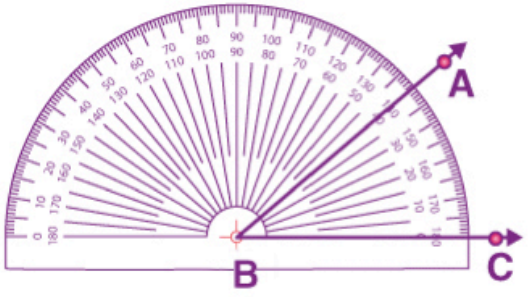
Step 2. Adjust the protractor in such a way that BC is parallel to the baseline of the protractor.

Step 3. The protractor has two 'scales' marked from 0 to 180 degrees on both the ends. Take the reading only when BC coincides with the 0 degree.

Step 4. Now from 0 degrees, check where the ray BA coincides with the curved edges of the protractor. This reading on the inner scale gives us the measure of angle ABC.



Given $\angle ABC$



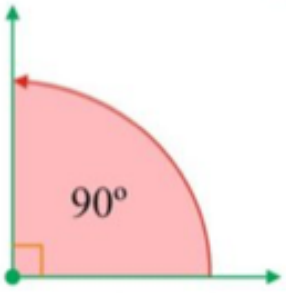
Measuring $\angle ABC$

The measure of $\angle ABC = 40°$

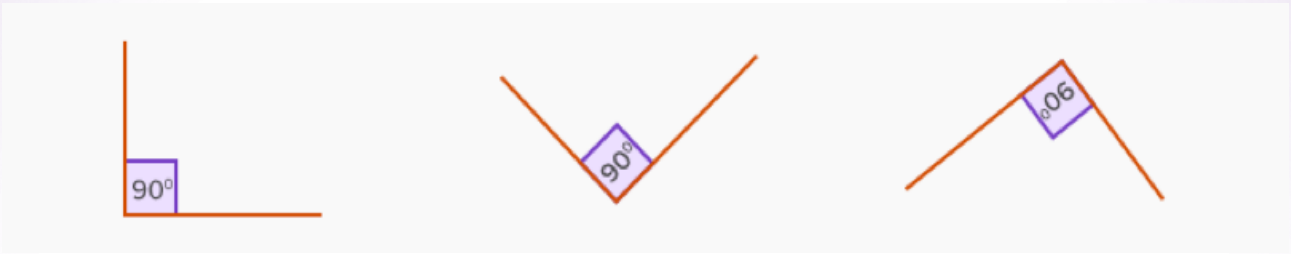
Types /kinds of angles

Right angle

An angle whose measure is exactly 90°is called a right angle.

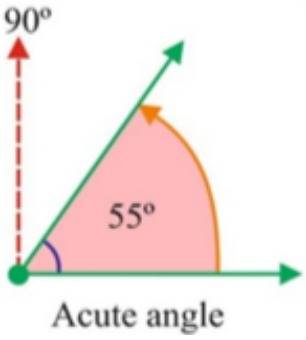


Right angle

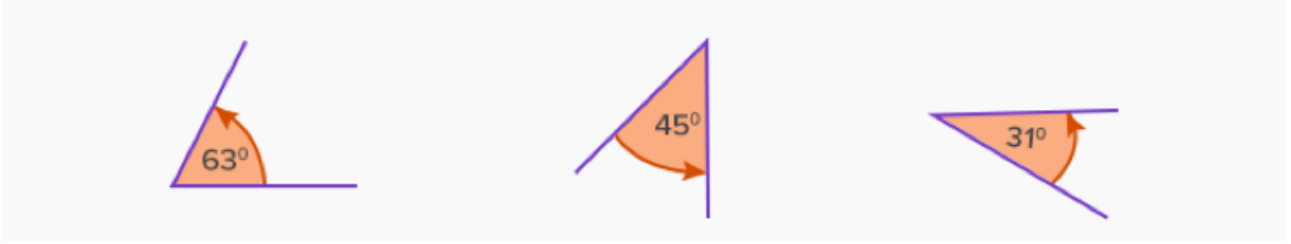


Acute angle

The angles whose measure are more than 0° but less than 90° are called acute angles.

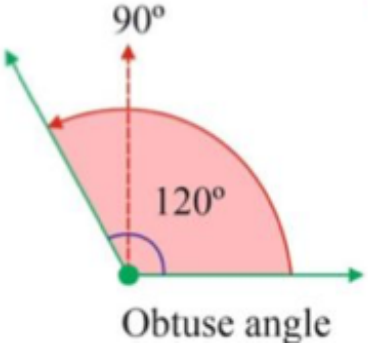


Some acute angles are.

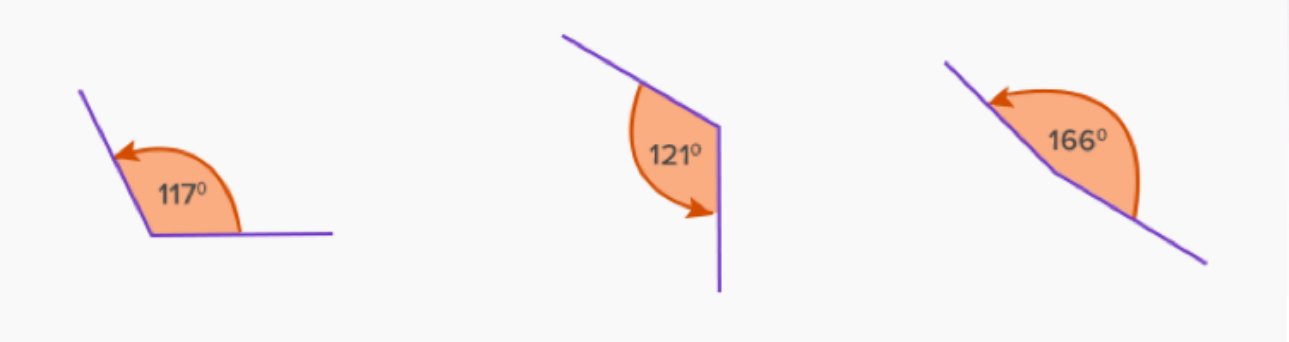


Obtuse angle

The angles whose measure is greater than 90° but less than 180° are called obtuse angles.

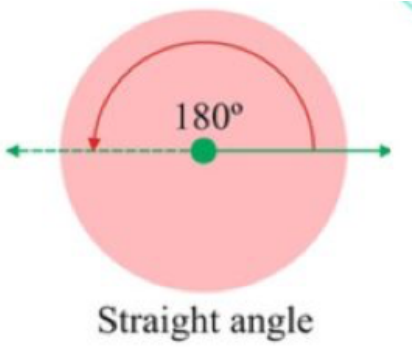


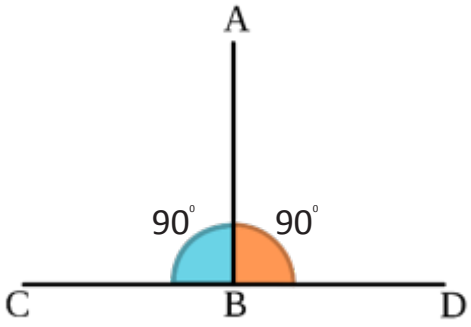
All angles given below are obtuse angles.



Straight angle

A straight angle measures 180˚. Two right angles together make a straight angle.

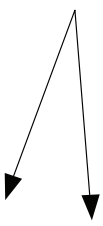




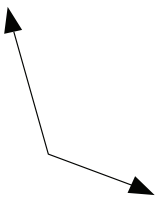
EXERCISE 11.2

1. Identify the angles as right, acute, obtuse or straight angle.

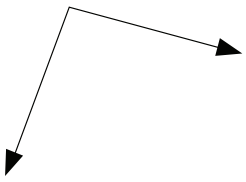
a)



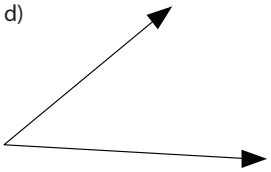
b)



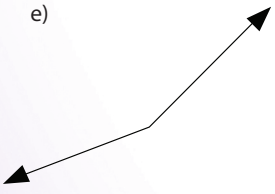
c)



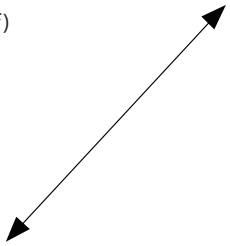
d)



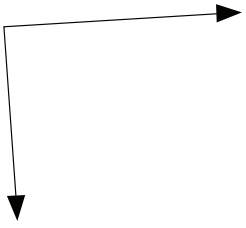
e)



f)

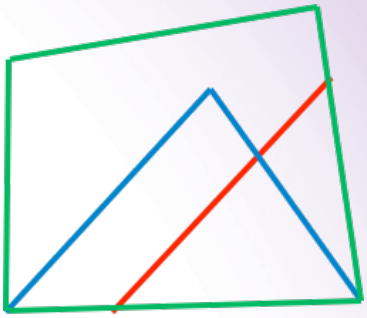


g)

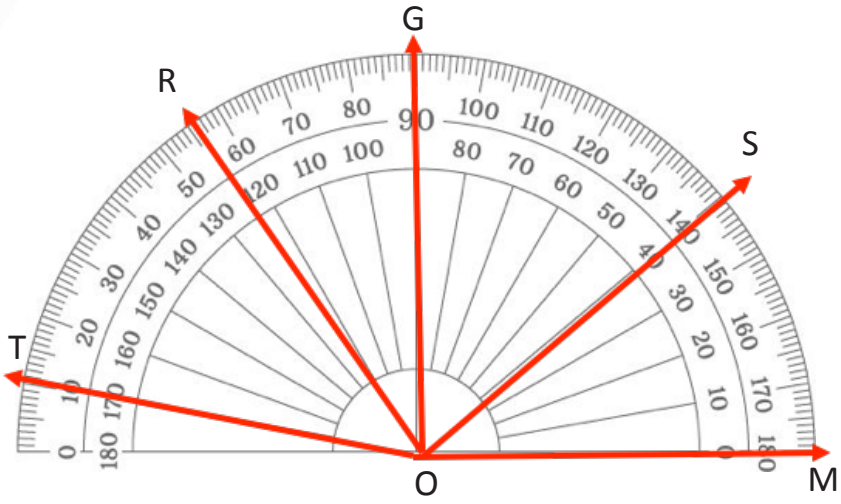


h)

2. Identify the right angles, acute angles and the obtuse angles in the given figure.



3. Find the measure in degrees of the angles given.

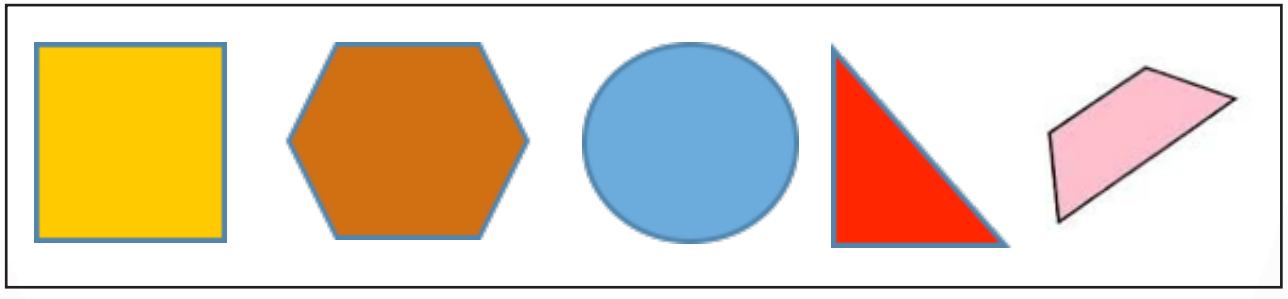


$\angle MOS$ = _____ $\angle MOG$ =_____

$\angle SOG$ = _____ $\angle GOR$ =_____

$\angle ROT$ =_____ $\angle TOM$ = _____

4. Find out the name of the shapes using the given clues.



a. I have 6 obtuse angles. _____

b. I have no angles. _____

c. I have one right angle and 2 acute angles. _____

d. I have four right angles. _____

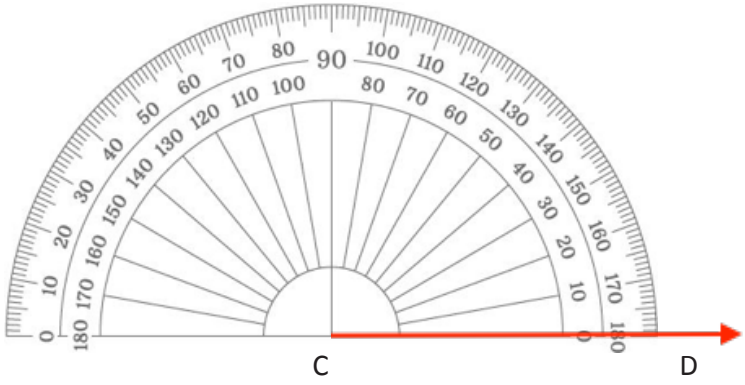
e. I have 2 acute angles and 2 obtuse angles. _____

Construction of an angle using a protractor

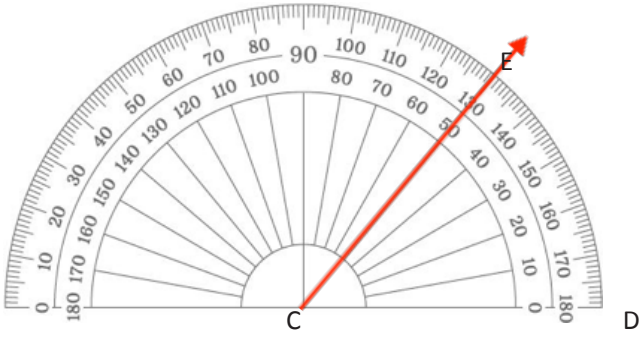
Example: Draw an angle of measure 50°.

Step 1: Draw a $\overrightarrow{CD}$ using a scale.

Step 2: Place the protractor on CD such that the baseline coincides with CD and the centre coincides with C.

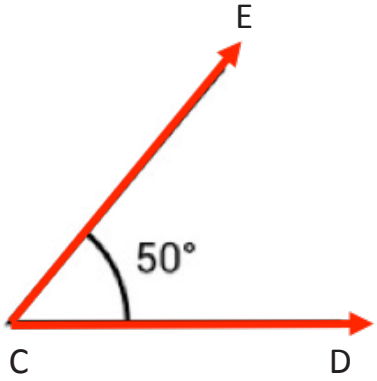


Step 3: Mark a point E, corresponding to the marking of 50° on the inner scale



Step 4: Remove the protractor and join C and E. We get

$\angle DCE = 50°$.



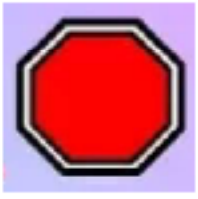
EXERCISE 11.3

1. Draw the following angles using a scale and a protractor.

a. 30° b. 55° c. 120° d. 75° e. 90° f. 140° g. 175° h. 30°

Value Based Question

I am sure you would have observed your parents following traffic signals while travelling by road. Let's check your observation. Classify the angles in each of them as acute, obtuse, right or straight.

Traffic signs	Meaning	Type of angle
	No stopping	
	Give way	
	Stop	

Do you think we should follow traffic rules? Why?

_____

_____

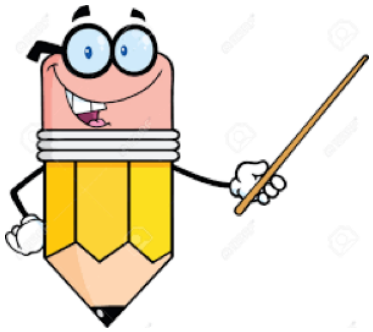
Find the angles made by the numbers 1, 4, 5 and 7. Do the measure of angles vary with the length of the arms that form it?

Fun activity

1. To start, here's a simple and easy activity to teach students about angles that have practical applicability.

2. Students can use a scale or draw freehand the letters of their name.

3.There should be no rounding near the edges of the letters.



K A V I N

4. Mark as many as angles and measure using a protractor and classify them, as acute, obtuse, right or straight angles.

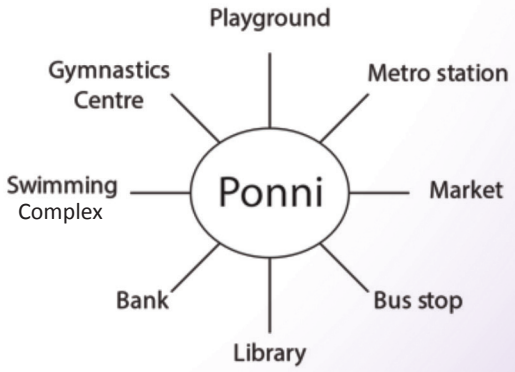
Art integration activity

Colour the given picture using crayons or colour pencils. Identify the different types of angles.

Logical Reasoning

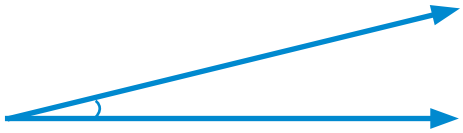
If Ponni is facing the swimming complex and she turns 135° in a clockwise direction, then what will Ponni be facing finally?

a) Bus stop
b) Gymnastic Centre
c) Metro station
d) Central Library



2. What would be the approximate measure of this angle in degrees?

a) 25° b) 45° c) 105° d) 95°



3. The chart paper in the figure 1 is folded two times to get the shape in figure 2.

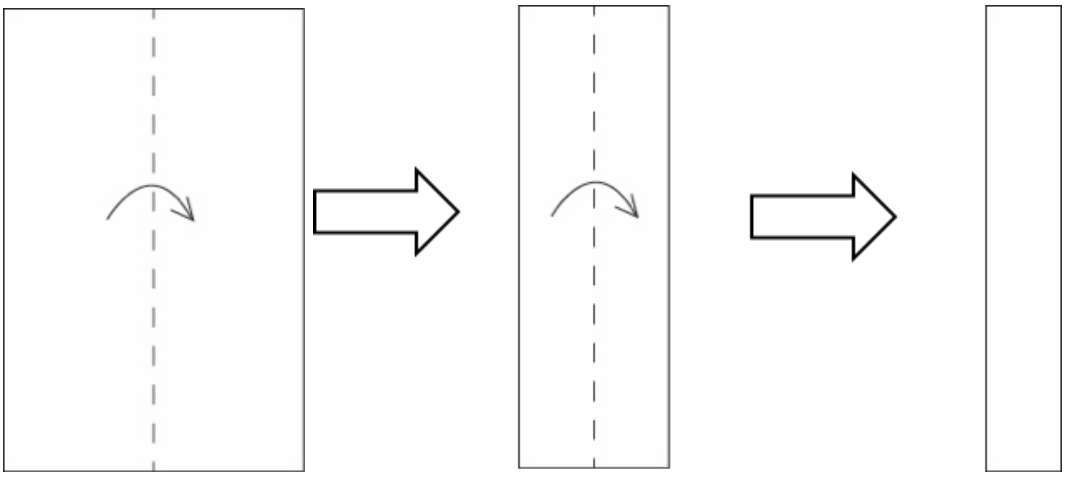
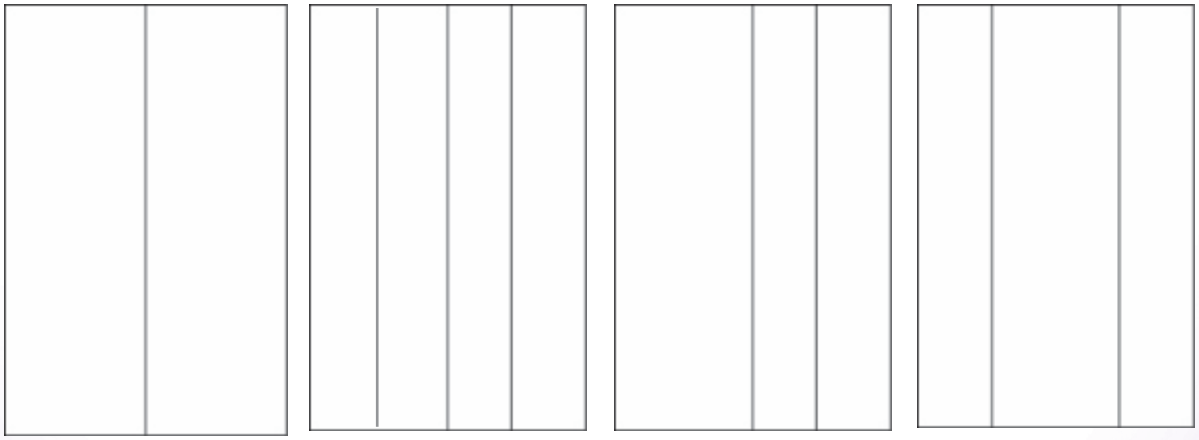


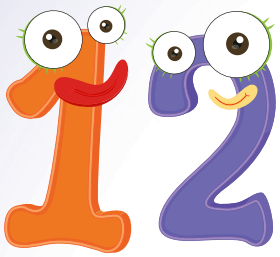
Figure 1 Figure 2

How will the paper look when it is completely unfolded?

(Note: The lines inside the paper show the folds.)



(a) (b) (c) (d)



HANDLING DATA

Learning outcomes

At the end of this chapter, students will be able to

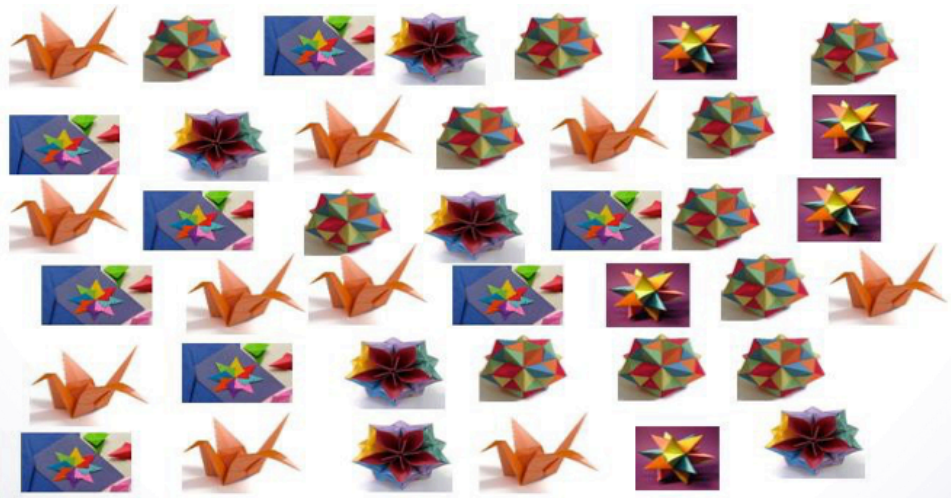
- Collect raw data
- Represent raw data using tally marks
- Interpret a bar graph
- Interpret a circle graph
- Interpret a line graph

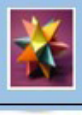
Information in the form of numerical figures is called data. Data can be collected and represented in different ways i.e., tally marks, bar graph, circle graph and line graph.

Tally Chart

Tally marks chart is a quick and easy way to count the number of items in each category in bundles of five. Four vertical lines are made for the first four counts, the fifth number is represented by a diagonal line.

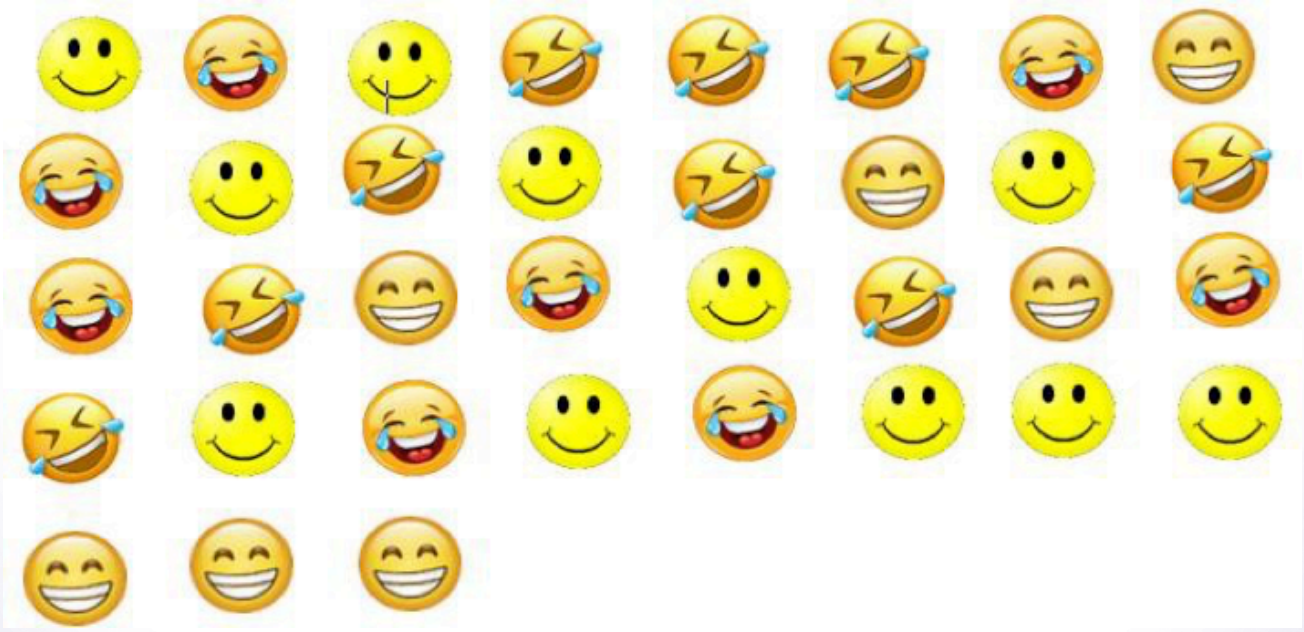
Example: The following were done by students of class V, during their craft class (Origami). Prepare a tally chart for the given data.



CRAFT ITEM	TALLY MARK	NUMBER OF ITEMS
	𝍸 I	6
	𝍸	5
	𝍸 III	8
	𝍸 𝍸 I	11
	𝍸 𝍸	10

EXERCISE 12.1

1. Whenever children visit orphanages, they make some craft items to make them happy. This time they made smileys as given below. Prepare a tally mark chart for the data given below.



SMILEYS	TALLY MARKS	NUMBER
		
		
		
		

2. A teacher asked her students to draw an angle. The following measures of angles were drawn by the students in their note book.

10°, 60°, 90°, 45°, 100°, 75°, 91°, 66°, 79°, 80°, 130°, 180°, 5°, 140°, 175°, 25°, 49°, 120°, 85°, 90°, 180°, 179°, 90°, 30°, 180°, 9°, 26°, 65°, 96°, 57°, 98°, 101°, 99°, 15°, 79°, 89°, 49°, 83°, 44°, 90°

Angles	Tally Marks	Number
Acute Angle		
Right Angle		
Obtuse Angle		
Straight Angle		

3. A set of class V students were asked, how they help their parents at home? They were asked to use the following codes to respond. The following are the responses.

(A- Folding the clothes, B-Arranging the vessels, C-Watering the plant, D-Sweeping the floor) The following are the responses.

A, B, C, A, C, D, B, D, A, C, D, A, C, B, A, C, B, D, C, D,

A, B, D, D, A, C, B, A, C, D, A, D, C, B, B, C, D, D, B, D

Prepare a tally mark chart for the responses given by them.

4. The places visited by the students of a class were collected as raw data. Represent the data as a tally mark chart to know how many students visited each of these places.

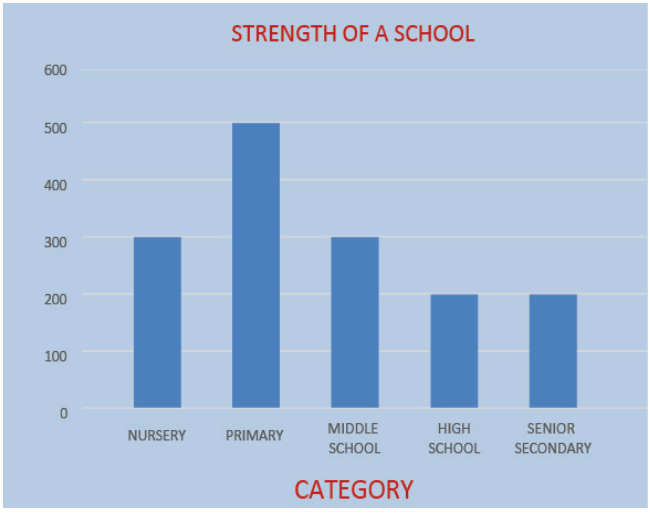
museum, beach, zoo, art gallery, goshala, beach, zoo, goshala, museum, beach art gallery, museum, zoo, beach, goshala, museum, art gallery, goshala, zoo, beach, goshala, art gallery, zoo, beach, museum, goshala, beach, zoo, art gallery, zoo museum, goshala, beach, zoo, zoo, beach, beach, art gallery, goshala, beach.

Bar Graph

A bar graph is a pictorial representation of numerical data using a number of bars erected horizontally or vertically, with equal spacing between them.

The length of the bar increases if the measure of data increases.

Example: The given bar graph depicts the total number of students in a school. Read the bar graph and answer the following questions.



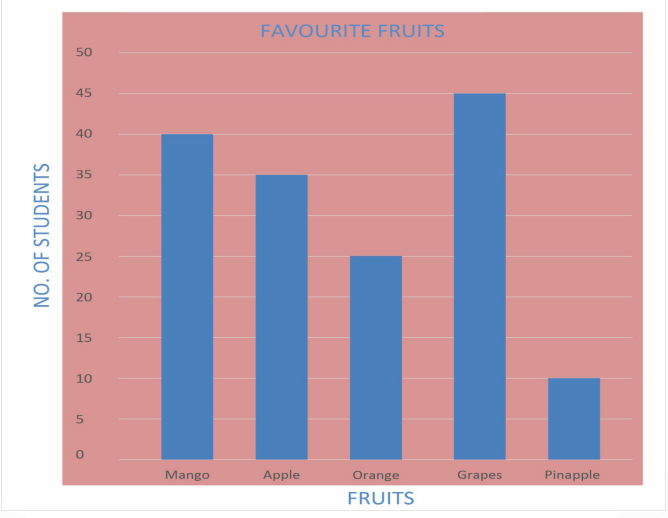
1. What is the strength of the school?

2. How many students have been enrolled in nursery and primary categories together?

3. How many less students are there in high school compared to the middle school?

EXERCISE 12.2

1. The given bar graph shows the favourite fruits of class V students. Look into the bar graph and answer the following questions.



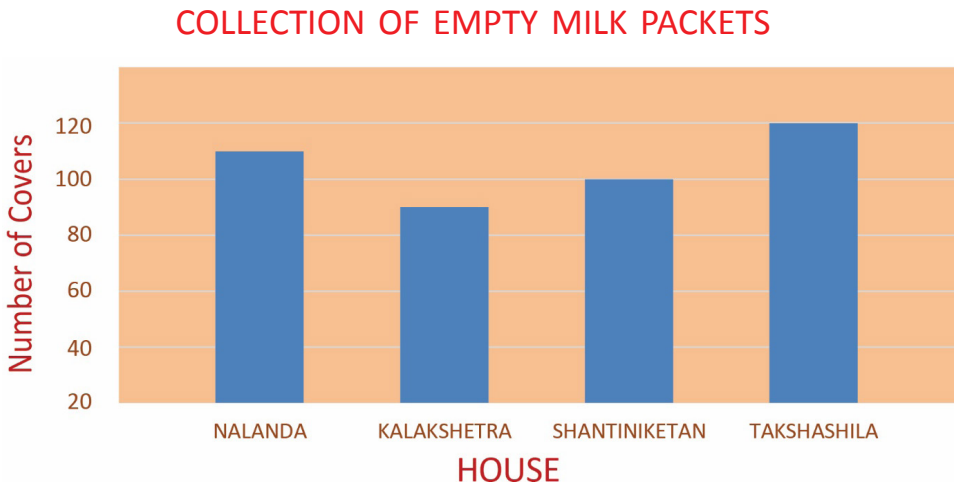
a. Which fruit is liked by maximum number of students?

b. Which is the least favourite fruit?

c. What are the other fruits liked by the students?

d. Why should we eat fruits regularly?

2. To create an awareness on recycling and reuse of plastic covers, the school organised a program to collect empty milk sachets for recycling. A bar graph was made to know which group / house collected the maximum number. Answer the following questions, based on the data depicted in the graph.



a. How many empty milk packets were collected in all?

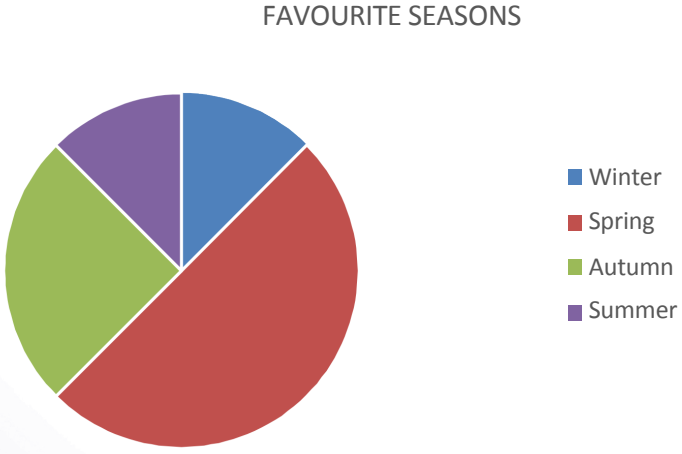
b. What is the necessity to recycle and reuse polythene covers?

c. Arrange the groups in ascending order according to the number of packets they brought.

Circle graph

A circle graph is a visual representation of data, made by dividing a circle into sectors according to the share of each in the whole.

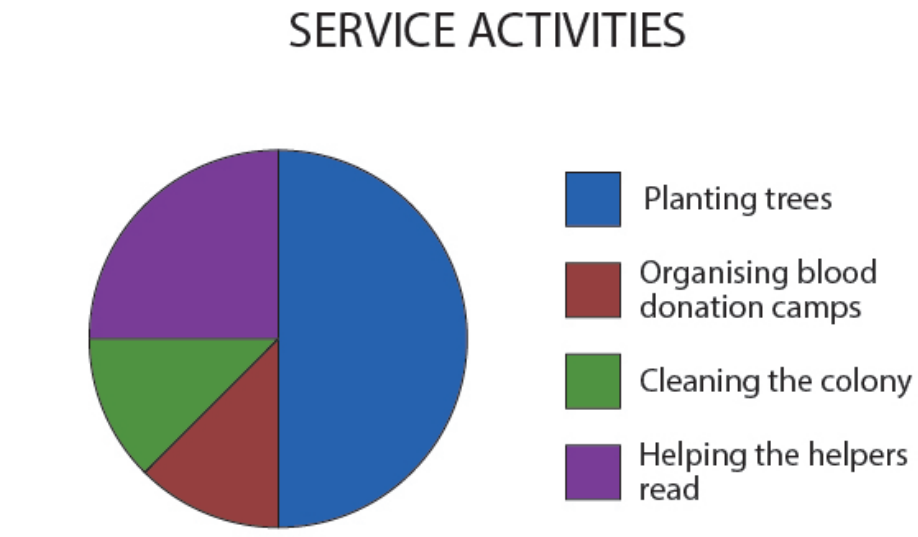
Example: Radha asked each of her classmates which season was their favourite. She made a circle graph, to depict it.



1. Which season is the favourite of her class?
2. What fraction of the students liked Autumn?
3. How many students liked the spring if there were 80 students in the class?

EXERCISE 12.3

1. Students of our colony planned to engage in a few services during the summer vacation. From the circle graph, answer the following questions.

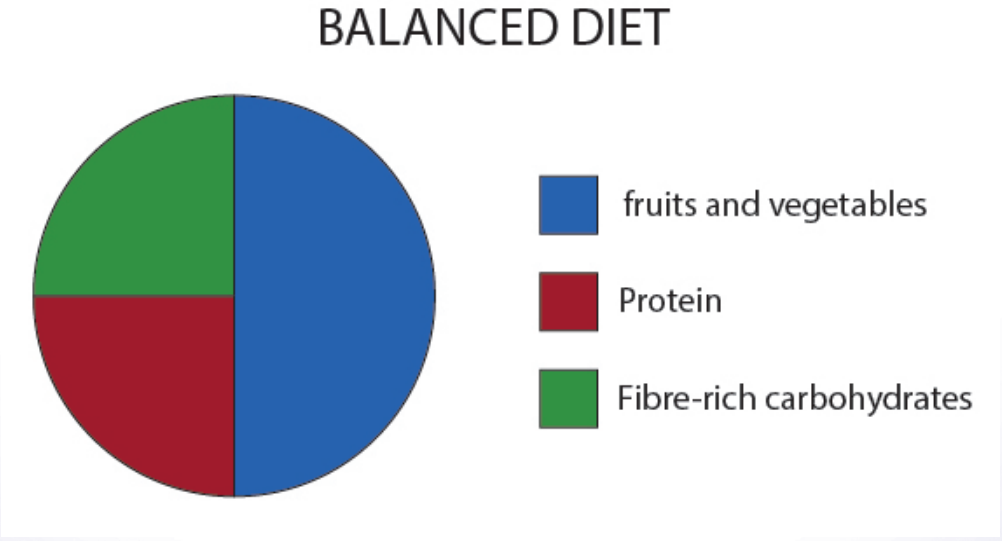


   a. Which is the most favourite activity of students?

   b. If there are 60 students in the colony, how many were able to help the helpers?

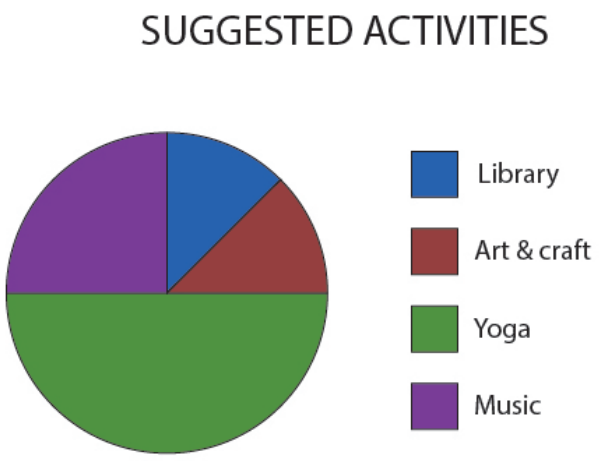
   c. What fraction of the students organised a blood donation camp?

2. The preferred diet chart for a child is given below. Answer the questions based on the graph.



a. What fraction of food should be fruits and vegetables?
b. What are the other two nutrients needed for good health?
c. Name some foods rich in proteins.

3. The circle graph represents the club activities suggested by students. Answer the following questions.



a. Which two activities were suggested by the same number of students?
b. If 10 students suggested art & craft, how many suggested music?
c. How many students gave their suggestions?

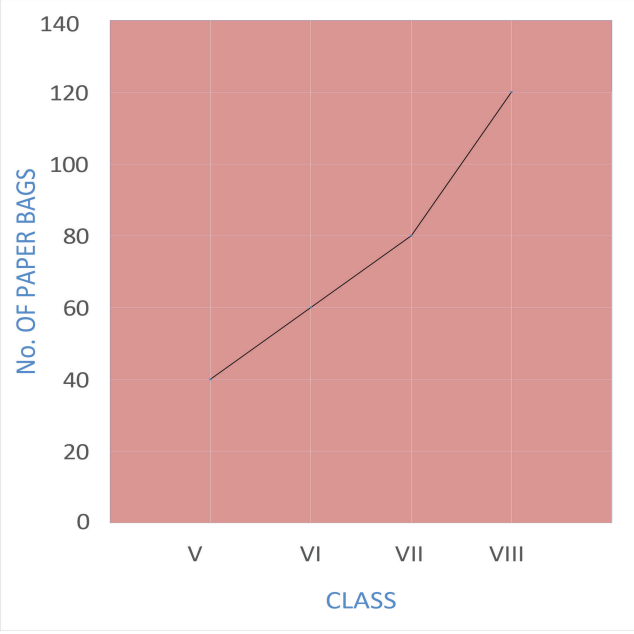
Line graph

Line graphs are used to track changes over short and long periods of time. When smaller changes exist, line graphs help us understand them better than bar graphs. Line graphs can also be used to compare changes over the same period of time for more than one group.

Example: The line graph given below represent the marks obtained by Ganesan in class V. Observe the graph and answer the following questions.

1. In which exam did he perform the best?
2. How many more marks did he get in PT 3 than in Term I exam?
3. In which two exams did he get the same marks?

4. The School organised a competition on making of paper bags in an hour to create the awareness on non-usage of plastic bags. Observe the line graph and answer the questions, that follow.



a. Which class made the maximum number of paper bags? How many did they make?

b. Find the total number of paper bags made in an hour.

c. How many more paper bags were made by the students of class VII than class VI?

5. The graph shows the temperature in Chennai on a certain day.

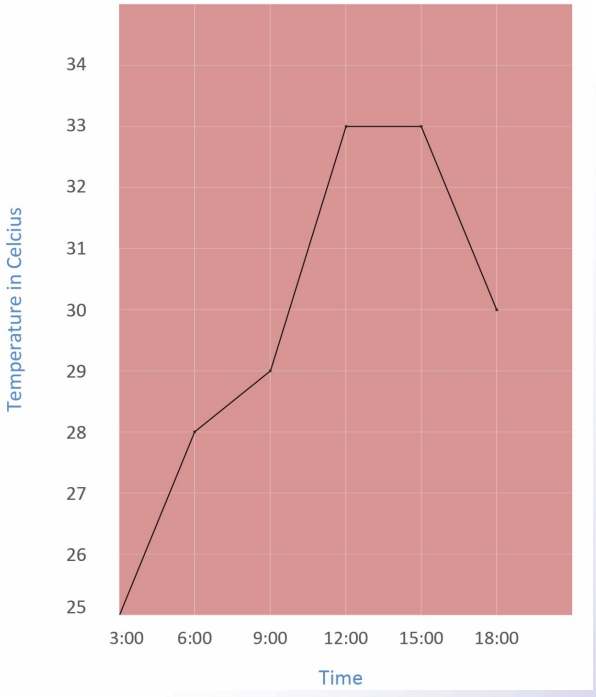
Answer the following questions:

a. What was the temperature at 9:00a.m.?

b. What was the temperature at 6:00p.m.?

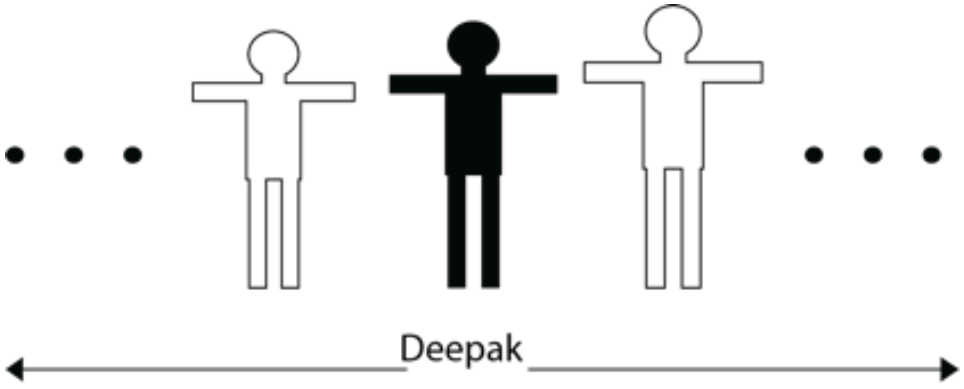
c. What was the maximum temperature recorded on that day?

d. For how many hours did the temperature remain the same?



Logical Reasoning

1. Some children of Deepak's class were standing in a single row, height wise. Deepak's position in the row from both the ends was 8th.



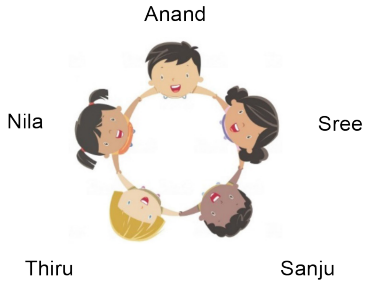
8th from either direction

How many children was standing in the row?

a) 8 b) 15 c) 16 d) 17

2. All the five friends stood in a circle to play games as shown in the picture below.

Who was holding Anand's right hand?



a) Sree

b) Sanju

c) Nila

d) Thiru

3. Many fishes were kept in fish tanks at the aquarium.
In one such tank, there were 3 types of fishes: Goldfish, Neon Tetra fish and Platy fish.

Fishes in the Tank

Gold Fish	★★★★★
Neon Tetra Fish	★★★★
Platy Fish	★

Key : 1 ★ represents 5 fishes

How many new Platy fish must be added to the fish tank so that the total of fishes are 70 ?

a) 3 b) 4 c) 5 d) 6

Magic Squares

A magic square is a set of numbers whose sum remains the same along the rows, columns and also diagonally.

Example:

8712	1089	6534	16335
3267	5445	7623	
4356	9801	2178	
16335			16335

We shall try to create some more magic squares by altering the given set of numbers. Remove the ones digit from all the numbers in the magic square and place them in the same position.

871	108	653	1632
326	544	762	
435	980	217	
1632			1632

87			162
32			
	98	21	
162			162

Observe the numbers given in the square. Follow the pattern to fill in the empty squares. Do you get a magic square? (Remember that they have been derived from the 1st set)

Follow the pattern and fill in the boxes to get magic squares. (Remember that they have to be derived from the 1st set)

712		
		178

		78

Vedic Mathematics

SUTRA: ऊर्ध्वतिर्यग्भ्याम् (URDHVATIRYAGBHYAM)
Meaning: Vertically and Crosswise

Application: To find the product of two numbers

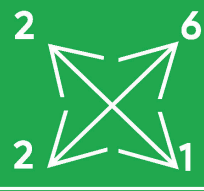
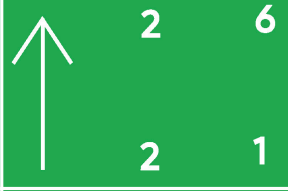
Example : 12 x 33

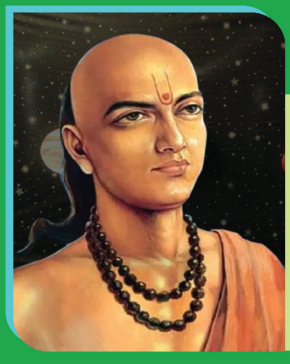
12 x 33

3	3+6	6
3	9	6

Ans : 396

Example : 26 x 21

Step 1	Step 2	Step 3
		
6	4 6	5 4 6
	1 carry over	
	(2x1) + (2x6) = 2 + 12 = 14 [Retain the units place and carry the tens place]	(2x2)+1 = 5



3.14159265359793238462643383279 50

The Great Indian Mathamatician Aryabhatta calculated the value of π at 3.1416.
π is the ratio of circle's circumference to its diameter. It's value is the same irrespective of the diameter of the circle.

3.14159265359793238462643383279 50

ISBN: 978-81-971186-9-2