

Rethink Mathematics-7

Chapter-1 Integers

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Comparing numbers/ Greatest and Lowest numbers, Ascending and Descending orders, Making numbers by using the given digits.	Children will be able to compare numbers and Understands all numbers are formed by using any of the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 students will be able to form numbers.	Through various situations, make children compare numbers up to 5-digits like cost of two houses, number of spectators present in two etc. Practise the method to make 4-digit, 5-digit, 6-digit numbers using the given digits.	Use $>$, $<$ or $=$ a) 101011 1010011 b) 54334 504334
Expanded form of a number Place Value and Place Value	Importance of place values and the method to write a number as the sum of ones, tens, hundreds, thousands etc.	Make the children understand expanded form using different egs. Like $9238 = 9 \times 1000 + 2 \times 100 + 3 \times 10 + 8 \times 1$	Find the product of the sum of the place value and face value of 75 in the number 7437
Indian and International system of numeration. Word problems	Difference between Indian and International system of numeration and their uses.	Give different numbers to understand that Indian system is in terms of hundreds and International system is in terms of thousands.	Express 84329 in indian and international system
Addition, subtraction and Division of large numbers Word problems	Larger number and thus solve perform real life problem	Number patterns could be used to extend numbers up to 8-digits and then daily life situations involving 8-digit numbers could be discussed e.g. cost of property. Involve children in solving daily life problems involving more than one operation and then to appreciate the hierarchy to be decided to carry on different operations.	The population of a town was 2049647 in 2012, 3124975 in 2013 and 3024976 in 2014. State the increase in population from 2013 to 2012 compare the population of 2013 and 2014.

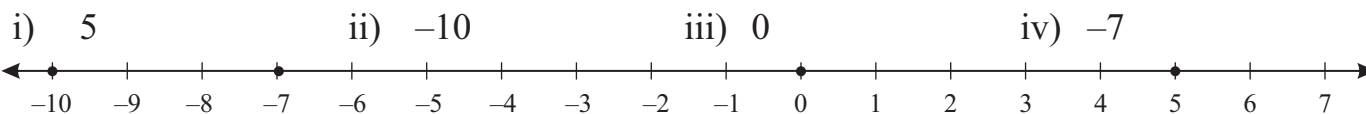
Estimation by rounding off nearest to tens, hundreds, thousands etc. Estimation of sum, difference product and quotient	Children will be able to nearest to tens, hundreds, thousands etc. and their uses in daily life	Make the children understand the method of estimation ie. Less than the middle value to the lower number and more than or equal to the middle number to the higher number. Egs round off 876 to nearest tens as 880 and nearest hundreds as 900.	Estimate the answer for the following to its highest place $1864 - 15 - 810$
Conversion of units	The children will be able to perform conversion of one unit to another	Practice the rules to convert to given unit to other units through different egs.	Convert a) 86 kg to g b) 1249 g to kg and g

Exercise 1.1

1. Write the following with the opposite sign.

- i) -100m (Descent of 100m) ii) $-\text{₹}200$ (Loss of $\text{₹}2000$)
iii) $+2^\circ\text{C}$ (Rise of temperature of 2°C) iv) $+\text{₹}1000$ (Deposit of $\text{₹}1000$)

2. Plot the following on the number line.



3. Write all the integers between -5 and 4 .

$-4, -3, -2, -1, 0, 1, 2, 3$

4. Some integers are marked on the number line. Study the number line and answer the questions.

- i) $-5 > 4 > 3 > 2 > 1 > 0 > -1 > -2 > -3 > -4 > -5$
ii) Point A is not greater than point Q.
iii) $A < Q < P$

5. Arrange in descending order.

- i) $0 > -3 > -8 > -17 > -25$ ii) $36 > 35 > 1 > 0 > -14 > -37$

6. Arrange in ascending order.

- i) $-27 < -11 < -8 < -4 < 0 < - < 9 < 18$ ii) $-42 < -37 < -16 < 0 < 14 < 16$

7. Evaluate the following.

- i) $|-4| + |6|$ ii) $|+8| - |-3|$ iii) $|13 - 4| + |-4|$
 $= 4 + 6$ $= 8 - 3$ $= 9 + 4$
 $= 10 \text{ Ans.}$ $= 5 \text{ Ans.}$ $= 13 \text{ Ans.}$

8. Fill in the blanks.

- i) 0 ii) -4 iii) negative iv) -1 v) greater

9. Use $>$, $<$ or $=$ to fill in the boxes.

i) $>$

iii) $>$

ii) $<$

iv) $=$

Exercise 1.2

1. Add:

i) -145 and 100

$$(-145) + 100$$

$$= -45$$

Ans. -45

ii) 63 and -50

$$63 + (-50)$$

$$= 63 - 50$$

$$= 13$$

Ans. 13

iii) -700 and -300

$$(-700) + (-300)$$

$$= -700 - 300$$

$$= -1000$$

Ans. -1000

iv) 64000 and -54000

$$64000 + (-54000)$$

$$= 64000 - 54000$$

$$= 10000$$

Ans. 10000

2. Subtract:

i) -850 from 1000

$$1000 - (-850)$$

$$= 1000 + 850$$

$$= 1850$$

Ans. 1850

ii) -500 from -400

$$(-400) - (-500)$$

$$= -400 + 500$$

$$= 100$$

Ans. 100

iii) 29 from 63

$$63 - 29$$

$$= 34$$

Ans. 34

iv) -1000 from -1200

$$(-1200) - (-1000)$$

$$= 1200 + 1000$$

$$= -200$$

Ans. -200

3. Solve:

i) $971 - (-161)$

$$= 971 + 161$$

$$= 1132$$

Ans. 1132

ii) $258 + (-280)$

$$= 258 - 280$$

$$= -22$$

Ans. -22

iii) $-194 - (-390)$

$$= 194 + 390$$

$$= 196$$

Ans. 196

iv) $-540 + (-660)$

$$= -540 - 660$$

$$= -1200$$

Ans. -1200

4. Evaluate the following.

i) $-80 - (-20) + 36 - 15$

$$= -80 + 20 + 36 - 15$$

$$= -39$$

Ans. 39

ii) $-15 - (-16) + (-14)$

$$= -15 + 16 - 14$$

$$= -13$$

Ans. -13

$$\begin{aligned}\text{iii) } & -86 + (-18) - (-96) \\ & = -86 - 18 + 96 \\ & = -8 \\ \text{Ans. } & -8\end{aligned}$$

$$\begin{aligned}\text{iv) } & 132 - (-32) + 14 - 36 \\ & = 132 + 32 + 14 - 36 \\ & = 142 \\ \text{Ans. } & 142\end{aligned}$$

Exercise 1.3

1. Multiply:

$$\begin{aligned}\text{i) } & -250 \times -60 \\ & (-250) \times (-60) \\ & = 15000 \\ \text{Ans. } & 15000\end{aligned}$$

$$\begin{aligned}\text{iv) } & -1000 \times 500 \\ & (-1000) \times 500 \\ & = -500000 \\ \text{Ans. } & -500000\end{aligned}$$

$$\begin{aligned}\text{ii) } & 85 \times -45 \\ & 85 \times (-45) \\ & = -3825 \\ \text{Ans. } & -3825\end{aligned}$$

$$\begin{aligned}\text{v) } & -15 \times -20 \\ & (-15) \times (-20) \\ & = 300 \\ \text{Ans. } & 300\end{aligned}$$

$$\begin{aligned}\text{iii) } & 29 \times 70 \\ & = 2030 \\ \text{Ans. } & 2030\end{aligned}$$

$$\begin{aligned}\text{vi) } & 11 \times -750 \\ & 11 \times (-750) \\ & = -8250 \\ \text{Ans. } & -8250\end{aligned}$$

2. Divide:

$$\begin{aligned}\text{i) } & -1200 \text{ by } 12 \\ & (-1200) \div 12 \\ & = -100 \\ \text{Ans. } & -100\end{aligned}$$

$$\begin{aligned}\text{iv) } & -4949 \text{ by } -7 \\ & (-4949) \div (-7) \\ & = 707 \\ \text{Ans. } & 707\end{aligned}$$

$$\begin{aligned}\text{ii) } & 640 \text{ by } -32 \\ & 640 \div (-32) \\ & = -20 \\ \text{Ans. } & -20\end{aligned}$$

$$\begin{aligned}\text{v) } & -45000 \text{ by } -90 \\ & (-45000) \div (-90) \\ & = 500 \\ \text{Ans. } & 500\end{aligned}$$

$$\begin{aligned}\text{iii) } & -8100 \text{ by } 27 \\ & -8100 \div 27 \\ & = -300 \\ \text{Ans. } & -300\end{aligned}$$

$$\begin{aligned}\text{vi) } & -5555 \text{ by } 11 \\ & (-5555) \div 11 \\ & = -505 \\ \text{Ans. } & -505\end{aligned}$$

3. Solve:

$$\begin{aligned}\text{i) } & (+86) \times (-78) \\ & 86 \times (-78) \\ & = -6708 \\ \text{Ans. } & -6708\end{aligned}$$

$$\begin{aligned}\text{ii) } & -47 \times (-36) \times (-7) \\ & (-47) \times (-36) \times (-7) \\ & = -11844 \\ \text{Ans. } & -11844\end{aligned}$$

$$\begin{aligned}\text{iii) } & -984 \div (-12) \\ & = 82 \\ \text{Ans. } & 82\end{aligned}$$

Exercise 1.4

Solve:

$$\begin{aligned}1. \quad & -25 + 14 \div (5 - 3) \\ & = -25 + 14 \div 2 \\ & = -25 + 7 \\ & = -18 \\ \text{Ans. } & -18\end{aligned}$$

$$\begin{aligned}2. \quad & 37 - [5 + \{28 - 15\} \times 2] \\ & = 37 - [5 + 13 \times 2] \\ & = 37 - [5 + 26] \\ & = 37 - 31 \\ & = 6 \\ \text{Ans. } & 6\end{aligned}$$

$$\begin{aligned}
 3. \quad & 63 - (-3) \times \{-2 - 8 \text{ of } 3\} \\
 & = 63 + 3 \times \{-2 - 24\} \\
 & = 63 + 3 \times (-26) \\
 & = 63 + (-78) \\
 & = 63 - 78 \\
 & = -15
 \end{aligned}$$

Ans. -15

$$\begin{aligned}
 5. \quad & 160 + 80 \div 4 - 2 \times 3 \\
 & = 160 + 20 - 6 \\
 & = 174
 \end{aligned}$$

Ans. 174

$$\begin{aligned}
 4. \quad & 22 - 4 \{-5 - (-40) \div 8\} \\
 & = 22 - 4 \{-5 - 40 \div 8\} \\
 & = 22 - 4 \\
 & = 22 - 0 \\
 & = 22
 \end{aligned}$$

Ans. 22

$$\begin{aligned}
 6. \quad & 19 - [14 + \{26 - (12 - 2)\}] \\
 & = 19 - [14 + \{26 - 10\}] \\
 & = 19 - [14 + 16] \\
 & = 19 - 2 \\
 & = -11
 \end{aligned}$$

Ans. -11

$$\begin{aligned}
 7. \quad & 45 - \{63 + 3 \text{ of } 21 \times 0\} \\
 & = 45 - \{63 + 63 \times 0\} \\
 & = 45 - \{63 + 0\} \\
 & = 45 - 63 \\
 & = -8
 \end{aligned}$$

Ans. -18

Exercise 1.5

1. In a test, a child gets 2 marks for correct answer and 1 mark is deducted for incorrect answer. If a child attempts 10 correct and 3 incorrect answers, what is her score?

Marks obtained for each correct answer = 2 mark

$\therefore$ Marks deducted for each incorrect answer = -1 mark

No. of correct answers of a child = 10

$\therefore$ Marks she gets for 10 correct answers = (10×2) marks

No. of incorrect answers of a child = 3

$\therefore$ Marks deducted for 3 incorrect answers = $3 \times (-1)$
 $= -3$

$\therefore$ Score of child = $\{20 + (-3)\}$ marks
 $= (20 - 3)$ marks
 $= 17$ marks

Ans. The child scored 17 marks.

2. **A seller has 30 eggs. He sells 18 eggs and 6 eggs are broken. How many eggs does the seller have now?**

$$\begin{aligned}\text{No. of eggs seller has} &= 30 \\ \text{No. of eggs sold} &= 18 \\ \text{No. of broken} &= 6 \\ \therefore \text{No. of eggs seller has now} &= 30 - 18 - 6 \\ &= 6\end{aligned}$$

Ans. The seller has 6 eggs left.

3. **A rabbit leaps ahead 25 steps each of length 30 cm. How far does he reach? He again goes back 10 steps each of 15 cm. How far is he from the starting position?**

$$\begin{aligned}\text{No. of steps rabbit leaps} &= 25 \\ \text{Length of each step} &= 30\text{cm} \\ \therefore \text{Distance travelled by him} &= (25 \times 30)\text{ cm} \\ &= 750\text{ cm} \\ \text{No. of steps rabbit goes back} &= 10 \\ \text{Length of each step} &= 15\text{cm} \\ \therefore \text{Distance he came back} &= (10 \times 15)\text{cm} \\ &= 150\text{cm} \\ \text{Distance of rabbit from the starting point} &= (750 - 150)\text{ cm} \\ &= 600\text{ cm}\end{aligned}$$

Ans. Distance of rabbit from starting point = 600 cm

4. **I have 50 mangoes each costing ₹ 10. I sell 20 of them for ₹ 20 each and 30 at ₹ 5 each. How much profit did I earn?**

$$\begin{aligned}\text{No. of mangoes I have} &= 50 \\ \text{Cost price of 50 mangoes} &= ₹(50 \times 10) \\ &= ₹500 \\ \text{No. of mangoes I sell for ₹20} &= 20 \\ \therefore \text{Selling price of 20 mangoes} &= ₹(20 \times 20) \\ &= ₹400 \\ \text{No. of mangoes I sell for ₹5} &= 30 \\ \therefore \text{Selling price of 30 mangoes} &= ₹(30 \times 5) \\ &= ₹150 \\ \text{C.P. of 50 mangoes} &= ₹500 \\ &= ₹(400 + 150) \\ &= ₹550\end{aligned}$$

$\therefore$ S.P. of 50 mangoes $>$ C.P. of 50 mangoes.

$\therefore$ I earned a gain

$$\begin{aligned}\text{gain amount} &= ₹(550 - 500) \\ &= ₹50\end{aligned}$$

Ans. I earned ₹50

- 5. Ishita has 300 flowers. She gives 120 flowers to Raman and 50 flowers to Suchi. Amit again gives her 100 flowers. How many flowers does Ishita have finally?**

$$\begin{aligned}\text{No. of flowers Ishita has} &= 300 \\ \text{No. of flowers she gives to Raman} &= 120 \\ \text{No. of flowers she gives to suchi} &= 50 \\ \text{No. of flowers Amit given to Ishita} &= 100 \\ \text{No. of flowers Ishita has at last} &= 300 - 120 - 50 + 100 \\ &= 400 - 120 - 50 \\ &= 230\end{aligned}$$

Ans. Ishita has 230 flowers at last

- 6. The fisherman had 250 fish. He sold 175 fish, kept 20 fish for his neighbours and remaining for himself. How many did he keep for himself?**

$$\begin{aligned}\text{No. of fish a fisherman has} &= 250 \\ \text{No. of fish he sold} &= 175 \\ \text{No. of fish he kept for neighbours} &= 20 \\ \therefore \text{No. of fish he kept for himself} &= 250 - 175 - 20 \\ &= 55\end{aligned}$$

Ans. The fisherman kept 55 fish for himself.

SELF ASSESSMENT-1

- 1. Simplify : $50 \div 5 + 7 - 8$**

$$\begin{aligned}50 \div 5 + 7 - 8 \\ &= 10 + 7 - 8 \\ &= 9\end{aligned}$$

Ans. 9

- 2. Express the following in mathematical term and then simplify.**

$$\begin{aligned}\text{i) } (-7) + (2 \times 8) \\ &= (-7) + 16 \\ &= 9\end{aligned}$$

Ans. 9

$$\begin{aligned}\text{ii) } \{(-3) \times (-6)\} - \{(-27) - 9\} \\ &= +18 - (-3) \\ &= 18 + 3 \\ &= 21\end{aligned}$$

Ans. 21

3. Fill in the blanks with $>$, $<$, $=$.

$$\begin{aligned} \text{i) } & -10 + 8 \times 2 & -10 - 8 \times (-2) \\ & = -10 + 16 & = -10 + 16 \\ & = 6 & = 6 \\ & \therefore \{-10 + (8 \times 2)\} = \{(-10) - 8 \times (-2)\} \end{aligned}$$

$$\begin{aligned} \text{ii) } & -4 \div 2 + 3 & -8 \div 2 + 9 \\ & = -2 + 3 & = -4 + 9 \\ & = 1 & = +5 \\ & \therefore -4 \div 2 + 3 < -8 \div 2 + 9 \end{aligned}$$

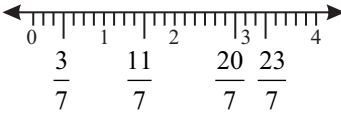
4. Write the product of all negative integers between -11 and -7 .

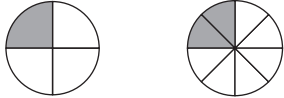
$$\begin{aligned} & -10 \times (-9) \times (-8) \\ & = -720 \end{aligned}$$

Ans. -720

5. -100 6. a) $-x$ 7. b) $-$ 8. d) -5 9. a) positive
10. c) -21 11. 1 12. a) 0 13. c) negative

Chapter-6 Fraction And Decimals

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Introduction : Fractions	Understand the concept of a fraction as the part of a whole.	Define fraction as the part of a whole. Representation of a fraction in the form $\frac{a}{b}$ where a is called numerator and b is called denominator. Show the diagrammatic representation of fractions through  egs. It represent $\frac{1}{4}$  It represent $\frac{6}{9}$	Write the fractions for the following.   
Fraction on A number Line	Understand the representation of fractions on a number line	Explain the method of representation of fractions on the number line by drawing it. 	Represent $3\frac{4}{5}$ on the number line

Types of Fractions And Their Conversions	Understand the different types of fractions as proper, Improper and mixed fractions Able to convert one from to another.	$N' < \Rightarrow$ proper fraction. Egs. $\frac{1}{2}, \frac{3}{5}, \frac{99}{100}, \dots$ $N' < \Rightarrow$ Improper fraction Egs. $\frac{5}{2}, \frac{23}{21}, \frac{50}{35}, \dots$ The combination of a whole number and a proper fraction is called mixed fraction. Egs. $1\frac{1}{2}, 3\frac{2}{7}, \dots$ $\frac{25}{5} = 4\frac{1}{6} \quad 6 \overline{) 25} \begin{array}{r} 4 \\ 24 \\ \hline 1 \end{array}$ $4\frac{1}{6} = \frac{6 \times 4 + 1}{6} = \frac{25}{6}$ Make the children understand the conversions by doing more problems.	Is $\frac{17}{5}$ a proper fraction. Give reasons. If no can it be converted to a mixed fraction?
Equivalent Fractions And Simplest Form of Fractions	Understand the meaning of equivalent fractions. Students will be able to reduce a fraction to its simplest form.	Demonstrate the equivalent fractions by taking different examples. Worksheets based on reducing a fraction to simplest form can be done.	1) Are the given fractions equivalent?  2) $\frac{6}{10} = \frac{\boxed{?}}{20}$
Like and Unlike fractions Comparison of fractions and ordering of fractions.	Students will be able to distinguish between the like and unlike fraction and apply them to compare two fractions	Explain to the students comparison of like (fractions and comparison of unlike fractions make the denominators equal and by using LCM and compare) Worksheet based on comparison and ordering can be done.	1) Is $\frac{2}{7}$ greater than $\frac{1}{6}$ 2) Use $>$, $<$ or $=$ $\frac{2}{7} \boxed{} \frac{1}{7}$ $\Rightarrow \frac{1}{8} \boxed{} \frac{6}{12}$

Addition and Subtraction of fractions	Students will be able to add and subtract fractions	Explain the method of adding like fraction and unlike fractions. O diagrams of fractions can be used to show addition and subtraction of fractions.	Solve: 1) $\frac{1}{6} + \frac{2}{6} = \square$ 2) $\frac{6}{7} + \frac{8}{6}$ $= \frac{\square + \square}{42}$ $= \square$
Multiplication and Division of fractions Reciprocal of a fraction	Students will be able to multiply and divide fractions	Explain to the children how to multiply fractions use eggs show multiplication of fraction by a whole number, by a fraction, by 1 and by 0. Explain the concept of reciprocal and explain division Worksheets can be done.	1) What is the reciprocal of $\frac{1}{6} \times \frac{3}{7}$? 2) Solve: $\frac{1}{8} \times \frac{1}{16} = \square$

Exercise 2.1

1. Classify as proper, improper and mixed fraction.

- | | | |
|--------------|--------------|------------|
| i) Proper | ii) Improper | iii) Mixed |
| iv) Improper | v) Mixed | vi) Proper |

2. Give two equivalent fraction for each.

i) $\frac{10}{7} = \frac{10}{7} \times 2 = \frac{20}{14}$

$\frac{10}{7} = \frac{10}{7} \times 3 = \frac{30}{21}$

Ans. Two equivalent fractions of $\frac{10}{7}$ are $\frac{20}{14}$ and $\frac{30}{21}$

ii) $\frac{6}{19} = \frac{6}{19} \times 2 = \frac{12}{38}$

$\frac{6}{19} = \frac{6}{19} \times 3 = \frac{18}{57}$

Ans. Two equivalent fractions of $\frac{6}{19}$ are $\frac{12}{38}$ and $\frac{18}{57}$

3. Express $\frac{64}{80}$ as a fraction with :

$$\text{i) } \frac{64}{80} = \frac{64 \div 8}{80 \div 8} = \frac{8}{10}$$

$$\text{ii) } \frac{64}{80} = \frac{64 \times 2}{80 \times 2} = \frac{128}{160}$$

$$\text{4. i) } \frac{1}{9} = \frac{12}{\boxed{108}}$$

$$\text{ii) } \frac{3}{2} = \frac{\boxed{270}}{180}$$

$$\text{iii) } \frac{6}{13} = \frac{\boxed{30}}{65}$$

$$\text{iv) } \frac{11}{15} = \frac{220}{\boxed{300}}$$

5. Change the following improper fractions into mixed fractions in the lowest terms.

$$\text{i) } \frac{13}{5} = 2\frac{3}{5} \text{ Ans.}$$

$$\text{ii) } \frac{14}{11} = 1\frac{3}{11} \text{ Ans.}$$

$$\text{ii) } \frac{\cancel{18}^6}{\cancel{15}_5} = \frac{6}{5} = 1\frac{1}{5} \text{ Ans.}$$

$$\text{iv) } \frac{335}{12} = 27\frac{11}{12} \text{ Ans.}$$

6. Reduce the following fractions to the lowest terms.

$$\text{i) } \frac{\cancel{48}^{4^2}}{\cancel{72}_{6^3}} = \frac{2}{3}$$

$$\text{ii) } \frac{12\cancel{\emptyset}}{25\cancel{\emptyset}} = \frac{12}{25}$$

$$\text{iii) } \frac{\cancel{98}^{49}}{\cancel{100}_{50_{25}}} = \frac{49}{25}$$

$$\text{iv) } \frac{17}{35}$$

7. Write a fraction equivalent to each of the following fractions.

$$\text{i) } \frac{2}{7} = \frac{2 \times 2}{7 \times 2} = \frac{24}{84}$$

$$\text{ii) } \frac{18}{14} = \frac{18 \times 6}{14 \times 6} = \frac{108}{315}$$

$$\frac{2}{7} = \frac{2 \times 45}{7 \times 45} = \frac{90}{315}$$

$$\frac{18}{14} = \frac{18 \times 5}{14 \times 5} = \frac{90}{70}$$

$$\text{iii) } \frac{15}{42} = \frac{15 \times 2}{42 \times 2} = \frac{30}{84}$$

$$\text{iv) } \frac{2}{21} = \frac{2 \times 4}{21 \times 4} = \frac{8}{84}$$

$$\frac{15}{42} = \frac{15 \times 6}{42 \times 6} = \frac{90}{252}$$

$$\frac{2}{21} = \frac{2 \times 45}{21 \times 45} = \frac{90}{945}$$

8. Convert the following into like fractions.

$$\begin{aligned} \text{i) } \frac{7}{2}, \frac{8}{9}, \frac{4}{15}, \frac{7}{18} \\ \frac{7}{2} &= \frac{7 \times 30}{2 \times 30} = \frac{210}{90} \\ \frac{8}{9} &= \frac{8 \times 10}{9 \times 10} = \frac{80}{90} \\ \frac{4}{15} &= \frac{4 \times 6}{15 \times 6} = \frac{24}{90} \\ \frac{7}{18} &= \frac{7 \times 5}{18 \times 5} = \frac{35}{90} \\ &= \frac{210}{90}, \frac{80}{90}, \frac{24}{90}, \frac{35}{90} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{ii) } \frac{1}{4}, \frac{5}{8}, \frac{3}{16}, \frac{19}{20} \\ \frac{1}{4} &= \frac{1 \times 20}{4 \times 20} = \frac{20}{80} \\ \frac{5}{8} &= \frac{5 \times 10}{8 \times 10} = \frac{50}{80} \\ \frac{3}{16} &= \frac{3 \times 5}{16 \times 5} = \frac{15}{80} \\ \frac{19}{20} &= \frac{19 \times 4}{20 \times 4} = \frac{76}{80} \\ &= \frac{20}{80}, \frac{50}{80}, \frac{15}{80}, \frac{76}{80} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{iii) } \frac{12}{13}, \frac{8}{39}, \frac{5}{26}, \frac{19}{78} \\ \frac{12}{13} &= \frac{12 \times 6}{13 \times 6} = \frac{72}{78} \\ \frac{8}{39} &= \frac{8 \times 2}{39 \times 2} = \frac{16}{78} \\ \frac{5}{26} &= \frac{5 \times 3}{26 \times 3} = \frac{15}{78} \\ \frac{19}{78} &= \frac{19 \times 1}{78 \times 1} = \frac{19}{78} \\ &= \frac{72}{78}, \frac{16}{78}, \frac{15}{78}, \frac{19}{78} \text{ Ans.} \end{aligned}$$

9. Fill in the missing number in the following equivalent fractions.

$$\begin{aligned} \text{i) } \frac{7}{3} &= \frac{\boxed{105}}{45} \\ \therefore n &= \mathbf{105} \end{aligned}$$

$$\begin{aligned} \text{ii) } \frac{6}{5} &= \frac{48}{\boxed{40}} \\ \therefore n &= \mathbf{40} \end{aligned}$$

$$\begin{aligned} \text{iii) } \frac{20}{4} &= \frac{\boxed{80}}{16} \\ \therefore n &= \mathbf{80} \end{aligned}$$

$$\begin{aligned} \text{iv) } \frac{6}{4} &= \frac{30}{\boxed{20}} \\ \therefore n &= \mathbf{20} \end{aligned}$$

$$\begin{aligned} \text{v) } \frac{11}{2} &= \frac{\boxed{44}}{8} \\ \therefore n &= \mathbf{44} \end{aligned}$$

$$\begin{aligned} \text{vi) } \frac{5}{2} &= \frac{35}{\boxed{14}} \\ \therefore n &= \mathbf{14} \end{aligned}$$

$$\begin{aligned} \text{vii) } \frac{2}{9} &= \frac{20}{\boxed{90}} \\ \therefore n &= \mathbf{90} \end{aligned}$$

$$\begin{aligned} \text{viii) } \frac{88}{3} &= \frac{\boxed{440}}{15} \\ \therefore n &= \mathbf{440} \end{aligned}$$

10. Arrange the following fractions in descending order.

i) $\frac{13}{14}, \frac{12}{35}, \frac{3}{7}, \frac{8}{21}, \frac{4}{7}$

$$\frac{13}{14} = \frac{13}{14} \times 15 = \frac{195}{210}$$

$$\frac{12}{35} = \frac{3}{7} \times 30 = \frac{72}{210}$$

$$\frac{3}{7} = \frac{8}{21} \times 10 = \frac{80}{210}$$

$$\frac{4}{7} = \frac{4}{7} \times 30 = \frac{120}{210}$$

$$\therefore \frac{13}{14}, \frac{12}{35}, \frac{3}{7}, \frac{8}{21}, \frac{4}{7}$$

$$= \frac{195}{210}, \frac{72}{210}, \frac{90}{210}, \frac{80}{210}, \frac{120}{210}$$

$$\nearrow 195 > 120 > 90 > 80 > 72$$

$$\therefore \frac{195}{210} > \frac{120}{210} > \frac{90}{210} > \frac{80}{210} > \frac{72}{210}$$

$$= \frac{13}{14} > \frac{4}{7} > \frac{3}{7} > \frac{8}{21} > \frac{12}{35} \text{ Ans.}$$

iii) $\frac{11}{24}, \frac{5}{18}, \frac{5}{36}, \frac{5}{6}, \frac{17}{48}$

$$\frac{11}{24} = \frac{11}{24} \times 12 = \frac{132}{288}$$

$$\frac{5}{36} = \frac{5}{18} \times 16 = \frac{40}{288}$$

$$\frac{17}{48} = \frac{17}{48} \times 6 = \frac{102}{288}$$

$$= \frac{132}{288}, \frac{80}{288}, \frac{40}{288}, \frac{240}{288}, \frac{102}{288}$$

$$\therefore \frac{240}{288} > \frac{132}{288} > \frac{102}{288} > \frac{80}{288} > \frac{40}{288}$$

ii) $\frac{4}{5}, \frac{7}{10}, \frac{11}{15}, \frac{13}{20}, \frac{3}{25}$

$$\frac{4}{5} = \frac{4}{5} \times 60 = \frac{240}{300}$$

$$\frac{7}{10} = \frac{7}{10} \times 30 = \frac{210}{300}$$

$$\frac{11}{15} = \frac{7}{10} \times 30 = \frac{220}{300}$$

$$\frac{13}{20} = \frac{13}{20} \times 15 = \frac{195}{300}$$

$$\frac{3}{25} = \frac{3}{25} = \frac{36}{300}$$

$$\therefore \frac{4}{5}, \frac{7}{10}, \frac{11}{15}, \frac{13}{20}, \frac{3}{25}$$

$$= \frac{240}{300}, \frac{210}{300}, \frac{195}{300}, \frac{36}{300}$$

$$\nearrow 240 > 220 > 210 > 195 > 36$$

$$\therefore \frac{240}{300} > \frac{220}{300} > \frac{210}{300} > \frac{195}{300} > \frac{36}{300}$$

$$= \frac{4}{5} > \frac{11}{15} > \frac{7}{10} > \frac{13}{20} > \frac{3}{25} \text{ Ans.}$$

$$\frac{5}{18} = \frac{5}{18} \times 16 = \frac{80}{288}$$

$$\frac{5}{6} = \frac{5}{6} \times 48 = \frac{240}{288}$$

$$\therefore \frac{11}{24}, \frac{5}{18}, \frac{5}{36}, \frac{5}{6}, \frac{17}{48}$$

$$\nearrow 240 > 132 > 102 > 80 > 40$$

$$= \frac{5}{6} > \frac{11}{24} > \frac{17}{48} > \frac{5}{18} > \frac{5}{36} \text{ Ans.}$$

11. Arrange the following fractions in ascending order.

i) $\frac{2}{3}, \frac{35}{48}, \frac{3}{4}$

$$\frac{2}{3} = \frac{2}{3} \times 16 = \frac{32}{48}$$

$$\frac{35}{48} = \frac{35}{48} = \frac{35}{48}$$

$$\therefore \frac{2}{3}, \frac{35}{48}, \frac{3}{4}$$

$$= \frac{32}{48}, \frac{35}{48}, \frac{36}{48}$$

$$\nearrow 32 < 35 < 36$$

$$\therefore \frac{32}{48} < \frac{35}{48} < \frac{36}{48}$$

$$= \frac{2}{3} < \frac{35}{48} < \frac{3}{4} \text{ Ans.}$$

ii) $\frac{1}{2}, \frac{3}{8}, \frac{8}{9}$

$$\frac{1}{2} = \frac{1}{2} \times 36 = \frac{36}{72}$$

$$\frac{3}{8} = \frac{3}{8} \times 9 = \frac{27}{72}$$

$$\frac{8}{9} = \frac{8}{9} \times 8 = \frac{64}{72}$$

$$\therefore \frac{1}{2}, \frac{3}{8}, \frac{8}{9}$$

$$= \frac{36}{72}, \frac{27}{72}, \frac{64}{72}$$

$$\nearrow 27 < 36 < 64$$

$$\therefore \frac{27}{72} < \frac{36}{72} < \frac{64}{72}$$

$$= \frac{3}{8} < \frac{1}{2} < \frac{8}{9} \text{ Ans.}$$

iii) $\frac{4}{15}, \frac{5}{8}, \frac{13}{20}$

$$\frac{4}{15} = \frac{4}{15} \times 8 = \frac{32}{120}$$

$$\frac{13}{20} = \frac{13}{20} \times 6 = \frac{78}{120}$$

$$= \frac{32}{120}, \frac{75}{120}, \frac{78}{120}$$

$$\therefore \frac{32}{120} < \frac{75}{120} < \frac{78}{120}$$

$$\frac{5}{8} = \frac{5}{8} \times 15 = \frac{75}{120}$$

$$\therefore \frac{4}{15}, \frac{5}{8}, \frac{13}{20}$$

$$\nearrow 32 < 75 < 78$$

$$= \frac{4}{15} < \frac{5}{8} < \frac{13}{20} \text{ Ans.}$$

12. Fill in the blanks with <, > or = .

i) $\frac{3}{7}$ $\frac{8}{15}$

By cross multiplication,

$$15 \times 3 = 45$$

$$7 \times 8 = 56$$

$$\nearrow \quad 45 < 56$$

$$\therefore \frac{3}{7} < \frac{8}{15} \text{ Ans.}$$

ii) $\frac{5}{7}$ $\frac{10}{11}$

By cross multiplication,

$$11 \times 5 = 55$$

$$7 \times 10 = 70$$

$$\nearrow \quad 55 < 70$$

$$\therefore \frac{5}{7} < \frac{10}{11} \text{ Ans.}$$

iii) $\frac{4}{5}$ $\frac{4}{7}$

By cross multiplication,

$$7 \times 4 = 28$$

$$5 \times 4 = 20$$

$$\nearrow \quad 28 < 20$$

$$\therefore \frac{4}{5} < \frac{4}{7} \text{ Ans.}$$

iv) $\frac{8}{16}$ $\frac{9}{18}$

By cross multiplication,

$$18 \times 8 = 144$$

$$16 \times 9 = 144$$

$$\nearrow \quad (18 \times 8) = (16 \times 9)$$

$$\therefore \frac{8}{16} = \frac{9}{18} \text{ Ans.}$$

v) $\frac{19}{28}$ $\frac{11}{35}$

By cross multiplication,

$$35 \times 19 = 665$$

$$28 \times 11 = 308$$

$$\nearrow \quad 665 > 308$$

$$\therefore \frac{19}{28} > \frac{11}{35} \text{ Ans.}$$

vi) $\frac{\overset{1}{\cancel{12}} \cancel{\emptyset}}{\underset{2}{\cancel{24}} \cancel{\emptyset}} \quad \frac{\cancel{4}^1}{\cancel{8}_2}$

$$= \frac{1}{2} \quad = \frac{1}{2}$$

$$\therefore \frac{120}{240} = \frac{4}{8} \text{ Ans.}$$

$$\text{vii) } \frac{6}{13} \quad \frac{25}{26}$$

By cross multiplication,

$$26 \times 6 = 156$$

$$13 \times 25 = 325$$

$$\nearrow \searrow \quad 156 < 325$$

$$\therefore \frac{6}{13} < \frac{25}{26} \text{ Ans.}$$

$$\text{viii) } \frac{13}{17} \quad \frac{125}{136}$$

By cross multiplication,

$$136 \times 13 = 1768$$

$$17 \times 125 = 2125$$

$$\nearrow \searrow \quad 1768 < 2125$$

$$\therefore \frac{13}{17} < \frac{125}{126} \text{ Ans.}$$

Exercise 2.2

1. Simplify the following.

$$\text{i) } 2\frac{2}{3} + 3\frac{3}{5}$$

$$= \frac{1}{3} + \frac{18}{5}$$

$$= \frac{40 + 54}{15}$$

$$= 6\frac{4}{15} \text{ Ans.}$$

$$\text{ii) } 6\frac{1}{2} - 2\frac{3}{5}$$

$$= \frac{13}{2} - \frac{11}{4}$$

$$= \frac{26 - 11}{4}$$

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

$$= 3\frac{3}{4} \text{ Ans.}$$

$$\text{iii) } 8\frac{3}{7} - 3\frac{3}{5}$$

$$= \frac{59}{7} - \frac{17}{5}$$

$$= \frac{295 - 119}{35}$$

$$= \frac{176}{35}$$

$$= 5\frac{1}{35} \text{ Ans.}$$

2. Dolly bought a ribbon $33\frac{1}{8}$ m long. She purchased $2\frac{5}{8}$ m more. How much ribbon does she have altogether?

$$\text{Length of ribbon bought first} = 33\frac{1}{8} \text{ m}$$

$$\text{Length of ribbon bought later} = 2\frac{5}{8} \text{ m}$$

$$\therefore \text{Total length of ribbon bought} = \left(\frac{265}{8} + \frac{21}{8} \right) \text{ m} = \frac{\overset{1}{\cancel{2}}\overset{4}{\cancel{6}}\overset{3}{\cancel{5}}}{\cancel{8}_4} \text{ m}$$

$$\text{Ans. } 35\frac{3}{4} \text{ m of ribbon purchased}$$

3. The total length of aluminium wire that Kitty bought is $8\frac{2}{3}$ m. She had to cut off $3\frac{2}{3}$ m from it for her project. How much is left with her now?

$$\begin{aligned}
 \text{Total length of aluminium wire} &= 8\frac{2}{3} \text{ m} \\
 \text{Length of wire cut off} &= 3\frac{2}{3} \text{ m} \\
 \therefore \text{Length of wire left} &= \left(8\frac{2}{3} - 3\frac{2}{3} \right) \text{ m} \\
 &= \frac{26}{3} - \frac{11}{3} \text{ m} \\
 &= \left(\frac{15}{3} \right) \text{ m}
 \end{aligned}$$

Ans. 5 m wire is left.

4. John takes $\frac{5}{6}$ of an hour to reach the metro station. If he takes $\frac{7}{5}$ of an hour in all to reach office, what is the time taken by the metro?

$$\begin{aligned}
 \text{Time taken to reach metro station} &= \frac{5}{6} \text{ of 1 hrs} \\
 &= \left(\frac{5}{6} \times 60 \right) \text{ mins } [\because 1 \text{ hrs}] \\
 &= 50 \text{ mins}
 \end{aligned}$$

$$\begin{aligned}
 \text{Time taken to reach office altogether} &= \frac{7}{5} \text{ of 1 hr} \\
 &= \left(\frac{7}{5} \times 60 \right) \\
 &= 84 \text{ mins}
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{Time taken by the metro} &= (84 - 50) \text{ mins} \\
 &= 34 \text{ mins}
 \end{aligned}$$

Ans. 34 mins

5. Shamvel jogs for $\frac{2}{5}$ km on Monday, $\frac{2}{3}$ km on Tuesday, and $\frac{14}{15}$ km on Wednesday, how many kilometres did he jog in all on those three days?

$$\text{Distance jogged on Monday} = \frac{2}{5} \text{ km}$$

$$\text{Distance jogged on Tuesday} = \frac{2}{3} \text{ km}$$

$$\text{Distance jogged on Wednesday} = \frac{14}{15} \text{ km}$$

$$\begin{aligned} \therefore \text{Total distance jogged in 3 days} &= \left(\frac{2}{5} + \frac{2}{3} + \frac{14}{15} \right) \text{ km} \\ &= \left(\frac{6 + 10 + 14}{15} \right) \text{ km} = \frac{30}{15} \text{ km} = 2 \text{ km} \end{aligned}$$

Ans. Shamvel jogged 2 km in 3 days.

6. Nita had a silk thread $8\frac{3}{4}$ m long. She cut $3\frac{1}{2}$ m from the thread. How much is left?

$$\text{Total length of thread} = 8\frac{3}{4} \text{ m}$$

$$\text{Length of thread cut off} = 3\frac{1}{2} \text{ m}$$

$$\begin{aligned} \therefore \text{Length of thread left} &= \left(8\frac{3}{4} - 3\frac{1}{2} \right) \text{ m} \\ &= \left(\frac{35}{4} - \frac{7}{2} \right) \text{ m} \\ &= \left(\frac{35 - 14}{4} \right) \text{ m} \\ &= \left(\frac{21}{4} \right) \text{ m} \\ &= 5\frac{1}{4} \text{ m} \end{aligned}$$

Ans. $5\frac{1}{4}$ m of thread left.

7. Rice bag weighs $88\frac{3}{4}$ kg. Wheat bag weighs $28\frac{7}{16}$ kg. Which one weighs more and by how much?

$$\text{Weight of rice bag} = 88\frac{7}{16} \text{ kg}$$

$$\text{Wright of wheat bag} = 28\frac{7}{16} \text{ kg} = \frac{455}{16}$$

$$\frac{355}{4} \quad \frac{455}{16}$$

L.C.M of 4 and 16 = 16

$$\therefore \frac{355}{4} = \frac{355}{4} \times 4 = \frac{1420}{16}$$

$$\frac{455}{16} = \frac{455}{16} \times 1 = \frac{455}{16}$$

$$\curvearrowright 1420 > 455 \quad \therefore \frac{1420}{16} > \frac{455}{16}$$

$$\begin{aligned} \therefore \text{Rice bag weighs more by } & \left(\frac{1420}{16} - \frac{455}{16} \right) \text{ kg} \\ & = \frac{965}{16} \text{ kg} = 60\frac{5}{16} \text{ kg} \end{aligned}$$

Ans. Rice bag weight more by $60\frac{5}{16}$ kg

8. Shakeel reaped $19\frac{1}{8}$ kg of lemons. Of this, he gave away $18\frac{3}{4}$ kg to his friends. How many kilograms of lemons is left with him now?

$$\text{Quantity of lemon reaped by shakeel} = 19\frac{1}{8} \text{ kg}$$

$$\text{Quantity of lemon he gave away} = 18\frac{3}{4} \text{ kg}$$

$$\begin{aligned} \therefore \text{Quantity of lemons left with him} &= \left(19\frac{1}{8} - 18\frac{3}{4} \right) \\ &= \left(\frac{153}{8} - \frac{75}{4} \right) \text{ kg} = \left(\frac{153 - 150}{8} \right) \text{ kg} \\ &= \frac{3}{8} \text{ kg} \end{aligned}$$

Ans. $\frac{3}{8}$ kg lemons are left with shakeel

Exercise 2.3

1. Multiply.

$$\begin{aligned} \text{i) } \frac{2}{9} \times \frac{1}{5} \\ = \frac{2}{45} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{ii) } \frac{7}{\cancel{2}} \times \frac{\cancel{16}^8}{9} \\ = \frac{56}{9} \\ = 6\frac{2}{9} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{iii) } \frac{\cancel{5}_4}{\cancel{8}_4} \times \frac{\cancel{10}^5}{\cancel{6}_3} \\ = \frac{5}{12} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{iv) } \frac{\cancel{56}^7}{\cancel{51}_3} \times \frac{\cancel{17}}{\cancel{8}} \\ = \frac{7}{3} \\ = 2\frac{1}{3} \text{ Ans.} \end{aligned}$$

2. Solve.

$$\begin{aligned} \text{i) } \frac{1}{\cancel{8}} \times \cancel{64}^8 \\ = 8 \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{ii) } \frac{3}{11} \times \frac{2}{19} \\ = \frac{6}{209} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{iii) } \frac{5}{\cancel{11}} \times \frac{\cancel{22}^2}{5} \\ = 2 \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{iv) } 1\frac{1}{12} \text{ of } \frac{1}{26} \\ = \frac{\cancel{13}^1}{12} \times \frac{1}{\cancel{26}_2} = \frac{1}{24} \text{ Ans.} \end{aligned}$$

3. There are 40 students in a class. $\frac{3}{5}$ of them are boys. Find the number of boys in the class.

$$\text{Total no. of students} = 40$$

$$\text{Traction of boys} = \frac{3}{5}$$

$$\therefore \text{ No. of boys} = \frac{3}{5} \text{ of } 40$$

$$= \frac{3}{\cancel{5}} \partial \cancel{40}^8$$

Ans. 24 boys are there in a class of 40

4. Aks has to cover a distance of 60 km. He has already covered $\frac{1}{12}$ of the distance. How much distance is left for Aks to cover?

$$\text{Total distance that needs to be covered} = 60 \text{ km}$$

$$\text{Fraction already covered} = \frac{1}{12}$$

$$\therefore \text{Distance already covered} = \left(\frac{1}{12} \text{ of } 60 \right) \text{ km}$$

$$= \left(\frac{1}{\cancel{12}} \text{ of } 60 \right) \text{ km}$$

$$= 5 \text{ km}$$

$$\therefore \text{Distance Aks is yet to cover} = (60 - 5) \text{ km} \\ = 55 \text{ km}$$

Ans. Aks is yet to cover 55km

5. Find the reciprocal of:

i) $\frac{3}{11}$ ii) $\frac{64}{7}$ iii) $\frac{19}{91}$ iv) $\frac{41}{6}$

6. What is:

$$\text{i) } \frac{1}{\cancel{10}} \times \frac{65}{\cancel{50}} \\ = 65 \text{ Ans.}$$

$$\text{ii) } \frac{2}{\cancel{9}} \times \frac{9}{\cancel{81}} \\ = 18 \text{ Ans.}$$

$$\text{iii) } \frac{3}{\cancel{7}} \times \frac{10}{\cancel{70}} \\ = 30 \text{ Ans.}$$

$$\text{iv) } \frac{1}{\cancel{15}_3} \times \frac{1}{\cancel{3}} \\ = \frac{1}{3} \text{ Ans.}$$

Exercise 2.4

1. Divide.

$$\text{i) } \frac{12}{5} \div 6 \\ = \frac{\cancel{12}^2}{5} \times \frac{1}{\cancel{6}} \\ = \frac{2}{5} \text{ Ans.}$$

$$\text{ii) } \frac{81}{20} \div \frac{18}{5} \\ = \frac{\cancel{81}^9}{\cancel{20}_4} \times \frac{\cancel{5}}{\cancel{18}_2} \\ = \frac{9}{8} \\ = 1\frac{1}{8} \text{ Ans.}$$

$$\text{iii) } 91 \div \frac{13}{7} \\ = \frac{\cancel{91}^7}{1} \times \frac{7}{\cancel{13}} \\ = \frac{49}{5} \text{ Ans.}$$

$$\begin{aligned}
 \text{iv) } 25 \div \frac{50}{97} &= \frac{\cancel{25}^1}{1} \times \frac{97}{\cancel{50}_2} \\
 &= 48\frac{1}{2} \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 \text{v) } \frac{44}{21} \div \frac{11}{7} &= \frac{\cancel{44}^4}{\cancel{21}_3} \times \frac{\cancel{7}}{\cancel{11}} \\
 &= \frac{4}{3} \\
 &= 1\frac{1}{3} \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 \text{vi) } 2 \div \frac{5}{2} &= \frac{2}{1} \times \frac{2}{5} \\
 &= \frac{4}{5} \text{ Ans.}
 \end{aligned}$$

2. Aanchal has $11\frac{3}{8}$ m of ribbon. She wants to cut it into 7 parts. What is the length of each part?

$$\begin{aligned}
 \text{Total length of ribbon Aanchal has} &= 11\frac{3}{8} \text{ m} \\
 \text{No. of pieces she cuts it into} &= 7 \\
 \therefore \text{Length of each part} &= \left(11\frac{3}{8} \div 7 \right) \text{ m} \\
 &= \left(\frac{\cancel{91}^{13}}{8} \times \frac{1}{\cancel{7}} \right) \text{ m} \\
 &= \frac{13}{8} \text{ m} \\
 &= 1\frac{5}{8} \text{ m} \\
 \text{Ans. Length of each piece} &= 1\frac{5}{8} \text{ m}
 \end{aligned}$$

3. Joseph has ₹10000. He has to distribute it equally among 4 persons. What is the amount for each person?

$$\begin{aligned}
 \text{Total amount Joseph has} &= ₹10000 \\
 \text{No. of people he distributes it among} &= 4 \\
 \therefore \text{Amount each person has} &= ₹ \left(\frac{\cancel{10000}^{25000}}{\cancel{4}} \right) \\
 &= ₹2500
 \end{aligned}$$

Ans. Each person has ₹2500.

4. I have to cover $\frac{68}{7}$ km to reach school. I want to divide the distance into two parts. What is the distance covered in each part?

$$\text{Total distance} = \frac{68}{7} \text{ km}$$

$$\text{No. of parts I want to divide it into} = 2$$

$$\begin{aligned} \therefore \text{Distance covered in each part} &= \left(\frac{68}{7} \div 2 \right) \text{ km} = \left(\frac{\overset{\downarrow 34}{\cancel{68}}}{7} \times \frac{1}{\cancel{2}} \right) \text{ km} \\ &= \frac{34}{7} \text{ km} = 4\frac{6}{7} \text{ km} \end{aligned}$$

Ans. $4\frac{6}{7}$ km is covered in each part.

5. The product of two fractions is $\frac{81}{70}$. If one fraction is $\frac{1}{7}$ find the other.

$$\text{Product of two fractions} = \frac{81}{70}$$

$$\text{One fraction} = \frac{1}{7}$$

$$\therefore \text{Another fraction} = \frac{81}{70} \div \frac{1}{7} = \frac{81}{10} = 8\frac{1}{10}$$

Ans. Another fraction is $8\frac{1}{10}$.

6. $\frac{60}{99}$ divided by what gives $\frac{60}{11}$?

$$\text{ATQ} \quad \frac{60}{99} \div x = \frac{60}{11}$$

$$\Rightarrow \frac{60}{99} \times \frac{1}{x} = \frac{60}{11}$$

$$\Rightarrow 60 \times 1 = 60 \times 99x$$

$$\Rightarrow \frac{60}{99x} = \frac{60}{11}$$

$$\Rightarrow \frac{\cancel{60} \div \cancel{11}}{\cancel{60} \times 99} = \frac{60}{11}$$

$$\frac{1}{9} = x$$

Ans. The required number is $\frac{1}{9}$.

Exercise 2.5

Simplify the following:

$$\begin{aligned}
 1. \text{ i) } \quad & \frac{4}{9} \div \left[\frac{12}{3} - \frac{3}{12} \right] \\
 &= \frac{4}{9} \div \left[\frac{48-3}{12} \right] = \frac{4}{9} \div \frac{45}{12} = \frac{4}{9} \times \frac{12}{45} = \frac{4}{9} \times \frac{4}{15} = \frac{16}{135} \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 \text{ii) } \quad & 7 + \left\{ \frac{1}{8} + \frac{2}{7} \times \left(\frac{7}{4} - \frac{5}{8} \right) \right\} \\
 &= 7 + \left\{ \frac{1}{8} + \frac{2}{7} \times \left(\frac{14-5}{8} \right) \right\} = 7 + \left\{ \frac{1}{8} + \frac{2}{7} \times \frac{9}{8} \right\} \\
 &= 7 + \left\{ \frac{1}{8} + \frac{9}{28} \right\} = 7 + \left\{ \frac{7+18}{56} \right\} \\
 &= 7 + \frac{25}{56} = \frac{392+25}{56} = \frac{417}{56} = 7\frac{25}{56} \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 2. \text{ i) } \quad & \left\{ \left(\frac{10}{3} - \frac{2}{9} \right) \div \frac{5}{18} \right\} \text{ of } \left(\frac{3}{7} + \frac{1}{14} \right) \\
 &= \left\{ \left(\frac{30-2}{9} \right) \div \frac{5}{18} \right\} \times \left(\frac{6+1}{14} \right) = \left\{ \frac{28}{9} \times \frac{18}{5} \right\} \times \frac{7}{14} \\
 &= \frac{56}{5} \times \frac{7}{14} = \frac{28}{5} = 5\frac{3}{5} \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 \text{ii) } \quad & 4\frac{1}{3} - \left\{ \frac{17}{4} - \left(\frac{81}{4} \times \frac{2}{27} \right) \right\} \\
 &= \frac{13}{3} - \left\{ \frac{17}{4} - \left(\frac{3}{2} \right) \right\} = \frac{13}{3} - \left\{ \frac{34-12}{8} \right\} \\
 &= \frac{13}{3} - \frac{11}{4} = \frac{52-33}{12} = \frac{19}{12} = 1\frac{7}{12}
 \end{aligned}$$

$$\begin{aligned}
2. \text{ i)} \quad & \left\{ \left(\frac{10}{3} - \frac{2}{9} \right) \div \frac{5}{18} \right\} \text{ of } \left(\frac{3}{7} + \frac{1}{14} \right) \\
&= \left\{ \left(\frac{30-2}{9} \right) \div \frac{5}{18} \right\} \times \left(\frac{6+1}{14} \right) \\
&= \left\{ \frac{28}{9} \times \frac{18}{5} \right\} \times \frac{7}{14} \\
&= \frac{56}{5} \times \frac{7}{14} = \frac{28}{5} \\
&= 5\frac{3}{5} \text{ Ans.}
\end{aligned}$$

$$\begin{aligned}
\text{ii)} \quad & 4\frac{1}{3} - \left\{ \frac{17}{4} - \left(\frac{81}{4} \times \frac{2}{27} \right) \right\} \\
&= \frac{13}{3} - \left\{ \frac{17}{4} - \left(\frac{3}{2} \right) \right\} \\
&= \frac{13}{3} - \left\{ \frac{34-12}{8} \right\} \\
&= \frac{13}{3} - \frac{11}{4} = \frac{52-33}{12} \\
&= \frac{19}{12} = 1\frac{7}{12}
\end{aligned}$$

$$\begin{aligned}
3. \text{ i)} \quad & \frac{72}{3} - \frac{21}{5} \left(\frac{21}{8} \times \frac{3}{4} \right) \\
&= \frac{72}{3} - \frac{21}{5} \times \frac{21}{8} \\
&= \frac{72}{3} - \frac{441}{40} \\
&= \frac{2880 - 1323}{120} \\
&= \frac{1557}{120} \\
&= 12\frac{117}{120} \text{ Ans.}
\end{aligned}$$

$$\begin{aligned}
\text{ii)} \quad & \frac{15}{21} \text{ of } \frac{45}{3} - \frac{1}{12} - \frac{3}{4} \\
&= \frac{15}{21} \times \left(\frac{45}{3} - \frac{1}{12} - \frac{3}{4} \right) \\
&= \frac{75}{7} - \frac{1}{9} \\
&= \frac{675-7}{63} \\
&= \frac{668}{63} \\
&= 10\frac{38}{63} \text{ Ans.}
\end{aligned}$$

$$\begin{aligned}
4. \text{ i)} \quad & \frac{5}{16} + \frac{13}{16} - \frac{29}{15} \div 3\frac{2}{5} \\
&= \frac{5}{16} + \frac{13}{16} - \frac{29}{15} \times \frac{17}{5} \\
&= \frac{918 - 464}{816} \\
&= \frac{227}{408} \text{ Ans.}
\end{aligned}$$

$$\begin{aligned}
&= \frac{18}{16} \square \frac{29}{51} \\
&= \frac{227}{408}
\end{aligned}$$

$$\begin{aligned}
 \text{ii) } & \frac{3}{8} \text{ of } \frac{16}{24} \div \frac{23}{48} + \frac{12}{16} \\
 &= \frac{3}{8} \times \frac{\overset{2}{\cancel{16}}}{\cancel{24}_8} \div 3 \times \frac{\overset{6}{\cancel{48}}}{23} + \frac{12}{16} = \frac{12}{23} + \frac{12}{16} \\
 &= \frac{192 + 276}{368} = \frac{\overset{234}{\cancel{468}}}{\cancel{368}_{184}_{92}} = \frac{117}{92} = 1\frac{25}{92} \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 5. \text{ i) } & \frac{7}{9} \times \frac{11}{7} \div \frac{8}{27} \\
 &= \frac{7}{9} \times \frac{11}{7} \times \frac{27}{8} \\
 &= \frac{\cancel{7}}{\cancel{9}} \times \frac{\overset{33}{\cancel{297}}}{\cancel{56}_8} \\
 &= \frac{33}{8} \\
 &= 4\frac{1}{8} \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 \text{ii) } & \left(\downarrow \frac{1}{5} + \frac{4}{10} \right) \text{ of } \frac{31}{5} \\
 &= \left(\frac{2+4}{10} \right) \times \frac{31}{5} \\
 &= \frac{\overset{2^1}{\cancel{10}}}{\underset{5}{\cancel{10}}} \times \frac{31}{\cancel{15}_5} \\
 &= \frac{31}{25} \text{ Ans.}
 \end{aligned}$$

SELF ASSESSMENT-2

1. Find a fraction equivalent of $\frac{10}{26}$ with

$$(a) \quad \frac{10}{26} = \frac{10}{26} \div 2 = \frac{5}{13}$$

$$(b) \quad \frac{10}{26} = \frac{10}{26} \times 3 = \frac{30}{78}$$

2. Which is greater $\left(\downarrow \frac{4}{9} \text{ of } \frac{3}{8} \right)$ or $\left(\frac{2}{3} \text{ of } \frac{21}{18} \right)$

$$\begin{aligned}
 \frac{\cancel{4}}{\cancel{9}_3} \text{ of } \frac{\cancel{3}}{\cancel{8}_2} & \quad \frac{\cancel{2}}{\cancel{3}} \text{ of } \frac{\overset{7}{\cancel{21}}}{\cancel{18}_9} \\
 &= \frac{1}{6} \quad \quad \quad \frac{7}{9}
 \end{aligned}$$

By cross multiplication,

$$9 \times 1 = 9$$

$$6 \times 7 = 42$$

$$\nwarrow \quad 42 > 9$$

$$\therefore \quad \frac{7}{9} > \frac{1}{6} \text{ Ans.}$$

3. From a 50 m ribbon, how many pieces of length $2\frac{1}{2}$ m can be cut?

$$\text{Total length of ribbon} = 50\text{m}$$

$$\begin{aligned}\text{Length of each small price} &= 50 \div 2\frac{1}{2} \\ &= 50 \div \frac{5}{2} \\ &= \cancel{50}^{\cancel{10}} \times \frac{2}{\cancel{5}} = 20\end{aligned}$$

Ans. 20 prices can be cut.

4. Arun eats $\frac{1}{3}$ apple in 1 day. How many apples does he eat in 9 days?

$$\begin{aligned}\text{Fraction of apple Arun eats in 1 day} &= \frac{1}{3} \\ \therefore \text{No. of apples Arun eats in 9 day} &= \frac{1}{\cancel{3}} \partial \cancel{9}^3 \\ &= 3\end{aligned}$$

Ans. Arun eats 3 apples in 9 days.

5. Find $\frac{3}{7}$ of $2\frac{1}{10}$.

$$\frac{3}{7} \text{ of } 2\frac{1}{10}$$

$$= \frac{3}{\cancel{7}} \times \frac{\cancel{21}^3}{10}$$

$$= \frac{9}{10} \text{ Ans.}$$

6. a) $\frac{10}{9}$

7. d) $\frac{1}{2}$

$$\begin{aligned}8. \quad \frac{5}{3} + \frac{10}{6} \\ &= \frac{10 \cancel{+} 10}{6} \\ &= \frac{\cancel{20}^{10}}{\cancel{6}_3} = \frac{10}{3}\end{aligned}$$

a) $\frac{10}{3}$

$$9. \quad \frac{\cancel{2}^1}{9} \times \frac{7}{\cancel{6}_3} = \frac{7}{27}$$

Reciprocal of $\frac{7}{27}$ is $\frac{27}{7}$ or $3\frac{6}{7}$

$\therefore$ option (c) $3\frac{6}{7}$

10. c) 0

11. d) $\frac{2}{5}$

12. a) 9

Chapter-7 Decimals

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Introduction to decimals Expanded form Converting fractions to decimals and vice-versa.	Students will be able to write decimals in expanded form and convert fractions to decimals and vice-versa	Explain to the students the concept of decimal number consisting of whole number and fractional part. 26 25 Whole number fractional part out of 100. Explain the place value chart and expanded form	Fill in the blank. 1) $23.407 = 20 + 3 + \frac{4}{10} + \square + \square$ 2) $\frac{2}{100} + \frac{5}{100} = \underline{\hspace{2cm}}$
Like and unlike Decimals Conversion of unlike decimals to like decimals. Comparison and ordering of decimals	Students will be able to convert unlike decimals to like decimals and compare and order the decimals.	Worksheet based on ordering and comparisons can be done	Use $>$, $<$ or $=$ 1) $2.05 \square 2.5$ 2) $0.006 \square 0005$
Operations on decimals Addition, subtraction multiplication and division of decimals. Word problems on decimal	Students will be able to perform basic operation on decimals and solve word problems based on real life situations	Explain the students the method of performing addition and subtraction of decimals. Explain multiplication and division and shortcut of multiplying and division by 10,100, 1000 and 50 on.	Solve the following $25 + (1.25 - 0.07) - 6 \times 2.0$

1. Convert to like decimals.

i) 63, 1500 ; 29.0040 ; 83.7563

ii) 1.400 ; 2.850 ; 0.549

iii) 0.500 ; 0.008 ; 0.640

2. Write the following decimals in expanded form.

i) $15.638 = 10 + 5 + \frac{6}{10} + \frac{3}{10} + \frac{8}{1000}$

ii) $729.14 = 700 + 20 + 9 + \frac{1}{10} + \frac{4}{100}$

iii) $0.1593 = 0 + \frac{1}{10} + \frac{5}{100} + \frac{9}{1000} + \frac{3}{10000}$

3. Insert >, < or = proper sign.

- i) < ii) < iii) > iv) >

4. Arrange the following decimal numbers in ascending order:

- i) 5.6; 2.87; 1.98; 5.82; 0.39 = 5.60; 2.87; 1.98; 5.82; 0.39
 Ascending = 0.39; 1.98; 2.87; 5.60; 5.82 = 0.39; 1.98; 2.87; 5.6; 5.82 **Ans.**
- ii) 72.102; 18.26; 72.305; 72.356 = 72.102; 18.260; 72.305; 72.356
 Ascending = 18.260; 72.102; 72.305; 72.356 = 18.26; 72.102; 72.305; 72.356 **Ans.**

5. Arrange the following decimal numbers in descending order.

- i) 11.263; 1.675; 1.682; 8.95 = 11.263; 1.675; 1.682; 8.950
 Descending = 11.263; 8.950; 1.682; 1.675 = 11.263; 8.95; 1.682; 1.675 **Ans.**
- ii) 3.0; 3.2; 3.25; 3.255 = 3.000; 3.200; 3.250; 3.255
 Descending = 3.255; 3.250; 3.200; 3.000 = 3.255; 3.25; 3.2; 3.0 **Ans.**

Exercise 5.2

1. Add.

i)

2 . 6 3 0 0
1 8 . 1 4 9 0
+ 3 2 . 5 4 3 4
5 3 . 3 2 2 4

Ans. 53.3224

ii)

8 . 1 7 0
6 . 1 0 0
5 . 0 0 0
+ 2 . 1 4 5
2 1 . 4 1 5

Ans. 21.415

iii)

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

Ans. 102.8752

iv)

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

Ans. 313.15

2. Subtract.

i)

1 0 1 . 4 3 9
– 9 7 . 1 0 0
4 . 3 3 9

Ans. 4.339

ii)

6 3 1 . 6 3 1
– 1 8 9 . 0 0 0
4 4 2 . 6 3 1

Ans. 442.631

iii)

1 0 0 . 0 0 0
– 2 4 . 6 3 8
7 5 . 3 6 2

Ans. 75.362

iv)

5 7 2 4 . 5 3
– 1 8 5 7 . 2 3
3 8 6 7 . 3 0

Ans. 3867.3

3. Sharimin has 261.75 m of ribbon. She cuts 16.1 m to make some craft. How much ribbon is left?

$$\begin{aligned}\text{Length of ribbon sharimin has} &= 261.75 \text{ m} \\ \text{Length of ribbon she cuts off} &= 16.1 \text{ m} \\ \therefore \text{Length of ribbon left} &= (261.75 - 16.1) \text{ m} \\ &= 245.65 \text{ m}\end{aligned}$$

Ans. 245.65 m of ribbon is left.

4. A fruit vendor has 15.29 kg apple, 36.21 kg papaya and 40.81 kg mango. How much fruits does he have in total?

$$\begin{aligned}\text{Quantity of apple} &= 15.29 \text{ kg} \\ \text{Quantity of papaya} &= 36.21 \text{ kg} \\ \text{Quantity of mango} &= 40.81 \text{ kg} \\ \therefore \text{Total quantity of fruits} &= (15.29 + 36.21 + 40.81) \text{ kg} \\ &= 92.31 \text{ kg}\end{aligned}$$

Ans. 92.31 kg of fruits is there

5. What number added to 21.64 gives 30.89?

3 0 . 8 9
– 2 1 . 6 4
9 . 2 5

Ans. 9.25 needs to be added to 21.64 to give 30.89

6. What number subtracted from 181.97 will give 101.59?

1 8 1 . 9 7
– 1 0 1 . 5 9
8 0 . 3 8

Ans. 80.38 needs to be subtracted from 181.97 to give 101.59.

7. Amit has ₹ 1001.85. His father gives him ₹ 500 more. He then gives ₹ 250.50 to his sister. How much money does Amit have now?

$$\begin{aligned}\text{Amount Amit has} &= ₹1001.85 \\ \text{Amount Amit's father gives him} &= ₹500 \\ \text{Amount Amit gives his sister} &= ₹250.50 \\ \therefore \text{Amount left with Amit} &= ₹(1001.85 + 500 - 250.50) \\ &= ₹(1501.85 - 250.50) \\ &= ₹1251.35\end{aligned}$$

Ans. ₹1251.35 is left with Amit.

Exercise 5.2

1. Multiply the following numbers.

$$\begin{array}{r} 6.43 \\ \times 0.1 \\ \hline 0.643 \end{array}$$

Ans: 0.643

$$\begin{array}{r} 248.92 \\ \times 5 \\ \hline 1244.60 \end{array}$$

Ans: 1244.60

$$\begin{array}{r} 95.291 \\ \times 23 \\ \hline 285873 \\ +1905820 \\ \hline 2191.693 \end{array}$$

Ans: 2191.693

$$\begin{array}{r} 0.84 \\ \times 15.13 \\ \hline 252 \\ 840 \\ 42000 \\ +84000 \\ \hline 12.7092 \end{array}$$

Ans: 12.7092

v) $0.0059 \times 100 = 0.59$

vi) $63.4178 \times 10000 = 634178$

$$\begin{array}{r} 0.235 \\ \times 2.3 \\ \hline 705 \\ +4700 \\ \hline 0.5405 \end{array}$$

Ans: 0.5405

$$\begin{array}{r} 8.64 \\ \times 0.0001 \\ \hline 0.000864 \end{array}$$

Ans: 0.000864

2. Divide the following.

$$\begin{array}{l} \text{i) } \frac{16.95}{0.5} \\ = \frac{16.95 \times 10}{0.5 \times 10} \\ = \frac{169.5}{5} \\ = 33.9 \\ \text{Ans. } 33.9 \end{array}$$

$$\begin{array}{r} \text{ii) } 8.645 \div 3 \\ \underline{2.88166} \\ 3 \overline{) 8.6450} \\ \underline{-6} \downarrow \\ 26 \\ \underline{-24} \downarrow \\ 24 \\ \underline{-24} \downarrow \\ 0 \\ \times 5 \\ \underline{-3} \downarrow \\ 20 \\ \underline{-18} \\ 2 \end{array}$$

Ans: 2.88166

$$\begin{array}{l} \text{iii) } \frac{0.005}{0.02} \\ = \frac{0.005 \times 10}{0.2 \times 10} \\ = \frac{0.05}{2} \\ = \frac{0.025}{2} \\ 2 \overline{) 0.05} \\ \underline{-4} \\ 10 \\ \underline{-10} \\ 0 \end{array}$$

$$\begin{array}{l} \text{iv) } \frac{60.05}{0.001} \\ = \frac{60.05 \times 1000}{0.001 \times 1000} \\ = \frac{60050}{1} \\ = 60050 \text{ Ans.} \end{array}$$

$$\text{v) } 0.0001 \div 100 \\ 0.000001$$

$$\begin{aligned} \text{vi) } & \frac{18.1818}{0.09} \\ &= \frac{18.1818 \times 100}{0.09 \times 100} \\ &= \frac{1818.18}{9} \\ &= 202.02 \\ &\text{Ans. } 202.02 \end{aligned}$$

$$\begin{aligned} \text{vii) } & \frac{1.648}{0.8} \\ &= \frac{1648 \times 10}{0.8 \times 10} \\ &= \frac{1648}{8} \\ &= 2.06 \\ &\text{Ans. } 2.06 \end{aligned}$$

3. Natalia has ₹3.78. She distributed it equally in three boxes. How much does each box have?

$$\text{Total amount Natalia has} = ₹3.78$$

$$\text{No. of boxes} = 3$$

$$\begin{aligned} \therefore \text{Amount in each box} &= ₹ \left(\frac{\cancel{3}^1 \cdot \cancel{78}^{26}}{\cancel{3}} \right) \\ &= ₹1.26 \end{aligned}$$

Ans. ₹1.26 is there in each box.

4. The cost of 6.14 m of ribbon is 100.50. What is the cost of 18.42m?

$$\text{Cost of 6.14 m of ribbon} = ₹100.50$$

$$\therefore \text{Cost of 1m ribbon} = ₹ \left(\frac{\cancel{100.50}}{6.14} \right)$$

$$= ₹ \left(\frac{100.50 \times 100}{6.14 \times 100} \right) = ₹ \frac{10050}{614}$$

$$\text{Cost of 18.42 m ribbon} = ₹ \left(\frac{10050}{614} \times 18.42 \right)$$

$$= ₹ \left(\frac{\cancel{10050}^{201}}{\cancel{614}} \times \frac{\cancel{1842}^3}{\cancel{10}^2 \cancel{0}} \right) = ₹ \frac{603}{2}$$

$$= ₹ 301.5$$

Ans. Cost of 18.42 m ribbon = ₹301.50

5. Aman had 90.468L of milk. He wants to put it in 9 cans. How much will each can contain?

$$\text{Total quantity of milk Aman has} = 90.468 \text{ l}$$

$$\text{No. of cans} = 9$$

$$\therefore \text{Quantity of milk in each can} = \left(\frac{\overset{10.052}{\downarrow} \cancel{90.468}}{\cancel{9}} \right) \text{ l} = 10.052 \text{ l}$$

Ans. Each can will contain 10.052 l

6. Benni has 24.504 kg of vegetables costing ₹ 220.536. What is the cost of 5 kg of vegetables?

$$\text{Cost of 24.504 kg of vegetables} = ₹ 220.536$$

$$\begin{aligned} \therefore \text{Cost of 1 kg of vegetables} &= ₹ \left(\frac{\overset{\downarrow}{220.536}}{24.504} \right) \\ &= ₹ \left(\frac{220.536 \times 1000}{24.504 \times 1000} \right) \\ &= ₹ \frac{220536}{24504} \end{aligned}$$

$$\therefore \text{Cost of 5 kg of vegetables} = ₹ \left(\frac{\overset{9}{\downarrow} \cancel{220536}}{\cancel{24504}} \times 5 \right) = ₹ 45$$

Ans. Cost of 5 kg vegetables = ₹ 45

7. Simplify:

$$\begin{aligned} \text{i)} \quad 17.709 + 9.001 - 10.02 \\ &= 26.710 - 10.020 \\ &= 16.690 \end{aligned}$$

Ans. 16.690 or 16.69

$$\begin{aligned} \text{iii)} \quad 7.235 - 5.007 + 21.19 \times 0.5 \\ &= 7.235 - 5.007 + 10.595 \\ &= 17.830 - 5.007 \\ &= 12.823 \end{aligned}$$

Ans. 12.823

$$\begin{aligned} \text{v)} \quad 18 - 4.2 \div 7 + 1.3 \times 0.4 \\ &= 18 - 0.6 + 0.52 \\ &= 18.52 - 0.6 \\ &= 17.92 \end{aligned}$$

Ans. 17.92

$$\begin{aligned} \text{ii)} \quad 113 - 56.28 - 4.7 \\ &= 113.00 - 51.58 \\ &= 61.42 \end{aligned}$$

Ans. 61.42

$$\begin{aligned} \text{iv)} \quad 19.05 - [2.06 + 0.5 \times 0.2] \\ &= 19.05 - [2.06 + 0.5 \times 0.2] \\ &= 19.05 - 2.16 \\ &= 16.89 \end{aligned}$$

Ans. 16.89

$$\begin{aligned} \text{vi)} \quad 6.4 \div 1.6 \text{ of } 5 + 1.3 \times 1.3 \\ &= 6.4 \div 1.6 \text{ of } 5 + 1.3 \times 1.3 \\ &= 0.8 + 1.69 \\ &= 2.49 \end{aligned}$$

Ans. 2.49

$$\text{vii) } 50.3 - 5.6 \div 0.8 \times 1.6 \text{ of } 2.5$$

$$= 50.3 - 5.6 \div 0.8 \times 4$$

$$= 50.3 - 7 \times 4$$

$$= 50.3 - 28$$

$$= 22.3$$

Ans. 22.3

$$\text{viii) } 27.08 \div 0.2 + 1 - 0.5 \times 0$$

$$= 135.4 + 1 - 0$$

$$= 136.4$$

Ans. 136.4

SELF ASSESSMENT-3

1. Multiply :

$$\begin{array}{r} \text{i) } \begin{array}{r} 78.92 \\ \times 3.005 \\ \hline 39460 \\ 00000 \\ 000000 \\ +23676000 \\ \hline 237.15460 \end{array} \end{array}$$

Ans: 237.1546

$$\begin{array}{r} \text{ii) } \begin{array}{r} 0.63 \\ \times 0.081 \\ \hline 63 \\ 5040 \\ \hline 0.05103 \end{array} \end{array}$$

Ans: 0.05103

2. Divide :

$$\begin{array}{l} \text{i) } \frac{2.25}{0.45} \\ \\ = \frac{2.25 \times 100}{0.45 \times 100} = \frac{\overset{45}{\cancel{225}}^5}{\underset{\cancel{45}}{45}} = 5 \text{ Ans.} \end{array}$$

$$\begin{array}{l} \text{ii) } \frac{\overset{17}{\cancel{31}}^{\cancel{44}}}{\cancel{2}} \\ \\ = 17.44 \text{ Ans.} \end{array}$$

3. Which is greater 0.13 or 0.013?

$$0.13 = 0.130$$

$$\therefore 0.13 > 0.013$$

4. Solve

$$\begin{array}{l} \text{i) } 0.4 + 2 \times 6.251 \\ = 0.4 + 12.502 \\ = 12.902 \\ \text{Ans. 12.902} \end{array}$$

$$\begin{array}{l} \text{ii) } 0.156 \div 0.03 \text{ of } 0.6 \\ = 0.156 \div 0.018 \\ = \frac{0.156}{0.018} \\ = \frac{0.156 \times 1000}{0.018 \times 1000} = \frac{\overset{78}{\cancel{156}}^{\cancel{26}}}{\underset{\cancel{18}}{18}_3} = 8.66 \\ \text{Ans. 8.66} \end{array}$$

5. If $\frac{x}{y} = 2.8 + 7.6$, find x, y.

$$\begin{aligned}\frac{x}{y} &= 2.8 + 7.6 \\ &= \frac{x}{y} = \frac{28}{10} + \frac{76}{10} = \frac{104}{10} \\ \text{Ans. } x &= 104 \\ y &= 10 \\ &\text{or} \\ n &= 5.2 \\ y &= 5\end{aligned}$$

6. a) 0.35

7.

8. a) 0.14075

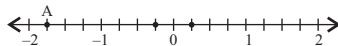
9. a) 3 places to the left

10. c) 2.460

11. d) both recurring and non-terminating

12. b) unlike

Chapter-4 Rational Numbers

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
What are rational numbers? Properties of rational numbers Equivalent rational numbers		Explain any number that can be written $\frac{p}{q}$ in form $\frac{a}{b}$ where q ≠ 0 is called rational number. Involve children in writing general form of rational number and associate it with rules of algebra Verify and explain the properties of rational numbers using different rational numbers.	
Representation of rational numbers on number line and standard form of rational number.	Students will be able to represent rational numbers on the number line.	Recall the representation of fractions on a number line and explain representation of rational numbers can be done in the same way.  $A = -\frac{3}{4}, B = -\frac{1}{4}, C = \frac{3}{4}$ Demonstrate the method on the black board.	represent $-\frac{5}{2}$ on the number line

Comparison and absolute value of rational numbers. Inserting rational numbers between two rational numbers	Students will be able to compare and find absolute values of a rational number They will be able to insert rational number	Explain to compare 2 rational numbers. Explain by converting to equivalent rational numbers and also by cross method $\frac{-2}{3} \quad \frac{-5}{8}$ $-10 > -24 \therefore \frac{-2}{3}$ is greater Explain absolute values are value irrespective of the signs. Explain on the board how to insert rational numbers between 2 given method. [converting to equivalent rational numbers and insert numbers]	What is the absolute value of $\left \frac{-2}{3} \right$ $\frac{-1}{2} \square \frac{3}{4}$. Use $>$, $<$ or $=$ Insert 2 rational numbers between $\frac{-5}{6}$ and $\frac{3}{4}$
Operations on rational numbers (Addition, subtraction, multiplication and division)	Students will be able to perform all operations on rational numbers.	Explain all 4 operations on the blackboard using suitable examples. Worksheets can be done.	$\frac{-2}{9}$ multiplied what gives $\frac{6}{13}$ multiplied $\frac{-4}{7}$ and $\frac{-14}{29}$

Exercise 4.1

1. Give three equivalent rational numbers for each.

$$\text{i) } \frac{-20}{30} = \frac{-20}{30} \times 2 = \frac{-40}{60}$$

$$\frac{-20}{30} = \frac{-20}{30} \times 3 = \frac{-60}{90}$$

$$\frac{-20}{30} = \frac{-20}{30} \times 4 = \frac{-80}{120}$$

$$\text{ii) } \frac{1}{-9} = \frac{1}{-9} \times 2 = \frac{2}{-18}$$

$$\frac{1}{-9} = \frac{1}{-9} \times 3 = \frac{3}{-27}$$

$$\frac{1}{-9} = \frac{1}{-9} \times 4 = \frac{4}{-36}$$

We may also divide by same number to obtain equivalent rational numbers

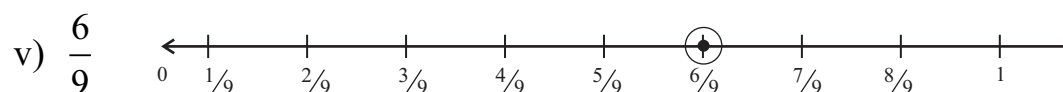
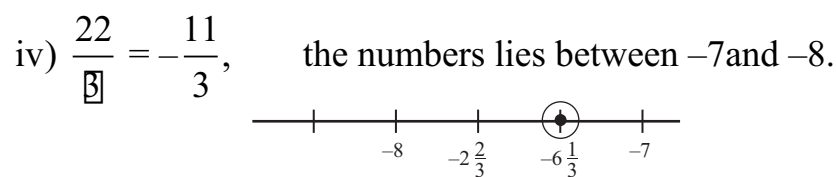
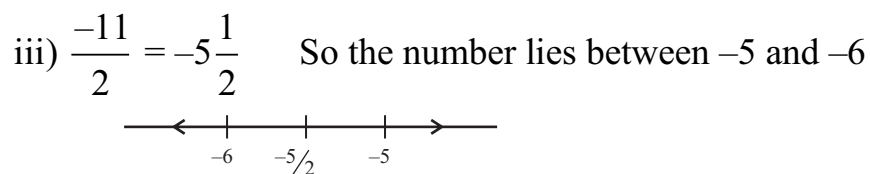
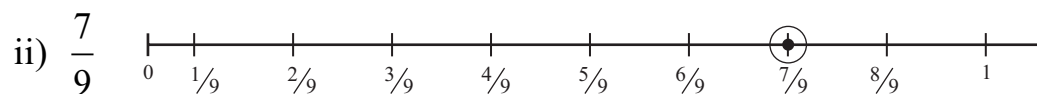
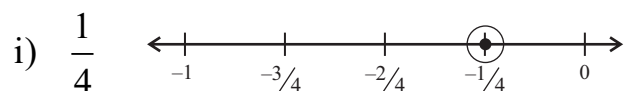
$$\begin{aligned} \text{iii) } \frac{15}{-45} &= \frac{15}{-45} \times 2 = \frac{30}{-90} \\ \frac{15}{-45} &= \frac{15}{-45} \times 3 = \frac{45}{-135} \\ \frac{15}{-45} &= \frac{15}{-45} \times 4 = \frac{60}{-180} \end{aligned}$$

We may also divide by with the same number.

2. Give an equivalent rational number for $\frac{-240}{180}$ with

$$\begin{aligned} \text{i) } \frac{-240}{180} &= \frac{(-240) \div (-30)}{180 \div (-30)} = \frac{8}{-6} \\ \text{ii) } \frac{-240}{180} &= \frac{(-240) \div (-10)}{(180) \div (-10)} = \frac{24}{-18} \\ \text{iii) } \frac{-240}{180} &= \frac{(-240) \div 3}{180 \div 3} = \frac{-120}{90} \\ \text{iv) } \frac{-240}{180} &= \frac{(-240) \div 2}{180 \div 2} = \frac{-120}{90} \\ \text{v) } \frac{-240}{180} &= \frac{(-240) \div (-5)}{180 \div (-5)} = \frac{48}{-36} \\ \text{vi) } \frac{-240}{180} &= \frac{(-240) \div 12}{180 \div 12} = \frac{-20}{15} \end{aligned}$$

3. Represent the following on the number line.



4. Check if the following rational numbers are equivalent or not.

i) $\frac{1}{3}$ and $\frac{2}{9}$

by cross multiplication,

$$9 \times 1 = 9$$

$$3 \times 2 = 6$$

$$\nwarrow (9 \times 1) \quad (3 \times 2)$$

$$\therefore \frac{1}{3} \neq \frac{2}{9}$$

$$\therefore \frac{1}{3} \text{ is not equivalent to } \frac{2}{9}$$

ii) $\frac{-5}{6}$ and $\frac{-10}{12}$

by cross multiplication,

$$12 \times (-5) = -60$$

$$6 \times (-10) = -60$$

$$\nwarrow 12 \times (-5) = 6 \times (-10)$$

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

$$\therefore \frac{-5}{6} \text{ is equivalent to } \frac{-10}{12}$$

iii) $\frac{9}{10}$ and $\frac{-5}{6}$

by cross multiplication,

$$6 \times 9 = 54$$

$$10 \times (-5) = -50$$

$$\nwarrow 6 \times 9 \quad 10 \times (-5)$$

$$\therefore \frac{9}{10} \neq \frac{-5}{6}$$

$$\therefore \frac{9}{10} \text{ is not equivalent to } \frac{-5}{6}$$

iv) $\frac{12}{33}$ and $\frac{4}{11}$

by cross multiplication,

$$11 \times 12 = 132$$

$$33 \times 4 = 132$$

$$\nwarrow 11 \times 12 = 33 \times 4$$

$$\therefore \frac{12}{33} = \frac{4}{11}$$

$$\therefore \frac{12}{33} \text{ is equivalent to } \frac{4}{11}$$

5. Express the following rational numbers in the standard form.

i) $\frac{1}{-9} = \frac{1 \times (-1)}{(-9) \times (-1)} = \frac{-1}{9}$

ii) $\frac{6}{-4} = \frac{6 \times (-1)}{(-4) \times (-1)} = \frac{-6}{4} = \frac{-3}{2} = 1\frac{1}{2}$

iii) $\frac{-2}{8} = \frac{-1}{4}$

iv) $\frac{-7}{14} = \frac{-1}{2}$

Exercise 4.2

1. Use >, < or = sign

i) $\frac{2}{6}$ and $\frac{-8}{3}$

by cross multiplication,

$$3 \times 2 = 6$$

$$6 \times (-8) = -48$$

$$\nearrow 6 > -48$$

$$\therefore \frac{2}{6} > \frac{-8}{3} \text{ Ans.}$$

ii) $\frac{08}{7}$ and $\frac{8}{7}$

by cross multiplication,

$$7 \times (-8) = -56$$

$$7 \times 8 = 56$$

$$\nearrow -56 < 56$$

$$\therefore \frac{-8}{7} < \frac{8}{7} \text{ Ans.}$$

iii) $\frac{08}{35}$ and $\frac{-8}{3}$

$$\nearrow 12 > (-18)$$

$$\therefore \frac{12}{35} > \frac{-8}{35} \text{ Ans.}$$

2. Arrange the rational numbers in ascending order.

i) $\frac{01}{3}, \frac{5}{5}, \frac{-3}{4}$

$$\frac{-1}{3} = \frac{(-1)}{3} \times 4 = \frac{-4}{12}$$

$$\frac{5}{6} = \frac{5}{6} \times 2 = \frac{10}{12}$$

$$\frac{-3}{4} = \frac{(-3)}{4} \times 3 = \frac{-9}{12}$$

$$\therefore \frac{-1}{3}, \frac{5}{6}, \frac{-3}{4} = \frac{-4}{12}, \frac{10}{12}, \frac{-9}{12} \quad \nearrow -9 < -4 < 10$$

$$\therefore \frac{-9}{12} < \frac{-4}{12} < \frac{10}{12} = \frac{-3}{4} < \frac{-1}{3} < \frac{5}{6} \text{ Ans.}$$

ii) $\frac{2}{9}, \frac{7}{3}, \frac{-5}{18}$

$$= \frac{-2}{9}, \frac{7}{3}, \frac{-5}{18}$$

$$\therefore \frac{-2}{9} = \frac{(-2)}{9} \times 2 = \frac{-4}{18}$$

$$\frac{7}{3} = \frac{7}{2} \times 6 = \frac{42}{18}$$

$$\frac{-5}{18} = \frac{(-5)}{18} \times 1 = \frac{-5}{18}$$

$$\therefore \frac{-2}{9}, \frac{7}{3}, \frac{-5}{18} = \frac{-4}{18}, \frac{42}{18}, \frac{-5}{18}$$

$$\nearrow -5 < -4 < 42$$

$$\therefore \frac{-5}{18} < \frac{-4}{18} < \frac{42}{18} = \frac{-5}{18} < \frac{2}{9} < \frac{7}{3} \text{ Ans.}$$

$$\begin{aligned}
 \text{iii) } & \frac{-11}{24}, \frac{7}{12}, \frac{1}{-4}, \frac{3}{4} \\
 &= \frac{-11}{24}, \frac{7}{12}, \frac{-1}{4}, \frac{3}{4} \\
 \therefore & \frac{-11}{24} = \frac{(-11)}{24} \times 1 = \frac{-11}{24} \\
 & \frac{7}{12} = \frac{7}{12} \times 2 = \frac{14}{24} \\
 & \frac{-1}{4} = \frac{(-1)}{4} \times 6 = \frac{-6}{24} \\
 & \frac{3}{4} = \frac{3}{4} \times 6 = \frac{18}{24} \\
 \therefore & \frac{-11}{24}, \frac{7}{12}, \frac{-1}{4}, \frac{3}{4} \\
 \nearrow & -11 < -6 < 14 < 18 \\
 \therefore & \frac{-11}{24} < \frac{-6}{24} < \frac{14}{24} < \frac{18}{24} \\
 = & \frac{-11}{24} < \frac{1}{-4} < \frac{7}{12} < \frac{3}{4} \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 & \frac{7}{12} = \frac{7}{12} \times 2 = \frac{14}{24} \\
 & \frac{3}{4} = \frac{3}{4} \times 6 = \frac{18}{24} \\
 = & \frac{-11}{24}, \frac{14}{24}, \frac{-6}{24}, \frac{18}{24} \\
 = & \frac{-11}{24} < \frac{-6}{24} < \frac{14}{24} < \frac{18}{24}
 \end{aligned}$$

3. Arrange in descending order.

$$\begin{aligned}
 \text{i) } & \frac{6}{8}, \frac{6}{7}, \frac{-5}{14}, \frac{3}{9} \\
 \therefore & \frac{6}{8} = \frac{6}{8} \times 7 = \frac{42}{56} \\
 & \frac{6}{7} = \frac{6}{7} \times 8 = \frac{48}{56} \\
 & \frac{-5}{14} = \frac{(-5)}{14} \times 4 = \frac{-20}{56} \\
 & \frac{3}{9} = \frac{3}{9} \times 4 = \frac{12}{36} \\
 \therefore & \frac{48}{56}, \frac{42}{56}, \frac{-20}{56}, \frac{12}{36} \\
 = & \frac{48}{56}, \frac{42}{56}, \frac{-20}{56}, \frac{12}{36} \\
 \nearrow & 48 > 42 > -20 > 12 \\
 \therefore & \frac{48}{56} > \frac{42}{56} > \frac{-20}{56} > \frac{12}{36} \\
 = & \frac{6}{7} > \frac{6}{8} > \frac{-5}{14} > \frac{1}{3} \text{ 4' e}
 \end{aligned}$$

$$\begin{aligned}
 \text{ii) } & \frac{3}{25}, \frac{3}{50}, \frac{11}{75}, \frac{-2}{5} \\
 \therefore & \frac{3}{25} = \frac{3}{25} \times 6 = \frac{18}{150} \\
 & \frac{3}{50} = \frac{3}{50} \times 3 = \frac{9}{150} \\
 & \frac{11}{75} = \frac{11}{75} \times 2 = \frac{22}{150} \\
 & \frac{-2}{5} = \frac{(-2)}{5} \times 30 = \frac{-60}{150} \\
 \therefore & \frac{18}{150}, \frac{9}{150}, \frac{22}{150}, \frac{-60}{150} \\
 = & \frac{18}{150}, \frac{9}{150}, \frac{22}{150}, \frac{-60}{150} \\
 \nearrow & 22 > 18 > 9 > -60 \\
 \therefore & \frac{22}{150} > \frac{18}{150} > \frac{9}{150} > \frac{-60}{150} \\
 = & \frac{11}{75} > \frac{3}{25} > \frac{3}{50} > \frac{-2}{5} \text{ Ans.}
 \end{aligned}$$

$$\text{iii) } \frac{9}{18}, \frac{-2}{3}, \frac{-7}{6}, \frac{-1}{2}$$

$$\therefore \frac{9}{18} = \frac{9}{18} \times 1 = \frac{9}{18} \quad \frac{-2}{3} = \frac{(-2)}{3} \times 6 = \frac{-12}{18} \quad \frac{-7}{6} = \frac{(-7)}{6} \times 3 = \frac{-21}{18}$$

$$\frac{-1}{2} = \frac{(-1)}{2} \times 9 = \frac{-9}{18} \quad \therefore \frac{9}{18}, \frac{-2}{3}, \frac{-7}{6}, \frac{-1}{2} = \frac{9}{18}, \frac{-12}{18}, \frac{-21}{18}, \frac{-9}{18}$$

$$\nwarrow 9 > -9 > -12 > -21 \quad \therefore \frac{9}{18} > \frac{-9}{18} > \frac{-12}{18} > \frac{-21}{18} = \frac{9}{18} > \frac{-9}{18} > \frac{-12}{18} > \frac{-21}{18} \text{ Ans.}$$

4. Insert three rational number between.

$$\text{i) } \frac{2}{9} \quad \text{ii) } \frac{7}{11} \quad \text{iii) } \frac{12}{17} \quad \text{iv) } \frac{15}{29}$$

Exercise 4.3

1. Add.

$$\begin{aligned} \text{i) } \frac{-11}{7} + \frac{3}{7} \\ &= \frac{(-11) + 3}{7} \\ &= \frac{-8}{7} \\ &= -1\frac{1}{7} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{ii) } \frac{-3}{58} + \frac{-19}{58} \\ &= \frac{(-3) + (-19)}{58} \\ &= \frac{-3 - 19}{58} \\ &= \frac{-22}{58} \\ &= \frac{-11}{29} \\ &= -\frac{11}{29} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{iii) } \frac{2}{9} + \left(\frac{-15}{12} \right) \\ &= \frac{8 + (-15)}{36} \\ &= \frac{8 - 15}{36} \\ &= \frac{-7}{36} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{iv) } \frac{12}{19} + \left(\frac{-21}{38} \right) \\ &= \frac{24 + (-21)}{38} \\ &= \frac{24 - 21}{38} \\ &= \frac{3}{38} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{v) } \frac{1}{3} + \left(\frac{-12}{15} \right) \\ &= \frac{5 + (-12)}{15} \\ &= \frac{5 - 12}{15} \\ &= \frac{-7}{15} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{vi) } \frac{-7}{100} + \left(\frac{9}{20} \right) \\ &= \left(\frac{-7}{100} \right) + \left(\frac{45}{100} \right) \\ &= \frac{(-7) + (45)}{100} \\ &= \frac{7 - 45}{100} = -\frac{38}{100} \\ &= -\frac{19}{50} \text{ Ans.} \end{aligned}$$

2. Subtract.

$$\begin{aligned}
 \text{i)} \quad & \left(\downarrow \frac{-7}{19} \right) - \frac{3}{8} \\
 &= \frac{-7-3}{8} \\
 &= \frac{\cancel{10}^5}{\cancel{8}_4} = \frac{-5}{4} \\
 &= -1\frac{1}{4} \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 \text{ii)} \quad & \left(\downarrow \frac{-17}{19} \right) - \left(\frac{-1}{19} \right) \\
 &= \frac{-17+1}{19} \\
 &= \frac{-16}{19} \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 \text{iii)} \quad & \frac{-1}{5} - \frac{11}{25} \\
 &= \frac{(-5)-11}{25} \\
 &= \frac{-16}{25} \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 \text{iv)} \quad & \frac{-3}{8} - \left(\downarrow \frac{-5}{32} \right) \\
 &= \frac{(-12)+5}{32} \\
 &= \frac{-7}{32} \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 \text{v)} \quad & \frac{2}{-3} - \left(\downarrow \frac{18}{-97} \right) \\
 &= \frac{\cancel{02}}{3} - \left(\frac{-18}{97} \right) \\
 &= \frac{-94+54}{291} \\
 &= \frac{140}{291} \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 \text{vi)} \quad & \frac{8}{15} - \left(\downarrow \frac{-14}{16} \right) \\
 &= \frac{128+210}{240} \\
 &= \frac{\cancel{338}^{169}}{\cancel{240}_{120}} \\
 &= 1\frac{49}{120} \text{ Ans.}
 \end{aligned}$$

3. What must be added to $\frac{1}{11}$ to get $\frac{-6}{13}$?

$$\begin{aligned}
 & \frac{-6}{13} - \left(\downarrow \frac{-1}{11} \right) \\
 &= \frac{(-66)-(-13)}{143} = \frac{-66+13}{143} \\
 &= \frac{-53}{143} \text{ Ans.}
 \end{aligned}$$

4. How much is $\frac{17}{26}$ less than $\frac{-6}{13}$?

$$\begin{aligned}
 & \frac{-6}{13} - \frac{17}{26} \\
 &= \frac{\cancel{06}-17}{26} = \frac{-11}{26} \\
 &= -\frac{11}{26} \text{ Ans.}
 \end{aligned}$$

5. What must be subtracted from $\frac{2}{81}$ to get $\frac{-5}{27}$?

$$\begin{aligned}
 & \frac{2}{81} - \left(\downarrow \frac{\cancel{05}}{27} \right) \\
 &= \frac{2-(-15)}{81} \\
 &= \frac{2+15}{81} \\
 &= \frac{17}{81} \text{ Ans.}
 \end{aligned}$$

6. Write the additive inverse of the following.

$$\begin{array}{ll}
 \text{i)} \quad \frac{2}{6} & \text{ii)} \quad \frac{1}{4} \\
 \text{iii)} \quad \frac{-2}{4} & \text{iv)} \quad \frac{2}{9}
 \end{array}$$

Exercise 4.4

1. Multiply :

$$\begin{aligned} \text{i)} \quad & \frac{\cancel{0\cancel{1}}}{\cancel{6}_3} \times \frac{\cancel{4}^2}{\cancel{6}_3} \\ &= \frac{\cancel{0\cancel{1}}}{9} \\ &= -\frac{2}{9} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{ii)} \quad & \frac{\cancel{0\cancel{8}}}{\cancel{6}} \times \frac{\cancel{27}^{-3}}{\cancel{64}_{-8}} \\ &= \frac{\cancel{0\cancel{8}}}{-8} \\ &= \frac{3}{8} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{iii)} \quad & \frac{\cancel{6}}{\cancel{55}_{0\cancel{5}}} \times \frac{\cancel{11}^{-3}}{\cancel{30}_5} \\ &= \frac{1}{\cancel{0\cancel{2}5}} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{iv)} \quad & \frac{\cancel{0\cancel{2}}}{\cancel{7}} \times \frac{\cancel{14}^2}{\cancel{72}_{0\cancel{3}6} \cancel{0\cancel{8}}} \\ &= \frac{1}{-18} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{v)} \quad & \frac{\cancel{0\cancel{1}01}}{\cancel{500}_{100}} \times \frac{\cancel{3}}{6} \\ &= \frac{\cancel{0\cancel{1}01}}{600} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{vi)} \quad & \frac{\cancel{51}^{+3}}{\cancel{70}_7} \times \frac{\cancel{10}}{\cancel{17}} \\ &= \frac{+3}{7} \text{ Ans.} \end{aligned}$$

2. Divide.

$$\begin{aligned} \text{i)} \quad & \frac{\cancel{0\cancel{2}}}{9} \div \frac{49}{18} \\ &= \frac{-7}{9} \times \frac{\cancel{18}^2}{\cancel{49}_{0\cancel{7}}} \\ &= \frac{2}{-7} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{ii)} \quad & \frac{18}{13} \div \frac{-162}{65} \\ &= \frac{\cancel{18}}{\cancel{13}} \times \frac{\cancel{65}^5}{\cancel{162}_9} \\ &= \frac{\cancel{0\cancel{6}}}{9} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{iii)} \quad & \frac{\cancel{0\cancel{6}}}{12} \div \frac{-75}{48} \\ &= \frac{\cancel{6}^{+2}}{\cancel{12}} \times \frac{\cancel{48}^4}{\cancel{75}_{25}} \\ &= \frac{+8}{25} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{iv)} \quad & \frac{1}{10} \div \frac{\cancel{0\cancel{8}}}{100} \\ &= \frac{1}{\cancel{10}} \times \frac{\cancel{100}^{-10}}{8} \\ &= \frac{-10^5}{\cancel{8}_4} \\ &= -1\frac{1}{4} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{v)} \quad & \frac{3}{20} \div \frac{90}{60} \\ &= \frac{\cancel{3}}{\cancel{20}} \times \frac{\cancel{60}^{\cancel{3}}}{\cancel{90}_{30} \cancel{10}} \\ &= \frac{1}{10} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} \text{vi)} \quad & \frac{\cancel{0\cancel{6}}}{17} \div \left(\frac{\cancel{11}^{-1}}{\cancel{34}} \right) \\ &= \frac{-1}{\cancel{17}} \times \frac{\cancel{34}^{-2}}{1} \\ &= \frac{2}{1} \text{ Ans.} \end{aligned}$$

3. What is the multiplicative inverse of the following?

$$\text{i)} \quad \frac{\cancel{0\cancel{1}}}{3}$$

$$\text{ii)} \quad \frac{11}{6}$$

$$\text{iii)} \quad \frac{-4}{21}$$

$$\text{iv)} \quad \frac{-1}{35}$$

4. What must $\frac{18}{4}$ be multiplied

with to get $\frac{-18}{25}$?

$$\left(\frac{-18}{25}\right) \div \left(\frac{-3}{4}\right)$$

$$= \frac{18}{25} \times \frac{-4}{3}$$

$$= \frac{24}{25} \text{ Ans.}$$

5. What should $\frac{18}{7}$ be divided by to get $\frac{-18}{25}$?

$$\left(\frac{-3}{7}\right) \div \left(\frac{-27}{49}\right)$$

$$= \frac{3}{7} \times \frac{49}{27}$$

$$= \frac{-7}{-9}$$

$$= \frac{7}{9} \text{ Ans.}$$

6. Which number divided by $\frac{-1}{20}$ gives $\frac{-27}{49}$?

$$\left(\frac{-1}{20}\right) \times \left(\frac{-7}{13}\right)$$

$$= \frac{7}{260} \text{ Ans.}$$

7. Find the reciprocal of the following :

$$\text{i) } \frac{2}{6} \times \left(\frac{-4}{8}\right) = \frac{-8}{21}$$

$$\text{Reciprocal of } \frac{-8}{21} = \frac{-21}{8} \text{ Ans.}$$

$$\text{ii) } \left(\frac{3}{20}\right) - \left(-\frac{3}{12}\right)$$

$$= -3 - \left(\frac{1}{-2}\right) = (-3) - \left(\frac{-1}{2}\right)$$

$$= \frac{(-6) - (-1)}{2} = \frac{6 + 1}{2} = -\frac{5}{2}$$

$$\text{Reciprocal of } \frac{-5}{2} = \frac{-2}{5} \text{ Ans.}$$

SELF ASSESSMENT-4

1. Write 3 rational numbers equivalent to $-\frac{6}{18}$.

$$\frac{6}{18} = \frac{(-6)}{18} \times 2 = \frac{-12}{36}$$

$$\frac{6}{18} = \frac{(-6)}{18} \times 3 = \frac{-8}{54}$$

$$\frac{-6}{18} = \frac{(-6)}{18} \times 4 = \frac{-24}{72}$$

$$\therefore \text{ Rational numbers equivalent to } \frac{-6}{18} = \frac{-12}{36}, \frac{-8}{54}, \frac{-24}{72}$$

2. What should be added to $\frac{-5}{11}$ to get $\frac{-2}{9}$?

$$\begin{aligned} & \left(\frac{-2}{9} \right) - \left(\frac{-5}{11} \right) \\ &= \frac{(-22) - (-45)}{99} = \frac{-22 + 45}{99} = \frac{23}{99} \text{ Ans.} \end{aligned}$$

3. Subtract the sum of $\frac{-1}{4}$ and $\frac{-6}{7}$ from $\frac{8}{13}$.

$$\begin{aligned} & \frac{8}{13} - \left\{ \left(\frac{-1}{4} \right) + \left(\frac{-6}{7} \right) \right\} \\ &= \left[\frac{8}{13} - \left\{ \frac{(-7) + (-24)}{28} \right\} \right] \\ &= \left[\frac{8}{13} - \left\{ \frac{(-7) - 24}{28} \right\} \right] \\ &= \left[\frac{8}{13} - \left(\frac{-31}{28} \right) \right] \\ &= \frac{224 - (-403)}{364} \\ &= \frac{224 + 403}{364} = \frac{627}{364} \\ &= 1 \frac{263}{364} \text{ Ans.} \end{aligned}$$

5. $\frac{8}{15}$ multiplied by what

will give $\frac{-16}{65}$?

$$\begin{aligned} & \frac{8}{15} \div \frac{8}{13} \\ &= \frac{\cancel{8}}{\cancel{15}_2} \times \frac{\cancel{8}}{\cancel{13}} \\ &= \frac{\cancel{8}}{2} \\ &= -2 \frac{1}{2} \text{ Ans.} \end{aligned}$$

6. a) $\frac{-11}{17}$

$$\begin{aligned} 8. \quad & \frac{3}{7} + \left(\frac{-19}{14} \right) \\ &= \frac{6 + (-19)}{14} \\ &= \frac{6 - 19}{14} \\ &= \frac{-13}{14} \\ \therefore \text{ b) } & \frac{-13}{14} \end{aligned}$$

7. c) $\frac{-4}{65}$

9. c) $\frac{y}{z}$

10. d) all of the above

Chapter-5 Exponents and Powers

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Concept of Exponents and Powers		Explain to the students about repeated multiplication can be written in short form in exponential form $3 \times 3 \times 3 \times 3 = 3^4$ exponents	Express -343 in exponential form Evaluates $\left(\frac{1}{2}\right)^3 \times \left(\frac{1}{5}\right)^2$
Laws of Exponent	Students will be able to solve sums by applying various laws of exponents	Explain all the laws of exponent by gluing eggs for each. For eq. $(x^m)^n$ Explain as $(2^3)^4 = 2^{3 \times 4} = 2^{12}$ Do various sums based on laws of exponent.	Simplify and write in exponential form $\left(\frac{2}{8}\right)^8 \div \left(\frac{2}{5}\right)^{-3}$
Scientific Notation	Students will be able to write huge numbers in exponential form (scientific Notation)	Explain the general representation of scientific notation. 8500000 can be written as 8.5×10^6 . [General form: $a \times 10^n$] where $1 \leq a < 10$	Write 0.000000014 in scientific notation.

Exercise 5.1

1. i) Base = 7

Exponent = 9

ii) Base = -12

Exponent = 10

iii) Base = $\frac{1}{10}$

power 50

iv) Base = $-\frac{61}{500}$

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

$$= 256$$

Ans. 256

ii) $(-7)^4$

$$= 7^4$$

$$= 7 \times 7 \times 7 \times 7$$

$$= 2401$$

Ans. 2401

iii) $\frac{1}{5^2}$

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

2. i) 2^8

$$= \frac{1}{25}$$

$$\text{Ans. } \frac{1}{25}$$

$$\text{iv) } \left(\frac{-3}{10}\right)^3$$

$$= \frac{(-3)^3}{10^3}$$

$$= \frac{-27}{1000}$$

$$\text{Ans. } \frac{-27}{1000}$$

$$\text{v) } \left(\frac{-7}{9}\right)^{-1}$$

$$= \frac{-7}{9}$$

$$\text{Ans. } \frac{-7}{9}$$

$$\text{vi) } \frac{5^1}{6^3}$$

$$= \frac{5}{6 \times 6 \times 6}$$

$$= \frac{5}{216}$$

$$3. \text{ i) } 675$$

$$= 3^3 \times 5^2$$

$$\text{Ans. } 675 = 3^3 \times 5^2$$

5	675
5	135
3	27
3	9
3	3
	1

$$\text{ii) } 99$$

$$= 3^2 \times 11^1$$

3	99
3	33
11	11
	1

$$\text{Ans. } 99 = 3^2 \times 11^1$$

$$\text{iii) } -24$$

$$= -(2^3 \times 3^1)$$

2	24
2	12
2	6
3	3
	1

$$\text{Ans. } -24 = -2^3 \times 3^1$$

$$\text{iv) } \frac{1}{72}$$

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

2	72
2	36
2	18
3	9
3	3
	1

$$\text{Ans. } \frac{1}{72} = \frac{1^1}{2^3 \times 3^2}$$

$$\text{v) } \frac{100}{81}$$

$$= \frac{2^2 \times 5^2}{3^4}$$

$$= \frac{(2 \times 5)^2}{3^4}$$

$$\begin{array}{r|l} 2 & 100 \\ \hline 2 & 50 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 3 & 18 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\text{Ans. } \frac{1000}{81} = \frac{(2 \times 5)^2}{3^4}$$

$$\text{vi) } -\frac{512}{27}$$

$$= \frac{-2^9}{3^3}$$

$$\begin{array}{r|l} 2 & 512 \\ \hline 2 & 256 \\ \hline 2 & 128 \\ \hline 2 & 64 \\ \hline 2 & 32 \\ \hline 2 & 16 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline 2 & 2 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\text{Ans. } \frac{-512}{27} = \frac{-2^9}{3^3}$$

$$\begin{aligned} 4. \quad \text{i) } & 2^0 \times 5^2 \\ & = 1 \times 25 \\ & = 25 \end{aligned}$$

$$\text{Ans. } 25$$

$$\text{ii) } (-13)^2 \times 3^3$$

$$\begin{aligned} & = 13^2 \times 3^3 \\ & = 169 \times 27 \\ & = 4563 \end{aligned}$$

$$\text{Ans. } 4563$$

$$\text{iii) } \left(-\frac{1}{4}\right)^2 \times 5^3$$

$$= \left(\frac{1}{4}\right)^2 \times 5^3$$

$$= \frac{1^2}{4^2} \times 125$$

$$= \frac{1}{16} \times 125$$

$$= \frac{125}{16}$$

$$= 7\frac{13}{16}$$

$$\text{Ans. } 7\frac{13}{16}$$

$$\begin{aligned} \text{iv) } & 6^3 \times 7^2 \\ & = 216 \times 49 \\ & = 10584 \\ & \text{Ans. } 10584 \end{aligned}$$

$$\text{v) } \left(\frac{1}{1000}\right)^0 \times 12^2$$

$$= 1 \times 144$$

$$= 144$$

$$\text{Ans. } 44$$

$$\begin{aligned} \text{vi) } & 5^2 \times (-3) \times 2^2 \\ & = 25 \times (-3) \times 4 \\ & = 100 \times (-3) \end{aligned}$$

$$= -300$$

$$\text{Ans. } -300$$

$$5. \quad \text{i)} \quad 1^{11} = 1$$

$$11 > 1$$

$$\therefore 11 > 1$$

$$\therefore 11^1 > 1$$

$$\text{Ans. } 11^1 > 1^{11}$$

$$\text{ii)} \quad 2^5 = 32$$

$$3^5 = 243$$

$$\therefore 243 > 32$$

$$\therefore 3^5 > 2^5$$

$$\text{Ans. } 3^5 > 2^5$$

$$\text{iii)} \quad \left(\frac{1}{4}\right)^2 = \frac{1^2}{4^2} = \frac{1}{16}$$

$$\left(\frac{1}{2}\right)^3 = \frac{1^3}{2^3} = \frac{1}{8}$$

$$\therefore \frac{1}{8} > \frac{1}{16}$$

$$\therefore \left(\frac{1}{2}\right)^3 > \left(\frac{1}{4}\right)^4$$

$$\text{Ans. } \left(\frac{1}{2}\right)^3 > \left(\frac{1}{4}\right)^4$$

$$\text{iv)} \quad 10^4 = 10000$$

$$2^7 = 128$$

$$\therefore 10000 > 128$$

$$\therefore 10^4 > 2^7$$

$$\text{Ans. } 10^4 > 2^7$$

$$\text{v)} \quad (-1)^5 = -1$$

$$(-1)^6 = 1$$

$$\therefore 1 > -1$$

$$\therefore (-1)^6 > (-1)^5$$

$$\text{Ans. } (-1)^6 > (-1)^5$$

$$\text{vi)} \quad 2^7 = 128$$

$$7^2 = 49$$

$$\therefore 128 > 49$$

$$\therefore 2^7 > 7^2$$

$$\text{Ans. } 2^7 > 7^2$$

$$6. \quad \text{i)} \quad 3^0 \times 1^9$$

$$= 1 \times 1$$

$$= 1$$

$$\text{Ans. } 1$$

$$\text{ii)} \quad (-3)^3 \times 7^0 \times (-1)^{18}$$

$$= -27 \times 1 \times 1$$

$$= -27$$

$$\text{Ans. } -27$$

$$\text{iii)} \quad 4^2 \times 3^4 \times (-1)^2$$

$$= 16 \times 81 \times 1$$

$$= 1296$$

$$\text{Ans. } 1296$$

$$\text{iv)} \quad 2^3 \times 3^3$$

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

$$= 6^3$$

$$= 216$$

$$\text{Ans. } 216$$

$$\text{v)} \quad 6^2 \times \frac{1}{3^3}$$

$$= 36 \times \frac{1}{27}$$

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

$$= 1\frac{1}{3}$$

$$\text{Ans. } 1\frac{1}{3}$$

$$\text{vi) } \left(\frac{-2}{3}\right)^3 \times \left(\frac{3^5}{2^4}\right)$$

$$= \frac{-2^3}{3^3} \times \frac{3^5}{2^4}$$

$$= \frac{8}{27} \times \frac{243}{16}$$

$$= \frac{9}{-2}$$

$$= \frac{-9}{2}$$

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

$$\text{Ans. } -4\frac{1}{2}$$

$$7. \quad \text{i) } 7^x = 4^9$$

$$7^x = 7^2$$

$\therefore$ Bases are same, powers should also be equal.

$$\therefore x = 2$$

$$\text{Ans. } x = 2$$

$$\text{ii) } 2^x = 32$$

$$2^x = 2^5$$

$\therefore$ Bases are same, powers should also be equal.

$$\therefore x = 5$$

$$\text{Ans. } x = 5$$

$$\text{iii) } (-4)^x = 256$$

$$\Rightarrow (-4)^x = (-4)^4$$

$\therefore$ Bases are equal, powers should also be same.

$$\therefore x = 4$$

$$\text{Ans. } x = 4$$

4	256
4	64
4	16
4	4
	1

$$\text{iv) } \left(\frac{-3}{4}\right)^x = -243$$

$$\Rightarrow \left(\frac{-3}{4}\right)^x = \left(\frac{-3}{4}\right)^5$$

$\therefore$ Bases are same, powers should also be equal.

$$\therefore x = 5$$

$$\text{Ans. } x = 5$$

3	243	4	1024
3	81	4	256
3	27	4	64
3	9	4	16
3	3	4	4
	1		1

$$\text{v) } \left(\frac{2}{7}\right)^x = \frac{8}{343}$$

$$\left(\frac{2}{7}\right)^x = \left(\frac{2}{7}\right)^3$$

$\therefore$ Bases are same, powers should also be equal.

$$\therefore x = 3$$

$$\text{Ans. } x = 3$$

2	8	7	343
2	4	7	49
2	2	7	7
	1		1

$$\text{vi) } (-4)^x = -1024$$

$$= (-4)^x = (-4)^5$$

$\therefore$ Bases are same, powers should also be equal.

$$\therefore x = 5$$

$$\text{Ans. } x = 5$$

$$8. \quad \text{i) } \begin{array}{r|l} 5 & 125 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\therefore 125 = 5^3$$

$$\text{Ans. } 125 = 5^3$$

$$\begin{array}{r|l} \text{ii)} & 2 \mid 360 \\ & 2 \mid 180 \\ & 2 \mid 90 \\ & 3 \mid 45 \\ & 3 \mid 15 \\ & 5 \mid 5 \\ & 1 \end{array}$$

$$\therefore 360 = 2^3 \times 3^2 \times 5^1$$

$$\text{Ans. } 360 = 2^3 \times 3^2 \times 5^1$$

$$\begin{array}{r|l} \text{iii)} & 2 \mid 540 \\ & 2 \mid 270 \\ & 3 \mid 135 \\ & 3 \mid 45 \\ & 3 \mid 15 \\ & 5 \mid 5 \\ & 1 \end{array}$$

$$\therefore 540 = 2^2 \times 3^3 \times 5^1$$

$$\text{Ans. } 540 = 2^2 \times 3^3 \times 5^1$$

iv)

$$\therefore 312 = 2^3 \times 3^1 \times 13^1$$

$$\text{Ans. } 312 = 2^3 \times 3^1 \times 13^1$$

Exercise 5.2

$$1. \quad \text{i)} \quad 2^{40} \div 2^5 \times (2^3)^2$$

$$= \frac{2^{40}}{2^5} \times 2^6$$

$$= 2^{40-5+6}$$

$$= 2^{41}$$

$$\text{Ans. } 2^{41}$$

$$\text{ii)} \quad 5^7 \times 5^3$$

$$= 5^{7+3}$$

$$= 5^{10}$$

$$\text{Ans. } 5^{10}$$

$$\text{iii)} \quad \frac{1}{10^2} \times 10^9$$

$$= 10^9 \div 10^2$$

$$= 10^{9-2}$$

$$= 10^7$$

$$\text{Ans. } 10^7$$

$$\text{iv)} \quad 7^4 \times \frac{1}{(7^2)^2} \times 7^1$$

$$= (7^4 + 1) \div 7^4$$

$$= \frac{7^5}{7^4}$$

$$= 7^{5-4}$$

$$= 7^1$$

$$\text{Ans. } 7^1$$

$$\text{v)} \quad 15^7 \div 15^4$$

$$= 15^{7-4}$$

$$= 15^3$$

$$\text{Ans. } 15^3$$

$$\text{vi)} \quad \frac{1}{3^{20}} \times 3^4 \div 3^2$$

$$= 3^{4-2} \div 3^{20}$$

$$= 3^{2-20}$$

$$= 3^{-18}$$

$$\text{Ans. } 3^{-18}$$

$$2. \quad \text{i)} \quad 2 \mid 288$$

$$2 \mid 144$$

$$2 \mid 72$$

$$2 \mid 36$$

$$2 \mid 18$$

$$3 \mid 9$$

$$3 \mid 3$$

$$1$$

$$\therefore 288 = 2^5 \times 3^2$$

$$\text{Ans. } 288 = 2^5 \times 3^2$$

$$\begin{array}{r|l} \text{ii)} & 2 \mid 300 \\ \hline & 2 \mid 150 \\ \hline & 3 \mid 75 \\ \hline & 5 \mid 25 \\ \hline & 5 \mid 5 \\ \hline & 1 \end{array}$$

$$\therefore 300 = 2^2 \times 3^1 \times 5^2$$

$$\text{Ans. } 300 = 2^2 \times 3^1 \times 5^2 = (2 \times 5)^2 \times 3^1$$

$$\begin{array}{r|l} \text{iii)} & 2 \mid 6250 \\ \hline & 5 \mid 3125 \\ \hline & 5 \mid 625 \\ \hline & 5 \mid 125 \\ \hline & 5 \mid 25 \\ \hline & 5 \mid 5 \\ \hline & 1 \end{array}$$

$$\therefore 6250 = 2^1 \times 5^5$$

$$\text{Ans. } 6250 = 2^1 \times 5^5$$

$$\begin{array}{r|l} \text{vi)} & 3 \mid 243 \\ \hline & 3 \mid 81 \\ \hline & 3 \mid 27 \\ \hline & 3 \mid 9 \\ \hline & 3 \mid 3 \\ \hline & 1 \end{array}$$

$$\therefore -243 = (-3)^5$$

$$\text{Ans. } -243 = (-3)^5$$

$$\text{v)} \quad \frac{1}{-243} = \left(\frac{1}{-3} \right)^5 \quad \text{Ans.}$$

$$\begin{array}{r|l} \text{vi)} & 2 \mid 108 \\ \hline & 2 \mid 54 \\ \hline & 3 \mid 27 \\ \hline & 3 \mid 9 \\ \hline & 3 \mid 3 \\ \hline & 1 \end{array}$$

$$\therefore 108 = 2^2 \times 3^3$$

$$\text{Ans. } 108 = 2^2 \times 3^3$$

$$\begin{aligned} 3. \quad \text{i)} \quad & 2^0 + 5^1 - (3^2)^0 \\ & = 1 + 5 - 3^0 \\ & = 1 + 5 - 1 \\ & = 5 \end{aligned}$$

$$\text{Ans. } 5$$

$$\begin{aligned} \text{ii)} \quad & 7^3 - 11^2 \\ & = 343 - 121 \\ & = 222 \end{aligned}$$

$$\text{Ans. } 222$$

$$\begin{aligned} \text{iii)} \quad & 6^0 - 3^0 + 1 \\ & = 1 - 1 + 1 \\ & = 1 \end{aligned}$$

$$\text{Ans. } 1$$

$$\begin{aligned} \text{iv)} \quad & \left(\frac{1}{3} \right)^2 + \left(\frac{-1}{2} \right)^2 \\ & = \frac{1^2}{3^2} + \left(\frac{-1^2}{2^2} \right) \\ & = \frac{1}{9} + \frac{1}{4} \\ & = \frac{4+9}{36} \\ & = \frac{13}{36} \end{aligned}$$

$$\text{Ans. } \frac{13}{36}$$

$$\begin{aligned}
 \text{v)} \quad & (1^5)^3 - 9^2 + 5^3 \\
 & = 1^{15} - 9^2 + 5^3 \\
 & = 1 - 81 + 125 \\
 & = 126 - 81 \\
 & = 45
 \end{aligned}$$

Ans. 45

$$\begin{aligned}
 \text{vi)} \quad & (2^2 \times 2^3) - (3^4 \div 3^1) \\
 & = 2^{2+3} - 3^{4-1} \\
 & = 2^5 - 3^3 \\
 & = 32 - 27 \\
 & = 5
 \end{aligned}$$

Ans. 5

$$\begin{aligned}
 4. \quad \text{i)} \quad & \left(\frac{2}{4}\right)^{-1} \div \left(\frac{1}{2}\right)^{-1} \\
 & = \left(\frac{4}{2}\right)^1 \div \left(\frac{2}{1}\right)^1 \\
 & = \frac{4}{2} \div \frac{2}{1} \\
 & = \frac{4}{2} \times \frac{1}{2} \\
 & = 1
 \end{aligned}$$

Ans. 1

$$\begin{aligned}
 \text{ii)} \quad & \left[\left\{ \left(\frac{7}{2} \right)^2 \right\}^4 \right]^{-1} \\
 & = \frac{7^{2 \times 4 \times (1)}}{2} \\
 & = \left(\frac{7}{2} \right)^{-8} \\
 & = \left(\frac{2}{7} \right)^8
 \end{aligned}$$

$$\begin{aligned}
 & = \frac{2^8}{7^8} \\
 & = \frac{256}{5763001}
 \end{aligned}$$

$$\text{Ans. } \frac{256}{5763001}$$

$$\begin{aligned}
 5. \quad & \left(\frac{1}{5}\right)^{-2} + \left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{3}\right)^{-2} + \left(\frac{1}{6}\right)^{-2} \\
 & = 5^2 + 2^2 + 3^2 + 6^2 \\
 & = 25 + 4 + 9 + 36 \\
 & = 74
 \end{aligned}$$

Ans. 74

$$\begin{aligned}
 6. \quad \text{i)} \quad & \frac{2^5 \times 10^2 \times 3}{5 \times 6^3} \\
 & = \frac{2^5 \times (2 \times 5)^2 \times 3^1}{5^1 \times (2 \times 3)^3} \\
 & = \frac{2^5 \times 2^2 \times 5^2 \times 3^1}{5^1 \times 2^3 \times 3^3} \\
 & = 2^{5+2-3} \times 5^{2-1} \times 3^{1-3} \\
 & = 2^4 \times 5^1 \times 3^{-2}
 \end{aligned}$$

$$= 16 \times 5 \times \left(\frac{1}{3}\right)^2$$

$$= 80 \times \frac{1}{9}$$

$$= 8\frac{8}{9}$$

Ans. $8\frac{8}{9}$

$$\text{ii)} \quad \frac{(2^6)^3 \times 3^4}{3^6 \times 2^5}$$

$$\begin{aligned}
&= \frac{2^{18} \times 3^4}{3^6 \times 2^5} \\
&= 2^{18-5} \times 3^{4-6} \\
&= 2^{13} \times 3^{-2} \\
&= 2^{13} \times \left(\frac{1}{3}\right)^2 \\
&= 4096 \times \frac{1}{9} \\
&= \frac{4096}{9}
\end{aligned}$$

$$= 456\frac{2}{9}$$

$$\text{Ans. } 456\frac{2}{9}$$

$$7. \quad \text{i)} \quad \frac{1}{3x} = 9$$

$$\Rightarrow 3^{-x} = 9$$

$$\Rightarrow 3^{-x} = 3^2$$

$\therefore$ Bases are same, powers should equal.

$$\therefore -x = 2$$

$$\Rightarrow x = -2$$

$$\text{ii)} \quad (5^2)^x = 9$$

$$\Rightarrow 5^{2x} = 625$$

$$\Rightarrow 5^{2x} = 5^4$$

$\therefore$ Bases are same, powers should equal.

$$\therefore 2x = 4$$

$$\Rightarrow x = \frac{4}{2}$$

$$= 2$$

$$\text{Ans. } x = 2$$

$$\text{iii)} \quad 2x \div 2^5 = 256$$

$$= 2^{x-5} = 2^8$$

$\therefore$ Bases are same, powers will be equal.

$$\therefore x - 5 = 8$$

$$\Rightarrow x = 8 + 5$$

$$= 13$$

$$\text{Ans. } x = 13$$

$$8. \quad \text{i)} \quad 10x = 1$$

$$\Rightarrow 10x = 10^0$$

$$\Rightarrow x = 0$$

$$\text{Ans. } x = 0$$

$$\text{ii)} \quad (52)^x = 125$$

$$= 52^x = 53$$

$\therefore$ Bases are same powers will be equal.

$$\therefore 2x = 3$$

$$\Rightarrow x = \frac{3}{2}$$

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

$$\text{Ans. } x = 1\frac{1}{2}$$

$$\text{iii)} \quad 7^5 \div 7x \times 7^3 = 1$$

$$\Rightarrow 7^{5-x+3} = 1$$

$$\Rightarrow 7^{8-x} = 1$$

$$\Rightarrow 7^{8-x} = 7^0$$

$\therefore$ Bases are same, powers will be equal.

$$\therefore 8 - x = 0$$

$$\Rightarrow 8 - 0 = x$$

$$\Rightarrow 8 = x$$

$$\text{Ans. } x = 8$$

$$9. \quad (-2)^{x-1} = -32$$

$$\Rightarrow (-2)^{x-1} = (-2)^5$$

$\therefore$ Bases are same, powers will be equal.

2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2

$$\therefore x - 1 = 5$$

$$\Rightarrow x = 5 + 1$$

$$= 6$$

$$\therefore (-4)^{\frac{x}{3}+1}$$

$$= (-4)^{\frac{x}{6}+1}$$

$$= (-1)^{2+1}$$

$$= (-4)^3$$

$$= -64$$

Ans. -64

$$10. \left(\frac{3}{5}\right)^4 \times \left(\frac{5}{3}\right)^{-8} = \left(\frac{3}{5}\right)^{2x}$$

$$= \left(\frac{3}{5}\right)^4 \times \left(\frac{3}{5}\right)^8 = \left(\frac{3}{5}\right)^{2x}$$

$$= \left(\frac{3}{5}\right)^{4+8} = \left(\frac{3}{5}\right)^{2x}$$

$$= \left(\frac{3}{5}\right)^{12} = \left(\frac{3}{5}\right)^{2x}$$

$\therefore$ Bases are same, powers, will be equal.

$$\therefore 12 = 2x$$

$$\Rightarrow \frac{12}{2} = x$$

$$\Rightarrow 6 = x$$

Ans. $x = 6$

$$11. \text{ i) } \frac{16 \times 7 \times 18}{49 \times 3^3 \times 2^4}$$

$$= \frac{2^4 \times 7^1 \times 2^1 \times 3^2}{7^2 \times 3^3 \times 2^4}$$

$$= \frac{2^{4+1} \times 7^1 \times 3^2}{7^2 \times 3^3 \times 2^4}$$

$$= 2^{5-4} \times 7^{1-1} \times 3^{2-3}$$

$$= 2^1 \times 7^{-1} \times 3^{-1}$$

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

$$= \frac{2}{21}$$

Ans. $\frac{2}{21}$

$$\text{ii) } \frac{a^5 \times (a^2)^0 \times b^3}{a^2 \times b^2 \times b}$$

$$= \frac{a^5 \times a^0 \times b^3}{a^2 \times b^{2+1}}$$

$$= \frac{a^{5+0} \times b^3}{a^2 \times b^3}$$

$$= a^{5-2} \times b^{3-3}$$

$$= a^3 \times b^0$$

$$= a^3 \times 1$$

$$= a^3$$

Ans. a^3

$$\text{iii) } \frac{35 \times 2^3 \times 5^3}{125 \times 16}$$

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

$$= \frac{7^1 \times 5^{1+3} \times 2^3}{5^3 \times 2^4}$$

$$= 7^1 \times 5^{4-3} \times 2^{3-4}$$

$$= 7^1 \times 5^1 \times 2^{-1}$$

$$= 35 \times \frac{1}{2}$$

$$= \frac{35}{2}$$

$$= 17\frac{1}{2}$$

$$\text{Ans. } 17\frac{1}{2}$$

Self Assessment-5

1. i) $2^3 \times 2^7$

$$= 2^{3+7}$$

$$= 2^{10}$$

$$= 1024$$

$$\text{Ans. } 1024$$

ii) $78 \div 76$

$$= 78 - 6$$

$$= 72$$

$$= 49$$

$$\text{Ans. } 49$$

2. i) $73 \times 72 = 7x$

$$= 73 + 2 = 7x$$

$$= 75 = 7x$$

$\therefore$ Bases are same, powers will be equal.

$$\therefore 5 = x$$

$$\text{Ans. } x = 5$$

ii) $(-11)^8 \div (-11)^2 = (-11)^x$

$$= 11^8 \div 11^2 = (-11)^x$$

$$= 11^{8-2} = (-11)^x$$

$$= 11^6 = 11x$$

$\therefore$ Bases are same powers will be equal.

$$\therefore 6 = x$$

$$\text{Ans. } x = 6$$

3. i) $5^0 + 8^0 - 7^0$

$$= 1 + 1 - 1$$

$$= 1$$

$$\text{Ans. } 1$$

ii) $1^0 - 3^1 + 7^2$

$$= 1 - 3 + 49$$

$$= 47$$

$$\text{Ans. } 47$$

4. i)
$$\begin{array}{r|l} 7 & 343 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$\therefore 343 = 7^3$$

$$\text{Ans. } 343 = 7^3$$

ii)
$$\begin{array}{r|l} 2 & 216 \\ \hline 2 & 108 \\ \hline 2 & 54 \\ \hline 2 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\therefore 216 = 2^3 \times 3^3$$

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

$$= 6^3$$

$$\text{Ans. } 216 = 6^3$$

5. $(-5)^2$

$$= 5^2$$

$$= 25$$

$$\text{Ans. } 25$$

6. b) -5

7. d) -8

8. c) 10

9. a)

10. a) 16

11. a) 1

12. a) $<$

Exercise 6.1

1.
 - i) $A = \{x \mid x \in \mathbb{N}, 2 < x, 5\}$
 $\therefore A = \{3, 4\}$
 - ii) $B = \{x \mid x \in \mathbb{W}, x \text{ is the first four even numbers}\}$
 $\therefore B = \{0, 2, 4, 6\}$
 - iii) $C = \{x \mid x \in \mathbb{Z}, -3 \leq x \leq 2\}$
 $\therefore C = \{-3, -2, -1, 0, 1, 2\}$
 - iv) $D = \{x \mid x \text{ is a letter in the word SATURDAY}\}$
 $\therefore D = \{S, A, T, U, R, D, Y\}$
 - v) $E = \{x \mid x \text{ is the first two months of the year}\}$
 $E = \{\text{January, February}\}$
2.
 - i) $A = \{\text{Natural numbers less than } 6\}$
 - ii) $B = \{\text{Squares of prime numbers less than } 7\}$
 - iii) $C = \{\text{Vowels of the english alphabet}\}$
 - iv) $D = \{\text{Letters in the word SPRING}\}$
 - v) $E = \{\text{Even integers between } -12 \text{ and } 0\}$
3.
 - i) $A = \{x \mid x \text{ is a } \in \text{single digit prime number}\}$
 - ii) $B = \{x \mid x \text{ is the first four letters of the English alphabet}\}$
 - iii) $C = \{x \mid x = 10n, n \in \mathbb{N}\}$
 - iv) $D = \{x \mid x \text{ is a day in a week starting with the letter } 5\}$
 - v) $E = \{x \mid x = n^2, n \in \mathbb{N}, 1 \leq n \leq 3\}$
4.
 - i) $A = \{x \mid x \in \mathbb{N}, x < 20\}$
 $\therefore A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19\}$
 $\therefore n(A) = 19$
 - ii) $B = \{x \mid x \in \mathbb{N}, x < 10, x \text{ is even}\}$
 $\therefore A = \{2, 4, 6, 8\}$
 $\therefore n(B) = 4$
 - iii) $C = \{x \mid x \text{ is an integer, } -3 < x < 3\}$
- $\therefore C = \{-2, -1, 0, 1, 2\}$
 $\therefore n(C) = 5$
- iv) $D = \{0\}$
 $\therefore n(D) = 1$
- v) $E = \{x \mid x \text{ is a letter in the word MATHEMATICS}\}$
 $\therefore E = \{M, A, T, H, E, I, C, S\}$
 $\therefore n(E) = 8$
- vi) $F = \{x \mid x \text{ is a consanant is the English alphabet}\}$
 $\therefore F = \{b, e, d, f, g, h, j, k, l, m, n, p, q, s, t, v, w, x, y, z\}$
 $\therefore n(F) = 21$
- vii) $G = \{x \mid x \in \mathbb{W}, x < 8\}$
 $\therefore G = \{0, 1, 2, 3, 4, 5, 6, 7\}$
 $\therefore n(G) = 8$
- viii) $H = \{x \mid x \text{ is an integer, } x < 4\}$
 $\therefore H = \{\dots, -3, -2, -1, 0, 1, 2, 3\}$
 $H \text{ is an infinite set.}$
 $\therefore n(H) = \text{is not defined}$
- ix) $I = \{x \mid x \text{ is a factor of } 30\}$
 $\therefore I = \{1, 2, 3, 4, 5, 6, 10, 15, 30\}$
 $\therefore n(I) = 8$
5.
 - i) $A = \{\text{Set of all naturel numbers}\}$
 $\therefore A \text{ is an infinite set.}$
 - ii) $B = \{\text{Set of whole numbers less than } 20\}$
 $\therefore B = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19\}$
 $\therefore n(B) = 20$
 $\therefore B \text{ is a finite set.}$
 - iii) $C = \{\text{Set of integere less than } 15\}$
 $\therefore C = \{\dots, 3, 4, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14\}$
 $\therefore C \text{ is a infinite set.}$

- iv) $D = \{\text{Set of all English alphabets}\}$
 $\therefore D = \{a, b, c, d, e, f\}$
 $\therefore n(D) = 26$
 $\therefore D$ is a finite set.
- v) $E = \{x \mid x \text{ is an integer, } |x| \leq 20\}$
 $\therefore E = \{-10, -19, -18, -17, -16, -15, -14, -13, -12, -11, -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20\}$
 $\therefore n(E) = 41$
 $\therefore E$ is a finite set.
- vi) $G = \{x \mid x \text{ is an integer, } x > 50\}$
 $\therefore G = \{\dots\dots\dots -3, -2, -1, 0 \dots\dots\dots 47, 48, 49\}$
 $\therefore G$ is a finite set.
- vii) $H = \{\text{Set of all factors of } 100\}$
 $\therefore H = \{1, 2, 4, 5, 10, 20, 25, 50, 100\}$
 $\therefore n(H) = 9$
 $\therefore H$ is a finite set.
- viii) $I = \{x \mid x \text{ is a rational number } 1 < x < 2\}$
 $\therefore I = \text{The finite sets are set B, set D, set, E, set H}$
6. i) $A = \{x \mid x \in W, x < 1\}$
 $\therefore A = \{0\}$
 $\therefore A$ is a singleton set.
- ii) $B = \{x \mid x \in W, x < 0\}$
 $\therefore B = \{\}, \phi$
 $\therefore B$ is an empty set
- iii) $C = \{x \mid x \in N, x < 1\}$
 $\therefore C = \{\}, \phi$
 $\therefore C$ is an empty set
- iv) $D = \{\text{Prime numbers between } 22 \text{ and } 26\}$
 $\therefore D = \{23\}$
- $\therefore D$ is an empty set
- v) $E = \{0\}$
 $\therefore E$ is an empty set
- vi) $F = \{\text{prime factors of } 5\}$
 $\therefore F = \{5\}$
 $\therefore F$ is a singleton set.
- vii) $G = \{\text{months with } 35 \text{ days}\}$
 $\therefore G = \{\}$
 $\therefore G$ is an empty set
- viii) $H = \{\text{days beginning with p}\}$
 $\therefore H = \{\}, \phi$
 $\therefore H$ is an empty set
- ix) $I = \{x \mid x \text{ is a prime number, } x < 2\}$
 $\therefore I = \{\}, \phi$
 $\therefore I$ is an empty set
7. i) $A = \{16, 7, 23, 32, 11, 5\}$
 $\therefore B = \{5, 23, 32, 7, 16, 11\}$
 $\therefore$ All elements of A and B are same
 $\therefore$ Set A = set B.
- ii) $A = \{x \mid x \in N, 5 < x < 10\}$
 $\therefore A = \{6, 7, 8, 9\}$
 $B = \{6, 8, 7\}$
 $\therefore$ All elements of set A and B are not same
 $\therefore$ Set A $\neq$ set B.
- iii) $A = \{\text{Prime numbers less than } 1\}$
 $\therefore A = \{\}$
 $B = \{\text{Even numbers less than } 2\}$
 $\therefore B = \{2, 4, 6, 8, 10\}$
 $\therefore$ All elements of set A and B are not equal
 $\therefore$ Set A $\neq$ set B.
- iv) $A = \{\text{Alphabets in word FICKET}\}$
 $\therefore A = \{T, I, C, K, E\}$
 $B = \{\text{Alphabets in word CRICKET}\}$

- $\therefore B = \{C, R, I, K, E, T\}$
 $\therefore$ All elements of set A and B are not same
 $\therefore$ Set $A \neq$ set B.
- v) $A = \{\text{Alphabets in word CREATE}\}$
 $\therefore A = \{C, R, E, A, T\}$
 $B = \{\text{Alphabets in word CRATE}\}$
 $\therefore B = \{C, R, A, T, E\}$
 $\therefore$ All elements of set A and set B are same
 $\therefore$ Set $A =$ set B.
- vi) $A = \{1, 2, 3\}$
 $B = \{\text{factors of 6 which are less than 6}\}$
 $\therefore B = \{1, 2, 3\}$
 $\therefore$ All elements of A and B are same.
 $\therefore$ Set $A =$ set B.
- vii) $A = \{6, 12, 18\}$
 $B = \{\text{even multiples of 6}\}$
 $\therefore B = \{6, 12, 18, 24, 30\}$
 $\therefore$ All elements of set A and set B are not same
 $\therefore$ Set A and set B are not equal.
- viii) $A = \{\text{months with only 30 days}\}$
 $\therefore A = \{\text{April, June, September, November}\}$
 $B = \{\text{November, April, September, June}\}$
 $\therefore$ All elements of set A and set B are same
 $\therefore$ Set $A =$ set B.
- ix) $A = \{\text{multiples of 5 which are less than 30}\}$
 $\therefore A = \{5, 10, 15, 20, 25\}$
 $B = \{\text{Multiples of 6 which are less than 30}\}$
- $\therefore B = \{6, 12, 18, 24\}$
 $\therefore$ All elements of set A and set B are not same
 $\therefore$ Set $A \neq$ set B.
8. i) $A = \{2, 4, 7, 10, 15\}$
 $\therefore n(A) = 5$
 $B = \{a, e, i, o, u\}$
 $\therefore n(B) = 5$
 $\therefore n(A)$ and $n(B)$ are same.
 $\therefore$ Set A and set B are equivalent.
- ii) $A = \{\text{alphabets of the word SMALL}\}$
 $\therefore A = \{S, M, A, L\}$
 $\therefore n(A) = 4$
 $B = \{\text{alphabets of the word LAMP}\}$
 $\therefore B = \{L, A, M, P\}$
 $\therefore n(B) = 4$
 $\therefore n(A)$ and $n(B)$ are same
 $\therefore$ Set A and set B are equivalent.
- iii) $A = \{q, w, e, r, t, y\}$
 $\therefore n(A) = 6$
 $B = \{o, e, i, o, u, p\}$
 $\therefore n(B) = 6$
 $\therefore n(A)$ and $n(B)$ are same,
 $\therefore A \leftrightarrow B$
- iv) $A = \{\text{January, March, July, August}\}$
 $\therefore n(A) = 4$
 $B = \{\text{April, June, September, November}\}$
 $\therefore n(B) = 4$
 $\therefore n(A)$ and $n(B)$ are same.
 $\therefore A \leftrightarrow B$
- v) $A = \{\text{odd natural numbers less than 20}\}$
 $\therefore A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19\}$

- $\therefore n(A) = 19$
 $B = \{\text{factors of } 36\}$
 $\therefore B = \{1, 2, 3, 4, 6, 9, 12, 18, 36\}$
 $\therefore n(B) = 9$
 $\therefore n(A)$ and $n(B)$ are not same,
 $\therefore$ Set A is not equivalent to set B.
9. Overlapping sets X Cancelled question.
10. i) $\{1, 2\}$
 $= \{1\}, \{2\}, \{1, 2\}, \phi$
 ii) $\{a, b, c\}$
 $= \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{a, b, c\}, \phi$
 iii) June, July, August
 $\{June\}, \{July\}, \{August\}, \{June, July\},$
 $\{June, August\}, \{July, August\}, \{June,$
 $July, August\}, \phi$
 iv) 1, 2, 10
 $\{1\}, \{2\}, \{10\}, \{1, 2\}, \{1, 10\}, \{2, 10\},$
 $\{1, 2, 10\}, \phi$
 v) mango guava
 $= \{mango\}, \{guava\}, \{mango, guava\}, \phi$
11. Complement. Cancelled question.
- Self Assessment-6**
1. i) $A = \{x \text{ is an integer less than } -16\}$
 $\therefore A = \{x \mid x \in \mathbb{Z}, x < -10\}$
- ii) $B = \{x \text{ is an alphabet in the word SPANISH}\}$
 $\therefore B = \{x \mid x \text{ is an alphabet in the word SPANISH}\}$
2. i) $A = \{x \mid x \in \mathbb{N}, 1 < x, 4\}$
 $\therefore A = \{2, 3\}$
 ii) $B = \{x \mid x \text{ is the colours in the rainlour}\}$
 $\therefore B = \{\text{Violet, Indigo, Blue, Green, Yel- low, Orange, Red}\}$
3. i) $A = \{0, -2, -8, -10, 20, 50\}$
 $\therefore n(A) = 6$
 ii) $B = \{x \mid x \text{ is the days of the week start- ing with 'T'}\}$
 $\therefore B = \{\text{Tuesday, Thursday}\}$
 $\therefore n(B) = 2$
4. $\{a, b, c, d\}$
 $\{a, B, c, d\}, \phi$
5. b) overlapping
6. c) $\{2, 12\}$
7. b) 5
8. c) equivalent sets
9. d) they have no elements in common.
10. b) infinite.

Chapter-7 Ratio and proportion

Exercise 7.1

1 i) $58 : 20$

$$= \frac{58}{20}$$

$$= \frac{39}{10}$$

$$= 29 : 10$$

Ans. $29 : 10$

ii) $24 \text{ cm} : 0.4 \text{ m}$

$$= 24 \text{ cm} : (0.4 \times 100) \text{ cm} [\because 1 \text{ m} = 100 \text{ cm}]$$

$$= 24 \text{ cm} : 40 \text{ cm}$$

$$= \frac{24}{40}$$

$$= \frac{3}{5}$$

$$= 3 : 5$$

Ans. $3 : 5$

iii) $11 : 121$

$$= \frac{11}{121}$$

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

$$= 1 : 11$$

Ans. $1 : 11$

2. i) $7 : 5$

$$= \frac{5}{7} = \frac{7 \times 3}{5 \times 3} = \frac{14}{10}$$

$$= \frac{5}{7} = \frac{7 \times 3}{5 \times 3} = \frac{21}{15}$$

Ans two equivalent ratios of 7 : 5 is $14 : 10$ and $21 : 15$

$$5 : 14$$

$$\frac{5 \times 2}{14 \times 2} = \frac{10}{28} \text{ and } \frac{5 \times 3}{14 \times 3} = \frac{15}{42}$$

Ans: Two equivalent ratios are $10 : 28$

ii) $13 : 28$

$$= \frac{13}{28} = \frac{13 \times 2}{28 \times 2} = \frac{26}{56}$$

$$= \frac{13}{28} = \frac{13 \times 3}{28 \times 3} = \frac{39}{84}$$

Ans Two equivalent ratios of $13 : 28$ are $26 : 56$ and $39 : 84$

3. $2 : 7$ $5 : 14$

$$= \frac{2}{7} \quad \quad \quad = \frac{5}{14}$$

By cross multiplication,

$$14 \times 2 = 28$$

$$7 \times 5 = 35$$

$$\therefore 28 < 35$$

$$\therefore \frac{2}{7} < \frac{5}{14}$$

$$= 2 : 7 < 5 : 14$$

Ans. $2 : 7 < 5 : 14$

4. Ratio of the two numbers = $4 : 3$

Let the numbers be $4x$ and $3x$ respectively
sum of two numbers = 140

$$\therefore 4x + 3x = 140$$

$$\Rightarrow 7x = 140$$

$$\Rightarrow x = \frac{\cancel{140}^{20}}{\cancel{7}}$$

$$= 20$$

$$\begin{aligned}\therefore \text{first number} &= 4x \\ &= 4 \times 20 \\ &= 80 \\ \text{Second number} &= 3x \\ &= 3 \times 20 \\ &= 60\end{aligned}$$

Ans. The required numbers are 80 and 60.

5. $12 : 15$

$$= \frac{12}{15}$$

$$\frac{12}{15} = \frac{12 \times 2}{15 \times 2} = \frac{24}{30} = 24 : 30$$

$$\frac{12}{15} = \frac{12 \times 3}{15 \times 3} = \frac{36}{45} = 36 : 45$$

$$\frac{12}{15} = \frac{12 \times 4}{15 \times 4} = \frac{48}{60} = 48 : 60$$

Ans. Three equivalent ratios of $12 : 15$ are $24 : 30$, $36 : 45$ and $48 : 60$.

6. Ratio of 9m to 360cm = $(9 \times 100)\text{cm}$:
360cm [1m = 100cm]
 $= 900 : 360$

$$= \frac{900}{360}$$

$$= \frac{5}{2}$$

$$= 5 : 2$$

Ans. Ratio of 9m to 360cm is $5 : 2$.

7. Total no. of horses in herd = 38

No. of white horses = 12

$\therefore$ No. of black horses = $38 - 12$

$\therefore$ Ratio of white to black horses = $12 : 26$

$$= \frac{\cancel{12}^6}{\cancel{26}^{13}}$$

$$= \frac{6}{13}$$

$$= 6 : 13$$

Ans. Ratio of white to black horses = $6 : 13$

8. No. of blue triangles = 5

No. of yellow triangles = 75

$$\begin{aligned}\therefore \text{Total no. of triangles} &= 75 + 5 \\ &= 80\end{aligned}$$

$$\begin{aligned}\therefore \text{Ratio of yellow triangles to total no. of triangles} \\ &= 75 : 80\end{aligned}$$

$$= \frac{\cancel{75}^{15}}{\cancel{80}^{16}}$$

$$= \frac{15}{16}$$

$$= 15 : 16$$

Ans. Ratio of yellow triangles to total no of triangles = $15 : 16$

9. No. of hearts = 16

No. of aces = 10

Ratio of aces to hearts = $10 : 16$

$$= \frac{\cancel{10}^5}{\cancel{16}^8}$$

$$= \frac{5}{8}$$

$$= 5 : 8$$

Ans. Ratio of aces to hearts = 5 : 8.

10. $5 : 6$ $2 : 9$

$$= \frac{5}{6} = \frac{2}{9}$$

By multiplication,

$$9 \times 5 = 45$$

$$6 \times 2 = 12$$

$$\therefore 45 > 12$$

$$\therefore \frac{5}{6} > \frac{2}{9}$$

$$= 5 : 6 > 2 : 9.$$

11. Ratio of 15 mins to 180 = (15×60)

..... : 180 [1min = 60)

$$= 900 : 180$$

$$= \frac{\cancel{900}^5}{\cancel{180}^1}$$

$$= \frac{5}{1}$$

$$= 5 : 1$$

Ans. Ratio of 15 to 180 = 5 : 1.

12. i) $13 : 14$ $24 : 25$

$$= \frac{13}{14} = \frac{24}{25}$$

By multiplication,

$$25 \times 13 = 325$$

$$14 \times 24 = 336$$

$$\therefore 336 > 325$$

$$\therefore \frac{24}{25} > \frac{13}{14}$$

$$= 24 : 25 > 13 : 14$$

$$\text{Ans. } 24 : 25 > 13 : 14$$

ii) $4 : 7$ $5 : 8$

$$= \frac{4}{7} = \frac{5}{8}$$

By multiplication,

$$8 \times 4 = 32$$

$$7 \times 5 = 35$$

$$\therefore 35 > 32$$

$$\therefore \frac{5}{8} > \frac{4}{7}$$

$$= 5 : 8 > 4 : 7$$

Ans. $5 : 8 > 4 : 7$.

13. Total strength of school = 60

Ratio of boys and girls = 7 : 4

Let the no of boys and girls be $7x$ and $4x$ respectively.

$$\therefore 7x + 4x = 60$$

$$\Rightarrow 11x = 60$$

$$\Rightarrow x = \frac{\cancel{660}^{60}}{11}$$

$$= 60$$

No. of boys = $7x$

$$= 7 \times 60$$

$$= 420$$

No. of girls = $4x$

$$= 4 \times 60$$

$$= 240$$

Ans. No. of boys = 420

No. of girls = 240

14. Total sum of money = ₹ 7500

Ratio it is to be divided into = 2 : 13.

sum of ratios = $2 + 13$

$$= 15.$$

$$\therefore \text{Amount sohail gets} = ₹ \left(\frac{5}{15} \text{ of } 7500 \right)$$

$$= ₹ \left(\frac{2}{15} \times 7500 \right)$$

$$= ₹ 1000$$

$$\therefore \text{Amount mahek gets} = (7500 - 1000) \\ = 6500$$

Ans. Sohail gets ₹ 1000

mahek gets ₹ 6500

15. Total weight of alloy = 56kg

Ratio of zinc and copper = 5 : 9

Let weight of zinc and copper be $5x$ and $9x$ respectively.

$$\therefore 5x + 9x = 56$$

$$\Rightarrow 14x = 56$$

$$\Rightarrow x = \frac{56}{14} \\ = 4$$

$$\therefore \text{weight of zinc} = (5x) \text{ kg}$$

$$= (5 \times 4) \text{ kg}$$

$$= 20 \text{ kg.}$$

$$\therefore \text{weight of copper} = (9x) \text{ kg}$$

$$= (9 \times 4) \text{ kg}$$

$$= 36 \text{ kg}$$

Ans. weight of zinc = 20 kg

weight of copper = 36 kg

16. Ratio of sides of triangle = 5 : 2 : 3

Total perimeter of triangle = 40cm

Let sides of triangle $5x$, $2x$ and $3x$ respectively.

$$\therefore 5x + 2x + 3x = 40$$

$$\Rightarrow 10x = 40$$

$$\Rightarrow x = \frac{40}{10} \\ = 4$$

$$\therefore \text{Length of first side} = (5x) \text{ cm}$$

$$= (5 \times 4) \text{ cm}$$

$$= 20 \text{ cm}$$

$$\therefore \text{Length of second side} = (2x) \text{ cm}$$

$$= (2 \times 4) \text{ cm}$$

$$= 8 \text{ cm}$$

$$\therefore \text{Length of third side} = (3x) \text{ cm}$$

$$= (3 \times 4) \text{ cm}$$

$$= 12 \text{ cm}$$

Ans. Length of first side = 20cm

Length of second side = 8cm

Length of third side = 12cm

Exercise 7.2

1. i) Given statement = $105 : 30 :: 45 : 55$

$$\text{Product of extremes} = 105 \times 55$$

$$= 5775$$

$$\text{Product of means} = 30 \times 45$$

$$= 1350$$

$\therefore$ Product of extremes $\neq$ product of means

$\therefore$ The given statement is not true

ii) Given statement = $\frac{1}{2} : \frac{1}{3} :: \frac{1}{3} : \frac{1}{4}$

$$\text{Product of extremes} = \frac{1}{2} \times \frac{1}{4}$$

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

$$\text{Product of means} = \frac{1}{3} \times \frac{1}{3}$$

$$= \frac{1}{9}$$

∴ Product of extremes ≠ product of means

∴ The given statement is not true.

$$\begin{aligned} \text{iii) Given statement} &= 25\text{cm} : 1\text{m} :: ₹ 40 : 160 \\ &= 25\text{cm} : 100\text{cm} :: ₹ 40 : 160 \\ &1 : 4 :: 1 : 160 \end{aligned}$$

The given statement is true as ratio is always between two equal units.

$$2. \quad \text{i) } 4 : 5 :: x : 400$$

$$\therefore \text{ATQ } \frac{4}{5} = \frac{x}{400}$$

$$\Rightarrow 4 \times 400 = 5x$$

$$\Rightarrow \frac{4 \times \cancel{400}^{80}}{\cancel{5}} = x$$

$$3200 = x$$

$$\text{Ans. } x = 320$$

$$\text{ii) } 9 : 21 :: 36 : x$$

$$\therefore \text{ATQ, } \frac{9}{21} = \frac{36}{x}$$

$$\Rightarrow 9x = 36 \times 21$$

$$\Rightarrow x = \frac{\cancel{36}^4 \times 21}{\cancel{9}} = 84$$

$$\text{Ans. } x = 84$$

$$\text{iii) } x : 28 :: 11 : 4$$

$$\therefore \text{ATQ } \frac{x}{28} = \frac{11}{4}$$

$$\Rightarrow 4x = 11 \times 28$$

$$\Rightarrow x = \frac{11 \times \cancel{28}^7}{\cancel{4}}$$

$$= 77$$

$$\text{Ans. } x = 77$$

$$\text{iv) } 45 : x :: 27 : 63$$

$$\therefore \text{ATQ } \frac{45}{x} = \frac{27}{63}$$

$$\Rightarrow 45 \times 63 = 27x$$

$$\Rightarrow \frac{45 \times 63}{9} = x$$

$$105 = x$$

$$\text{Ans. } x = 105$$

$$3. \quad \text{i) Let the fourth proportional be } x.$$

$$\therefore 72 : 24 :: 18 : x$$

$$\Rightarrow \text{ATQ } \frac{72}{24} = \frac{18}{x}$$

$$\Rightarrow 72x = 18 \times 24$$

$$\Rightarrow x = \frac{18 \times 24}{72} = 6$$

∴ The fourth proportional = 6

Ans. fourth proportional = 6

$$\text{ii) Let the fourth proportional be } x.$$

$$\therefore 36 : 48 :: 6 : x$$

$$\therefore \text{ATQ, } \frac{36}{48} = \frac{6}{x}$$

$$\Rightarrow 36x = 6 \times 48$$

$$\Rightarrow x = \frac{6 \times 48}{36} = 8$$

∴ fourth proportional = 8

Ans. fourth proportional = 8

iii) Let the fourth proportional be x .

$$\therefore 5 : 3 :: 200 : x$$

$$\therefore \text{ATQ } \frac{5}{3} = \frac{200}{x}$$

$$\Rightarrow 5x = 200 \times 3$$

$$\Rightarrow x = \frac{200 \times 3}{5}$$
$$= 120$$

$\therefore$ fourth proportional = 120

Ans. fourth proportional = 120

iv) Let the fourth proportional be x .

$$\therefore 8 : 6 :: 4 : x$$

$$\therefore \text{ATQ } \frac{8}{6} = \frac{4}{x}$$

$$\Rightarrow 8x = 4 \times 6$$

$$\Rightarrow x = \frac{4 \times 6}{8}$$
$$= 3$$

$\therefore$ fourth proportional = 3

Ans. fourth proportional = 3

4. i) Let the third proportional be x .

$$\therefore 12 : 6 :: 6 : x$$

$$\therefore \text{ATQ, } \frac{12}{6} = \frac{6}{x}$$

$$\Rightarrow 12x = 6 \times 6$$

$$\Rightarrow x = \frac{6 \times 6}{12}$$
$$= 3$$

$\therefore$ The third proportional = 3

Ans. third proportional = 3

ii) Let the third proportional be x .

$$\therefore 0.2 : 0.4 :: 0.4 : x$$

$$\therefore \text{ATQ } \frac{0.2}{0.4} = \frac{0.4}{x}$$

$$\Rightarrow 0.2x = 0.4 \times 0.4$$

$$\Rightarrow x = \frac{0.4 \times 0.4}{0.2}$$

$$= \frac{0.16}{0.2}$$

$$= \frac{0.16 \times 10}{0.2 \times 10}$$

$$= \frac{0.16}{2}$$

$$= 0.8$$

$\therefore$ The third proportional = 0.8

Ans. third proportional = 0.8.

iii) Let the third proportional be x .

$$\therefore 72 : 24 :: 24 : x$$

$$\therefore \text{ATQ } \frac{72}{24} = \frac{24}{x}$$

$$\Rightarrow 72x = 24 \times 24$$

$$\Rightarrow x = \frac{24 \times 24}{72}$$
$$= 8$$

$\therefore$ Third proportional = 8

Ans. Third proportional = 8.

iv) Let the third proportional be x .

$$\therefore 6 : 12 :: 12 : x$$

$$\therefore \text{ATQ } \frac{6}{12} = \frac{12}{x}$$

$$\Rightarrow 6x = 12 \times 12$$

$$\Rightarrow x = \frac{12 \times 12}{6}$$
$$= 24$$

∴ The third proportional = 24

Ans. Third proportional = 24

5. i) Let the mean proportional be x .

$$\therefore 9 : x :: x : 4$$

$$\therefore \text{ATQ } \frac{9}{x} = \frac{x}{4}$$

$$\Rightarrow 9 \times 4 = x^2$$

$$\Rightarrow 36 = x^2$$

$$\Rightarrow \sqrt{36} = x$$

$$\Rightarrow 6 = x$$

∴ mean proportional = 6

Ans. mean proportional = 6

6. Ratio of number of males and female teacher = 5 : 4

No. of female teachers = 20

Let no. of male teachers be x .

$$\therefore \text{ATQ } \frac{x}{20} = \frac{5}{4}$$

$$\Rightarrow 4x = 20 \times 5$$

$$\Rightarrow x = \frac{20 \times 5}{4}$$
$$= 25$$

∴ No. of male teachers = 25

Ans. No. of male teachers = 25.

7. No. of English books = 1200

No. of maths books = 1800

∴ Ratio of English books to maths = 1200 : 18000

$$= \frac{1200}{1800}$$

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

$$= 2 : 3$$

∴ Ratio of maths books to science books = 2 : 3

Let no. of science books be x .

$$\therefore \frac{2}{3} = \frac{1800}{x}$$

$$\Rightarrow 2x = 1800 \times 3$$

$$\Rightarrow x = \frac{1800 \times 3}{2}$$
$$= 2700$$

∴ No. of science books = 2700

Ans. No of science books = 2700.

8. Ratio of tulips to roses = 15 : 23

No. of tulips = 3000

Let no. of roses be x .

$$\therefore \frac{15}{23} = \frac{3000}{x}$$

$$\Rightarrow 15x = 3000 \times 23$$

$$\Rightarrow x = \frac{3000 \times 23}{15}$$
$$= 4600$$

∴ No. of roses = 4600

Ans. No of roses = 4600.

9. Ratio of number of broses = 4 : 7

No. of broses = 21000.

Let no. of cars be x .

$$\therefore \frac{4}{7} = \frac{x}{21000}$$

$$\Rightarrow 4 \times 21000 = 7x$$

$$\Rightarrow \frac{4 \times 21000}{7} = x$$

$$\Rightarrow 12000 = x$$

∴ No. of cars = 12000

Ans. No of cars = 12000.

Exercise 7.3

2. weight of 56 bogs = 8kg

$$\therefore \text{weight of 1 bog} = \left(\frac{8}{56}\right)\text{kg}$$

$$\therefore \text{weight of 280 bogs} = \left(\frac{8}{56} \times 280\right)\text{kg} \\ = 40\text{kg}$$

No. of bogs weighing 8kg = 56

$$\therefore \text{No. of bogs weighing 1kg} = \frac{56}{8}$$

$$\therefore \text{No. of bogs weighing 4kg} = \left(\frac{56}{8} \times 4\right) \\ = 28$$

Ans. weight of 280 bogs = 40kg

No. of bogs weighing 4kg = 28

3. No. of words typed in half an hour i.e. 30 mins = 1500

$$\therefore \text{No. of words typed in 1 min} = \frac{1500}{30}$$

$\therefore$ No. of words typed in 12 mins

$$= \frac{1500}{30} \times 12 \\ = 600$$

Ans. No. of words typed in 12 mins = 600

4. Amount paid for 6 days of work = ₹ 800

$$\therefore \text{Amount paid for 1 day of work} = ₹ \frac{800}{6}$$

$\therefore$ Amount paid for 24 days of work

$$= ₹ \left(\frac{800}{6} \times 24\right)$$

$$= 3200$$

Ans. Amount paid for 24 days of work = ₹ 3200

5. No. of dishes for 15kg rice = 45

$\therefore$ No. of dishes required for 1kg rice

$$= \frac{45}{15}$$

$\therefore$ No. of dishes required for 10kg rice

$$= \left(\frac{45}{15} \times 10\right) \\ = 30$$

Ans. 30 dishes are required for 10kg rice.

6. Amount of petrol required by 25 cars = 351L

$\therefore$ Amount of petrol required by 1 car

$$= \left(\frac{351}{25}\right)\text{L}$$

$\therefore$ Amount of petrol required by 75 cars

$$= \left(\frac{351}{25} \times 75\right)\text{L} \\ = 1053\text{L}$$

Ans. 1053L of petrol is required by 75 cars.

7. No. of people handled by 4 accountants = 150

$\therefore$ No. of people handled by accountant

$$= \frac{150}{4}$$

$\therefore$ No. of people handled by 12 accountants

$$= \frac{150}{4} \times 12 \\ = 450$$

Ans. 450 people are handled by 12 accountants.

8. No of books costing ₹ 25000 = 125

$$\therefore \text{No. of books costing ₹ 1} = \frac{125}{25000}$$

$\therefore$ No. of books costing ₹ 75000

$$= \frac{125}{25000} \times 75000$$

$$= 375$$

Ans. 375 books cost 75000

9. Cost of 65 quintals wheat = ₹ 325

$$\therefore \text{Cost of quintal of wheat} = ₹ \left(\frac{325}{65} \right)$$

$\therefore$ Cost of 26 quintal of wheat

$$= ₹ \left(\frac{325}{65} \times 26 \right)$$

$$= 130$$

Ans. 26 quintal of wheat cost 130.

10. i) Line taken to travel 282 km = 1 hr

$$\therefore \text{Line taken to travel 1 km} = \frac{1}{282} \text{ hrs}$$

$\therefore$ Line taken to travel 1269 km

$$= \left(\frac{1}{282} \times 1269 \right) \text{ hrs}$$

$$= \frac{9}{2} \text{ hrs}$$

$$= 4.5 \text{ hrs}$$

ii) Distance travelled in 1 hr = 282 km

$\therefore$ Distance travelled in 13 hrs

$$= (282 \times 13) \text{ km}$$

$$= 3666 \text{ km}$$

Ans. i) 4.5 hrs taken to travel 1269 km

ii) 3666 km travelled in 13 hrs

Exercise 7.4

1. Distance covered = 1.2 km

$$= (1.2 \times 1000) \text{ m} [\because 1 \text{ km} = 1000 \text{ m}]$$

$$= 1200 \text{ m}$$

Line taken = 40 mins

$$= (40 \times 60) \text{ secs} [\because 1 \text{ min} = 60 \text{ secs}]$$

$$= 2400 \text{ secs.}$$

$$\therefore \text{Speed of boy in 8 m/s} = \left(\frac{1}{2} \times \frac{18}{5} \right) \text{ km/hr}$$

$$= \frac{9}{5} \text{ km/hr}$$

$$= 1.8 \text{ km/hr}$$

Ans. Speed of boy = 1.8 km/hr

2. Distance covered = 51 km

Line taken = 3 hrs

$$\therefore \text{Speed} = \left(\frac{51}{3} \right) \text{ km/hr}$$

$$= 17 \text{ km/hr}$$

Ans. Speed of train = 17 km/hr

3. Distance covered = 65 km

Line taken = 2 hrs

$$\therefore \text{Speed of man in km/hr} = \left(\frac{65}{2} \right) \text{ km/hr}$$

$$= 32.5 \text{ km/hr.}$$

$$\therefore \text{Speed of man in m/s} = \left(32.5 \times \frac{8}{18} \right) \text{ m/s}$$

$$= \frac{162.5}{18} \text{ m/s}$$

$$= 9.02 \text{ m/s}$$

Ans. Speed of man in m/s = 9.02 m/s.

4. Distance travelled = 700 m

Line taken = 35 secs

$$\therefore \text{Speed of train in m/s} = \left(\frac{700}{35} \right) \text{ m/s} \\ = 20 \text{ m/s}$$

$$\therefore \text{Speed of train in km/hr} = \left(20 \times \frac{18}{5} \right) \text{ km/hr} \\ = 72 \text{ km/hr}$$

Ans. Speed of train in km/hr 72 km/hr

5. Distance covered = 160 m.

$\therefore$ Speed of cos = 12 km/hr.

$$= \left(12 \times \frac{5}{18} \right) \text{ m/s} \\ = 20 \text{ m/s}$$

$$\therefore \text{Line taken} = \left(\frac{160}{20} \right) \text{ secs} \\ = 8 \text{ secs}$$

Ans. Line taken = 8 secs.

$$6. \quad i) \quad \left(9 \times \frac{5}{18} \right) \text{ m/s} \\ = \frac{5}{2} \text{ m/s (Ans)}$$

$$ii) \quad \left(72 \times \frac{5}{18} \right) \text{ m/s} \\ = 20 \text{ m/s (Ans)}$$

iii) 1.2 km/hr

$$= \left(1.2 \times \frac{5}{18} \right) \text{ m/s} \\ = \frac{1}{3} \text{ m/s (Ans)}$$

$$7. \quad i) \quad \left(15 \times \frac{18}{5} \right) \text{ km/hr} \\ = 54 \text{ km/hr (Ans)}$$

$$ii) \quad \left(8 \times \frac{18}{5} \right) \text{ km/hr} \\ = \frac{144}{5} \text{ km/hr} \\ = 28.8 \text{ km/hr}$$

iii) 120 m/mr

$$= \frac{120}{1000} \times 60 \\ = \frac{72}{10} = 7.2 \text{ km/hr}$$

8. Speed of 50 m/s

$$= 50 \times \frac{18}{5} \\ = 180 \text{ km/hr.}$$

$\therefore$ 50 m/sec. is greatex

9. Total distance = 50×2

$$= 100 \text{}$$

time = 5 minutes

$$\text{Speed} = \frac{D}{T} = \frac{100 \times 60}{5 \times 1000} \\ = \frac{6}{5} = 1.2 \text{ km/hr.}$$

$$10. \quad i) \quad \text{Speed} = \frac{D}{T} = \frac{350}{5} = 70 \text{ km/hr}$$

$$ii) \quad \text{Dist} = \text{SXT} = 70 \times 6.2 = 434 \text{ km}$$

$$iii) \quad T = \frac{D}{S} = \frac{210}{70} = 3 \text{ hr.}$$

Self Assessment-7

1. i) 7 yrs : 14 months

$$\Rightarrow 7 \times 12 : 14$$

$$\Rightarrow 84 : 14$$

$$\Rightarrow 6 : 1$$

ii) 2 kg : 200 gm.

$$= 2 \times 1000 : 200 \text{ gm}$$

$$= 2000 : 200$$

$$= 10 : 1$$

2. Ratio = 1 : 5 : 3

$$\text{Total Ratio} = 9$$

$$1^{\text{st}} \text{ angle} = \frac{1}{9} \times 180 = 20^\circ$$

$$2^{\text{nd}} \text{ angle} = \frac{5}{9} \times 180 = 100^\circ$$

$$3^{\text{rd}} \text{ angle} = \frac{3}{9} \times 180 = 60^\circ$$

$\therefore$ The angles are 20° , 60° and 100°

3. Cost of 4 books = 280

$$\text{Cost of 1 books} = \frac{280}{4}$$

$$\text{Cost of 15 books} = \frac{280}{4} \times 15$$

$$= ₹ 1050.$$

4. 6 : 7 or 7 : 11

$$\frac{6}{7} \text{ and } \frac{7}{11}$$

$$\therefore 6 \times 11 \text{ and } 7 \times 7$$

$$\therefore 66 < 49$$

$$\therefore 6 : 7 \text{ is greater}$$

5. 1, 5, 7, 35

$$1 \times 35 = 5 \times 7$$

$\therefore$ The numbers are in proportion

6. 20 : 30 in simplest form is 2 : 3

Ans: option (a)

7. 2 : 5 :: x : 40

$$2 \times 40 = 5 \times x$$

$$16 = x$$

Ans: option (b)

8. Cost of 2 pelace is will be 10

Ans: option (a)

9. 12 weeks : 27 days

$$12 \times 7 : 27$$

$$= 84 : 27$$

$$= 28 : 9$$

Ans: option (d)

10. Expenditure = 8000/ —

Ans: option (c)

11. $S = \frac{D}{T} = \frac{400}{20} = 20 \text{ km/hr}$

Ans: option (c)

Chapter-8 Percentage and its application

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Meaning of percentage Converting fractions and decimals to percentage and vice versa and ratio to percentage converting percentage to how many.	The students will be able to understand the concept of percentage. They will know how to convert fractions and decimals to percentage they will be able to find percentage of a given quantity.	Make the children understand that % is 'out of 100'. Using examples, explain the conversions. Ask the children to take a fully filled water in a 500 ml bottle. Take a plastic glass of 200ml. Ask the students to pour out water from the bottle into the glass. Ask them to calculate the percentage of water poured out and percentage of water left in the bottle. $\text{Water poured out} = \frac{200}{500} \times 100$ $= 40\%$ $\% \text{ left} = 100\% - 40\%$ $= 60\%$	- Convert 3.5% into fraction. - Convert $\frac{1}{25}$ into percentage - What percent is 40 of 1200? - An man gives 10% of this money to his son, 25% to his daughter and rest to his wife. If he has ₹ 400. What is the share of each person?
Increase and decrease of percentage.	The students will be able to calculate increase/decrease in percentage.	Make the children understand $\% \text{ change} = \frac{\text{amt of change}}{\text{base}} \times 100\%$ Ask the students to find out the temperature of 2 consecutive days and calculate the % increase/decrease	The price of an air conditioner increases from ₹ 45000 to ₹ 50000. What is the increase percentage %.

Profit and Loss: Concept of Profit/Loss Profit % and Loss%	The students will be clear with the CP, SP, profit, loss, profit % and loss%.	Make the children understand and calculate the loss/profit by give real life example. Explain the formula and its derivations $\text{Profit} = \text{SP} - \text{CP}$ $\text{SP} = \text{CP} + \text{profit}$ $\text{CP} = \text{SP} - \text{profit}$ $\text{Profit \%} = \frac{\text{Profit}}{\text{CP}} \times 100$ $\text{Loss} = \text{CP} - \text{SP}$ $\text{SP} = \text{CP} - \text{loss}$ $\text{CP} = \text{SP} + \text{loss}$ $\text{Loss\%} = \frac{\text{loss}}{\text{CP}} \times 100$ Practice different types of sums.	A shopkeepers bought a packet of pens for ₹ 250 and sold it for ₹ 500. That it profitable if yes calculate the profit %.
Simple Interest	The students will be clear with the terms principal, rate, time and how to calculate the simple interest on a given amount.	Explain the terms principal as the amount borrowed/deposited, the rate percentage we get as interest, and time as the time period. Give a situation to the students that a man deposited ₹ 75000 in a bank for 10 years at 5% simple interest. Ask the students to calculate the amount he will get back after 10 years.	Sunil deposited ₹ 300 in the bank on 15 th November 2003 and with drew on 16 th November 2005. If the bank gives 5%. Interest, how much will he get back after 2 years.

Exercise 8.1

1. i) 23% $= \frac{43}{1000}$ (Ans)
- $= \frac{23}{100}$ (Ans)
- ii) 4.3% $= \frac{105}{100}$
- $= \frac{4.3}{100}$ $= \frac{21}{20}$ (Ans)
- $= \frac{4.3 \times 10}{100 \times 120}$ iv) 3%

$$= \frac{3}{100} \text{ (Ans)}$$

$$\begin{aligned} 2. \quad i) \quad & \left(\frac{2}{3} \times 100 \right) \% \\ &= \frac{200}{3} \% \\ &= 66 \frac{2}{3} \% \text{ (Ans)} \end{aligned}$$

$$\begin{aligned} ii) \quad & \left(\frac{4}{25} \times 100 \right) \% \\ &= 16\% \text{ (Ans)} \end{aligned}$$

$$\begin{aligned} iii) \quad & \left(\frac{7}{8} \times 100 \right) \% \\ &= \frac{175}{2} \% \\ &= 87.5\% \text{ (Ans)} \end{aligned}$$

$$\begin{aligned} iv) \quad & \left(\frac{1}{10} \times 100 \right) \% \\ &= 10\% \text{ (Ans)} \end{aligned}$$

$$\begin{aligned} 3. \quad i \quad & \frac{1.2}{100} \\ &= 0.12 \text{ (Ans)} \end{aligned}$$

$$\begin{aligned} ii. \quad & \frac{63}{100} \\ &= 0.63 \text{ (Ans)} \end{aligned}$$

$$\begin{aligned} iii. \quad & \frac{25.55}{100} \\ &= 0.2555 \text{ (Ans)} \end{aligned}$$

$$iv. \quad \frac{0.08}{100}$$

$$= 0.0008 \text{ (Ans)}$$

$$\begin{aligned} 4. \quad i) \quad & (0.2 \times 100)\% \\ &= 20\% \text{ (Ans)} \end{aligned}$$

$$\begin{aligned} ii) \quad & (2.7 \times 100)\% \\ &= 2700\% \text{ (Ans)} \end{aligned}$$

$$\begin{aligned} iii) \quad & (65.2 \times 100)\% \\ &= 65200\% \text{ (Ans)} \end{aligned}$$

$$\begin{aligned} iv) \quad & (34.56 \times 100)\% \\ &= 3456\% \text{ (Ans)} \end{aligned}$$

Exercise 8.2

$$1. \quad 7\% \text{ of } 1207$$

$$= \frac{7}{100} \times 1207$$

$$= \frac{8449}{100}$$

$$= 84.49 \text{ (Ans)}$$

$$2. \quad \text{Let total marks obtained be } x.$$

$$\text{percentage of raj} = 51\%$$

$$\text{marks obtained raj} = 459$$

$$\therefore 51\% \text{ of } x = 459$$

$$\Rightarrow \frac{51x}{100} = 459$$

$$\Rightarrow 51x = 459 \times 100$$

$$\begin{aligned} \Rightarrow x &= \frac{459 \times 100}{51} \\ &= 900. \end{aligned}$$

$$\therefore \text{Total marks} = 900$$

$$\text{marks Ria obtained} = 702$$

$$\begin{aligned} \therefore \text{Percentage of ria} &= \left(\frac{702}{900} \times 100 \right) \% \\ &= 78\% \end{aligned}$$

$$\text{Ans. Percentage obtained by Ria} = 78\%$$

3. Let the required number be x .

ATQ 30% of $x = 21$

$$\Rightarrow \frac{30x}{100} = 21$$

$$\Rightarrow 30x = 21 \times 100$$

$$\Rightarrow x = \frac{21 \times 100}{30} = 70$$

Ans. The required number is 70.

4. i) $\left(\frac{12}{48} \times 100\right)\%$
 $= 25\%$ (**Ans**)

ii) $\left(\frac{102}{51} \times 100\right)\%$
 $= 200\%$ (**Ans**)

iii) $65\text{kg} = (65 \times 1000)\text{g}$ [$\therefore 1\text{kg} = 1000\text{g}$]
 $= 65000\text{g}$

$$\therefore \left(\frac{130}{65000} \times 100\right)\%$$
$$= \frac{1}{5}\%$$
$$= 0.2\%$$
 (**Ans**)

5. Let total percentage of students be 100%

Percentage of girls $= 56\%$

$\therefore$ Percentage of boys $= (100 - 56)\%$
 $= 44\%$

Total no. of students $= 800$.

$\therefore$ No. of boys $= 44\%$ of 800

$$= \left(\frac{44}{100} \times 800\right)$$

$$= 352$$

Ans. No. of boys $= 352$

6. Let total percentage of skittles be 100%.

Percentage of green skittle $= 37\%$

Percentage of blue skittles $= 24\%$

$\therefore$ Percentage of red skittles $= (100 - 37 - 24)\%$
 $= (63 - 24)\%$
 $= 39\%$

Ans. Percentage of red skittles $= 39\%$

7. Total n. children $= 70$.

No. of non - swimmers $= 42$

$\therefore$ Percentage of non - swimmers $= \left(\frac{42}{70} \times 100\right)\%$
 $= 60\%$

Ans. Percentage of non - swimmers $= 60\%$

8. Total marks $= 55$

marks taraz scored $= 22$

$\therefore$ Percentage he got right $= \left(\frac{22}{55} \times 100\right)\%$
 $= 40\%$

Ans. Percentage taraz got right $= 40\%$

9. Let total percentage of children be 100%

percentage who buger $= 30\%$

Percentage who chose $= 42\%$

percentage who chose chipw $= (100 - 30 - 42)\%$
 $= (70 - 42)\%$
 $= 28\%$

Ans. 28% of students chose chips

10. Let total percentage of animals be 100%

Percentage of cats $= 38\%$

Percentage of dogs $= (100 - 38)\%$

$$= 62\%$$

Total no. of animals = 850

No. of dogs = 62% of 850

$$= \left(\frac{62}{100} \times 850 \right)$$

$$= 527$$

Ans. 527 dogs.

11. Let no. of books = 5000

Percentage of fiction books = 70%

No. of fiction books = 70% of 5000

$$= \left(\frac{70}{100} \times 5000 \right)$$

$$= 3500$$

Percentage of mythology books = 10%

No. of mythology books = 10% of 5000

$$= \left(\frac{10}{100} \times 5000 \right)$$

$$= 500$$

No. of scientific books = (5000 – 3500 – 500)

$$= (1500 - 500)$$

$$= 1000$$

Ans No. of fiction books = 3500

No. of mythology books = 500

No. of scientific books = 1000

12. Total weight of mixture = 400g

Percentage of flour = 40%

weight of flour = (40% of 400) g

$$= \left(\frac{40}{100} \times 400 \right) \text{g}$$

$$= 160\text{g}$$

Percentage of butter = 20%

weight of butter = (20% of 400)g

$$= \left(\frac{20}{100} \times 400 \right) \text{g}$$

$$= 80\text{g}$$

Percentage of sugar = 10%

weight of sugar = (10% of 400)g

$$= \left(\frac{10}{100} \times 400 \right) \text{g}$$

$$= 40\text{g}$$

weight of chocolate = (400 – 80 – 40)g

$$= (400 - 280)\text{g}$$

$$= 120\text{g}$$

Ans. Weight of flour = 160g

Weight of sugar = 40g

Weight of butter = 80g

Weight of chocolate = 120g

Exercise 8.3

1. i) C.P = 30

$$\text{S.P} = 400$$

$$\text{S.P} > \text{C.P}$$

A gain is experienced. gain amount =

$$(400 - 300)$$

$$= 100$$

$$\text{gain percentage} = \left(\frac{100}{300} \times 100 \right) \%$$

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

$$= 33 \frac{1}{3}$$

$$\text{gain percentage} = 33 \frac{1}{3} \%$$

ii) C.P = 250

$$\text{S.P} = 225$$

$$\therefore \text{S.P} < \text{C.P.}$$

$\therefore$ A loss was suffered

$$\begin{aligned}\therefore \text{Loss amount} &= (250 - 225) \\ &= \text{Rs.} 25\end{aligned}$$

$$\begin{aligned}\therefore \text{Loss percentage} &= \left(\frac{25}{250} \times 100 \right) \% \\ &= \text{Rs.} 10\%\end{aligned}$$

Ans. Loss percentage = 10%

2. i) S.P = Rs. 742

gain percentage = 6%

$\therefore$ gain amount = 6% of C.P

$$= \frac{6}{100} \times \text{C.P}$$

$$\therefore \text{C.P} + \frac{6}{100} \times \text{C.P} = 742$$

$$\Rightarrow \frac{100 \text{C.P} + 6 \text{C.P}}{100} = 742$$

$$\Rightarrow 106 \text{C.P} = 742 \times 100$$

$$\begin{aligned}\Rightarrow \text{C.P} &= \frac{742 \times 100}{106} \\ &= 700\end{aligned}$$

C.P. = Rs. 700 (**Ans**)

ii) Let C.P. be Rs. x .

S.P. = Rs. 1056

Loss percentage = 12%

$\therefore$ Loss amount = Rs. (12% of x)

$$= \text{Rs.} \left(\frac{12x}{100} \right)$$

$$\therefore x - \frac{12x}{100} = 1056$$

$$\Rightarrow \frac{100x - 12x}{100} = 1056$$

$$\Rightarrow 88x = 1056 \times 100$$

$$\begin{aligned}\Rightarrow x &= \frac{1056 \times 100}{88} \\ &= 1200\end{aligned}$$

$\therefore$ C.P. = Rs. 1200 (**Ans**)

iii) Let C.P be Rs. x .

S.P = Rs. 600

gain percentage = 25%

$\therefore$ gain amount = Rs. (25% of x)

$$= \text{Rs.} \frac{25x}{100}$$

$$= \text{Rs.} \frac{x}{4}$$

$$\therefore x + \frac{x}{4} = 600$$

$$\Rightarrow \frac{4x + x}{4} = 600$$

$$\Rightarrow 5x = 600 \times 4$$

$$\begin{aligned}\Rightarrow x &= \frac{600 \times 4}{5} \\ &= 480\end{aligned}$$

C.P = Rs. 480 (**Ans**)

3. i C.P = Rs. 875

gain percentage = 5%

gain amount = Rs. (5% of 875)

$$= \text{Rs.} \left(\frac{5}{100} \times 875 \right)$$

$$= \text{Rs.} \frac{175}{4}$$

$$\text{S.P} = \text{Rs.} \left(875 + \frac{175}{4} \right)$$

$$= \text{Rs.} \left(\frac{3500 + 175}{4} \right)$$

$$= \text{Rs.} \frac{3675}{4}$$

$$= \text{Rs.} 918 \frac{3}{4} \text{ (**Ans**)}$$

ii) C.P = Rs. 450

Loss percentage = 15%

$\therefore$ Loss amount = Rs. (15% of 450)

$$= \text{Rs.} \left(\frac{15}{100} \times 450 \right)$$

$$= \text{Rs.} \frac{135}{2}$$

$$= \text{Rs.} 67.5$$

$\therefore$ S.P = Rs. (450 - 67.5)

$$= \text{Rs.} 382.5 \text{ (**Ans**)}$$

iii) C.P = Rs. 480

gain percentage = 20%

$$\begin{aligned}
\therefore \text{gain amount} &= \text{Rs. } (20\% \text{ of } 480) \\
&= \text{Rs. } \left(\frac{20}{100} \times 480 \right) \\
&= \text{Rs. } 96 \\
\therefore \text{S.P.} &= \text{Rs. } (480 + 96) \\
&= \text{Rs. } 576 \text{ (Ans)} \\
4. \quad \text{C.P. of item} &= \text{Rs. } 650 \\
\text{gain percentage} &= 12\% \\
\therefore \text{gain amount} &= \text{Rs. } (12\% \text{ of } 650) \\
&= \text{Rs. } \left(\frac{12}{100} \times 650 \right) \\
&= \text{Rs. } 78 \\
\therefore \text{S.P. of the item} &= \text{Rs. } (650 + 78) \\
&= \text{Rs. } 728 \\
5. \quad \text{C.P.} &= \text{Rs. } 2700 \\
\text{S.P.} &= \text{Rs. } 2400 \\
\therefore \text{S.P.} &< \text{C.P.} \\
\therefore \text{A loss was suffered.} \\
\therefore \text{Loss amount} &= \text{Rs. } (2700 - 2400) \\
&= \text{Rs. } 300 \\
\therefore \text{Loss percentage} &= \left(\frac{300}{2700} \times 100 \right) \% \\
&= \frac{100}{9} \% \\
&= 11\frac{1}{9} \%
\end{aligned}$$

Ans. Loss percentage = $11\frac{1}{9}\%$.

$$\begin{aligned}
6. \quad \text{Let C.P. of book be Rs. } x. \\
\text{S.P. of book} &= \text{Rs. } 550 \\
\text{gain percentage} &= 10\% \\
\therefore \text{gain amount} &= (10\% \text{ of } x) \\
&= \text{Rs. } \left(\frac{10x}{100} \right) \\
&= \text{Rs. } \frac{x}{10} \\
\therefore \quad x + \frac{x}{10} &= 550 \\
\Rightarrow \quad \frac{10x + x}{10} &= 550 \\
\Rightarrow \quad 11x &= 550 \times 10
\end{aligned}$$

$$\begin{aligned}
x &= \frac{550 \times 10}{11} \\
&= 500.
\end{aligned}$$

$$\begin{aligned}
\therefore \text{C.P. of the book} &= \text{Rs. } 500 \text{ (Ans)} \\
7. \quad \text{C.P. of 120 pencils} &= \text{Rs. } (2 \times 120) \\
\text{No. of pencils sold at Rs. 2.5 each} &= 72. \\
\text{No. of pencils sold at Rs. 3 each} &= 102 - 72 \\
&= 30 \\
\therefore \text{S.P. of 120 pencils} &= \text{Rs. } \{(2.5 \times 72) + (30 \times 3)\} \\
&= \text{Rs. } (180 + 90) \\
&= \text{Rs. } 270 \\
\therefore \text{S.P. of 120 pencils} &> \text{C.P. of 120 pencils.} \\
\therefore \text{A gain was experienced.} \\
\therefore \text{gain amount} &= \text{Rs. } (270 - 240) \\
&= \text{Rs. } 30
\end{aligned}$$

$$\begin{aligned}
\therefore \text{gain percentage} &= \left(\frac{30}{240} \times 100 \right) \% \\
&= \frac{25}{2} \% \\
&= 12.5\%
\end{aligned}$$

Ans. gain percentage = 12.5%

$$\begin{aligned}
8. \quad \text{S.P. of first horse} &= \text{Rs. } 12000. \\
\text{Let C.P. of first horse be Rs. } x. \\
\text{gain percentage on first horse} &= 25\% \\
\therefore \text{gain amount of first horse} &= \text{Rs. } (25\% \text{ of } x) \\
&= \text{Rs. } \left(\frac{25x}{100} \right) \\
&= \text{Rs. } \frac{x}{4}
\end{aligned}$$

$$\therefore \quad x + \frac{x}{4} = 12000$$

$$\Rightarrow \quad \frac{4x + x}{4} = 12000$$

$$\Rightarrow \quad 5x = 12000 \times 4$$

$$\begin{aligned}
\Rightarrow \quad x &= \frac{12000 \times 4}{5} \\
&= 9600
\end{aligned}$$

$$\begin{aligned}
\therefore \text{C.P. of first horse} &= \text{Rs. } 9600. \\
\text{S.P. of second horse} &= \text{Rs. } 12000. \\
\text{Let C.P. of second horse be Rs. } y. \\
\text{Loss percentage on second horse} &= \text{Rs. } 25\% \\
\therefore \text{Loss amount on second horse} &= \text{Rs. } (25\% \text{ of } y) \\
&= \text{Rs. } \left(\frac{25y}{100} \right)
\end{aligned}$$

$$= \text{Rs. } \frac{y}{4}$$

$$\therefore y - \frac{y}{4} = 12000$$

$$\Rightarrow \frac{4y - y}{4} = 12000$$

$$\Rightarrow 3y = 12000 \times 4$$

$$\Rightarrow y = \frac{12000 \times 4}{3}$$

$$= 16000$$

$\therefore$ C.P. of second horse = Rs. 16000.

$\therefore$ Total C.P. of both horses = Rs. (9600 + 16000)
= Rs. 25600

$\therefore$ Total S.P. both horses = Rs. (1200 $\times$ 2)
= Rs. 24000

$\therefore$ S.P. of both horse < C.P of both horses

$\therefore$ A loss was suffered.

$\therefore$ loss amount = Rs. (25600 – 24000)
= Rs. 1600

$\therefore$ Loss percentage = $\left(\frac{1600}{25600} \times 100 \right) \%$

$$= \frac{25}{4} \%$$

$$= 1\frac{1}{4} \%$$

9. Amount the table was bought for = Rs. 3600

Amount spent on transportation = Rs. 200

Amount spent on repair = Rs. 800

$\therefore$ C.P. of table Rs. (3600 + 200 + 800)
= Rs. 4600

Loss percentage = 10%

$\therefore$ Loss amount = Rs. (10% of 4600)

$$= \text{Rs. } \left(\frac{10}{100} \times 4600 \right)$$

$$= \text{Rs. } 460$$

S.P. of table = Rs. (4600 – 460)

$$= \text{Rs. } 4140$$

Ans. S.P. of table = Rs. 4140

10. Let C.P. of bedsheet be Rs. x .

S.P. of bedsheet = Rs. 3450.

gain percentage = 15%

$\therefore$ gain amount = Rs. (15% of x)

$$= \frac{15x}{100}$$

$$= \text{Rs. } \frac{3x}{20}$$

$$\therefore x = \frac{3x}{20} = 3450$$

$$\Rightarrow \frac{20x + 3x}{20} = 3450$$

$$\Rightarrow 23x = 3450 \times 20$$

$$\Rightarrow x = \frac{3450 \times 20}{23}$$

$$= 3000$$

Ans. C.P. of bedsheet = Rs. 3000

Exercise 8.4

1. i Let principal be Rs. P.

S.I = Rs. 1920

Rate of interest = 12% p.a.

Time = 2 years.

We know that,

$$\text{S.I.} = \frac{P \times R \times T}{100}$$

$$\Rightarrow 1920 = \frac{P \times 12 \times 2}{100}$$

$$\Rightarrow \frac{1920 \times 100}{12 \times 2} = P$$

$$\Rightarrow 8000 = P$$

$\therefore$ Principal = Rs. 8000 (**Ans**)

ii) Let principal be Rs. P.

S.T = Rs. 2000

Rate of interest = 2% p.a.

Time = 5 years

We know that,

$$\text{S.T} = \frac{P \times R \times T}{100}$$

$$\therefore 2000 = \frac{P \times 2 \times 5}{100}$$

$$\Rightarrow \frac{2000 \times 100}{2 \times 5} = P$$

$$\Rightarrow 20000 = P$$

Ans. principal = Rs. 20,000

2. i) Let Rate of interest be R% p.a.

Principal = Rs. 3500

Time = 4 years.

S.I = Rs. 1400

We know that,

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$\therefore 1400 = \frac{3500 \times R \times 4}{100}$$

$$\Rightarrow \frac{1400 \times 100}{3500 \times 4} = R$$

$$\Rightarrow 10 = R$$

Rate of interest = 10% p.a. **(Ans)**

ii) Let Rate of interest be R% p.a.

principal = Rs. 9600

Time = 2 years.

S.T = Rs. 480

We know that,

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$\therefore 480 = \frac{9600 \times R \times 2}{100}$$

$$\Rightarrow \frac{480 \times 100}{9600 \times 2} = R$$

$$\Rightarrow \frac{5}{2} = R$$

$$\Rightarrow 2.5 = R$$

$\therefore$ Rate of interest = 2.5% p.a **(Ans)**

3. i) Let the time be T years.

Principal = Rs. 4500

Rate of interest = 7.5% p.a.

S.I. = Rs. 1500

We know that,

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$\therefore 1500 = \frac{4500 \times 7.5 \times T}{100}$$

$$\Rightarrow \frac{1500 \times 100}{4500 \times 7.5} = T$$

$$\Rightarrow \frac{100}{22.5} = T$$

$$\Rightarrow \frac{100 \times 10}{22.5 \times 10} = T$$

$$\Rightarrow \frac{1000}{225} = T$$

$$\Rightarrow 4\frac{4}{9} = T$$

$$\therefore \text{Time taken} = 4\frac{4}{9} \text{ years (Ans)}$$

ii) Let time taken be T years.

Principal = Rs. 3000

Rate of interest = 18% p.a.

Simple interest = Rs. 540.

We know that,

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$\therefore 540 = \frac{3000 \times 18 \times T}{100}$$

$$\Rightarrow \frac{540 \times 100}{3000 \times 18} = T$$

$$\Rightarrow 1 = T$$

$\therefore$ Time taken = 1 years **(Ans)**

4. i) Principal = Rs. 2800

Rate of interest = 15%

Time = 10 years

$$\therefore \text{S.I.} = \text{Rs.} \left(\frac{2800 \times 15 \times 10}{100} \right)$$

= Rs. 4200

$\therefore$ Amount = Rs. (2800 + 4200)

= Rs. 7000

Ans. S.I = Rs. 4200

Amount = Rs. 7000

ii) Principal = Rs. 2600

Rate of interest = 20%

Time = 3 years

$$\therefore \text{S.I.} = \text{Rs.} \left(\frac{2600 \times 20 \times 3}{100} \right)$$

= Rs. 1560

$\therefore$ Amount = Rs. (2600 + 1560)

= Rs. 4160

Ans. S.I = Rs. 1560

Amount = Rs. 4160

iii) Principal = Rs. 3125

Rate of interest = 32%

Time = 73 days

$$= \left(\frac{73}{365} \right) \text{ years } [\because 1 \text{ year} = 365 \text{ day}]$$

$$\text{S.I} = \text{Rs.} \left(\frac{3125 \times 32 \times \frac{73}{365}}{100} \right)$$

$$\begin{aligned} \therefore \text{S.I} &= \text{Rs.} \left(3125 \times 32 \times \frac{73}{365} \times \frac{1}{100} \right) \\ &= \text{Rs.} \frac{20000}{100} \\ &= \text{Rs.} 200 \end{aligned}$$

$$\therefore \text{Amount} = \text{Rs.} (3125 + 200)$$

$$= \text{Rs.} 3325$$

$$\text{Ans. S.I} = \text{Rs.} 200$$

$$\text{Amount} = \text{Rs.} 3325$$

$$\text{iv) Principal} = \text{Rs.} 5000$$

$$\text{Rate of interest} = 11\% \text{ p.a.}$$

$$\text{Time} = 9 \text{ months}$$

$$= \left(\frac{9}{12} \right) \text{ years } [12 \text{ months} = 1 \text{ year}]$$

$$= \left(\frac{3}{4} \right) \text{ years}$$

$$\therefore \text{S.I.} = \text{Rs.} \left(\frac{5000 \times 11 \times \frac{3}{4}}{100} \right)$$

$$= \text{Rs.} \left(5000 \times 11 \times \frac{3}{4} \times \frac{1}{100} \right)$$

$$= \text{Rs.} \left(\frac{275 \times 3}{2} \right)$$

$$= \text{Rs.} \frac{825}{2}$$

$$= \text{Rs.} 412.50$$

$$\therefore \text{Amount} = \text{Rs.} (5000 + 412.50)$$

$$= \text{Rs.} 5412.50$$

$$\text{Ans. S.I} = \text{Rs.} 412.50$$

$$\text{Amount} = \text{Rs.} 5412.50$$

$$5. \text{ Let the required sum of money be Rs. } p.$$

$$\text{Simple interest} = \text{Rs.} 360$$

$$\text{Time}$$

$$= 4 \text{ years}$$

$$\text{Rate of interest} = 3\% \text{ p.a.}$$

we know that,

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$\therefore 360 = \frac{P \times 3 \times 4}{100}$$

$$\Rightarrow \frac{360 \times 100}{3 \times 4} = P$$

$$\Rightarrow 3000 = P$$

Ans. The required sum of money = Rs. 3000

$$6. \text{ Let Rate of interest be } R\% \text{ p.a.}$$

$$\text{Principal} = \text{Rs.} 2500$$

$$\text{Amount} = \text{Rs.} 3300$$

$$\therefore \text{Simple interest} = \text{Rs.} (3300 - 2500)$$

$$= \text{Rs.} 800$$

$$\text{Time} = 4 \text{ years.}$$

We know that,

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$\therefore 800 = \frac{2500 \times R \times 4}{100}$$

$$\Rightarrow \frac{800 \times 100}{2500 \times 4} = R$$

$$\Rightarrow 8 = R$$

Ans. Rate of interest = 8% p.a.

$$7. \text{ Let Rate of interest be } R\% \text{ p.a.}$$

$$\text{Principal} = \text{Rs.} 1400$$

$$\text{Simple interest} = \text{Rs.} 70$$

$$\text{Time} = 2 \text{ years.}$$

we know that,

$$\text{S.T} = \frac{P \times R \times T}{100}$$

$$\therefore 70 = \frac{1400 \times R \times 2}{100}$$

$$\Rightarrow \frac{70 \times 100}{1400 \times 2} = R$$

$$\Rightarrow \frac{5}{2} = R$$

$$\Rightarrow 2.5 = R$$

Ans. Rate of interest = 2.5 p.a.

$$8. \text{ Let time be } T \text{ years.}$$

$$\text{Principal} = \text{Rs.} 4000$$

$$\text{Amount} = \text{Rs.} 5120$$

$$\therefore \text{S.I} = \text{Rs.} (5120 - 4000)$$

$$= \text{Rs.} 1120$$

$$\text{Rate of interest} = 16\% \text{ p.a.}$$

We know that,

$$\text{S.I} = \frac{P \times R \times T}{100}$$

$$\therefore 1120 = \frac{4000 \times 16 \times T}{100}$$

$$\Rightarrow \frac{1120 \times 100}{4000 \times 16} = T$$

$$\Rightarrow \frac{7}{4} = T$$

$$\Rightarrow 1\frac{3}{4} = T$$

Ans time taken = $1\frac{3}{4}$ years.

9. Let the required sum be Rs. P.
 Amount = Rs. 7200
 Simple interest = Rs. (7200 - P)
 Rate of interest = 20% p.a.
 Time = 4 years.
 We know that,

$$S.I = \frac{P \times R \times T}{100}$$

$$\therefore 7200 - P = \frac{P \times 20 \times 4}{100}$$

$$\Rightarrow \frac{100(7200 - P)}{20 \times 4} = P$$

$$\Rightarrow 36000 - 5P = 4P$$

$$\Rightarrow 36000 = 4P + 5P$$

$$\Rightarrow 36000 = 9P$$

$$\Rightarrow \frac{36000}{9} = P$$

$$\Rightarrow 4000 = P$$

Ans. The required sum = Rs. 4000

10. Principal = Rs. 2000
 Rate of interest = 8% p.a.
 Time = 10 years.

$$\therefore S.I = \text{Rs.} \left(\frac{2000 \times 8 \times 10}{100} \right)$$

$$= \text{Rs.} 1600$$

$$\therefore \text{Amount} = \text{Rs.} (2000 + 1600)$$

$$= \text{Rs.} 3600$$

$$\text{Amount given in cash} = \text{Rs.} 2600$$

$$\therefore \text{Cost of watch} = \text{Rs.} (3600 - 2600)$$

$$= \text{Rs.} 1000$$

Ans. Cost of watch = Rs. 1000

11. Let time be T years
 Principal = Rs. 400
 Simple interest = Rs. 112
 Rate of interest = 1.4% p.a.
 We know that,

$$S.I = \frac{P \times R \times T}{100}$$

$$\therefore 112 = \frac{400 \times 1.4 \times T}{100}$$

$$\Rightarrow \frac{112 \times 100}{400 \times 1.4} = T$$

$$\Rightarrow \frac{2}{0.1} = T$$

$$\Rightarrow \frac{2 \times 10}{0.1 \times 10} = T$$

$$\Rightarrow \frac{20}{1} = T$$

Ans. Time taken = 20 years.

12. Let rate of interest be r% p.a.
 Let sum of money be Rs. P.
 Amount = Rs. 3P
 $\therefore$ S.I Rs. (3P - P)
 = Rs. 2P
 Time = 2 years.
 We know that,

$$S.I = \frac{P \times R \times T}{100}$$

$$\Rightarrow 2P = \frac{P \times R \times 2}{100}$$

$$\Rightarrow \frac{2P \times 100}{P \times 2} = R$$

$$\Rightarrow 100 = R.$$

$\therefore$ Rate of interest = 100% p.a (**Ans**)

13. Let the time taken be T years.
 Let the sum of money be Rs. p
 Amount = Rs. 2P.
 Rate of interest = 10%
 $\therefore$ S.I = Rs. (2p - p)
 = Rs. P
 We know that,

$$S.I = \frac{P \times R \times T}{100}$$

$$\Rightarrow \frac{108P}{100} = T$$

$$\Rightarrow 10 = T$$

Ans. Time taken = 10 years.

Chapter-9 Algebraic Expressions

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
• Concept of constants, variables, Terms and coefficient of terms. • Algebraic Expression – monomial, binomial, trinomial and polynomial • Degree of a polynomial	The Students will be clear with the concept of variables, terms and coefficient The will be able to identify and classify an expression as monomial, trinomial, binomial and polynomial and will also be able to find the degree of a polynomial	Practice forming algebraic expression using variables, constants and arithmetic operations Give the children few terms on the blackboards. For eg. $3x^4y$, z, $3y^2$ Ask the students to identify the coefficients Also practice identifying terms in an expression $3x^3y + 3xy + 5$ Classify as monomial, binomial etc. the different terms, degree of the polynomial.	$4y^2 - 3x^3 - y^2x^3 - 4$ Is it a binomial or trinomial or polynomial? What is the degree?
Addition and Subtraction of Algebraic expression	The students will be able to add and subtract algebraic expressions	Explain to the students that like terms can be added/subtracted and also explain terms with similar sign gets added and terms with different signs. Get subtracted the result taking the sign of higher number. For eg: $+2x + 3x = 5x$ $-2x + 3x = x$ $-2x - 3x = -5x$ $2x - 3x = -x$ Explain the method of addition and subtraction of algebraic method Worksheets and sums from exercises to be done.	The sum $3x^2 + 5x$ if one expression is $x^2 + 3x$ find the other expression

Exercise 9.1

Teke answers from the book.

1. Add.
 - i) $-19x + 2x$
 $= -17x$ (Ans)
 - ii) $2x + y(-11x - 9y)$
 $= 2x + y - 11x - 9y$
 $= 2x - 11x + y - 9y$
 $= -9x - 8y$ (Ans)
 - iii) $a^2 b^2 - 4ab + c + 7a^2 b^2 - 7c$
 $= a^2 b^2 + 7a^2 b^2 - 4ab + c - 7c$
 $= 8a^2 b^2 - 4ab - 6c$ (Ans)
 - iv) $8a + 6b - c + 4a + b + 7c - 20 + 5b - 9c$
 $= 10a + 12b - 3c$ (Ans)
 - v) $2xy - 4yz + 5xy + 9zy = 3xy + 7yz + 11zx + xy + yz + zx$
 $= 2xy + 5xy + 3xy + xy - 4yz + 7yz + yz + 9zx + 11zx + zx$
 $= 11xy + 4yz + 21zx$ (Ans)
2.
 - i) $-90a - 8a$
 $= -98a$ (Ans)
 - ii) $x + y - (2x - 11y)$
 $= x + y - 2x + 11y$
 $= -x + 12y$ (Ans)
 - iii) $-6pq + 12qr + 7rs - (pq - qr + rs)$
 $= -6pq + 12qr + 7rs - pq + qr - rs$
 $= -7pq + 13qr + 6rs$ Ans
 - iv) $6a - 20b + 8d - (a + b - 4c)$
 $= 6a - 20b + 8d - a - b + 4c$
 $= 5a - 21b + 4c + 8d$ Ans
 - v) $-xy - yz - zx - (xy + yz + zx)$
 $= -xy - yz - zx - xy - yz - zx$
 $= -2xy - 2yz - 2zx$ Ans
3. $x + y - 2z - (13x - 12y - 9z)$
 $= x + y - 2z - 13x + 12y + 9z$
 $= -12x + 13y + 7z$
4. $3a + 9b - 4c + (a + b - c)$
 $= 3a + 9b - 4c + a + b - c$
 $= 4a + 10b - 5c$
5. $-17x - 4y - 3z - (7x + y)$
 $= -17x - 4y - 3z - 7x - y$
 $= -24x - 5y - 3z$
6. $12x - 4y - 5x$
 $= 12x - 4y - 5x$
 $= 7x - 4y$

Exercise 9.3

1. $a = 1, b = 2, c = -3, d = -1$
 - i) $ab - 3c + d$
 $= 1(2) - 3(-3) + (-1)$
 $= 2 + 9 - 1$
 $= 11 - 1$
 $= 10$
 - ii) $4(ab - bc) + 7dc$
 $= 4(1 \times 2 - 2 \times (-3)) + 7(-1 \times -3)$
 $= 4(2 + 6) + 7 \times 3$
 $= 32 + 21$
 $= 53$
 - iii) $5 - \{2(a - d) + 4b\}3$
 $= 5 - \{2(1 - (-1)) + 4(2)\} \times 3$
 $= 5 - \{2(1 + 1) + 8\} \times 3$
 $= 5 - \{4 + 8\} \times 3$
 $= 5 - \{12\} \times 3$
 $= 5 - 36$
 $= -31$
 - iv) $2(a + b) - 3(b + c)$
 $= 2(1 + 2) - 3(2 - 3)$
 $= 2(3) - 3(-1)$
 $= 6 + 3$
 $= 9$
 - v) $6a - \{7(a - b) - 3(a + c)\}$
 $= 6 \times 1 - \{7(1 - 2) - 3(1 - 3)\}$
 $= 6 - \{7(-1) - 3(-2)\}$
 $= 6 - \{-7 + 6\}$
 $= 6 - \{-1\}$
 $= 7$
 - iv) $abc - 4bc d$
 $= (1)(2)(-3) - 4(2)(-3)(-1)$
 $= -6 - 24$
 $= -30$
2.
 - i) Area of square $= 3x \times 3x$
 $= 9x^2 \text{ m}^2$
 - ii) Area $= \frac{1}{2} \times 3x \times 4y$
 $= 6xy \text{ sq. unit}$
 - iii) Area $= (l \times b)$
 $= (x \times y)$
 $= xy \text{ sq. units.}$
3.
 - i) Perimeter $= 2(l + b)$
 $= 2\{3a - b\} + (-7a + 13b + c)$
 $= 2\{-4a + 12b + c\}$
 $= -8a + 24b + 2c$

$$\text{ii) Perimeter} = (x + y + z) + (5x - 10y + 2z) + (x + 3y)$$

$$= 7x - 6y + 3z$$

$$\text{iii) Perimeter} = 4 \times \text{side}$$

$$= 4 \times (a + b - c)$$

$$= 4a + 4b - 4c$$

$$\begin{aligned} 4. \quad \text{i) Putting } x=1 \quad x=2 \quad x=3 \\ 2x = 2 \times 1 \quad 2x = 2 \times 2 \quad 2x = 2 \times 3 \\ = 1^{\text{st}} 3 + \text{terms} = 2, 4, 6. \end{aligned}$$

$$\text{ii) } x = 1$$

$$\frac{x+1}{1}$$

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

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

$$\text{iii) } x = 2$$

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

$$= \frac{3}{3}$$

$$= 1$$

$$\text{iv) } x = 3$$

$$\frac{3+1}{3}$$

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

$$\text{The first 3 terms } \frac{2}{3}, 1, \frac{4}{3}$$

$$\begin{aligned} \text{v) when } x=1 \quad x=2 \quad x=3 \\ 5x=1 \quad 5x-2 \quad 5x-2 \\ = 5(1)-2 \quad = 5(2)-2 \quad = 5(3)-2 \\ = 5-2 \quad = 10-2 \quad = 15-2 \\ = 3 \quad = 8 \quad = 13 \end{aligned}$$

$$\text{The first 3 terms are } 3, 8, 13$$

$$\begin{aligned} 5. \quad \text{i) } 2 - 7(a - b) - 6b \\ = 2 - 7a + 7b - 6b \\ = 2 - 7a + b \quad (\text{Ans}) \end{aligned}$$

$$\text{ii) } 10p - \{6(p + 3q) - 14\}$$

$$= 10p - \{6p + 18q - 14\}$$

$$= 10p - 6p - 18q + 14$$

$$= 4p - 18q + 14 \quad (\text{Ans})$$

$$\begin{aligned} \text{iii) } 8(x + y) - 8(x - y) \\ = 8x + 8y - 8x + 8y \\ = 16y \quad (\text{Ans}) \end{aligned}$$

$$\begin{aligned} \text{iv) } = xy = yz + 5(xy - yz) \\ = xy + yz = 5xy - 5yz \\ = 6xy - 4yz \quad (\text{Ans}) \end{aligned}$$

$$\begin{aligned} \text{v) } 4 - 3\{2(p - q) + 5(p + q)\} \\ = 4 - 3\{2p - 2q + 5p + 5q\} \\ = 4 - 3\{7p + 3q\} \\ = 4 - 21p - 9q \quad (\text{Ans}) \end{aligned}$$

Self Assessment-9

$$\begin{aligned} 1. \quad -3a + b - 7c - (6a - 5b + 2c) \\ = -3a + b - 7c - 6a + 5b - 2c \\ = -9a + 6b - 9c \end{aligned}$$

$$\therefore -9a + 6b - 9c \text{ should be added}$$

$$\begin{aligned} 2. \quad \text{i) } x - y + 3x - 2y - 10z \\ = 4x - 3y - 10z \quad (\text{Ans}) \\ \text{ii) } a + b + 3a - b + c - 2c \\ = 4a - 4a + b - b + c - 2c \\ = -c \end{aligned}$$

$$\begin{aligned} 3. \quad \text{i) } 3a - 6c + b - (2a - 7a + 8c) \\ = 3a - 6c + b - 2a + 7a - 8c \\ = a + 8b - 14c \end{aligned}$$

$$\begin{aligned} \text{ii) } -a + b + c - (a + b + c) \\ = -a + b + c - a - b - c \\ = -2a \end{aligned}$$

$$\begin{aligned} 4. \quad \text{i) } 2x - 3y \quad (x + 1, y = 2, a = 0) \\ = 2(1) - 3(2) \\ = 2 - 6 \\ = -4 \end{aligned}$$

$$\begin{aligned} \text{ii) } 5ax - 9xy \quad (x = 1, y = 2, a = 0) \\ = 5(0)(1) - 9(1)(2) \\ = 0 - 18 \\ = -18 \end{aligned}$$

$$\begin{aligned} 5. \quad \text{i) } 2x + 1 \\ \text{when } x = 1 \quad x = 2 \\ = 2(1) + 1 \quad = 2(2) + 1 \\ = 2 + 1 \quad = 4 + 1 \\ = 3 \quad = 5 \\ \text{first 2 no's} = 3, 5 \end{aligned}$$

$$\begin{aligned} \text{ii) } 4(x + 2) \\ \text{when } x = 1 \quad x = 2 \\ = 4(x + 2) \quad 4(x + 2) \\ = 4(1 + 2) \quad = 4(2 + 2) \\ = 4 \times 3 \quad = 4(4) \\ = 12 \quad = 16 \\ \text{First 2 no's} = 12, 16 \end{aligned}$$

6. A binomial has 2 terms.

Ans: option (b)

$$7. \quad \text{coefficint} = -16yz$$

Ans: option (d)

$$\begin{aligned} 8. \quad 2ab - ca \text{ when } a = 1, b = -3, c = -5 \\ 2(1)(-3) - (-5)(1) \\ = -\underline{6} + 5 \end{aligned}$$

Ans: option (b)

$$9. \quad \text{Degree of the polynomial} = 4$$

Ans: option (d)

$$\begin{aligned} 10. \quad 5x - 3y + x \\ = 6x - 3y \end{aligned}$$

Ans: option (c).

$$11. \quad 2x + 5$$

Ans: option (c)

$$12. \quad \text{coefficient} = -2yz.$$

Ans: option (b)

$$13. \quad \text{No of terms} = 3$$

Ans: option (c)

Chapter-10 Linear Equalions

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
What an equation is?	To understand variables and constants, To identify an equation.	Show different equations on the black board like $2x + 3 = 5$, $5y = 10$, $\frac{2}{x} = \frac{3}{5}$ etc. and explain that If two algebraic expressions which contains at least one variable, have equal values we can write them by putting an equal sign between them.	$3x^3 + 2xyz + 3$ is an equation or an expression?
Converting a statement into an equation Converting an equation into a statement	To frame an equation from a given statement by using one variable which is called simple equation. To know how to write the statement form of an equation.	Demonstrate the methods by showing different examples. 'The sum of umbers x and 4 is 9'. The corresponding equation is $x + 4 = 9$ Consider the equation $-5 = 7$. The corresponding statement is subtracting 5 from x gives 7.	If a box of mangoes cost ₹ x , what will be the cost of 20 such boxes? Give your answer in terns of x .
Solution of an equation.	To understand the method of finding the solution of an equation which is known as 'solving'	Meaning of solution. The value of the variable for which LHS = RHS Explain the method of transposing the terms from one side to the other side, le when we transpose a term the operation will be changed. + to -, to ÷, - to +, ÷ to × $x + 3 = 5 \rightarrow x = 5 - 3 = 2$ $y - 5 = 10 \rightarrow y = 10 + 5 = 15$ $3x = 21 \rightarrow x = \frac{21}{3} = 7$ $\frac{z}{2} = 5 \rightarrow z = 5 \times 2 = 10$	Solve: $2(x - 3) = 5(x + 4)$

More equations and applications of simple equations in daily problems.	To solve an equation containing different operations together. To make an equation from daily life situation and solve it.	Consider the equation $2(3x + 5) = 28$ $3x + 5 = \frac{28}{2} = 14$ $3x = 14 - 5 = 9 \rightarrow x = \frac{9}{3} = 3$ One fourth of a number is 3 more than 7 find the number $\frac{1}{4}x = 3 + 7 \rightarrow \frac{1}{4}x = 10 \rightarrow x = 10 \times 4 = 40$	Sunil is 6 years older than her yrenges sister. After 10 years the sum of their ages will be 50 years. What is their present ages.
Linear inequities	The students will be able to solve linear inequalities	Explain to the students the difference between equation and inequality. Explain the method of solving linear in equality. The method of balancing and also changing of sign when divided or multiplied by a negative salve.	What is the solution set of $3x + 2 \geq 14$, $x \in w$.

Exercise 10.1

1. i) $x + y$ is an expression
ii) $x + 3y = 9$ is an equation.
iii) $\frac{P}{3} + 1$ is an expression.
iv) $\frac{r-5}{3} = 2$ is an equation.
v) $\frac{P}{8} = 2$ is an equation
vi) $y + 7 = 0$ is an equation
2. i) $a + b = -14$
ii) $\frac{P \times t \times r}{100} = 50$
iii) $4a = 40$

iv) $8y = -96$.

v) $3x + 2 - 20$

vi) $\frac{9}{y} - 8 = 4$

3. Take answers from th back.

Exercise 10.2

1. i) $P + 12 = 13$
or, $P + 12 - 12 = 13 - 12$
or, $P = 1$ (Ans)
ii) $z - 7 = 2$
or, $z - 7 + 7 = 2 + 7$
or, $z = 9$ (Ans)
iii) $3x = 15$
or, $\frac{3x}{3} = \frac{15}{3}$

$$\text{or, } x = 5 \text{ (Ans)}$$

$$\text{iv) } \frac{y}{4} = -20$$

$$\begin{aligned} \text{or, } \frac{y}{4} \times 4 &= -20 \times 4 \\ &= y = -80 \text{ (Ans.)} \end{aligned}$$

$$\text{v) } 5y + 4 = 29$$

$$\text{or, } 5y + 4 - 4 = 29 - 4$$

$$\text{or, } 5y = 25$$

$$\text{or, } \frac{5y}{5} = \frac{25}{5}$$

$$\text{or } y = 5 \text{ (Ans)}$$

$$\text{vi) } 7x - 24 = 25$$

$$\text{or, } 7x - 24 + 24 = 25 + 24$$

$$\text{or, } 7x = 49$$

$$\text{or, } \frac{7x}{7}$$

$$\text{or } x = \text{ (Ans)}$$

$$2. \text{ i) } 2x - 1 = 3$$

$$\text{or, } 2x = 3 + 1$$

$$\text{or, } 2x = 4$$

$$\text{or, } x = \frac{4}{2}$$

$$x = 2 \text{ (Ans)}$$

$$\text{ii) } 3y + 5 = 8y - 35$$

$$\text{or, } 3y - 8y = -35 - 5$$

$$\text{or, } -5 = -40$$

$$\text{or, } y = \frac{-40}{-5}$$

$$y = 8. \text{ (Ans)}$$

$$\text{iii) } P - 97 = 3$$

$$\text{or, } P = 3 + 97$$

$$\text{or, } P = 100 \text{ (Ans).}$$

$$\text{iv) } 12P + 6 = 78$$

$$\text{or, } 12P = 78 - 6$$

$$\text{or, } 12P = 72$$

$$\text{or, } P = \frac{78}{12}$$

$$P = 6 \text{ (Ans)}$$

$$\text{v) } \frac{r}{3} - 4 = -1$$

$$\text{or, } \frac{r}{3} = -1 + 4$$

$$\text{or, } \frac{r}{3} = 3$$

$$\text{or, } r = 3 \times 3$$

$$r = 9 \text{ (Ans)}$$

$$\text{vi) } 2(x + 7) = 5(x - 17)$$

$$\text{or, } 2x + 14 = 5x - 85$$

$$\text{or, } 2x - 5x = -85 - 14$$

$$\text{or, } -3 = -99$$

$$\text{or } x = \frac{-99}{3}$$

$$x = 33 \text{ (Ans)}$$

$$\text{vii) } 5(x + 7) - 3(3x - 2) = 45$$

$$\text{or, } 5x + 35 - 9x + 6 = 45$$

$$\text{or, } -4x + 41 = 45$$

$$\text{or, } -4x = 45 - 49$$

$$\text{or, } -4x = 4$$

$$\text{or, } \frac{4}{-4}$$

$$x = -1 \text{ (Ans)}$$

$$\text{viii) } \frac{x+7}{3} - \frac{3x-2}{5}$$

$$\text{or, } \frac{5(x+7)-3(3x-)}{15} = 3$$

$$\text{or, } \frac{5x+35-9x+6}{15} = 3$$

$$\text{or, } -4x + 41 = 15 \times 3$$

$$\text{or, } -4x = 45 - 41$$

$$\text{or, } -4 = 4$$

$$\text{or } x = \frac{4}{-4}$$

$$x = -1 \text{ (Ans)}$$

$$\text{ix) } 6 + 1.2y = 6.6$$

$$\text{or, } 1.2y = 6.6 - 6$$

$$\text{or, } 1.2y = 0.6$$

$$\text{or, } y = \frac{0.6}{1.2}$$

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

$$y = 0.5 \text{ (Ans)}$$

$$\text{x) } 25\% \text{ of } x = 200$$

$$\text{or, } \frac{25}{100} \times x = 200$$

$$\text{or, } x = \frac{200 \times 100}{25}$$

$$x = 800 \text{ (Ans)}$$

$$3. \ 2x - 2 = 8(x + 5) + 13$$

$$\text{or, } 2x - 2 = 8x + 40 + 13$$

$$\text{or, } 2x - 2 = 8x + 53$$

$$\text{or, } 2x - 8x = 53 + 2$$

$$\text{or } -6x = 55$$

$$\text{or } x = \frac{-55}{6} \text{ (Ans)}$$

$$4. \ \text{i) } 3(y - 2) + \frac{2}{10} \text{ of } 60 = 10$$

$$\text{or, } 3y - 6 + \frac{1}{10} \times 60 = 10$$

$$\text{or, } 3y - 6 + 12 = 10$$

$$\text{or } 3y = 10 - 12 + 6$$

$$\text{or, } 3y = 4$$

$$\text{or, } y = \frac{4}{3} \text{ (Ans)}$$

$$\text{ii) } 5(x - 4) - 25\% \text{ of } (x - 5) = 20$$

$$\text{or, } 5x - 20 - \frac{25 \times (x - 5)}{100} = 20$$

$$\text{or, } \frac{500x - 2000 - 25(x - 5)}{100} = 20$$

$$\text{or, } 500x - 2000 - 25x + 125 = 2000$$

$$\text{or, } 500x - 25x = 2000 + 2000 + 125$$

$$\text{or, } 475x = 4125$$

$$\text{or } \frac{4125}{475}$$

$$= \frac{165}{19}$$

Exercise 10.2

$$1. \ \text{Let the consecutive numbers be } x, x + 1, x + 2$$

ATP

$$x + x + 1 + x + 2 = 66$$

$$\text{or, } 3x + 3 = 66$$

$$\text{or, } 3x = 66 - 3$$

$$\text{or, } 3x = 63$$

$$\text{or, } x = \frac{63}{3} = 21$$

$$x = 21 \quad 3x + 1 = 22 \quad 3x + 2 = 23$$

The consecutive numbers are 21, 22, 23

$$\text{or, } 2x + 2 = 56$$

$$\text{or, } 2x = 58$$

$$\text{or } x = \frac{58}{2}$$

$$x = 29$$

The consecutive odd numbers are 29, 31.

2. Let the number of boys be x

number of girls = $x + 120$

ATP.

$$x + x + 120 = 500$$

$$\text{or, } 2x + 120 = 500$$

$$\text{or, } 2x = 500 - 120$$

$$\text{or, } 2x = 380$$

$$\text{or, } x = \frac{380}{2}$$

$$x = 190$$

No. of boys = 190

3. Let the number x .

$$3x + 14 = 29$$

$$\text{or, } 3x = 29 - 14$$

$$\text{or, } 3x = 15$$

$$\text{or, } x = \frac{15}{3} = 5$$

The number is 5

4. Let the number be x .

ATP

$$5x = 13x - 32$$

$$\text{or, } 5x - 13x = -32$$

$$\text{or, } -8x = -32$$

$$x = \frac{-32}{-8}$$

$$x = 4$$

The number is 4.

5. Let the consecutive odd number be $x, x + 2$

ATP

$$x + x + 2 = 56$$

6. Let the present age of sine's younger sister be x

present age of sene younger = $(x + 6)$ yrs

After 10 yrs.

Sine = $x + 6$ 10 = $(x = 16)$ years

sines younger sister = $(x + 10)$ yrs

ATP

$$x + 16 + x + 10 = 50$$

$$\text{or, } 2x + 26 = 50$$

$$\text{or, } 2x + = 50 - 26$$

$$\text{or } 2x = 24$$

$$x = 12 \text{ yer}$$

Sines age = $x + 6 = 12 + 6 = 18$ yrs and
younger sister = 12 yrs

7. Let the breadths be x units.

length = $(x + 6)$ units

Peremeter = $2(l + b)$

ATP

$$60 = 2(x + x + 6)$$

$$\text{or, } 60 = 2(x + 6)$$

$$\text{or, } 60 = 4x + 12$$

$$\text{or, } 60 - 12 = 4x$$

$$\text{or, } 48 = 4x$$

$$\text{or, } x = \frac{48}{4}$$

$$x = 12 \text{ units}$$

breadth = 12 units length = $12 + 6 = 18$ units

8. Let the width be x units

length = $2x$.

ATP

$$= 4200 = 2(x + 2x)$$

$$\text{or, } 4200 = 2(3x)$$

$$\text{or, } \frac{4200}{2 \times 3} = x$$

$$\text{or, } 700 = x$$

width = 700 units length = 1400 units

9. Let the number of boys be x

$$\text{girls} = \frac{4x}{23}$$

ATP

$$x + \frac{4x}{23} = 54$$

$$\text{or, } \frac{23x + 4x}{23} = 54$$

$$\text{or, } 27x = 54 \times 23$$

$$x = \frac{54 \times 23}{27}$$

$$x = 46$$

$$\text{No. of boys} = 46, \text{ no of girls} = \frac{4}{23} \times 16$$

$$= 8$$

10. Let the smaller angle be x°

ATP

$$x + x + 28 = 90^\circ$$

$$\text{or, } 2x + 28 = 90$$

$$\text{or, } 2x = 90 - 28$$

$$\text{or, } 2x = 62$$

$$\text{or, } x = 31^\circ$$

Smaller angle = 31° larger = $31 + 28 = 59^\circ$

11. Let the base angles be x° each

$$\text{ATP, } x + x + 74 = 180^\circ$$

$$\text{or, } 2x + 74 = 180^\circ$$

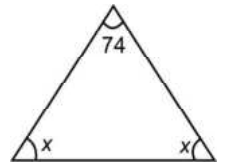
$$\text{or } 2x = 180 - 74$$

$$2x = 106$$

$$\text{or, } x = \frac{106}{2}$$

$$= 53^\circ$$

Base angle = 53°



12. Let one part be x , other part = $36 - x$

ATP

$$\frac{1}{2}x = \frac{1}{7}(36 - x)$$

$$\text{or, } \frac{x}{5} = \frac{36}{7} - \frac{x}{7}$$

$$\text{or, } \frac{x}{5} + \frac{x}{7} = \frac{36}{7}$$

$$\text{or, } \frac{7x + 5x}{35} = \frac{36}{7}$$

$$\text{or } 12x = 36 \times 5$$

$$\text{or } x = \frac{36 \times 5}{12} = 15^\circ$$

one part is 15

other part is $36 - 15$

$$= 21$$

$$\text{v) } \frac{x}{3} + 4 > 5$$

$$\text{or, } \frac{x + 12}{3} > 5$$

$$\text{or, } \frac{x+12}{3} \times 3 > 5 \times 3$$

$$\text{or, } x + 12 > 15$$

$$\text{or, } x + 12 - 12 > 15 - 12$$

$$\text{or, } x > 3$$

$$\text{vi) } \frac{x-1}{5} + \frac{2}{1} > 4$$

$$\text{or, } \frac{x-1+10}{5} > 4$$

$$\text{or, } \frac{x+9}{5} > 4$$

$$\text{or, } \frac{x+9}{5} \times 5 > 4 \times 5$$

$$\text{or, } x + 9 > 20$$

$$\text{or } x + 9 - 9 > 20 - 9$$

$$\text{or } x > 11$$

$$2. \quad \text{i) } x - 9 < -2, x \text{ EW}$$

$$\text{or, } x - 9 < -2$$

$$\text{or, } x - 9 + 9 < -2 + 9$$

$$\text{or, } x < 7$$

$$\text{Solution set} = \{0, 1, 2, 3, 4, 5, 6\}$$

$$\text{ii) } 2x + 1 > 7, x \text{ EZ}$$

$$\text{or, } 2x + 1 - 1 > 7 - 1$$

$$\text{or, } 2x > 6$$

$$\text{or } \frac{2x}{2} > \frac{6}{2}$$

$$\text{or } x > 3.$$

$$\text{Solution set} = \{4, 5, 6, 7, 8 \dots\}$$

$$\text{iii) } \frac{x-1}{4} \leq 3, x \text{ EN}$$

$$\text{or } \frac{x-1}{4} \times 4 \leq 3 \times 4$$

$$\text{or, } x - 1 \leq 3 \times 4$$

$$\text{or, } x - 1 \leq 12$$

$$\text{or, } x - 1 + 1 \leq 12 + 1$$

$$\text{or, } x \leq 13$$

$$\text{Solution set} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13\}$$

$$\text{iv) } 3x - 4 < -1, x \text{ EW}$$

$$\text{or, } 3x - 4 < -1$$

$$\text{or, } 3x - 4 + 4 < -1 + 4$$

$$\text{or, } 3x < 3$$

$$\text{or } \frac{3x}{3} < \frac{3}{3}$$

$$\text{or, } x < 1$$

$$\text{Solution set} = \{0\}$$

$$\text{v) } \frac{x}{7} > \frac{-3}{14}, x \text{ EZ}$$

$$\text{or } \frac{x}{7} \times 7 > \frac{-3}{14} \times 7$$

$$\text{or, } x > \frac{-3}{2}$$

$$\text{or } x > -1.5.$$

$$\text{Solution set} = \{-1, 0, 1 \dots\}$$

$$\text{vi) } x - 9 > -4, x \text{ EN}$$

$$\text{or, } x - 9 + 9 > -4 + 9$$

$$\text{or } x > 5$$

$$\text{Solution set} = \{1, 2, 3, 4\}$$

Self Assessment 10.

$$1. \quad \text{i) } 2x + \frac{1}{4} = \frac{-3}{4}$$

$$\text{or, } 2x = \frac{-3}{4} - \frac{1}{4}$$

$$\text{or, } 2x = \frac{-4}{4}$$

$$\text{or } 2x = -1$$

$$\text{or } x = \frac{-1}{2} \text{ Ans}$$

$$\text{ii) } \frac{x}{5} + 2 = 9$$

$$\text{or, } \frac{x}{5} = 9 - 2$$

$$\text{or, } \frac{x}{5} = 7$$

$$\text{or, } x = 7 \times 5$$

$$\text{or } x = 35 \text{ Ans}$$

2. Let the number be x .

$$72 + x = 100$$

$$\text{or, } x = 100 - 72$$

$$\text{or, } x = 28 \text{ Ans}$$

The number is 28.

3. i) Tow times x increased by 11 $x - 3$

ii) One - third of a number decreased by 5 is 14.

4. Let the breadth be x cm then length = $x + 5$ cm.

ATP,

$$2(x + x + 5) = 42$$

$$\text{or, } 2x + 5 = \frac{42}{2}$$

$$\text{or, } 2x = 21 - 5$$

$$\text{or } x = \frac{16}{2}$$

$$x = 8.$$

$$\text{breadth} = 8\text{cm length} = 8 + 5 = 13\text{cm.}$$

5. Let the consecutive number be $x, x + 1, x + 2,$

$$x + 3$$

ATP

$$(x) + (x + 1) + (x + 2) + (x + 3) = 46$$

$$\text{or, } 4x + 6 = 46$$

$$\text{or, } 4x = 40$$

$$\text{or, } x = 10$$

$\therefore$ The number are 10, 11, 12, 13.

6. Putters x 5 in $x - 27 = -22$ we get 0

$\therefore$ It is the solution of the above equation

Ans: option (b)

7. 12x months

Ans option (b)

$$8. x + x + 1 = 7$$

$$2x = 6$$

$$x = 3$$

Ans option d)

9. option b)

$$10. \frac{x}{3} = -4$$

$$x = -12$$

$$\therefore 2x = -24$$

Ans: option (c)

$$11. x - 7 > 0, x \in \mathbb{N}.$$

$$x - 7 + 7 > 0 + 7$$

$$x > 7$$

$\therefore$ Solution set = $\{8, 9, 10, \dots\}$

Ans was: option (c)

$$12. 2x - 4 < 0 \text{ is an inequality.}$$

Ans: option (c)

$$12. 10 \text{ sec} \rightarrow 30 \text{ km}$$

$$1 \rightarrow \frac{30}{10} = 3 \text{ km}$$

Ans: option (b)

13. $4, x, x, 9$

$$4 \times 9 = x \times x$$

$$36 = x^2$$

$$x = 6$$

Ans: option (b)

14. To change speed from km/hr to m/sec we

multiply by $\frac{5}{18}$

Ans: option (a)

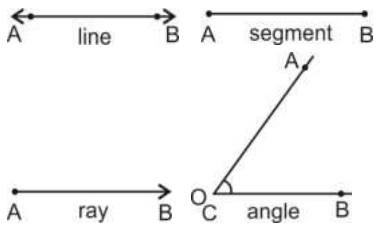
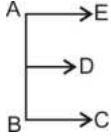
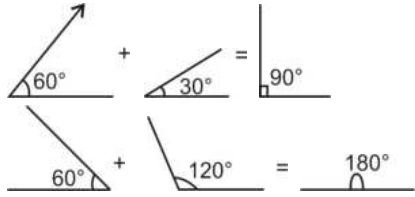
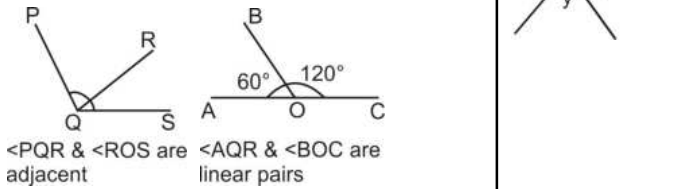
15. $T = \frac{D}{S}$

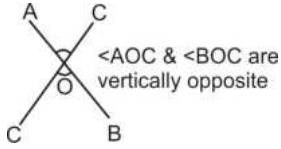
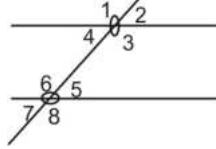
$$= \frac{39}{6}$$

$$= 6.5 \text{ hr}$$

Ans: option (b).

Chapter-11 Lines and angles

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Introduction	Understand the basic terms of geometry like point, line, line segment, ray and angles.	Explain the basic terms by drawing the figures on the black board. Involve the children to draw the figures. 	Identify the line segments and rays from the given figure. 
Complementary and Supplementary angles	Understand the conditions of two angles to be complementary and supplementary	$\angle A + \angle B = 90^\circ \Rightarrow \angle A$ and $\angle B$ are complementary $\angle A + \angle B = 180^\circ \Rightarrow \angle A$ and $\angle B$ are supplementary. Demonstrate the conditions by showing different pairs of angles. 	Which angle is the complement of itself?
Adjacent angles and linear pairs vertically opposite angles	Understand when a pair of pair of angles and linear pairs.	Demonstrate different adjacent angles, linear pairs and vertically opposite angles on the black board.  $\angle PQR$ & $\angle ROS$ are adjacent $\angle AQR$ & $\angle BOC$ are linear pairs	What is the value of x and y .

		 A pair of adjacent angles become linear pair if they are supplementary.	
Angles made by a transversal	Identify the different angles formed by the transversal on a pair of parallel lines the properties of the angles.	 $\angle 1 = \angle 5$, $\angle 2 = \angle 6$, $\angle 4 = \angle 7$, $\angle 3 = \angle 8$...corresponding angles. $\angle 4 = \angle 5$, $\angle 3 = \angle 6$.... alternate interior angles $\angle 4 + \angle 6 = 180^\circ$ and $\angle 3 + \angle 5 = 180^\circ$.... Interior angles.	State true or false 1. Vertically opposite angles add up to give 180° 2. Corresponding angles are equal.

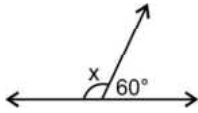
Exercise 11.1

1. i) $105^\circ + 5^\circ$
 $= 180^\circ$ (Supplementary)
 ii) $65^\circ + 115^\circ$
 $= 180^\circ$ (Supplementary)
 iii) $42^\circ + 48^\circ$
 $= 90^\circ$ (Complementary)
 iv) $76^\circ + 14^\circ$
 $= 90^\circ$ (Complementary)
2. 45° is equal to its complement
3. i) Complement of 70°
 $= 90^\circ - 70^\circ$
 $= 20^\circ$ **Ans**
 ii) Complement of 15°
 $= 90^\circ - 15^\circ$
 $= 75^\circ$ **(Ans)**
 iii) Complement of 88°
 $= 90^\circ - 88^\circ$

- $= 2^\circ$ **(Ans)**
 4. i) Supplement of 90°
 $= 180^\circ - 90^\circ$
 $= 90^\circ$ **(Ans)**
 ii) Supplement of 30°
 $= 180^\circ - 30^\circ$
 $= 150^\circ$ **(Ans)**
 iii) Supplement of 105°
 $= 180^\circ - 105^\circ$
 $= 75^\circ$ **(Ans)**
5. i) $\angle POA$ and $\angle AOB$ adjacent angles
 (Note: there are many more adjacent angles in the figure)
 ii) $\angle POQ$ and $\angle POD$ are forming linear pair
 iii) $\angle BOC$ and $\angle COD$ are angle having OC as the common arm.
6. $\angle POQ$ and $\angle SOR$ or $\angle SOP$ and $\angle ROQ$ are vertically opp. angles. $\angle POQ$ and $\angle$

QOR are adjacent angles.

7. i)

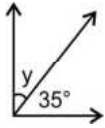


$$x + 60^\circ \text{ (Linear pair)}$$

$$\text{or, } x = 180 - 60^\circ$$

$$x = 120^\circ \text{ (Ans)}$$

ii)

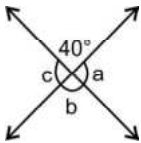


$$y + 35^\circ = 90^\circ$$

$$\text{or, } y = 90 - 35$$

$$y = 55^\circ \text{ (Ans)}$$

iii)



$$\angle b = 40^\circ \text{ (vertically)}$$

$$\angle a = 180^\circ - b \text{ (linear pair)}$$

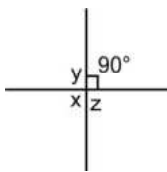
$$\angle a = 180^\circ - 40$$

$$= 40^\circ \text{ (Ans)}$$

$$\angle c = \angle a \text{ (vertically opp. angle)}$$

$$\angle c = 40^\circ \text{ (Ans)}$$

iv)



$$x = 90^\circ \text{ (vertically opp. angle)}$$

$$\angle y = 180^\circ - 90^\circ$$

$$\angle y = 90^\circ \text{ (linear pair)}$$

$$\angle z = y = 90^\circ \text{ (vertically opp. angle).}$$

$$\text{v) } \angle x = 180^\circ - (28 + 32^\circ) \text{ (Linear)}$$

$$\angle x = 180^\circ - 60$$

$$\angle x = 120^\circ$$

$$\angle y = 32^\circ \text{ (vertically) oppositi angle}$$

$$\text{vi) } \angle x = 180^\circ - 60^\circ$$

$$\angle x = 120^\circ \text{ (linear pair)}$$

$$\angle y = \angle x = \angle 120^\circ \text{ (vertically opposite angle)}$$

8. ATP,

$$(2x - 5) + (4x - 10) = 90 \text{ (complementary angles)}$$

$$\text{or, } 6x - 15 = 90$$

$$\text{or, } 6x = 90 + 15$$

$$\text{or, } x = \frac{105}{6}$$

$$1^{\text{st}} \text{ angle} = 2x - 5$$

$$= 2\left(\frac{105}{6}\right) - 5$$

$$= 30^\circ \text{ (Ans)}$$

$$2^{\text{nd}} \text{ angle} = 4x - 10$$

$$= 4\left(\frac{105}{6}\right) - 10$$

$$= 70 - 10$$

$$= 60^\circ \text{ (Ans)}$$

$$9. x + 10 + 3x + 50 = 180^\circ$$

$$\text{or, } 4x + 60 = 180^\circ$$

$$\text{or, } 4x + 180 - 60$$

$$x = \frac{120}{4}$$

$$x = 30^\circ$$

$$1^{\text{st}} \text{ angle} = x + 10$$

$$= 30 + 10$$

$$= 40^\circ \text{ (Ans)}$$

$$2^{\text{nd}} \text{ angle} = 3x + 50$$

$$= 3(30) + 50$$

$$= 90 + 50$$

$$= 140^\circ \text{ (Ans)}$$

10. Let common be x

ATP,

$$4x + 5x = 90^\circ$$

$$\text{or, } 9x = 90^\circ$$

$$\text{or, } x = \frac{90}{9} = 10^\circ$$

$$1^{\text{st}} \text{ angle} = 4x$$

$$= 4 \times 10$$

$$= 40^\circ \text{ (Ans)}$$

$$2^{\text{nd}} \text{ angle} = 5x$$

$$= 5 \times 10$$

$$= 50^\circ \text{ (Ans)}$$

11. Let the common ratio be x .

ATP,

$$1x + 17x = 180^\circ$$

$$18x = 180^\circ$$

$$x = \frac{180}{18} = 10^\circ$$

$$1^{\text{st}} \text{ angle} = 1x$$

$$= 10^\circ \text{ (Ans)}$$

$$2^{\text{nd}} \text{ angle} = 17x$$

$$= 17 (10)$$

$$= 170^\circ \text{ (Ans)}$$

Exercise 11.2

1. $z = 13^\circ$ (vertically opp. angle).

$$\angle x = 180^\circ - 130^\circ$$

$$= 50^\circ \text{ (Linear pair)}$$

$$\angle y = \angle x = 50^\circ \text{ (vertically opp. angle)}$$

2. $\angle a = 60^\circ$ (vertically opp angle)

$$\angle b = 180^\circ - 60 \text{ (Linear pair)}$$

$$= 120^\circ$$

$$\angle c = \angle b = 120^\circ \text{ (alternate angles).}$$

$$\angle d = \angle c = 120^\circ \text{ (vertically opp. angles)}$$

angles)

3. $\angle x = 180^\circ$ (vertically opp. angle)

$$\angle y = 180 - \angle x \text{ (co-interior angle)}$$

$$= 180 - 100$$

$$\angle y = 80^\circ$$

$$\angle z = \angle x = 100^\circ \text{ (alternate angle)}$$

$$\angle a = \angle z = 100^\circ \text{ (vertically opp. angle)}$$

$$\angle b = 180^\circ - \angle a \text{ (co-interior angle.)}$$

$$= 180 - 100$$

$$\angle b = 80^\circ$$

$$\angle c = \angle b = 80^\circ \text{ (vertically opp. angle)}$$

4. i) $\angle a = 180 - (45 + 15)$ (Linear pair)

$$= 180 - 60$$

$$\angle a = 120^\circ$$

$$45^\circ = b + 15^\circ \text{ (vertically opp. angle)}$$

$$b = 30^\circ$$

$$\angle b + \angle c = 180^\circ \text{ (Linear pair)}$$

$$30^\circ + \angle c = 180^\circ$$

$$\angle c = 180 - 30$$

$$= 50^\circ$$

ii) $\angle a = 180 - (95 + 65)$ (Linear pair)

$$= 180 - 160$$

$$\angle a = 20^\circ$$

$$\angle b = 180 - 95 \text{ (co-interior angle)}$$

$$= 105^\circ$$

$$\angle c = 95^\circ + a \text{ (corresponding angles)}$$

$$\angle c = 95 + 20$$

$$\angle c = 115^\circ$$

iii) $\angle a = 180^\circ - 85$ (co-interior angle.

$$= 95^\circ$$

$$\angle b = \angle a = 95^\circ \text{ (vertically opp. angle)}$$

$$\angle c = \angle b = 95^\circ \text{ (corresponding angles)}$$

5. i) $\angle x = 180 - (30 + 110^\circ)$ Linear pair

$$= 180 - 140$$

$$\angle x = 40^\circ$$

$$\angle y = 180 - 110^\circ \text{ (Linear pair)}$$

$$\angle y = 70^\circ$$

$$\angle p = 110^\circ \text{ (corresponding angles)}$$

$$\angle q = \angle p \text{ (vertically opp. angle)}$$

$$\angle q = 110^\circ$$

$$\angle r = \angle y \text{ (corresponding angle)}$$

$$\angle r = 70^\circ$$

$$\angle s = \angle p \text{ (corresponding angles)}$$

$$\angle s = 110^\circ$$

$$\angle t = \angle s = 110^\circ \text{ (vertically opp. angle)}$$

$$\angle z = \angle y = 110^\circ \text{ (corresponding angle)}$$

ii) $\angle p = 180 - 91^\circ \text{ (Linear pair)}$

$$= 89^\circ$$

$$\angle r = p = 89^\circ \text{ (alternate angle)}$$

$$\angle q = 90^\circ \text{ (vertically opp. angle)}$$

$$\angle s = \angle r = 89^\circ \text{ (vertically opp. angle)}$$

iii) $\angle a = 80^\circ \text{ (corresponding angle)}$

$$\angle b = \angle a = 80^\circ \text{ (vertically opp. angle)}$$

$$\angle c = 180^\circ - 80^\circ \text{ (Linear pair)}$$

$$\angle c = 100^\circ$$

$$\angle d = \angle b = 80^\circ \text{ (corresponding angle)}$$

6. i) The lines are parallel because $70^\circ = 70^\circ$ (corresponding angles,

ii) The lines are not parallel because corresponding angles are not equal.

iii) The lines are parallel because co-interior angles ($130^\circ + 50^\circ$) is equal to 180° .

Self Assessment 11

1. i) Complement of $60^\circ = 90^\circ - 60^\circ$

$$= 30^\circ \text{ (Ans)}$$

ii) Complement of $18^\circ = 90^\circ - 18^\circ$

$$= 72^\circ \text{ (Ans)}$$

iii) Complement of $10^\circ = 90^\circ - 10^\circ$

$$= 80^\circ \text{ (Ans)}$$

iv) Complement of $78^\circ = 90^\circ - 78^\circ$

$$= 12^\circ \text{ (Ans)}$$

2. i) Supplement of $105^\circ = 180 - 105$

$$= 75^\circ \text{ (Ans)}$$

ii) Supplement of $170^\circ = 180^\circ - 170^\circ$

$$= 10^\circ \text{ (Ans)}$$

iii) Supplement of $90^\circ = 180^\circ - 50^\circ$

$$= 130^\circ \text{ (Ans)}$$

iv) Supplement of $90^\circ = 180^\circ - 90^\circ$

$$= 90^\circ$$

3. i) $\angle a = 180^\circ - 100^\circ \text{ (linear pair)}$

$$\angle a = 80^\circ$$

$$\angle b = 100^\circ \text{ (vertically opp. angle)}$$

$$\angle c = a = 80^\circ \text{ (corresponding angle)}$$

$$\angle d = c = 80^\circ \text{ (vertically opp. angle)}$$

ii) $\angle x = 180^\circ - 70^\circ \text{ (Linear pair)}$

$$\angle x = 110^\circ$$

$$\angle y = 70^\circ \text{ (vertically opp. angle)}$$

4. i) $2x + 10 = 3x - 70$ (Since the 2 angles are vertically opp they should be equal)

$$\text{or, } 10 + 70 = 3x - 2x$$

$$\text{or, } 80 = x \text{ Ans.}$$

5. Let common ratio be 3 : 2

$$\text{ATP } 3x + 2x = 180^\circ \text{ (co-interior angle)}$$

$$\text{or, } 5x = 180^\circ$$

$$\text{or, } x = \frac{180}{5}$$

$$= 36^\circ$$

$$1^{\text{st}} \text{ angle} = 3x$$

$$= 3 \times 36$$

$$= 108^\circ \text{ (Ans)}$$

$$2^{\text{nd}} \text{ angle} = 2x$$

$$= 2 \times 36$$

$$= 72^\circ \text{ (Ans)}$$

6. Complement of $35^\circ = 90 - 35$
 $= 55^\circ$

Ans: option (c)

7. Vertically opp. angles are equal

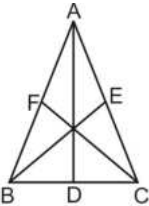
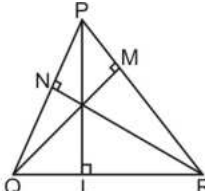
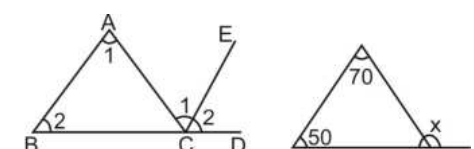
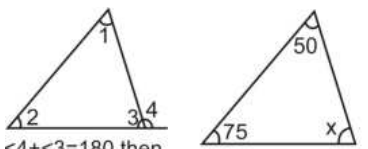
Ans: option (a)

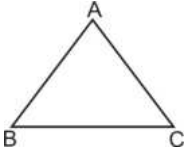
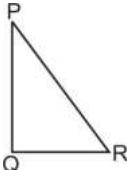
8. **Ans:** option (c) 53°

9. **Ans:** option (b) obtuse angle

10. **Ans:** option (a) common vertex and common arm.

Chapter-12 Triangles and its properties

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Medians and altitudes	Understand that median is join of vertex to the midpoint of opposite side and altitude is the perpendicular from the vertex to line containing opposite side	Explain the concepts with the use of diagrams.  AD, BE and CF are the medians and they intersect at a point  PL, QM and RN are altitudes Explain the medians and altitudes in the case of acute angles, right and obtuse angled triangles.	Does the median based the opposite side?
Exterior angles of a triangle	Able to identify the exterior angle and its interior opposite angles. Understand that an exterior angle is the sum of interior opposite angles.	Demonstrate the exterior angle property by drawing the figure on the black board  AB//CE then $\angle ACD = \angle 1 + \angle 2$ $x = 70 + 50 = 120$	Find the value of x.
Angle sum property of a triangle	Understand that the sum of the three angles of a triangle is 180°	Show the angle sum property by using exterior angle property.  $\angle 4 + \angle 3 = 180$ then $\angle 1 + \angle 2 + \angle 3 = 180$ $x = 180 - (75 + 50) = 55$	If two angles of a triangle are 50° and 40° , the 3 rd angle is?

Sum of the lengths of two sides of a triangles	To understand the necessary and sufficient conditions of three lengths to be the three sides of a triangle.	Verify the conditions in different cases and make the children understand that if the sum of any two sides is greater than the third side, then only the triangle will exist.  $AB + AC > BC$ $AC + BC > AB$ $AB + BC > AC$ Also every side will be more the difference between the other two sides. Explain with different example.	If you take measures of 4cm, 5 cm and 8 cm, is it possible to form triangles.
Pythagorean property	To understand the Pythagoras theorem in a right triangle and its application.	Explain a right angled triangle and statement of Pythagoras theorem.  $(Hyp)^2 = (per)^2 + (base)^2$ $PR^2 = PQ^2 + QR^2$ Use the property in different problems to find the third side if two sides are given in a right angled triangle.	Find the missing number in the Pythagorean triplet 8, ..., 17

Exercise 12.1

Teke all answers from the back.

Exercise 12.2

1. i) $x = \frac{180^\circ}{3}$

= 60° (Ans)

ii) $x = 180 - (55 + 45^\circ)$ [sum of all angles of a triangle is 180°]

= $180 - 100$

= 80° (Ans)

iii) $x + x + 90 = 180^\circ$

$$\text{or, } 2x = 180 - 90$$

$$\text{or, } 2x = 90^\circ$$

$$\text{or } x = 45^\circ \text{ (Ans)}$$

$$\begin{aligned} \text{iv) } x &= 180^\circ - 150^\circ \\ &= 30^\circ \text{ (Ans)} \end{aligned}$$

$$2. \quad \text{i) } x + 70^\circ = 120^\circ \text{ (Exterior angle is equal to sum of two interior opp. angles)}$$

$$\begin{aligned} \text{or, } x &= 120 - 70^\circ \\ &= 50^\circ \text{ (Ans)} \end{aligned}$$

$$\text{ii) } x + x + 60^\circ = 180^\circ \text{ (sum of angles of a triangle is } 180^\circ)$$

$$\text{or, } 5x = 125^\circ$$

$$\text{or, } x = \frac{125}{5}$$

$$= 25^\circ \text{ (Ans)}$$

$$\text{iii) } x + x + 60^\circ = 180^\circ \text{ (Sum of angles of a triangle is } 180^\circ)$$

$$\text{or, } 2x + 60^\circ = 180^\circ$$

$$\text{or, } 2x = 180 - 60^\circ$$

$$\text{or, } 2x = 120^\circ$$

$$\text{or, } x = \frac{120}{2}$$

$$x = 60^\circ \text{ Ans}$$

$$3. \quad \text{i) } 2x + 40^\circ + 70^\circ = 180^\circ \text{ (Sum of angles of a triangle is } 180^\circ)$$

$$\text{or, } 2x + 110^\circ = 180^\circ$$

$$\text{or, } 2x = 180 - 110^\circ$$

$$2x = 70^\circ$$

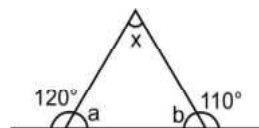
$$x = 35^\circ \text{ (Ans)}$$

$$\begin{aligned} \text{ii) } \angle a &= 180^\circ - 120^\circ \\ &= 60^\circ \end{aligned}$$

$$\angle b = 180^\circ - 110^\circ$$

$$= 70^\circ$$

$$\angle x = 180^\circ - (60 + 70)$$



$$= 180 - 130^\circ$$

$$= 50^\circ \text{ (Ans)}$$

$$\text{iii) } \angle a = 100^\circ \text{ (vertically opp. angle)}$$

$$\angle a + \angle b + \angle b = 180^\circ$$

$$100 + 2b = 180^\circ$$

$$2b = 80^\circ$$

$$b = 40^\circ \text{ (Ans)}$$

$$4. \quad \text{Let the 2 equal angles be } x.$$

ATP,

$$x + x + 80^\circ = 180$$

$$\text{or, } 2x = 180 - 80$$

$$2x = 100$$

$$x = 50^\circ$$

It is an acute angled triangle.

$$5. \quad \text{Let the common ratio be } x.$$

$$\text{ATP, } 4x + 2x + 3x = 180^\circ$$

$$\text{or, } 9x = 180$$

$$x = 20^\circ$$

$$1^{\text{st}} \text{ angle} = 4x$$

$$= 4 \times 20$$

$$= 80^\circ$$

$$2^{\text{nd}} \text{ angle} = 2x$$

$$= 2 \times 20$$

$$= 40^\circ$$

$$3^{\text{rd}} \text{ angle} = 3x$$

$$= 3 \times 20$$

$$= 60^\circ$$

$$6. \quad 115^\circ = (50 + x)$$

$$x = 115 - 50$$

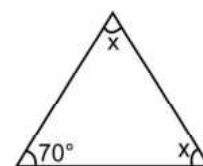
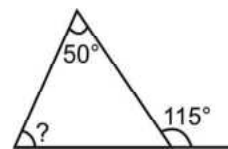
$$= 65^\circ \text{ (Ans)}$$

$$7. \quad x + x + 70^\circ = 180^\circ$$

$$2x = 180 - 70$$

$$2x = 110$$

$$x = 55^\circ \text{ (Ans).}$$



$$8. \quad 9x + 5x + 40 = 180^\circ$$

or, $14x = 180 - 40$

or, $14x = 140^\circ$

$$\text{or, } x = \frac{140}{14} = 10^\circ$$

$$1^{\text{st}} \text{ angle} = 9x$$

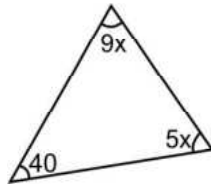
$$= 9 \times 10$$

$$= 90^\circ$$

$$2^{\text{nd}} \text{ angle} = 5x$$

$$= 5 \times 10$$

$$= 50^\circ$$



Exercise 12.3

1. i) 45°
- ii) 60°
- iii) one

$$2. \quad i) \quad \frac{180 - 40^\circ}{2} = \frac{140}{2}$$

$$= 70^\circ \text{ (Ans)}$$

- ii) Let base angles be ' a '.

$$\angle a = 180 - 110^\circ$$

$$= 70^\circ$$

$$70 + 70 = x = 180^\circ \text{ (Sum of angles is } 180^\circ)$$

or, $140 + x = 180^\circ$

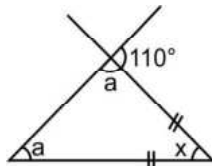
$$x = 40^\circ$$

- iii) both base angles of the triangle = 65°

$$\therefore 65 + 65 + x = 180$$

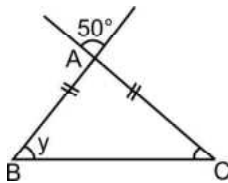
or, $x = 180 - 130$

$$= 50^\circ \text{ (Ans)}$$



3. i) $\angle c = y$ (base angles of an isosceles triangle)

$$\angle BAC = 50^\circ \text{ (vertically opp. angle)}$$



$$\therefore \angle y + \angle y + 50^\circ = 180^\circ \text{ (Sum of angles of a triangle)}$$

$$2y = 180 - 50$$

or, $2y = 130^\circ$

or, $y = 65^\circ$

- ii) $y = 45^\circ$ (alternate angles)

The base angle will also be 45° be 45°
(Since isosceles triangles.)

$$\therefore y + y + x = 180^\circ$$

or, $45 + 45 + x = 180^\circ$

$$x = 90^\circ$$

- iii) $\angle x = 45^\circ$ (base angle of an isosceles triangle)

$\angle y = 45^\circ + x$ (ext. angle = sum of 2 interior opp. angle)

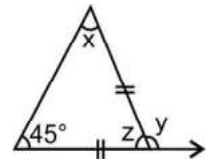
$$= 45 + 45$$

$$\angle y = 90^\circ \text{ (Ans)}$$

$$\angle z = 180 - y \text{ (Linear pair)}$$

$$= 180 - 90$$

$$\angle z = 90^\circ \text{ (Ans)}$$



4. i) $a = 180 - 105$

$$a = 75^\circ$$

- $$\therefore y = a \text{ (Base angles of an isosceles triangle)}$$

$$y = 75^\circ$$

$$\angle x = 180 - (75 + 75) \text{ (Sum of angles of a triangle)}$$

$$= 180 - 150$$

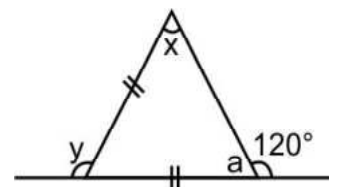
$$x = 30^\circ$$

- ii) $a = x$ (base angles of an isosceles triangle)

$$a = 180 - 120^\circ$$

$$= 60^\circ$$

$$\therefore x = 60^\circ$$

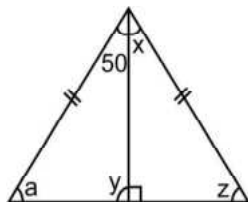


$y = x + a$ (exterior angle is equal to sum of interior opp angle)

$$= 60 + 60$$

$$y = 120^\circ$$

- iii) $a = 2$ (base angles of an isosceles triangle)



5. Let the common ratio be x

$$\text{Vertical angle} = 6x$$

$$\text{Base angle} = 7x$$

$$\therefore 6x + 7x + 7x = 180^\circ$$

$$\text{or, } 20x = 180^\circ$$

$$\text{or, } x = 9^\circ$$

$$\text{Vertical angle} = 6x$$

$$= 6 \times 9$$

$$= 54^\circ$$

$$\text{Base angles} = 7x$$

$$= 7 \times 9$$

$$= 63^\circ$$

6. Let the vertical angle be x

$$\text{base angle} = 2x$$

$$\therefore x + 2x + 2x = 180^\circ$$

$$\text{or, } 5x = 180^\circ$$

$$\text{or, } x = \frac{180}{5}$$

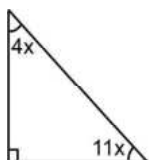
$$x = 36^\circ$$

$$\text{Vertical angle} = 36^\circ \text{ Base angles} = 72^\circ$$

7. $4x + 11x + 90 = 180^\circ$

$$15x = 90$$

$$x = \frac{90}{15}$$



$$= 6$$

$$1^{\text{st}} \text{ angle} = 4x$$

$$= 4 \times 6$$

$$= 24^\circ$$

$$2^{\text{nd}} \text{ angle} = 11x$$

$$= 11 \times 6$$

$$= 66^\circ$$

8. Let the common ratio be x .

$$\text{ATP, } 2x + 3x + 4x = 180^\circ$$

$$\text{or, } 9x = 180$$

$$\text{or, } x = \frac{180}{9} = 20^\circ$$

$$1^{\text{st}} \text{ angle} = 2x = 2 \times 20 = 40^\circ$$

$$2^{\text{nd}} \text{ angle} = 3x = 3 \times 20 = 60^\circ$$

$$3^{\text{rd}} \text{ angle} = 4x = 4 \times 20 = 80^\circ$$

Exercise 12.4

1. i) 4.5, 3.5, 6.4

$$4.5 + 3.5 > 6.4 \text{ true}$$

$$3.5 + 6.4 > 4.5 \text{ true}$$

$$4.5 + 6.4 > 3.5 \text{ true}$$

Since, the sum of two sides is greater than the third side, those can be the sides of a triangle.

- ii) 2.5, 3.5cm, 6.0cm

$$2.5 + 3.5 > 6.0 \text{ (false)}$$

$$3.5 + 6.0 > 2.5 \text{ true}$$

$$2.5 + 6.0 > 3.5 \text{ true}$$

Since, the sum of one pair of sides is not greater than the third side, these cannot be the sides of a triangle.

- iii) 2.5cm, 4.2cm, 8cm

$$2.5 + 4.2 > 8 \text{ false}$$

$$4.2 + 8 > 2.5 \text{ true}$$

$$2.5 + 8 > 4.2 \text{ true}$$

These cannot be the sides of a triangle

iv) 8cm, 2cm, 5cm.

$$8 + 2 > 5 \text{ true}$$

$$2 + 5 > 8 \text{ true}$$

$$8 + 5 > 2 \text{ true}$$

These can be the sides of a triangle.

2. i) According to Pythagoras theorem ,

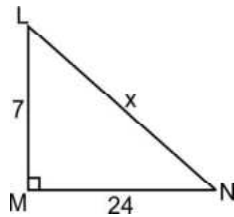
$$x^2 = 24^2 + 7^2$$

$$x^2 = 576 + 49$$

$$x^2 = 625$$

$$x = \sqrt{625}$$

$$= 25 \text{ Ans}$$



ii) According to Pythagoras theorem

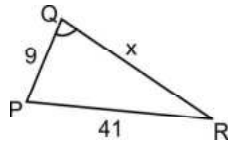
$$41^2 = 9^2 + x^2$$

$$\text{or, } 41^2 - 9^2 = x^2$$

$$\text{or, } 1681 - 81 = x^2$$

$$\text{or, } 1600 = x^2$$

$$\text{or } x = \sqrt{1600} = 40 \text{ (Ans)}$$



iii) According to pythagoras theorem,

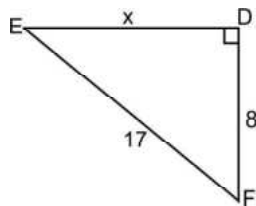
$$17^2 = x^2 + 8^2$$

$$\text{or, } 17^2 - 8^2 = x^2$$

$$\text{or, } 289 - 64 = x^2$$

$$\text{or, } x^2 = 225$$

$$x = \sqrt{225} = 15 \text{ (Ans)}$$



3. $h^2 = b^2 + P^2$.

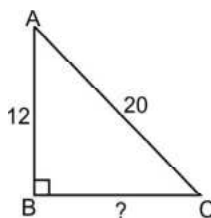
$$\text{or, } 20^2 = BC^2 + 12^2$$

$$\text{or, } 20^2 - 12^2 = BC^2$$

$$\text{or, } 400 - 144 = BC^2$$

$$\text{or, } 256 = BC^2$$

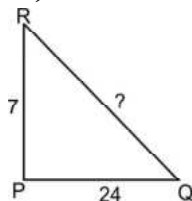
$$\text{or, } BC = \sqrt{256} = 16\text{cm (Ans)}$$



4. $h^2 = b^2 + P^2$

$$\text{or, } QR^2 = 24^2 + 7^2$$

$$\text{or, } QR^2 = 576 + 49$$



$$= 625$$

$$QR = \sqrt{625} = 25\text{cm}$$

5. $h^2 = b^2 + P^2$

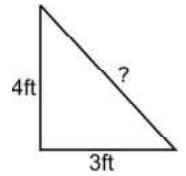
$$\text{or, } h^2 = 3^2 + 4^2$$

$$= 9 + 16$$

$$h^2 = 25$$

$$h = \sqrt{25} = 5\text{ft.}$$

The light is 5ftd from the shadow's head.



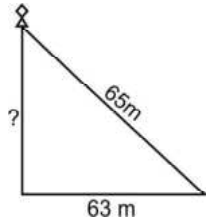
6. $h^2 = b^2 + P^2$

$$\text{or, } 65^2 = 63^2 + P^2$$

$$\text{or, } 65^2 - 63^2 = P^2$$

$$\text{or, } 4225 - 3969 = P^2$$

$$\text{or, } P = \sqrt{256} = 16 \text{ (Ans)}$$



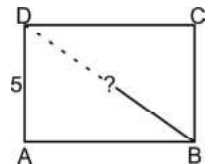
7. $DB^2 = AB^2 + AD^2$

$$DB^2 = 15^2 + 5^2$$

$$DB^2 = 225 + 25$$

$$DB = \sqrt{250}$$

$$DB = 5\sqrt{10} \text{ cm. (Ans)}$$



8. i) $8^2 = 6^2 + 7^2$

$$\text{or, } 64 = 36 + 49$$

$$\text{or, } 64 \neq 85$$

$\therefore$ the triangle is not a right angled triangle

ii) $5^2 = 3^2 + 4^2$

$$25 = 9 + 16$$

$$25 = 25$$

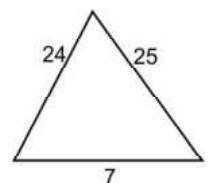
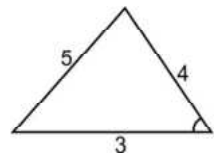
$\therefore$ The triangle is possible

iii) $25^2 = 24^2 - 7^2$

$$= 576 - 49$$

$$625 \neq 527.$$

$\therefore$ Triangle is not possible.



9. In $\triangle ADC$.

$$AC^2 = 5^2 + 12^2$$

$$= 25 + 144$$

$$= 169$$

$$AC = \sqrt{169} = 13$$

In $\triangle BCD$.

$$BD^2 = BC^2 + DC^2$$

$$= 5^2 + 12^2$$

$$= 169$$

$$BD = 13\text{cm}$$

$\therefore AC = DC$ (Both diagonals are equal)
(proved)

Self Assessment-12

1. i) $110^\circ, 100^\circ, 30^\circ$

$$110 + 100 + 30 \neq 180^\circ$$

$\therefore$ triangle is not possible

ii) $60 + 50 + 70 = 180^\circ$

$\therefore$ triangle is possible

iii) 3cm, 4cm, 11cm

$$3 + 4 > 11 \text{ false}$$

$$4 + 11 > 3 \text{ true}$$

$$3 + 11 > 4 \text{ true}$$

triangle is not possible

iv) 4cm, 5cm, 8cm

$$4 + 5 > 8 \text{ true}$$

$$5 + 8 > 4 \text{ true}$$

$$4 + 8 > 5 \text{ true}$$

$\therefore$ triangle is possible

2. i)

ii)

lake answers from the back

v)

3. i) $x + x + 90 = 180^\circ$

$$\text{or, } 2x + 90 = 180$$

$$\text{or } 2x = 180 - 90$$

$$2x = 90^\circ$$

$$x = \frac{90}{2} = 45^\circ$$

ii) $x = 180 - (110 + 30)$

$$= 180 - 140$$

$$x = 40^\circ \text{ (Ans)}$$

$$y = 180 - 30$$

$$y = 150^\circ \text{ (Ans)}$$

4. $5x + 3x + 1x = 180$

$$\text{or, } 9x = 180$$

$$x = \frac{180}{9}$$

$$x = 20^\circ$$

$$1^{\text{st}} \text{ angle} = 5 \times 20 = 100^\circ \text{ (Ans)}$$

$$2^{\text{nd}} \text{ angle} = 3 \times 20 = 60^\circ \text{ (Ans)}$$

$$3^{\text{rd}} \text{ angle} = 1 \times 20 = 20^\circ \text{ (Ans)}$$

5. i) $x^2 = 122 + 52$

$$= 144 + 25$$

$$x^2 = 169$$

$$x = \sqrt{169} = 13\text{cm (Ans)}$$

ii) $10^2 = x^2 + 6^2$

$$100 - 36 = x^2$$

$$64 = x^2$$

$$x = \sqrt{64} = 8\text{cm (Ans).}$$

6. $180 - (50 + 40)$

$$= 90^\circ$$

Ans: option (b)

7. obtuse angled triangle

Ans: option (a)

8. **Ans:** option (d)

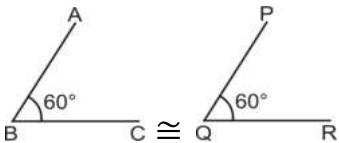
9. hypotenuse

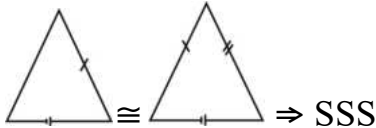
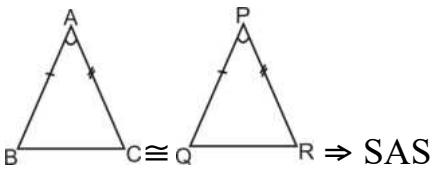
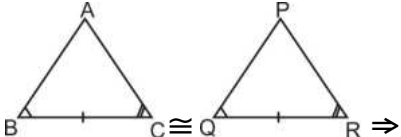
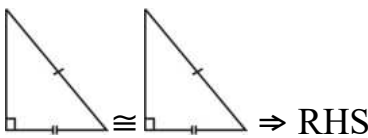
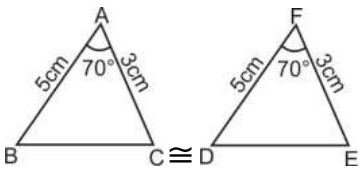
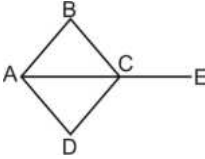
Ans: option (c)

10. 60°

Ans: option (b).

Chapter-13 Congruency of triangles

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Introduction Congruence of Plane Figures	Able to identify the figures having same size and shape. Understand the properties of plane figures having congruence.	Make the children understand to identify the figures in their surroundings having same size and same shape. Egs. Biscuits in the same packet, blades in the same packet, the circles having the same radius, equilateral triangles having the same side etc. The congruence is represented by the symbol ' $\cong$ '. 	Higher order thinking skills
Congruence of line segments, angles and triangles	Understand the conditions of congruence of two line segments, two angles and then two triangles	Explain the congruence of two line segments, two angles and two triangles. $\overline{AB} \cong \overline{CD}$ only if length of AB = length of CD $\overline{A} \quad 2\text{cm} \quad \overline{B} \cong \overline{A} \quad 2\text{cm} \quad \overline{B}$ $\angle A \cong \angle B$ only if $m\angle A = m\angle B$  Two triangles are congruent if (i) the corresponding sides are equal and (ii) the corresponding angles are equal $\Delta PQR \cong \Delta ABC$ if $PQ = AB$, $QR = BC$, $PR = AC$ and $\angle A = \angle P$, $\angle B = \angle Q$ and $\angle C = \angle R$  The corresponding parts are also called CPCT	Are the two figures congruent 

Criteria for congruence of triangles	Understand SSS congruence rule, SAS congruence rule, ASA congruence rule and RHS congruence rule.	    Make the children understand how to identify the congruence rule from the given triangles and how to name the triangles according to the correspondence.  Similarly apply the different rules in various problems.	 AE is a bisector prove $\angle B = \angle D$
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Exercise 13.1

1. i)
- ii)
- iii) Take answers from back.
- iv)

2. In $\triangle ABP$ and $\triangle ACP$

$AB = AC$ (given)

$BP = CP$ (given)

AP is common

$\therefore \triangle ABP \cong \triangle ACP$ (sss)

3. yes, the two triangles are congruent.

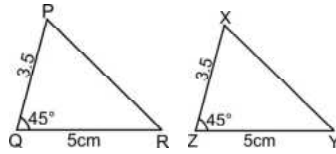
As we can see.

$$QR = 2y$$

$$PQ = xz$$

$$\angle Q = \angle z$$

$$\therefore \triangle PQR \cong \triangle xzy \text{ (S.A.S)}$$



4. In $\triangle ACB$ and $\triangle ADB$

$$\angle C = \angle D = 90^\circ \text{ (given)}$$

$$AC = BD = 2\text{cm} \text{ (given)}$$

AB is common

$$\therefore \triangle ACB \cong \triangle ADB \text{ (R.H.S)}$$

$$\therefore AD = BC \text{ (c. p.c. t)}$$

5. In $\triangle xyz$ and $\triangle xwz$

$$xy = xw \text{ (given)}$$

$$yz = wz \text{ (given)}$$

$$xz = xz \text{ (given)}$$

$$\therefore \triangle xyz \cong \triangle xwz \text{ (SAS)}$$

$$\therefore wx = yz \text{ (c.p.c.t)}$$

6. In $\triangle LMN \cong \triangle PNM$

$$LN = PM \text{ (given)}$$

$$\angle LMN = \angle PNM = 90^\circ \text{ (since LM } \perp \text{ MN and PN } \perp \text{ MN)}$$

MN is the common side

$$\therefore \triangle LMN \cong \triangle PNM \text{ (S.A.S)}$$

$$\therefore LM = PN \text{ (c.p.c.t)}$$

7. In $\triangle DEF$ and $\triangle GFE$

$$\angle EDF = \angle FGE = 90^\circ \text{ (given)}$$

$$ED = FG \text{ (given)}$$

EF is common

$$\therefore \triangle DEF \cong \triangle GFE \text{ (F.H.S)}$$

8. In $\triangle AOB \cong \triangle COD$

$$AB = CD \text{ (given)}$$

$$\angle BAO = \angle ODC \text{ (Alternate angles ABCD)}$$

$$\angle ABO = \angle OCD \text{ (Alternate angles ABCD)}$$

$$\therefore \triangle AOB \cong \triangle COD \text{ (A.S.A)}$$

9.

10. In $\triangle BEC$ and $\triangle CDB$

$$\angle BEC = \angle CDB = 90^\circ \text{ (given)}$$

BC is common.

$$BO = OC$$

$$SO \quad BO + OD = OC + OE$$

$$\therefore \triangle BEC \cong \triangle CDB$$

11. In $\triangle ADC$ and $\triangle ABC$.

$$\angle DAC = \angle BAC \text{ (AP is bisector)}$$

$$\angle DCA = \angle BCA \text{ (AP is bisector)}$$

AC is common.

$$\therefore \triangle BAC \cong \triangle DAC \text{ (A.S.A)}$$

$$\therefore CD = CB \text{ (c.p.c.t)}$$

Self Assessment-13

$$1. \angle P = x \quad PQ = xy.$$

$$\angle Q = y \quad QR = yz.$$

$$\angle R = z \quad PR = xz$$

$$2. \angle ABC = \angle LNM \text{ (given)}$$

$$AB = LN \text{ (given)}$$

$$BC = NM \text{ (given)}$$

$$\therefore \triangle ABC \cong \triangle LMN$$

3. In $\triangle ADC$ and $\triangle ADB$.

$$\angle ADC = \angle ADB$$

AD is common.

$$AC = AB \text{ (given)}$$

$$\therefore \triangle ADC \cong \triangle ADB \text{ (S.S.A)}$$

$$\therefore CD = DB \text{ (c.p.c.t)}$$

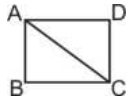
Chapter-15 Symmetry

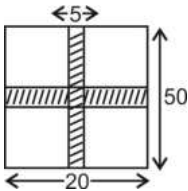
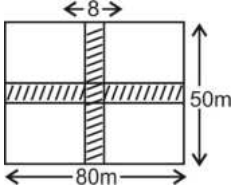
Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
• Concept of symmetry, • Symmetrical figures, figures with one more line symmetry and than one line of symmetry • Symmetry of figures like triangle, square, parallogen rectangle etc. • Symmetry of Letters of English alphabet. • Concept of vertical and horizontal line of symmetry	The students will be clear with the concept of symmetry. They will be able to identify the lines of symmetry of various figures and letters of English alphabet.	Activity of symmetrical figures formation using cut out from double fold can be done. Show the students different cut outs of symmetrical figures and fold them to show the line of symmetry.	 The above figure has how many line of symmetry? Horizontal/Vertical line of symmetry?
• Rotational symmetry and order of rotational symmetry.	The students will be able to identify wtr/her figure for rotational symmetry and order of rotational symmetry	Use cut outs of figures have rotational symmetry and explain the children about order of rotational symmetry Eg.  Explain that since H was rotated 2 times to bring it to original form the order is 2.	What is the order of rotational symmetry of scalene triangle.

Chapter-16 Visualising solid shapes

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
1D, 2D and 3D shapes concept of faces, edges, vertices of 3D-figures like cube, cuboid, cone, prism, pyramid, sphere, cylinder etc.	The students will be able to develop conceptual clarity of 3-D shapes and will be able to identify faces, edges and vertices	Show videos on different 3-D figures showing different faces, vertices and edges of 3D figures. Discuss with the class about how many edges does various figures have. Discuss about flat edge and curved edges also.	How many flat and curved edges does a cylinder has.
Different views of a 3-D figure front, top and side view.	The students will be able to visualize solid shapes from three views.	Take a loaf of bread and cut the bread and show the children and ask them to identify the different shapes at different views.	Draw the front view of the figure given below 
Representation of 3D shapes on paper. (oblique sketch and Isometric sketch) Nets of solid figures	The students will be able to draw 3D figure on paper. They will be able to draw nets of various solid figures	Make the students draw a cube using isometric sketch. Using a thin cardboard ask the students to cut out a net of a cuboid and join the edges to form a cuboid (3-D)	

Chapter-17

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Perimeter and Area of squares and Rectangles	Students will be able to find the perimeter and area of square and rectangle and their application	Recollect the formulae from the children. Ask the student to measure the dimensions of the class blackboard and calculate the area and perimeter of the blackboard	What will be the cost of paunting the blackboard (measurement to be done by students) of your classroom @ ₹ 5.25 per sq.m.
Area of a parallelogram and area of a triangle.	The students will be able to calculate the area of parallelogram and triangle.	Explain to the students the base and corresponding height of a parallelogram. Suns from exercise to be done.	Prove that the area of a triangle A, B is equal to $\frac{1}{2}$ the area of the parallelogram 
Circles—circumference and area of circles.	Students will be able to understand the concept of π and be able to calculate area and circumference of a circle and its applications.	Use different coins (with different radii) and ask the students to measure the circumference of coin (using thread) and also measure the diameter. Calculate the circumference using the formula also and compare. It can also be observed that $\frac{c_1}{d_1} = \frac{c_2}{d_2} = \frac{c_3}{d_3} = 3.14$ or $\frac{22}{7}$ approximately and is denoted by π (pie) $\therefore \frac{c}{d} = \pi$ or, $c = \pi d$ or $c = 2\pi r$ ($\because d = 2r$)	Calculate the area of a ₹ 10 coin.

Applications of area and perimeter of plane figures	Students will be able to apply the concept of area and perimeter in real life situations. They will also be able to calculate the area and perimeter of combined figures.	Demonstrate some sums of combined figures (like crossed path) and explain to calculate the area of the path  The shaded path is 2 crossroads passing through the center of the field. Help students to calculate its area. Area of the path = area of horizontal road + area of vertical road – area of common squares $= 20 \times 5 + 50 \times 5 - 5 \times 5$ $= 100 + 250 - 25$ $= 350 - 25$ $= 325 \text{ unit sq.}$	Calculate the cost of paving the cross path of width 8 m running parallel in the centre of a rectangular field $80\text{m} \times 50\text{m}$. 
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Exercise 17.1

1. i) Side = 6.5 cm
Perimeter = 4×6.5 Area = 6.5×6.5
= 26 cm (Ans) = 42.25 cm² (Ans)
- ii) Perimeter = 28 cm
Side = $\frac{\text{perimeter}}{4}$ Area = side $\times$ side
$$= \frac{28}{4} = 49 \text{ cm}^2 \text{ (Ans)}$$

side = 7 cm (Ans)
- iii) Side = 2.9 cm
Perimeter = 4×2.3 Area = 2.3×2.3
= 9.2 cm = 5.29 cm²
- vi) Area = 252 Perimeter = 4×5

$$\text{Side} = \sqrt{25} = 20\text{cm}$$

$$= 5 \text{ cm}$$

2. i) Length = 30, Breadth = 24cm
Perimeter = $2(l + b)$ Area = $l \times b$
$$= 2(30 + 24) = 30 \times 24$$

$$= 2(54) = 720$$

$$= 108 \text{ cm}$$

- ii) Length = 46 cm, Perimeter = 120 cm

$$\text{breadth} = \frac{\text{perimeter}}{2} - l \quad \text{Area} = l \times b$$

$$= \frac{120}{2} - 46 = 46 \times 14$$

$$= 60 - 46 =$$

$$= 14 \text{ cm}$$

iii) breadth = 9 cm , Area = 144 cm²

$$\text{length} = \frac{\text{Area}}{\text{breadth}}$$

$$= \frac{144}{9}$$

$$= 16 \text{ cm}$$

$$\text{perimeter} = 2 (16 + 9)$$

$$= 2 \times 25$$

$$= 50 \text{ cm.}$$

iv) Breadth = 12 cm , Perimeter = 64 cm

$$\text{Length} = \frac{\text{perimeter}}{2} - \text{breadth}$$

$$\Rightarrow \frac{64}{2} - 12$$

$$\Rightarrow 32 - 12$$

$$\text{length} = 20 \text{ cm (Ans)}$$

$$\text{Area} = l \times b$$

$$= 20 \times 12$$

$$= 24 \text{ cm}^2 \text{ (Ans)}$$

3. Area of rectangular plot = 1040 m²

$$\text{Length} = 40 \text{ m}$$

$$\text{Breadth} = \frac{\text{Area}}{\text{length}}$$

$$= \frac{1040}{40}$$

$$= 26 \text{ m}$$

$$\text{perimeter} = 2 (l + b)$$

$$= 2 (40 + 26)$$

$$= 2 (66)$$

$$= 132 \text{ m}$$

4. perimeter of rectangle = perimeter of square

$$\Rightarrow 2 (38 + 20) = 4 \times \text{side.}$$

$$\Rightarrow \text{side} = \frac{2 \times 58}{4}$$

$$= 29 \text{ cm.}$$

The square has side 29 cm.

$$\text{Area of rectangle} = 38 \times 20 = 760 \text{ cm}^2$$

$$\text{Area of square} = 29 \times 29$$

$$= 841 \text{ cm}^2$$

$\therefore$ Square occupies more area.

5. Area of door = 1.4m $\times$ 3m

$$\text{Total painting} = 4.2 \times 4 \times 6$$

$$= 100.80$$

$\therefore$ Chitra pays ₹100.80.

7. Distance travelled = 2 $\times$ perimeter

$$= 2 \times (50 \times 4)$$

$$= 1200 \text{ m}$$

$$\text{Time} = \frac{\text{Dist}}{\text{speed}}$$

$$= \frac{1200}{7.5}$$

$$= 160 \text{ min.}$$

8. Cost of tarring = perimeter $\times$ rate

$$= 2 (12.5 + 10) \times 2.75$$

$$= 45 \times 2.75$$

$$= ₹123.75$$

9. Cost of ploughing = area $\times$ rate

$$= (1.8 \times 1.8) \times 82.50$$

$$= 3.24 \times 82.50$$

$$= ₹267.30$$

10. Distance covered = perimeter of square

$$6 \text{ cm} = 4 \times \text{side}$$

$$\text{side} = \frac{6}{4} = 1.5 \text{ cm (Ans)}$$

11. length = 40 m

ATP

i) $\text{Cost} = \text{Rate} \times \text{Area}$

$$8320 = 8 \times l \times b$$

or, $\frac{8320}{8 \times 40} = b$

or, $b = 26 \text{ m}$ **Ans i)**

ii) $\text{Cost of fencing} = \text{rate} \times \text{perimeter}$

$$= 17.5 \times 2 (40 + 26)$$

$$= 17.2 \times 132$$

$$= ₹2310$$

12. perneta = 100 m

$$\text{side} = \frac{100}{4} = 25 \text{ m.}$$

$$\text{Cost of laying grass} = \text{Rate} \times \text{Area}$$

$$= 3.8 \times (25 \times 25)$$

$$= ₹2375$$

13. Length of outer rectangular

$$= 10.5 + 1.25 + 1.25$$

$$= 13x$$

preadth of outer rectangular

$$= 5 + 1.25 + 1.25$$

$$= 7.50 \text{ m}$$

Area of path = Area of outer rectangle – Area of rectangle

$$= (13 \times 7.50) - (10.5 \times 5)$$

$$= 97.5 - 52.5$$

$$= 45 \text{ m}^2$$

$$\text{Area of the path} = 45 \text{ m}^2$$

$$\text{Cost of leveling} = 45 \times 100$$

$$= ₹4500$$

Exercise 17.2

1. i) $\text{Area} = \text{base} \times \text{heights}$ $\text{Area} = 208 \text{ cm}^2$,
height = 60 cm.

$$\therefore \text{Base} = \frac{\text{Area}}{\text{height}}$$

$$= \frac{208}{60}$$

$$= 3.46$$

ii) $\text{Area} = 150 \text{ cm}^2$, base = 15 cm.

$$\text{height} = \frac{\text{Area}}{\text{base}}$$

$$= \frac{150}{15}$$

$$= 10 \text{ cm (Ans).}$$

iii) height = 51 cm, Base = 38 cm

$$= 38 \times 51$$

$$= 1938 \text{ cm}^2 \text{ (Ans)}$$

iv) $\text{Area} = \frac{1}{2} \times b \times h$

$$= \frac{1}{2} \times 18 \times 26$$

$$= 234 \text{ cm}^2 \text{ (Ans)}$$

v) $110 = \frac{1}{2} \times 11 \times b$

or $\frac{220}{22} = b$

$$b = 10 \text{ cm. (Ans)}$$

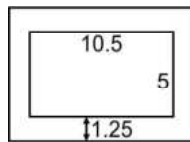
2. i) $\text{Area of shaded region} = \text{Area of } 11 \text{ lgm} - \text{Area triangle}$

$$= b \times h - \frac{1}{2} (b \times h)$$

$$= 30 \times 10 - \frac{1}{2} \times 4 \times 10$$

$$= 300 - 20$$

$$= 280 \text{ cm}^2$$



- ii) Area of shaded region = Area of sq. – area of triangle

$$= 8 \times 8 - \frac{1}{2} \times 8 \times 8$$

$$= 64 - 32$$

$$= 32 \text{ cm}^2$$

- iii) Area of shaded region = Area of rectangle

$$= (25 + 13) \times 10 - \frac{1}{2} \times 13 \times 10$$

$$= 380 - 65$$

$$= 315 \text{ cm}^2$$

- iv) Area of shaded region = Area of rect – (Area of sq + Area of triangle)

$$= 45 \times 30 - \left(7 \times 7 + \frac{1}{2} \times 4 \times 5 \right)$$

$$= 1350 - (49 + 10)$$

$$= 1350 - 59$$

$$= 1291 \text{ cm}^2$$

3. i) Area of 11 Lgm = $b_1 \times h_1 = b_2 \times h_2$

$$\therefore 24 \times 12 = 16 \times h_2$$

$$\text{or } \frac{24 \times 12}{16} = h_2$$

$$\text{or, } h_2 = 18 \text{ cm.}$$

$$\text{ii) } b_1 \times h_1 = b_2 \times h_2 = \text{Area}$$

$$\text{or, } 15 \times 18 = 10 \times h_2$$

$$\text{or, } \frac{15 \times 18}{10} = h_2$$

$$\text{or } 27 = h_2 \text{ Ans.}$$

$$4. \text{ height} = \frac{\text{Area}}{\text{base}}$$

$$= \frac{8.75}{3.5}$$

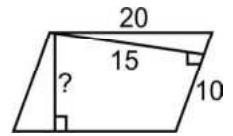
$$= 2.5 \text{ cm.}$$

$$5. b_1 \times h_1 = b_2 \times h_2$$

$$\text{or, } 10 \times 15 = 20 \times x$$

$$\text{or, } \frac{10 \times 15}{20} = x$$

$$\text{or, } 7.5 \text{ cm. Ans}$$



Exercise 17.3

1. i. Radius = 49 cm

$$\therefore \text{Diameter} = (49 \times 2) \text{ cm}$$

$$= 98 \text{ cm}$$

$$\text{Circumference} = \left(2 \times \frac{22}{7} \times 49 \right) \text{ cm}$$

$$= 380 \text{ cm}$$

$$\text{Area} = \left(\frac{22}{7} \times 49 \times 49 \right) \text{ cm}^2$$

$$= 7546 \text{ cm}^2$$

$$\text{Ans Diameter} = 98 \text{ cm}$$

$$\text{Circumference} = 380 \text{ cm}$$

$$\text{Area} = 7546 \text{ cm}^2$$

- ii) Diameter = 42 cm

$$\text{Radius} = \left(\frac{42}{2} \right) \text{ cm}$$

$$= 21 \text{ cm}$$

$$\text{Circumference} = \left(2 \times \frac{22}{7} \times 21 \right) \text{ cm}$$

$$= 132 \text{ cm}$$

$$\text{Ans Radius} = 21 \text{ cm}$$

$$\text{Circumference} = 132 \text{ cm}$$

$$\text{Area} = 1386 \text{ cm}^2$$

- iii) Radius = 60 cm

$$\text{Diameter} = (60 \times 2) \text{ cm}$$

$$= 120 \text{ cm}$$

$$\therefore \text{Circumference} = (2 \times 3.14 \times 60) \text{ cm}$$

$$= 376.80 \text{ cm}$$

$$\therefore \text{Area} = (3.14 \times 60 \times 60) \text{ cm}^2$$

$$= 11304 \text{ cm}^2$$

Ans Diameter = 120 cm

$$\text{Circumference} = 376.80 \text{ cm}$$

$$\text{Area} = 11304 \text{ cm}^2$$

iv) Diameter = 24 cm

$$\therefore \text{Radius} = \left(\frac{24}{2}\right) \text{ cm}$$

$$= 12 \text{ cm}$$

$$\text{Circumference} = (2 \times 3.14 \times 12) \text{ cm}$$

$$= (2 \times 37.68) \text{ cm}$$

$$= 75.36 \text{ cm}$$

$$\text{Area} = (3.14 \times 12 \times 12) \text{ cm}^2$$

$$= (37.68 \times 12) \text{ cm}^2$$

$$= 452.16 \text{ cm}^2$$

Ans Radius = 12 cm

$$\text{Circumference} = 75.36 \text{ cm}$$

$$\text{Area} = 452.16 \text{ cm}^2$$

2. Radius = 56 cm

$$\text{Area of semicircle} = \left(\frac{1}{2} \times \frac{22}{7} \times 56 \times 56\right)$$

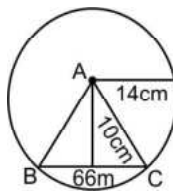
$$\text{cm}$$

$$= (88 \times 56) \text{ cm}^2$$

$$= 4928 \text{ cm}^2$$

Ans Area of Semicircle = 4928 cm²

3. i. Radius of circle = 14 cm



$$\therefore \text{Area of circle} = \left(\frac{22}{7} \times 14 \times 14\right) \text{ cm}^2$$

$$= (44 \times 14) \text{ cm}^2$$

$$= 616 \text{ cm}^2$$

In ΔABC ,

$$\text{Base} = BC = 6 \text{ cm}$$

$$\text{height} = 10 \text{ cm}$$

$$\therefore \text{Area of } \Delta ABC = \left(\frac{1}{2} \times 6 \times 10\right) \text{ cm}^2$$

$$= 30 \text{ cm}^2$$

$$\therefore \text{Area of shaded region} = (616 - 30) \text{ cm}^2$$

$$= 586 \text{ cm}^2$$

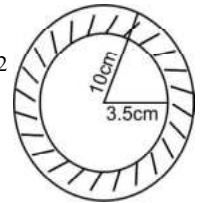
Ans Area of shaded region = 586 cm²

ii) Radius of bigger circle = 10 cm

$$\therefore \text{Area of bigger circle}$$

$$= (3.14 \times 10 \times 10) \text{ cm}^2$$

$$= 314 \text{ cm}^2$$



$$\text{Radius of smaller circle} = 3.5 \text{ cm}$$

$$\text{Area of smaller circle}$$

$$= \left(\frac{22}{7} \times 3.5 \times 3.5\right) \text{ cm}^2$$

$$= (11 \times 3.5) \text{ cm}^2$$

$$= 38.5 \text{ cm}^2$$

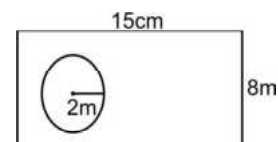
$$\text{Area of shaded region} = (314 - 38.5) \text{ cm}^2$$

$$= 275.5 \text{ cm}^2$$

Ans Area of shaded region = 275.5 cm²

iii) Length of rectangle = 15 cm

$$\text{Breadth of rectangle} = 8 \text{ cm}$$



$$= (8 \times 100) \text{ mc } [\because 1 \text{ m} = 100 \text{ cm}]$$

$$= 800 \text{ cm}$$

$$\therefore \text{Area of rectangle} = (15 \times 800) \text{ cm}^2$$

$$= 12000 \text{ cm}^2$$

Radius of circle = 2 m

$$= (2 \times 100) \text{ cm } [\because 1\text{m} = 100 \text{ cm}]$$
$$= 200 \text{ cm}$$

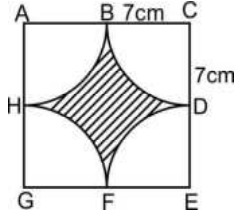
$$\therefore \text{Area circle} = (3.14 \times 200 \times 00) \text{ cm}^2$$
$$= (3.14 \times 40000) \text{ cm}^2$$
$$= 1256000 \text{ cm}^2$$

iv) Length of side of square = 7 cm

$$\therefore \text{Area of square} = (7 \times 7) \text{ cm}^2$$
$$= 49 \text{ cm}^2$$

$$AC = 7 \text{ cm}$$

$$\therefore AB = \left(\frac{7}{2}\right) \text{ cm}$$
$$= 3.5 \text{ cm}$$



$\therefore$ Area of squarter of circle =

$$\left(\frac{11}{4} \times \frac{22}{7} \times 3.5 \times 3.5\right) \text{ cm}$$

$$= \left(\frac{11 \times 3.5}{4}\right) \text{ cm}^2$$

$$= \left(\frac{38.5}{4}\right) \text{ cm}^2$$

$$= \left(\frac{38.5 \times 10}{4 \times 10}\right) \text{ cm}^2$$

$$= \frac{385}{40} \text{ cm}^2$$

$$= 9.625 \text{ cm}^2$$

$\therefore$ Area of four quarters of a circle

$$= (9.625 \times 4) \text{ cm}^2$$

$$= 38500 \text{ cm}^2$$

$$= 38.5 \text{ cm}^2$$

$\therefore$ Area of shaded region = $(49 - 38.5)$
 cm^2

$$= 10.5 \text{ cm}^2$$

Ans Area of shaded region = 10.5 cm^2

4. i) Circumference of circle = 110 cm

Q. Let radius of circle be (x) cm.

We know that,

$$\text{Cicumference} = 2 \times \frac{22}{7} \times \text{radius}$$

$$\therefore 110 = 2 \times \frac{22}{7} \times x$$

$$\Rightarrow \frac{110 \times 7}{2 \times 22} \times x$$

$$\Rightarrow \frac{35}{2} = x$$

$$\Rightarrow 17.5 = x$$

$\therefore$ Radius of circle = 17.5 cm

$$\therefore \text{Area of circle} = \left(\frac{22}{7} \times 17.5 \times 17.5\right) \text{ cm}^2$$

$$= 962.5 \text{ cm}^2$$

Ans Area fo circle = 962.5 cm^2

ii) Circumference of circle = 220 cm

Let radius of circle be (x) cm

We know that,

$$\text{Circumference} = 2 \times \frac{22}{7} \times \text{radius.}$$

$$\therefore 220 = 2 \times \frac{22}{7} \times x$$

$$\Rightarrow \frac{220 \times 7}{2 \times 22} = x$$

$$\Rightarrow 35 = x.$$

$\therefore$ Radius of circle = 35 cm

$$\therefore \text{Area of circle} = \left(\frac{22}{7} \times 35 \times 35\right) \text{ cm}^2$$

$$= 110 \times 35 \text{ cm}^2$$

$$= 3850 \text{ cm}^2$$

Ans Area of circle = 3850 cm²

iii) Circumference of circle = 8.8 cm

Let radius of circle be (x) cm

We know that,

$$\text{Circumference} = 2 \times \frac{22}{7} \times \text{radius}$$

$$\therefore 8.8 = 2 \times \frac{22}{7} \times x$$

$$\Rightarrow \frac{8.8 \times 7}{2 \times 22} = x$$

$$\Rightarrow 1.4 = x$$

$$\therefore \text{Radius} = 1.4 \text{ cm}$$

$$\therefore \text{Area of circle} = \left(\frac{22}{7} \times 1.4 \times 1.4 \right) \text{ cm}^2$$

$$= (4.4 \times 1.4) \text{ cm}^2$$

$$= 6.16 \text{ cm}^2$$

Ans Area of circle = 6.16 cm²

iv) Circumference of circle = 0.55 m

$$= (0.55 \times 100) \text{ cm}$$

$$[\because 1. \text{ m} = 100 \text{ cm}]$$

$$= 55 \text{ cm}$$

Let radius of circle be (x) cm

We know that,

$$\text{Circumference} = 2 \times \frac{22}{7} \times \text{radius.}$$

$$\therefore 55 = 2 \times \frac{22}{7} \times x$$

$$\Rightarrow \frac{55 \times 7}{2 \times 22} = x$$

$$\Rightarrow \frac{35}{4} = x$$

$$\Rightarrow 8.75 = x$$

$$\therefore \text{Radius of circle} = 8.75 \text{ cm}$$

$$\therefore \text{Area of circle} = \left(\frac{22}{7} \times 8.75 \times 8.75 \right) \text{ m}^2$$

$$= 240.625 \text{ m}^2$$

Ans Area of circle = 240.625 cm²

5. Length of were = 352 cm

$$\therefore \text{Circumference of were} = 352 \text{ cm}$$

Let radius of the circle be (x) cm

We know that,

$$\text{Circumference} = 2 \times \frac{22}{7} \times \text{radius}$$

$$\therefore 352 = 2 \times \frac{22}{7} \times x$$

$$\Rightarrow \frac{352 \times 7}{2 \times 22} = x$$

$$\Rightarrow 56 = x$$

$$\therefore \text{Radius of circle} = 56 \text{ cm}$$

$$\therefore \text{Diameter of circle} = (56 \times 2) \text{ cm} \\ = 112 \text{ cm}$$

Ans Diameter of circle = 112 cm

6. Length of rope = 1.4 m

$$\therefore \text{Radius of circular grazed plot} = 1.4 \text{ m}$$

$$\therefore \text{Area of circular grazed plot} =$$

$$\left(\frac{22}{7} \times 1.4 \times 1.4 \right) \text{ m}^2$$

$$= (4.4 \times 1.4) \text{ m}^2$$

$$= 6.16 \text{ m}^2$$

Ans Area of circular grazed field = 6.16 m²

7. Radius of garden with road = 34 m

$$\begin{aligned}\therefore \text{Area of garden with road} &= (3.14 \times 34 \\ &\times 34) \text{ m}^2 \\ &= 3629.84 \text{ m}^2\end{aligned}$$

Width of road = 7 m

$$\begin{aligned}\therefore \text{Radius of garden without road} &= (34 - \\ &7) \text{ m} \\ &= 27 \text{ m}\end{aligned}$$

$$\begin{aligned}\therefore \text{Area of garden without road} &= (3.14 \times \\ &27 \times 27) \text{ m}^2 \\ &= 2389.06 \text{ m}^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Area of road} &= (3629.84 - 2389.06) \text{ m}^2 \\ &= 1240.78 \text{ m}^2 \text{ (Ans)}\end{aligned}$$

8. Radius of circular field = 40 m

$$\begin{aligned}\therefore \text{Area of circular field} &= (3.14 \times 40 \times 40) \\ &\text{m}^2 \\ &= (125.6 \times 40) \text{ m}^2 \\ &= 5024.00 \text{ m}^2 \\ &= 5024 \text{ m}^2\end{aligned}$$

Width of parking region which is outside the field = 3 m

$$\therefore \text{Radius of circular field with parking region} = (40 + 3) \text{ m}$$

$$\begin{aligned}\therefore \text{Area of field with parking region} &= \\ &(3.14 \times 43 \times 43) \text{ m}^2 \\ &= 5805.86 \text{ m}^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Area of parking region} &= (5805.86 - \\ &5024) \text{ m}^2 \\ &= 781.86 \text{ m}^2\end{aligned}$$

Ans Area of parking region = 781.86 m²

9. Length of side of equilateral triangle = 5 cm

$$\begin{aligned}\therefore \text{perimeter of triangle} &= (5 \times 3) \text{ cm} \\ &= 15 \text{ cm}\end{aligned}$$

$$\therefore \text{Length of side} = 15 \text{ cm}$$

$$\therefore \text{Circumference of circle} = 15 \text{ cm}$$

Let the radius of circle be (x) cm

We know that,

$$\text{Circumference} = 2 \times 3.14 \times \text{radius}$$

$$\therefore 15 = 2 \times \frac{3.14}{100} \times x$$

$$\Rightarrow \frac{15 \times 100}{2 \times 3.14} = x$$

$$\Rightarrow \frac{750}{3.14} = x$$

$$\Rightarrow 2.3 = x$$

$$\therefore \text{Radius of circle} = 2.3 \text{ cm}$$

$$\begin{aligned}\therefore \text{Area of circle} &= (3.14 \times 2.3 \times 2.3) \text{ cm}^2 \\ &= 16.6106 \text{ cm}^2\end{aligned}$$

Ans Area of circle = 16.6106 cm²

Exercise 17.4

1. Circumference of circle = 88 cm

$$= \left(\frac{88}{100} \right) \text{ m [1 cm = 100)}$$

$$= 0.88 \text{ m}$$

Let radius of circle be (x) m.

We know that,

$$\text{Circumference} = 2 \times \frac{22}{7} \times \text{radius}$$

$$\therefore 0.88 = 2 \times \frac{22}{7} \times x$$

$$\Rightarrow \frac{0.88 \times 7}{2 \times 22} = x$$

$$\Rightarrow 0.14 = x$$

$$\therefore \text{Radius} = 0.14 \text{ m}$$

$$\therefore \text{Area of circle} = \left(\frac{22}{7} \times 0.14 \times 0.14 \right) \text{ m}^2$$

$$= (0.44 \times 0.14) \text{ m}^2$$

$$= 0.0616 \text{ m}^2$$

$$\text{Ans Area of circle} = 0.0616 \text{ m}^2$$

2. Length of lawn = 40 m

$$\text{Breadth of lawn} = 30 \text{ m}$$

$$\therefore \text{Area of lawn} = (30 \times 40) \text{ m}^2$$

$$= 1200 \text{ m}^2$$

$$\text{Width of flower bed} = 70 \text{ m}$$

$$= \left(\frac{77}{100} \right) \text{ m} [\because 1 \text{ m} = 100 \text{ cm}]$$

$$= 0.7 \text{ m}$$

$$\therefore \text{Length of lawn with flower bed} = \{40 + (0.7 \times 2)\} \text{ m}$$

$$= (40 + 1.4) \text{ m}$$

$$= 41.4 \text{ m}$$

$$\therefore \text{Width of lawn with flower bed} = \{30 + (0.7 \times 2)\} \text{ m}$$

$$= (30 + 1.4) \text{ m}$$

$$= 31.4 \text{ m}$$

$$\therefore \text{Area of lawn with flower bed} = (41.4 \times 31.4) \text{ m}^2$$

$$= 1299.96 \text{ m}^2$$

$$\therefore \text{Area of flower bed} = (1299.96 - 1200) \text{ m}^2$$

$$= 99.96 \text{ m}^2$$

$$\text{Ans Area of flower bed} = 99.96 \text{ m}^2$$

3. Length of side of paper = 22 cm

$$\therefore \text{Area of paper with} = (22 \times 22) \text{ cm}^2$$

$$= 484 \text{ cm}^2$$

$$\text{Width of margin inside paper} = 0.5 \text{ cm}$$

$$\therefore \text{Length of side of paper without margin} = (22 \times 2) \text{ cm}$$

$$= (22 - 1) \text{ cm}$$

$$= 21 \text{ cm}$$

$$\therefore \text{Area of paper without margin} = (21 \times$$

$$21) \text{ cm}^2$$

$$= 441 \text{ cm}^2$$

$$\therefore \text{Area of paper left for writing} = 441 \text{ cm}^2$$

$$\text{Ans Area of paper left for writing} = 441 \text{ cm}^2$$

4. Length of outer rectangle = 15 m

$$\text{Breadth of outer rectangle} = 12 \text{ m}$$

$$\therefore \text{Area of outer rectangle} = (15 \times 12) \text{ m}^2$$

$$= 180 \text{ m}^2$$

$$\text{Length of inner rectangle} = \{15 - (1.5 \times 2)\} \text{ m}$$

$$= (12 - 3) \text{ m}$$

$$= 12 \text{ m}$$

$$\text{Breadth of inner rectangle} = \{12 - (1.5 \times 2)\} \text{ m}$$

$$= (12 - 3) \text{ m}$$

$$= 9 \text{ m}$$

$$\therefore \text{Area of inner rectangle} = (12 \times 9) \text{ m}^2$$

$$= 108 \text{ m}^2$$

$$\therefore \text{Area of shaded region} = (180 - 108) \text{ m}^2$$

$$= 72 \text{ m}^2$$

$$\text{Ans Area of shaded region} = 72 \text{ m}^2$$

5. Height of door = 2.5 m

$$= (2.5 \times 100) \text{ cm} [\because 1 \text{ m} = 100 \text{ cm}]$$

$$= 150 \text{ cm}$$

$$\therefore \text{Area of door} = (250 \times 150) \text{ cm}^2$$

$$= 37500 \text{ cm}^2$$

$$\text{Width of margin} = 10 \text{ cm}$$

$$\therefore \text{Length of door without margin} = \{150 - (10 \times 2)\} \text{ cm}$$

$$= (150 - 20) \text{ cm}$$

$$= 130 \text{ cm}$$

$$\therefore \text{Height of door without margin} = \{250 - (10 \times 2)\} \text{ cm}$$

$$= (250 - 20) \text{ cm}$$

$$= 230 \text{ cm}$$

$$\therefore \text{Area of door without margin} = (130 \times 230) \text{ cm}^2$$

$$= 29900 \text{ cm}^2$$

$$\therefore \text{Area of margin} = (37500 - 29900) \text{ cm}^2$$

$$= 7600 \text{ cm}^2$$

$$\text{Rate of painting margin} = 3/\text{cm}^2$$

$$\therefore \text{Cost of painting a 10 cm wide margin}$$

$$= (7600 \times 3)$$

$$= \text{Rs. } 22800$$

$$\text{Ans Cost of painting margin} = \text{Rs. } 22800$$

$$6. \text{ Length of wall} = 10 \text{ m}$$

$$\text{Breadth of wall} = 8 \text{ m}$$

$$\therefore \text{Area of wall} = (10 \times 8) \text{ m}^2$$

$$= 80 \text{ m}^2$$

$$\text{Length of window} = 403 \text{ cm}$$

$$= \left(\frac{403}{100} \right) \text{ m} [\because 100 \text{ cm} = 1 \text{ m}]$$

$$= 4.03 \text{ m}$$

$$\text{Breadth of window} = 300 \text{ cm}$$

$$= \left(\frac{300}{100} \right) \text{ m} [\because 100 \text{ cm} = 1 \text{ m}]$$

$$= 3 \text{ m}$$

$$\therefore \text{Area of window} = (4.03 \times 3) \text{ m}^2$$

$$= 12.09 \text{ m}^2$$

$$\therefore \text{Area of wall to be whitewashed}$$

$$= (80 - 12.09) \text{ m}^2$$

$$= 67.91 \text{ m}^2$$

$$\text{Rate of whitewashing} = \text{Rs. } 0.6/\text{m}^2$$

$$\therefore \text{Cost of whitewashing} = \text{Rs. } (67.91 \times 0.6)$$

$$= \text{Rs. } 40.74$$

$$\text{Ans Cost of whitewashing} = \text{Rs. } 40.74$$

Self Assessment-17

$$1. \text{ i) Length of side of square} = 6 \text{ cm}$$

$$\therefore \text{Perimeter of square} = (4 \times 6) \text{ cm}$$

$$= 24 \text{ cm}$$

$$\therefore \text{Area of square} = (6 \times 6) \text{ cm}^2$$

$$= 36 \text{ cm}^2$$

$$\text{Ans Perimeter of square} = 24 \text{ cm}$$

$$\text{Area of square} = 36 \text{ cm}^2$$

$$\text{ii) Length of side of square} = 1.5 \text{ cm}$$

$$\therefore \text{Perimeter of square} = (1.5 \times 4) \text{ cm}$$

$$= 6 \text{ cm}$$

$$\therefore \text{Area of square} = (1.5 \times 1.5) \text{ cm}^2$$

$$= 2.25 \text{ cm}^2$$

$$\therefore \text{Ans Perimeter of square} = 6 \text{ cm}$$

$$\text{Area of square} = 2.25 \text{ cm}^2$$

$$2. \text{ i) Length of rectangle} = 10 \text{ cm}$$

$$\text{Breadth of rectangle} = 6 \text{ cm}$$

$$\therefore \text{Perimeter of rectangle} = 2 (10 + 6) \text{ cm}$$

$$= (2 \times 16) \text{ cm}$$

$$= 32 \text{ cm}$$

$$\therefore \text{Area of rectangle} = (10 \times 6) \text{ cm}^2$$

$$= 60 \text{ cm}^2$$

$$\text{Ans Perimeter of rectangle} = 32 \text{ cm}$$

$$\text{Area of rectangle} = 60 \text{ cm}^2$$

$$\text{ii) Length of rectangle} = 50 \text{ cm}$$

$$\text{Breadth of rectangle} = 20.5 \text{ cm}$$

$$\therefore \text{perimeter of rectangle} = 2 (50 + 20.5) \text{ cm}$$

$$= (2 \times 70.5) \text{ cm}$$

$$= 141.0 \text{ cm}$$

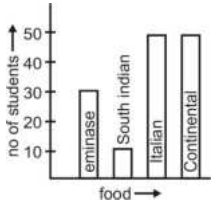
$$\therefore \text{Area of rectangle} = (50 \times 20.5) \text{ cm}^2$$

$$= 1025 \text{ cm}^2$$

$$\text{Ans perimeter of rectangle} = 141 \text{ cm}$$

- Area of rectangle = 1025 cm^2 $= (44 \times 6) \text{ cm}$
 $= 264 \text{ cm}$
3. i) Base of triangle = 10 cm
Heiht of triangle = 5.8 cm
 $\therefore$ Area of triangle = $\left(\frac{1}{2} \times 10 \times 5.8\right) \text{ cm}^2$
 $= 29 \text{ cm}^2$
Ans Area of triangle = 29 cm^2
- ii) Base of triangle = 12.5
Height of triangle = 8 cm
 $\therefore$ Area of triangle =
 $= 500 \text{ m}^2$
 $= 50 \text{ m}^2$
Ans Area of triangle = 50 m^2
4. i) Base of parallelogram = 25 cm
Height of parallelogram = 6.8 cm
 $\therefore$ Area of parallelogram $(25 \times 6.8) \text{ cm}^2$
 $= 170 \text{ cm}^2$
Ans Area of parallelogram = 170 cm^2
- ii) Base of parallelogram = 1.5 m
Height of parallelogram = 0.8 m
 $\therefore$ Area of parallelogram = $(1.5 \times 0.8) \text{ m}^2$
 $= 1.20 \text{ m}^2$
 $= 1.2 \text{ m}^2$
Ans Area if parallelogram = 1.2 m^2
5. i) Radius of circle = 42 cm
 $\therefore$ Circumference of circle = $\left(2 \times \frac{22}{7} \times 42\right)$
 cm
- $\therefore$ Area of circle = $\left(\frac{22}{7} \times 42 \times 42\right) \text{ cm}^2$
 $= (132 \times 42) \text{ cm}^2$
 $= 5544 \text{ cm}^2$
Ans Circumference of circle = 264 cm
Area of circle = 5544 cm^2
- ii) Diameter of circle = 70 cm
 $\therefore$ Radius = of circle = $\left(\frac{77}{2}\right) \text{ cm}$
 $= 35 \text{ cm}$
 $\therefore$ Circumference = $\left(2 \times \frac{22}{7} \times 35\right) \text{ cm}$
 $= (44 \times 5) \text{ cm}$
 $= 220 \text{ cm}$
 $\therefore$ Area of circle = $\left(\frac{22}{7} \times 35 \times 35\right) \text{ cm}^2$
 $= (110 \times 35) \text{ cm}^2$
 $= 3850 \text{ cm}^2$
Ans Cicumference of circle = 220 cm
Area of circle = 3850 cm^2
- 6) a) 9 cm
7) c) 6 cm
8) b) 12 cm
9) a) 60 cm
10) b) Rs. $64.$

Chapter-18 Data Handling

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Concept of data. Organizing data using tally marks (frequency distribution table)	The students will be able to organize data into a frequency distribution table.	Explain to the students the method of drawing tally marks. Representation of data by 'I' 2 data by 'II' 5 data by 'IIII'. Ask the students do called data from founds of the transportation wed to come to school (Car, bus, metro, motorcycle) and draw frequency distribution table from the raw data collected.	Based on the tally marks tone on transportation answers the following unties i) Haw many students luaus by metro ii) Which transpire is marl used and by how many students
Bar Graph. Drawing, describing, extracting and interpreting bar graph (both vertical and horizontal)		Teacher should show pupils a vertical bar graph and horizontal bar graph. Explain the axes and data representation on a bar graph. Using the frequency distribution table prepared above (transportation) ask the students to prepare a bar graph. Ask some questions based on bar graph i) Which mode of transport is most used? ii) Which mode of transport is least proffered.	 Study the bar graph given abuse and answer the questions given below i) Which food type is famous among students? ii) How many students tike Chinese food. iii) Which food type is least proffered?

Measure of central tendency. Mean, median and mode.	The students will be able to find the mean and median using formula. The students will also be able to find the mode.	Using different examples explain how to use to calculate mean and median using formula. Explain that to find median data should be arranged in ascending or descending order.	What is the mean weight of the students of your class students (Roll no 1 to 10). Also calculate the median and mode
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Exercise 18.1

Take answers from the back.

Exercise 18.2

Take answers from the back.

Exercise 18.3

1. mean of 1st 10 whole numbers

$$= \frac{0+1+2+3+4+5+6+7+8+9}{10}$$

$$= \frac{45}{10} = 4.5 \text{ (Ans)}$$

2. Average = $\frac{10+22+39+29}{4} = \frac{100}{4} = 25$

3. mean = $\frac{58+76+40+x+46+45+80+30}{8}$

$$\text{or, } 50 \times 8 = 375 + x$$

$$\text{or, } 400 - 375 = x$$

$$\text{or, } x = 25 \text{ (Ans)}$$

4. mean age = $\frac{2+4+8+7+3+x+1}{7}$

$$\text{or, } 4 = \frac{25+x}{7}$$

$$\text{or, } 28 - 25 = x$$

$$\text{or } x = 3 \text{ yrs}$$

5. Swire (x)	No of students (f)	fx
50	4	200
80	5	400
100	5	500
150	12	1800
200	12	2400
250	2	500
$\Sigma f = 40$		$\Sigma fx = 5800$

$$\text{mean} = \frac{\Sigma fx}{\Sigma f} = \frac{5800}{40} = 145 \text{ (Ans).}$$

6. x	f	fx
8	5	40
12	3	36
15	20	300
18	15	270
20	10	200
$\Sigma f = 53$		$\Sigma fx = 846$

$$\text{mean} = \frac{\Sigma fx}{\Sigma f} = \frac{846}{53} = 15.96 \text{ (Ans)}$$

7. x	f	fx
2	5	10
4	6	24
6	x	6x
8	4	32
10	9	90
12	10	120
$34 + x$		$\Sigma fx = 276 + 6x$

$$\text{Mean} = \frac{276+6x}{34+x} = 8$$

$$\text{or, } 276 + 6x = 8(34 + x)$$

$$\text{or, } 276 + 6x = 272 + 8x$$

$$\text{or } 276 - 272 = 8x - 6x$$

$$4 = 2x$$

$$x = 2 \text{ (Ans)}$$

8.

x	f	fx
10	5	50
29	x	$29x$
20	2	40
25	1	25
<u>$8 + x$</u>		<u>$115 + 29x$</u>

$$\text{Mean} = \frac{115+29x}{8+x}$$

$$16 = \frac{115+29x}{8+x}$$

$$\text{or, } 16(8 + x) = 115 + 29x$$

$$\text{or, } 128 + 16x = 115 + 29x$$

$$\text{or } 128 - 115 = 29x - 16x$$

$$13 = 13x$$

$$x = 1 \text{ (Ans)}$$

$$9. \text{ i) mean} = \frac{88+63+75+24+33+58}{6}$$

$$= \frac{333}{6} = 55.5 \text{ (Ans)}$$

$$\text{ii) mean} = \frac{2.2+3.3+6.8+7.5+2.9+1.3+5.2}{7}$$

$$= \frac{29.2}{7}$$

$$= 4.17 \text{ (Ans)}$$

$$10. \text{ mean} = \frac{1+6+2+6+5+6+2+3+8+4+3+1+8+7+4+5+1+1+2+3}{20}$$

$$= \frac{78}{20}$$

$$= 3.9 \text{ (Ans)}$$

Exercise 18.4

1. i) Ascending order : 3, 6, 6, 12, 15

$$\text{median} = \frac{6+9}{2} = \frac{15}{2} = 7.5$$

$$\text{mode} = 6.$$

ii) Ascending order : 22, 5, 5, 5, 6, 9, 11, 15

$$\text{median (middle value)} = 5$$

$$\text{mode} = 5$$

iii) Ascending order : 3, 8, 10, 13, 15, 15, 24, 49

$$\text{median} = \frac{13+15}{2}$$

$$= \frac{28}{2} = 14 \text{ (Ans)}$$

$$\text{mode} = 15 \text{ (Ans)}$$

iv) Ascending order : 3, 9, 30, 49, 56, 58, 64, 83

$$\text{median} = 56$$

$$\text{mode} : \text{no mode.}$$

2. i) 1st 5 multiples of 6 = 6, 12, 18, 24, 30

$$\text{median} = 18 \text{ (Ans)}$$

iii) prime number between 10 and 30 = 11, 13, 17, 19, 23, 29

$$\text{median} = \frac{17+19}{2} = \frac{36}{2} = 18 \text{ (Ans)}$$

Self Assessment-18

- iii) Even number between 50 and 57 = 52, 54, 56
 median (middle value) = 54 **Ans.**
- iv) Odd number between 1 and 18 = 3, 5, 7, 9, 11, 13, 15, 17

$$\text{median} = \frac{9+11}{2} = \frac{20}{2} = 10 \text{ (Ans)}$$
3. marks is Ascending order : 35, 42, 48, 49, 50, 58, 64, 79, 84
 median = 50 **(Ans)**
4. Data in Ascending order = 10, 10, 20, 20, 20, 30, 40, 50, 60, 60, 80
 median = 30 **(Ans)**
 mode = 20 **(Ans)**
5. Since the data is in Ascending order : 40, 42, 47, 49, 50, x, 52, 55, 57, 58

$$\text{median} = \frac{50+x}{2}$$
 or, $50.5 = \frac{55+x}{2}$
 or, $101 = 50 + x$
 or $x = 101 - 50$
 $= 51 \text{ (Ans)}$
6. $\text{median} = \frac{x+1x+4}{2}$
 or, $17 \times 2 = 2x + 5$
 or, $34 - 5 = 2x$
 or, $\frac{29}{2} = x$
 or, $x = 14.5 \text{ Ans.}$
7. Since in the given data 4 maximum Occurance mode = 4
8. Mode = 5

1. Take answer from the back.
2. i) mean of 6 multiples of 3 =

$$\frac{3+6+12+15+18+21}{6}$$

$$= \frac{75}{6} = 12.5 \text{ (Ans)}$$
- ii) $\text{mean} = \frac{91+93+95+97+99}{5}$

$$= \frac{475}{5} = 95 \text{ (Ans)}$$
3. i) Data in ascending order = 0, 1, 2, 3, 5, 7

$$\text{median} = \frac{2 \times 3}{2} = 2.5 \text{ (Ans)}$$
- ii) Data in ascending order : 10, 12, 13, 15, 16, 18, 18
 median = 15 **(Ans)**
4. i) mode = 2
Ans: option (a)
5.

x	f	fx
2	1	2
4	8	32
5	4	20
7	3	21
6	5	21
	21	30

$$\text{mean} = \frac{105}{21} = 5 \text{ (Ans)}$$
6. mean of 1st 5 natural number = $\frac{1+2+3+4+5}{5}$

$$= \frac{15}{5} = 3$$

Ans: option (b)

8. mode = 586

Ans: option (c)

9. 1st 7 natural number = 1, 2, 3, 4, 5, 6, 7

median = 4 (**Ans**)

10. mode

Ans: option (c)

11. option (d)

12.

13. Take answers from the back.

Chapter-19 Probability

Topics	Learning Outcomes	Teaching Learning Activity	Questions on Hots
Concept of probability and associated concepts of event, out cones simple space. Calculating the probability of events.	The students will be a able to find the number of events is an outcome or sample space, and will be able to calculate probabilities of events.	Explain the concept of probability as chances and that probability lies between 0 and 1. Use a dice to show possible outcomes. Pass out a bag containing a red ball, blue ball, black ball. Now have students calculate the probability of drawing a) i) red ball ii) blue ball iii) black ball Explain daily life situations with certain/uncertain/impossible	What are the possible outcomes when two coins are tossed together? From the bag of balls containing red, blue and black ball, what is the probability of drawing a green ball?

Exercise 19.1

1. i) $P(\text{defective}) = \frac{150}{400} = \frac{3}{8}$ (Ans)

ii) Non-defective = $400 - 150$
= 250.

$P(\text{non-defective}) = \frac{250}{400} = \frac{5}{8}$ (Ans)

2. i) $P(\text{girl}) = \frac{55}{70} = \frac{11}{14}$ (Ans)

boys = $70 - 55 = 15$

ii) $P(\text{boy}) = \frac{15}{70} = \frac{3}{14}$ (Ans)

3. i) $P(\text{head}) = \frac{8}{20} = \frac{2}{5}$ (Ans)

ii) $P(\text{tail}) = \frac{12}{20} = \frac{3}{5}$ (Ans)

4. i) $P(\text{heart}) = \frac{13}{52} = \frac{1}{4}$ (Ans)

ii) $P(\text{quiere}) = \frac{4}{52} = \frac{1}{13}$ (Ans)

iii) $P(\text{black card}) = \frac{26}{54} = \frac{1}{2}$ (Ans)

5. i) $P(\text{girl}) = \frac{160}{200} = \frac{4}{5}$ (Ans)

$$\text{ii) } P(\text{boy}) = \frac{40}{200} = \frac{1}{5} \text{ (Ans)}$$

$$6. \text{ i) } P(\text{even no}) = \frac{4}{9} \text{ (Ans)}$$

$$\text{ii) } P(\text{odd no}) = \frac{5}{9} \text{ (Ans)}$$

$$\text{iii) } P(\text{prime no}) = \frac{4}{9} \text{ (Ans).}$$

7. when a dice is tossed

i) prime number = 1, 2, 5 and total outcomes = 6

$$P(\text{prime no}) = \frac{3}{6} = \frac{1}{2} \text{ (Ans).}$$

$$\text{ii) } P(\text{odd}) = \frac{3}{6} = \frac{1}{2} \text{ (Ans)}$$

$$\text{iii) } P(\text{multiple}) = \frac{1}{6} \text{ (Ans)}$$

Self Assessment-19

1. red = 70, blue = 150 - 70 = 80, total = 150

$$\text{i) } P(\text{red ball}) = \frac{70}{150} = \frac{7}{15} \text{ (Ans)}$$

$$\text{ii) } P(\text{blue ball}) = \frac{80}{150} = \frac{8}{15} \text{ (Ans)}$$

$$2. \frac{2}{26} = \frac{1}{13} \text{ (Ans)}$$

$$3. \text{ i) } P(\text{multiple of 2}) = \frac{3}{6} = \frac{1}{2} \text{ Ans. [possible outcome = 2, 4, 6]}$$

$$\text{ii) } P(\text{greater than 7}) = .0$$

$$4. P(\text{king}) = \frac{4}{52} = \frac{1}{13}$$

Ans: option (d)

$$5. P(\text{apple}) = \frac{3}{10}$$

Ans: option (a)

$$6. \text{ Ans: option (a)}$$

$$7. P(\text{getting a 6}) = \frac{1}{6}$$

Ans: (b)

$$8. P(\text{prime no}) = \frac{3}{6} = \frac{1}{2}$$

Ans: option (c)

$$9. \frac{85}{200}$$

Ans: option (c)

$$10. \frac{6}{90} \text{ (Ans)}$$