

Maths – 7

Chapter-1 Numbers

Exercise – 1.1

- Describe the following statements by using positive or negative numbers :
 - +600 cm
 - +6 hours
 - +18°C
 - 10 yards
 - 7 minutes
 - 30°C
- Write the absolute value of :
 - =17
 - =23
 - =|-8|=8
 - =|-14|=14
- Arrange the following integers in ascending order :
 - 27, -9, -5, 4, 9, 16
 - 16, -9, -3, -1, 0, 7
 - 21, -18, -12, 1, 7, 14
- Arrange the following integers in descending order :
 - 30, 8, 0, -1, -5, -21
 - 25, 15, 1, -3, -7, -25
 - 8, 4, 3, -9, -15, -16
- Find the value of :
 - +5-7=-2
 - 8-15=-23
 - 9+17=+8
 - +11-14=-3
 - 18+6=-12
 - 22-23=-45
- Which temperature is higher?
 - 2°C
 - +70°C
 - 2°C
 - +80°C

Exercise – 1.2

- Multiply :
 - =-162
 - =208
 - =-516
 - =0
 - =-54
 - =-210
 - =126
 - =-204
 - =(12) × (-7) = 84
 - =(-15) × (132) = -1980
 - =(-16) × (-15) = 240
 - =-12 × (48) = -576
- What will be the sign of the product if we multiply together?
 - Negative
 - Negative

- Find the integer whose product with -1 is -64.

Let the integer be x

$$(-1) \times (x) = -64$$

$$x = \frac{-64}{-1} = 64.$$

Hence, the integer is 64 whose product with -1 is -64.

- Find the integer whose product with -1 is -85.

Let the integer be x

$$(-1) \times (x) = 85$$

$$x = \frac{85}{-1} = -85.$$

Hence, the integer is -85 whose product with -1 is 85.

Exercise – 1.3

- Divide :

$$a. = \frac{35}{-5} = -7$$

$$b. = \frac{-40}{10} = -4$$

$$c. = \frac{+48}{+6} = +8$$

$$d. = \frac{24}{-3} = -8$$

$$e. = \frac{+81}{+3} = +27$$

$$f. = \frac{0}{-1} = 0$$

$$g. = \frac{-625}{25} = -25$$

$$h. = \frac{+729}{+9} = +81$$

$$i. = \frac{20000}{-100} = -200$$

$$j. = \frac{3655}{-3655} = -1$$

$$k. = \frac{+432}{+12} = +36$$

- Fill in the blanks :

$$a. 121 \div x = -11$$

$$\frac{121}{-11} = x$$

$$-11 = x$$

$$b. 96 \div x = -12$$

$$\frac{96}{-12} = x$$

$$-8 = x$$

$$c. x \div (-13) = 169$$

$$x = 169 \times (-13)$$

$$= -2197$$

$$D. x \div (-31) = 18$$

$$x = 31 \times 18$$

$$= 558$$

3. Simplify :

$$\begin{aligned} \text{a. } & (-10 - |-51|) \div (30 - |-21|) \\ & = (-10 - 5) \div (30 - 25) \\ & = -15 \div 5 \\ & = -3 \end{aligned}$$

$$\begin{aligned} \text{b. } & |120 \div (-5)| \div |16 \div (-4)| \\ & |-24| \div |-4| \\ & = 24 \div 4 = 6 \end{aligned}$$

4. Determine the integer which when divided by -1 gives -45.

Let the integer be x

$$x \div (-1) = -45$$

$$x = -45 \times (-1)$$

$$x = 45$$

Hence, The integer is 45 which when divided by -1 gives -45.

5. Determine the integer which when divided by -1 gives 96.

Let the integer be x

$$x \div (-1) = 96$$

$$x = 96 \times (-1)$$

$$x = -96$$

Hence, The integer is -96 which when divided by -1 gives 96.

6. Write True to False :

- | | |
|----------|----------|
| a. False | b. False |
| c. False | d. False |
| e. False | f. True |

Exercise - 1.4**1. Fill in the blanks :**

- | | | |
|----------|----------|-----------|
| a. (-7) | b. (-12) | c. (-28) |
| d. (18) | e. (-16) | f. (7) |
| g. (-10) | h. (-6) | i. (-325) |
| j. (1) | k. (0) | l. (0) |
| m. (0) | n. (53) | |

2. Fill in the blanks :

- | | | |
|----------|----------|---------|
| a. (41) | b. (-40) | c. (14) |
| d. (-16) | e. (14) | |

3. Find the sum by suitable rearrangements:

$$\begin{aligned} \text{a. } & -142 + (-58) + 311 \\ & = -142 - 58 + 311 \\ & = -200 + 311 = 111 \end{aligned}$$

$$\begin{aligned} \text{b. } & 236 + 828 - 328 \\ & = 236 + 500 = 736 \end{aligned}$$

$$\begin{aligned} \text{c. } & 525 + 75 + (-207) \\ & = 600 - 207 = 393 \end{aligned}$$

$$\begin{aligned} \text{d. } & 143 + 167 - 567 + 257 \\ & = 310 - 310 = 0 \end{aligned}$$

4. Find the product by suitable rearrangements:

$$\begin{aligned} \text{a. } & 50 \times 8 \times 125 \times (-6) \\ & = -400 \times -750 \\ & = 3,00,000 \end{aligned}$$

$$\begin{aligned} \text{b. } & 625 \times (-16) \times (-172) \\ & = (-10,000) \times (-172) \\ & = 17,20,000 \end{aligned}$$

$$\begin{aligned} \text{c. } & 6 \times (-5) \times (-35) \\ & = (-30) \times (-35) \\ & = 1050 \end{aligned}$$

$$\begin{aligned} \text{d. } & -125 \times (-8) \times 257 \\ & = 1000 \times 257 \\ & = 2,57,000 \end{aligned}$$

5. Find the product by suitable rearrangements:

$$\begin{aligned} \text{a. } & -318 \times (151 + 349) \\ & = 318 \times 500 \\ & = 1,59,000 \end{aligned}$$

$$\begin{aligned} \text{b. } & -125 \times (-4) \times 328 \\ & = 500 \times 328 \\ & = 1,64,000 \end{aligned}$$

$$\begin{aligned} \text{c. } & -832 \times (256 + 371 + 373) \\ & = -832 \times 100 \\ & = -8,32,000 \end{aligned}$$

$$\begin{aligned} \text{d. } & 125 \times 8 \times (-175) \\ & = 1000 \times (-175) \\ & = -175000 \end{aligned}$$

6. Multiply using suitable properties:

$$\begin{aligned} \text{a. } & -251 \times (100 - 2) \\ & = -215 \times 100 - (-251) \times (2) \\ & = -25100 + 502 \\ & = -24598 \end{aligned}$$

$$\begin{aligned} \text{b. } & (1000 - 5) \times (-49) \\ & = 1000 \times (-49) - 5 \times (-49) \\ & = -49000 + 245 = -48755 \end{aligned}$$

$$\begin{aligned} \text{c. } & 7219 \times (-1000 - 5) \\ & = 7219 \times (-1000) + 7219 \times (-5) \\ & = -7219000 - 36095 \\ & = -7255095 \end{aligned}$$

$$\begin{aligned} \text{d. } & -256 \times (100 + 5) \\ & = -256 \times 100 + (-256) \times 5 \\ & = -25600 - 1280 \\ & = -26880 \end{aligned}$$

$$-540 + (540 + 540 + -60) = (-540 + 540 + 540) - 60$$

$$-540 + (1080 - 60) = 540 - 60$$

$$-540 + 1020 = 480$$

$$480 = 480$$

$$\text{L.H.S} = \text{R.H.S}$$

Hence, Verified

c. $-1000 + (-2654) + 654$

$$-3000$$

Verification

$$-1000 + (-2654 + 654) = [-1000 + (-2654)] + 654$$

$$-1000 - 2000 = -3654 + 654$$

$$-3000 = -3000$$

$$\text{L.H.S} = \text{R.H.S}$$

Hence, Verified

5. Subtract:

a. $-218 - 0 = -218$

b. $0 - (-218) = 218$

c. $-775 - 775 - 1550$

d. $468 - (-468) = 936$

Chapter-2 Fractions

Exercise – 2.1

1. Solve the following:

a. $\frac{2+4}{7} = \frac{6}{7}$

b. $\frac{8-4}{11} = \frac{4}{11}$

c. $\frac{3+4}{7} = \frac{7}{7} = 1$

d. $\frac{66+52}{13} = \frac{118}{13}$

e. $\frac{7+11}{19} = \frac{18}{19}$

f. $\frac{2+5}{6} = \frac{7}{6}$

g. $\frac{42+52+81}{60} = \frac{175}{60} = \frac{35}{12}$

h. $\frac{78+160}{65} = \frac{238}{65}$

i. $\frac{12-6}{13} = \frac{6}{13}$

j. $\frac{5-1}{29} = \frac{4}{29}$

k. $\frac{90+117}{195} = \frac{207}{195}$

l. $\frac{304-187}{323} = \frac{117}{323}$

2. Solve the following:

a. $\frac{84}{98} = \frac{6}{7}$

Exercise – 2.2

1. Find:

a. $\frac{1}{10} \times \frac{140}{36} = \frac{7}{18}$

b. $\frac{1}{10} \times \frac{220}{17} = \frac{22}{17}$

c. $\frac{1}{4} \times \frac{1000}{1000} = 250$

2. Solve the following:

a. $\frac{18}{3} \times \frac{30}{7} = \frac{108}{7}$

b. $16 \times \frac{2}{3} = \frac{32}{3}$

c. $\frac{5}{8} \times \frac{3}{4} = \frac{15}{4}$

Exercise – 2.3

1. Find the reciprocal of the following:

a. $\frac{4}{3}$

b. $\frac{15}{8}$

c. $\frac{57}{15}$

d. $\frac{7}{12}$

2. Divide:

a. $\frac{16}{3} \div \frac{1}{54}$

b. $\frac{10}{15} \div \frac{14}{3}$

$\frac{16}{3} \times \frac{54}{1} = 288$

$\frac{10}{15} \times \frac{3}{14} = \frac{1}{7}$

c. $\frac{8}{13} \div \frac{21}{13}$

d. $\frac{29}{3} \div \frac{21}{3}$

$\frac{8}{13} \times \frac{13}{21} = \frac{8}{21}$

$\frac{29}{3} \times \frac{3}{21} = \frac{29}{21}$

3. Solve the following:

a. $2 \times \frac{11}{12} = \frac{11}{6}$

b. $5 \times \frac{16}{30} = \frac{4}{3}$

c. $\frac{1}{2} \times \frac{17}{8} = \frac{17}{16}$

d. $9 \times \frac{5}{2} = \frac{45}{2}$

e. $6 \times \frac{7}{5} = \frac{42}{5}$

f. $\frac{9}{4} \times \frac{5}{3} = \frac{15}{4}$

4. Fill in the boxes:

a. $\frac{4}{5} \times \frac{4}{5} = \frac{8}{25}$

b. $\frac{3}{4} \times \frac{1}{6} = \frac{1}{8}$

$\frac{16}{5} \div \frac{8}{5} = 2$

$\frac{3}{24} = \frac{1}{8}$

$\frac{1}{8} \times \frac{3}{16} = \frac{3}{128}$

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

$\square = 2$

$3 \times 3 = 9$

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

$$c. \frac{\square}{6} \times \frac{9}{8} = \frac{3}{4}$$

$$\frac{9\square}{48} = \frac{3}{4}$$

$$\square = \frac{3}{4} \times \frac{48}{9} = 4$$

$$d. \frac{5}{6} \times \frac{\square}{5} = 1$$

$$\frac{5\square}{30} = 1$$

$$\square = 1 \times \frac{30}{5} = 6$$

5. Identify the pattern and write the next three numbers in the series. The first one is done for you:

$$b. \frac{1}{6}, \frac{1}{7}, \frac{1}{8}$$

$$c. 3, 3\frac{1}{2}, 4$$

6. State whether the answer is greater or less than one. Put a (✓) in the appropriate box:

	Greater than one	Less than one
a. $\frac{9}{10} \div \frac{9}{5} = \frac{9}{10} \times \frac{5}{9} = \frac{1}{2}$		✓
b. $\frac{2}{7} \div \frac{2}{14} = \frac{2}{7} \times \frac{14}{2} = 2$	✓	
c. $\frac{4}{3} \div \frac{1}{4} = \frac{4}{3} \times \frac{4}{1} = \frac{16}{3}$		✓
d. $\frac{4}{3} \div \frac{1}{4} = \frac{4}{3} \times \frac{4}{1} = \frac{16}{3}$	✓	

7. Write = or # in the boxes without actually working out the answer:

$$a. = \quad b. \neq \quad c. = \quad d. \neq$$

Exercise – 2.4

1. Cost of a Book = ₹ $\frac{47}{3}$
Cost of a notebook = ₹ $\frac{19}{4}$

Equating both fractions.

$$\frac{47}{3} \times \frac{4}{4}, \quad \frac{19}{4} \times \frac{3}{3}$$

$$\frac{188}{12}, \quad \frac{57}{12}$$

$$\text{Cost of book is more by } \left(-\frac{188}{12} - \frac{57}{12} \right)$$

$$= \frac{131}{12} = 10\frac{11}{12}$$

2. Length of road = 564 m.

$$\text{Length of road repaired on 1 day} = \frac{1}{4} \times 564 \text{ m}$$

$$= \frac{1}{4} \times 564 \text{ m}$$

$$= 141 \text{ m.}$$

$$\text{Length of road unrepaired} = 564 \text{ m} - 141 \text{ m} = 423 \text{ m.}$$

3. Length of 1 trouser = $52\frac{1}{2}$ m

$$= \frac{105}{2} \text{ m}$$

$$\text{Cloth required for 32 trousers} = 32 \times \frac{105}{2} = 1680 \text{ m.}$$

4. Total no. of students = 72.

$$\text{No. of boys} = \frac{5}{12} \text{ of } 72$$

$$= \frac{5}{12} \times 72 = 30$$

$$\text{No. of girls} = 72 - 30 = 42.$$

5. Total money person gets = ₹ 210

$$\text{Cost of 1 apples} = ₹ 3\frac{3}{4} = \frac{15}{4}$$

$$\text{No. of apples sold} = 210 \div \frac{15}{4}$$

$$= 210 \div \frac{15}{4} = 56$$

6. Cost of $8\frac{1}{2}$ kg sugar = $148\frac{3}{4} = \frac{595}{4}$

$$\text{Total sugar bought} = 8\frac{1}{3} = \frac{17}{3}$$

$$\text{Cost of 1 kg of sugar} = \frac{595}{4} \div \frac{17}{3}$$

$$= \frac{595}{4} \times \frac{3}{17}$$

$$= ₹ 17\frac{1}{2}$$

7. Distance of Lalit in east from A = $\frac{3}{4}$ km

$$\text{Distance of Lalit in west from east} = \frac{6}{7} \text{ km}$$

$$\text{Difference between them} = \frac{6}{7} \text{ km} - \frac{3}{4} \text{ km}$$

$$= \frac{24 - 21}{28} \text{ km}$$

$$= \frac{3}{28} \text{ km}$$

$$\text{Lalit is } \frac{3}{28} \text{ km far from starting point A.}$$

Revision Exercise

1. Tick (✓) the correct answer:

- a. (iv) $\frac{9}{4}$ b. (iv) $\frac{105}{112}$
- c. (i) $\frac{11}{20}$

2. Solve:

- a. $\frac{8^2}{5} \times \frac{1}{4_1} = \frac{2}{5}$ b. $\frac{95^{19}}{8} \times \frac{3}{20_4} = \frac{-57}{32}$
- c. $\frac{53}{6} \times \frac{19}{12} = \frac{1007}{72}$ d. $\frac{23}{10} - \frac{22}{15}$
 $\frac{69-44}{30}$
 $\frac{25^5}{30_6} = \frac{5}{6}$
- e. $\frac{14^1}{25_5} \times \frac{35^7}{57_3} \times \frac{34^{21}}{56_{42}} = \frac{7}{30}$ f. $\frac{108^{93}}{7_1} \times \frac{49^7}{72_{62}} = \frac{21}{2}$
- g. $\frac{52^{13}}{7} \times \frac{7}{8_2} = \frac{13}{2}$ h. $\frac{16}{19} - \frac{2}{7}$
 $\frac{112-38}{133} = \frac{74}{133}$

3. Fill in the blanks:

- a. 1 b. $\frac{10}{81}$
- c. $\frac{5}{27}$ d. $\frac{7}{18}$
- e. $\frac{-3}{4}$ f. 27

4. How many seconds are there in $\frac{2}{3}$ of 2 hours?

$$\begin{aligned} \text{Seconds in 1 hour} &= 3600 \text{ seconds} \\ \text{Seconds in 2 hours} &= 7200 \text{ seconds} \\ \text{Seconds in } \frac{2}{3} \text{ of hours} &= \frac{2}{3} \times 7200 = 4800 \end{aligned}$$

5. Find $\frac{6}{7}$ of 56:

$$\frac{6}{7} \times 56 = 48$$

6. There are 240 seats in the balcony of a theatre.

If $\frac{1}{8}$ th of the total seats are occupied. What are the number of seats which are empty?

Total seats in balcony of the theatre = 240

$$\begin{aligned} \text{Seats Occupied} &= \frac{1}{8} \text{ of } 240 \\ &= \frac{1}{8} \times 240 = 30 \end{aligned}$$

$$\text{Empty seats} = 240 - 30 = 210$$

7. By what number should $9\frac{4}{5}$ be multiplied to get 42?

Let the no to be multiplied be x

$$9\frac{4}{5} \times x = 42$$

$$\frac{49}{5} \times x = 42$$

$$x = 42 \times \frac{5}{49} = \frac{30}{7}$$

Chapter-3 Decimals

Exercise – 3.1

1. Multiply:

$$\begin{array}{r} 5175 \\ \times 211 \\ \hline 5175 \\ 5175 \times \\ 10350 \times \times \\ \hline 10.91925 \end{array}$$

$$= 10.1925$$

$$\begin{array}{r} 153 \\ \times 817 \\ \hline 1071 \\ 153 \times \\ 1224 \times \times \\ \hline 125.001 \end{array}$$

$$= 125.001$$

$$\begin{array}{r} 1223 \\ \times 52 \\ \hline 2446 \\ 6115 \times \\ \hline 63.596 \end{array}$$

$$= 63.596$$

$$\begin{array}{r} 4101 \\ \times 1701 \\ \hline 4101 \\ 0000 \times \\ 28707 \times \times \\ 4101 \times \times \times \\ \hline 6.975801 \end{array}$$

$$= 6.975801$$

$$\begin{array}{r} 421 \\ \times 733 \\ \hline 1263 \\ 1263 \times \\ 2947 \times \times \\ \hline 30.8593 \end{array}$$

$$= 30.8593$$

$$\begin{array}{r} 22048 \\ \times 2713 \\ \hline 6744 \\ 2248 \times \\ 15730 \times \times \\ 4496 \times \times \times \\ \hline 609.8824 \end{array}$$

$$= 609.8824$$

g.

1412
×214
5648
1412×
2824××
302.168

= 302.168

i.

2132
×17
14924
2132×
36244
×13
108732
36244×
7.71172

= 7.71172

k.

2173
×895
10865
19557×
17384××
19.44835

= 19.44835

m.

317
×236
1902
951×
634××
74812
×1147
523684
299248×
74812××
74812×××
85.809364

= 85.809364

h.

14858
×3321
14858
29716×
44574××
44574×××
4934.3418

= 4934.3418

j.

82911
×105
414555
00000×
80911××
870.5655

= 870.5655

l.

13368
×1189
120312
106944×
13368××
13368×××
1589.4552

= 1589.4552

n.

23168
×1193
69504
208512×
23168××
23168×××
27.639424

= 27.639424

o.

131
×67
917
786×
8777
×444
35108
35108×
35108××
38.96988

= 38.96988

2. Find the product of the following:

- a. 1605
c. 5505.30
e. 36.14
g. 423.370
i. 144.500
- b. 5670
d. 583.400
f. 850
h. 163.80

3. Divide:

a.

$$\begin{array}{r} 9 \overline{) 1008} \overline{) 112} \\ \underline{9 \downarrow} \\ 108 \\ \underline{9 \downarrow} \\ 18 \\ \underline{18} \\ 0 \end{array} = 1.12$$

b.

$$\begin{array}{r} 13 \overline{) 156} \overline{) 12} \\ \underline{13 \downarrow} \\ 26 \\ \underline{26} \\ 0 \end{array} = 1.2$$

c.

$$\begin{array}{r} 21 \overline{) 1113} \overline{) 53} \\ \underline{105 \downarrow} \\ 63 \\ \underline{63} \\ 0 \end{array} = 5.3$$

d.

$$\begin{array}{r} 24 \overline{) 80} \overline{) .333} \\ \underline{72} \\ 80 \\ \underline{72} \\ 80 \\ \underline{72} \\ 8 \end{array} = 3.33$$

e.

$$\begin{array}{r} 3 \overline{) 57} \overline{) 19} \\ \underline{3 \downarrow} \\ 27 \\ \underline{27} \\ 0 \end{array} = 1.9$$

f.

$$\begin{array}{r} 27 \overline{) 1242} \overline{) 46} \\ \underline{108 \downarrow} \\ 162 \\ \underline{162} \\ 0 \end{array} = 4.6$$

g.

$$\begin{array}{r} 7 \overline{) 1001} \overline{) 143} \\ \underline{7 \downarrow} \\ 30 \\ \underline{28 \downarrow} \\ 21 \\ \underline{21} \\ 0 \end{array} = 0.143$$

h.

$$\begin{array}{r} 64 \overline{) 2896} \overline{) 45.25} \\ \underline{256 \downarrow} \\ 336 \\ \underline{320} \\ 160 \\ \underline{128} \\ 320 \\ \underline{320} \\ 0 \end{array} = 45.25$$

i.

$$\begin{array}{r} 414 \overline{) 13455} \overline{) 32.5} \\ \underline{1242 \downarrow} \\ 1035 \\ \underline{828} \\ 2070 \\ \underline{2070} \\ 0 \end{array} = 3.25$$

j.

$$\begin{array}{r} 73 \overline{) 3796} \overline{) 52} \\ \underline{365 \downarrow} \\ 146 \\ \underline{146} \\ 0 \end{array} = 5.2$$

$$\begin{array}{r} 1124 \overline{) 38778} (34.5 \\ \underline{3372} \\ 5058 \\ \underline{4496} \\ 5620 \\ \underline{5620} \\ 0 \end{array} = 3.45$$

$$\begin{array}{r} 3 \overline{) 759} (253 \\ \underline{6} \\ 15 \\ \underline{15} \\ 0 \\ \times 9 \\ 9 \\ \underline{0} \end{array} = 0.253$$

$$\begin{array}{r} 17 \overline{) 5134} (302 \\ \underline{51} \\ 0 \\ \times 34 \\ 34 \\ \underline{0} \end{array} = 3.02$$

4. Find the quotient of the following:

$$a. \frac{0.83}{10000} = 0.0083$$

$$b. \frac{52.974}{100000} = 0.52974$$

$$c. \frac{183.6}{600} = 3.06$$

$$d. \frac{8.17}{1000} = 0.817$$

$$e. \frac{634.18}{1000} = 63.418$$

$$f. \frac{0.002}{100000} = 0.00002$$

$$g. \frac{0.96}{100000} = 0.00096$$

$$h. \frac{573.1}{10000} = 0.5731$$

$$i. \frac{3258}{200} = 1.64$$

$$j. \frac{0.081}{10} = 0.00081$$

$$k. \frac{108.5}{500} = 2.17$$

$$l. \frac{20.101}{1000} = 0.020101$$

Exercise – 3.2

1. Multiply:

$$a. 0.003m$$

$$b. 43.4 \text{ cm}$$

$$c. 5000 \text{ g}$$

$$d. 0.009 \text{ km}$$

$$e. 1200 \text{ m}$$

$$f. 0.51 \text{ m}$$

$$g. 31 \text{ mm}$$

$$h. 870 \text{ m}$$

$$i. 53 \text{ g}$$

$$j. 700 \text{ cm}$$

$$k. .008 \text{ kg}$$

$$l. 7300 \text{ cm}$$

$$m. .006 \text{ km}$$

$$n. 0.076 \text{ km}$$

$$\begin{array}{r} 65 \overline{) 2795} (43 \\ \underline{260} \\ 195 \\ \underline{195} \\ 0 \end{array} = 4.3$$

2. Mohini carries a bag weighing 4.98kg. What will be the weight of 1000 such bags?

Weight to bag that Mohini carries = 4.98 kg

$$\begin{aligned} \text{Weight of 100 such bags} &= 4.98 \times 100 \\ &= 498.00 \text{ kg.} \end{aligned}$$

3. Sagar's school is 4km from his village. How many metres does he cover in going to school and coming back to his village?

Distance of sagar's school from his village = 4 km.

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

$$4 \text{ km} = 4 \times 1000 = 4000 \text{ m}$$

He covers 4000m in going to school.

$$\begin{aligned} \text{Distance covered in going and coming back} &= 4000 \times 2 \\ &= 8000 \text{ m.} \end{aligned}$$

4. a. Multiply b. (10)

5. Where do you move the decimal; towards the right or left and by how many places converting?

a. Right, 3

b. Right, 2

c. Left, 3

d. Left, 3

Exercise – 3.3

1. If cost a pencil is ₹123.85. What is the cost of 42 such pencils?

Cost of 1 Pencil = 123.85

$$\text{Cost of 42 such pencil} = 123.85 \times 42$$

$$\begin{array}{r} 12385 \\ \times 42 \\ \hline 24770 \\ 49540 \times \\ \hline 520170 \end{array} = 520.17$$

Hence, the cost of 42 such pencils = ₹520.17

2. It the cost of 1m cloth is ₹472.91. What is the cost of 56 metres of cloth?

Cost of 1 metre of cloth = ₹472.91

$$\text{Cost of 56 metres of cloth} = 472.91 \times 56$$

$$\begin{array}{r} 47291 \\ \times 56 \\ \hline 283746 \\ 236455 \times \\ \hline 2648296 \end{array} = ₹26482.96$$

Hence, the cost of 42 such pencils = ₹520.17

3. A jar holds 925g of chocolate milk. How much milk will be there in 25 such bottles? Give the answer in kg.

Total quantity of milk = 925g.

$$\text{Milk in 25 bottles} = 925 \times 25$$

925
×25
4625
1850×
23125

$$\frac{23125 \text{ kg}}{1000} = 23.125 \text{ kg}$$

4. **Garima cuts 51.75m of ribbon into pieces of 1.15m each. How many pieces does she get?**

Total length of Ribbon = 51.75m

Length of 1 piece = 1.15

No. of pieces

$$\begin{array}{r} 115 \overline{) 5175} \quad (45 \\ \underline{460} \\ 575 \\ \underline{575} \\ 0 \end{array}$$

She gets 45 pieces

5. **The weight of 37 bags of rice is 3607.5 kg. If all the bags weigh equally, what is the weight of each bag?**

Weight of 37 bags = 3607.5kg

Weight of 1 bag = $3607.5 \div 37$

$$\begin{array}{r} 37 \overline{) 36075} \quad (975 \\ \underline{333} \\ 277 \\ \underline{259} \\ 185 \\ \underline{185} \\ 0 \end{array}$$

6. **The product of two decimals is 197.9724. If one of them is 14.44, find the other.**

Let the other decimal be x

$$14.44 \times x = 197.9724$$

$$x = 197.9724 \div 14.4$$

$$\begin{array}{r} 144 \overline{) 1979724} \quad (13748.083 \\ \underline{144} \\ 539 \\ \underline{432} \\ 1077 \\ \underline{1008} \\ 692 \\ \underline{576} \\ 1164 \\ \underline{1152} \\ 1200 \\ \underline{1152} \\ 480 \\ \underline{432} \\ 48 \end{array}$$

7. **The cost of a toy car is ₹126.75. What is the cost of 36 such toy mobiles?**

Cost of a toy car = ₹126.75

Cost of 36 such toy mobiles = 126.75×36

12675
×36
76050
38025×
456300

$$= 456300$$

Hence, the cost of 36 such toy mobiles is ₹4563.

8. **The product of two decimals numbers is 131.58. If one of them is 2.15, find the other.**

Let the other no. be x

$$x \times 2.15 = 131.58$$

$$x = 131.58 \div 2.15$$

$$\begin{array}{r} 215 \overline{) 13158} \quad (61.2 \\ \underline{1290} \\ 258 \\ \underline{215} \\ 430 \\ \underline{430} \\ 0 \end{array}$$

The other no is 61.2

9. **A pile of plates is 54.4 cm high. If each book is 3.2cm thick, how many plants are there in the pile?**

Total height of pile = 54.4 cm

Height of each book = 3.2 cm

No. of books = $54.4 \div 3.2$

$$\begin{array}{r} 32 \overline{) 544} \quad (17 \\ \underline{32} \\ 224 \\ \underline{224} \\ 0 \end{array}$$

Hence, there are 17 plates in the pile.

10. **The thickness of 12 sheets of paper is 2.28cm. Find the thickness of 1 sheet of paper.**

Thickness of 12 sheets = 2.28 cm.

Thickness of 1 sheet = $2.28 \div 12$

$$\begin{array}{r} 12 \overline{) 228} \quad (19 \\ \underline{12} \\ 108 \\ \underline{108} \\ 0 \end{array}$$

The thickness of 1 sheet is 0.19 cm.

11. **A sum of ₹4483.60 was equally distributed among 44 workers. How much did each worker get?**

Total amount = ₹4483.60

No. of workers = 44

Salary of each worker = $4483.60 \div 44$

$$\begin{array}{r}
 44 \overline{) 448360} \quad (10190 \\
 \underline{44} \\
 083 \\
 \underline{44} \\
 396 \\
 \underline{396} \\
 \times 0 \\
 0 \\
 \hline
 \times = ₹101.90
 \end{array}$$

Hence, the salary of each worker is ₹101.90

12. Mukesh saves 0.2 part of his salary every month. If his monthly salary is ₹5500, how much will he save in one year?

Mukesh salary of Mukesh = ₹5500

Salary saved by him = 0.2 of 5500

$$= \frac{0.2}{10} \times \frac{1100}{1} = 1100$$

Salary save in 1 year = 1100×12

$$= 13200$$

13. The capacity of a tumbler is 5.32l. What is the capacity of 13 such jugs?

Capacity of 1 tumbler = 5.32l.

Capacity of 13 jugs = 5.32×13

$$\begin{array}{r}
 532 \\
 \times 13 \\
 \hline
 1596 \\
 532 \times \\
 \hline
 6916
 \end{array} = 69.16l$$

Hence, the capacity of 13 jugs is 69.16l.

14. If 1m is equal to 39.37 inches, how many inches will be equal to 16m?

1m = 39.37 inches

16m = 16×39.37 inches

$$\begin{array}{r}
 3937 \\
 \times 16 \\
 \hline
 23622 \\
 3937 \times \\
 \hline
 62992
 \end{array} = 629.92 \text{ inches}$$

Revision Exercise

1. Tick (✓) the correct answer:

- a. (iii) 0.001 b. (iii) ₹2150
c. (iii) 20 d. (ii) 337.3609
e. (iii) 100 f. (i) ₹41.88

2. Which of the following decimals can be expressed as rational numbers?

- a. (✓) b. (✓) c. (✗)
d. (✗) e. (✗) f. (✗)

3. Multiply the following decimal numbers:

a.
$$\begin{array}{r}
 586 \\
 \times 145 \\
 \hline
 2930 \\
 2344 \times \\
 586 \times \times \\
 \hline
 84970
 \end{array} = 84.970$$

b.
$$\begin{array}{r}
 394 \\
 \times 424 \\
 \hline
 1576 \\
 788 \times \\
 1576 \times \times \\
 \hline
 167056
 \end{array} = 16.7056$$

c.
$$\begin{array}{r}
 213 \\
 \times 156 \\
 \hline
 1278 \\
 1065 \times \\
 213 \times \times \\
 \hline
 33228
 \end{array} = 3.3228$$

d.
$$\begin{array}{r}
 446 \\
 \times 9 \\
 \hline
 4014
 \end{array} = 4.014$$

e.
$$\begin{array}{r}
 85 \\
 \times 42 \\
 \hline
 170 \\
 340 \times \\
 \hline
 3570
 \end{array} = 35.70$$

f.
$$\begin{array}{r}
 590 \\
 \times 5 \\
 \hline
 2950
 \end{array} = 2.950$$

4. Divide the following decimal numbers:

a.
$$\begin{array}{r}
 14 \overline{) 21} \quad (1.5 \\
 \underline{14} \\
 70 \\
 \underline{70} \\
 \times = 1.5
 \end{array}$$

b.
$$\begin{array}{r}
 4 \overline{) 172} \quad (43 \\
 \underline{16} \\
 12 \\
 \underline{12} \\
 \times = 4.3
 \end{array}$$

c.
$$\begin{array}{r}
 312 \overline{) 2028} \quad (6.5 \\
 \underline{1872} \\
 1560 \\
 \underline{1560} \\
 \times = 0.65
 \end{array}$$

d.
$$\begin{array}{r}
 549 \overline{) 17019} \quad (31 \\
 \underline{1649} \\
 549 \\
 \underline{549} \\
 \times = 0.31
 \end{array}$$

e.
$$\begin{array}{r}
 29 \overline{) 145} \quad (5 \\
 \underline{145} \\
 \times = 5
 \end{array}$$

f.
$$\begin{array}{r}
 615 \overline{) 1968} \quad (3.2 \\
 \underline{1845} \\
 1230 \\
 \underline{1230} \\
 \times = 3.2
 \end{array}$$

5. If 1 m is equal to 3.28084 feet, how many feet will 26 m be equal to?

$$1 \text{ m} = 3.28084 \text{ feet}$$

$$26 \text{ m} = 3.28084 \times 26$$

238084	
× 26	
1968504	
656168 ×	
8530184	= 85.30184

6. If 2.54 cm makes an inch, how many inches will 65.04 cm make?

$$1 \text{ inch} = 2.54 \text{ cm}$$

$$? \text{ inches} = 65.04 \text{ cm}$$

$$= \frac{65.04}{2.54}$$

$$\begin{array}{r} 254 \overline{) 6604} \quad (26 \\ \underline{508} \\ 1524 \\ \underline{1524} \\ 0 \end{array}$$

$$26 \text{ inches} = 65.04 \text{ cm.}$$

Chapter-4 Rational Numbers

Exercise – 4.1

1. Which of the following are negative rational numbers?

a. $\frac{4}{-9}$ b. $\frac{1}{-2}$ c. $\frac{-5}{7}$

2. Find four rational numbers equivalent to each of the following:

a. $\frac{6}{11} \times \frac{2}{2}, \frac{6}{11} \times \frac{3}{3}, \frac{6}{11} \times \frac{4}{4}, \frac{6}{11} \times \frac{5}{5}$

$$\frac{12}{22}, \frac{18}{33}, \frac{24}{44}, \frac{30}{55}$$

b. $\frac{-3}{8} \times \frac{2}{2}, \frac{-3}{8} \times \frac{3}{3}, \frac{-3}{8} \times \frac{4}{4}, \frac{-3}{8} \times \frac{5}{5}$

$$\frac{-6}{10}, \frac{-9}{24}, \frac{-12}{32}, \frac{-15}{40}$$

c. $-1 \times \frac{2}{2}, -1 \times \frac{3}{3}, -1 \times \frac{4}{4}, -1 \times \frac{5}{5}$

$$\frac{-2}{2}, \frac{-3}{3}, \frac{-4}{4}, \frac{-5}{5}$$

d. $\frac{7}{-15} \times \frac{2}{2}, \frac{7}{-15} \times \frac{3}{3}, \frac{7}{-15} \times \frac{4}{4}, \frac{7}{-15} \times \frac{5}{5}$

$$\frac{14}{-30}, \frac{21}{-45}, \frac{28}{-60}, \frac{35}{-75}$$

e. $1 \times \frac{2}{2}, 1 \times \frac{3}{3}, 1 \times \frac{4}{4}, 1 \times \frac{5}{5}$

$$\frac{2}{2}, \frac{3}{3}, \frac{4}{4}, \frac{5}{5}$$

f. $8 \times \frac{2}{2}, 8 \times \frac{3}{3}, 8 \times \frac{4}{4}, 8 \times \frac{5}{5}$

$$\frac{16}{2}, \frac{24}{3}, \frac{32}{4}, \frac{40}{5}$$

3. Find the absolute value of the following:

a. 24 b. $\frac{31}{49}$ c. $\frac{3}{7}$

d. $\frac{6}{5}$ e. 9 f. $\frac{4}{11}$

4. Fill in the blanks to make an equivalent rational number in each of the following:

a. $\frac{8}{9} \times \frac{8}{8} = \frac{-64}{72}$

b. $\frac{1}{-5} \times \frac{6}{6} = \frac{6}{-30}$

c. $\frac{-3}{7} \times \frac{8}{8} = \frac{24}{56}$

d. $\frac{16}{48} \div \frac{-4}{-4} = \frac{-4}{-12}$

e. $\frac{36}{63} \div \frac{-9}{-9} = \frac{-4}{-7}$

f. $\frac{8}{12} \div \frac{-4}{-4} = \frac{-2}{-3}$

5. Use >, < or = appropriately using the property of cross products:

a. $3 \times 10 < 4 \times 8$ b. $-6 \times 20 < -11 \times 11$
 $= 30 < = 32$ $= -120 < = -121$

c. $23 \times 30 > 12 \times 40$ d. $72 \times 10 = 80 \times 9$
 $690 > 480$ $720 = 720$

e. $-3 \times 10 > -4 \times 7$ f. $18 \times 20 = 9 \times 40$
 $-30 > -28$ $360 = 360$

6. a. $\frac{14}{-5} = \frac{42}{\square}$

$$14 \times \square = 42 \times -5$$

$$\square = \frac{42 \times -5}{14} = -15$$

$$\frac{14}{-5} = \frac{42}{-15}$$

b. $\frac{14}{-5} = \frac{-70}{\square}$

$$14 \times \square = -70 \times -5$$

$$\square = \frac{-70 \times -5}{14} = 25$$

$$\frac{14}{-5} = \frac{-70}{25}$$

7. a. $\frac{13}{-6} = \frac{\square}{-30}$

$$\frac{13}{-6} \times -30 = \square$$

$$65 = \square$$

$$\frac{13}{-6} = \frac{65}{-30}$$

b. $\frac{13}{-6} = \frac{\square}{24}$

$$\frac{13}{-6} \times -24 = \square$$

$$-52 = \square$$

$$\frac{13}{-6} = \frac{-52}{24}$$

8. a. $\frac{-36}{24} = \frac{-9}{\square}$
 $-36 \times \square = -9 \times 24$
 $\square = \frac{\cancel{9}^1 \times 24^6}{\cancel{36}_{\cancel{1}_1}}$
 $\square = 6$
 $\frac{-36}{24} = \frac{-9}{6}$

b. $\frac{-36}{24} = \frac{6}{\square}$
 $-36 \times \square = 6 \times 24$
 $\square = \frac{\cancel{6}^1 \times 24^4}{\cancel{36}_{\cancel{1}_1}}$
 $\square = -4$
 $\frac{-36}{24} = \frac{6}{-4}$

Equating the denominator

$$\frac{-5}{7} \times \frac{8}{8}, \frac{-3}{8} \times \frac{2}{7}$$

$$\frac{-40}{56}, \frac{-21}{56}$$

$$\frac{-39}{56}, \frac{-38}{56}, \frac{-37}{56}, \frac{-36}{56}, \frac{-35}{56},$$

9. a. $\frac{84}{-147} = \frac{\square}{7}$
 $\frac{84^4 \times 7^1}{\cancel{147}_{\cancel{21}_1}} = \frac{\square}{7}$
 $-4 = \square$
 $\frac{84}{-147} = \frac{-4}{7}$

b. $\frac{84}{-147} = \frac{\square}{49}$
 $\frac{84^4 \times 49^7}{\cancel{147}_{\cancel{21}_1}} = \frac{\square}{49}$
 $28 = \square$
 $\frac{84}{-147} = \frac{28}{49}$

10. Write each of the following rational numbers in standard form:

a. $\frac{+14^2}{+49_7} = \frac{2}{7}$

b. $\frac{-78^{39}}{116_{58}} = \frac{-39}{58}$

c. $\frac{8^2}{-36_9} = \frac{-2}{9}$

d. $\frac{299^{23}}{-161_7} = \frac{-23}{7}$

e. $\frac{35^5}{49_7} = \frac{5}{7}$

f. $\frac{91^7}{-78_6} = \frac{-7}{6}$

g. $\frac{-27^3}{45_5} = \frac{-3}{5}$

h. $\frac{-68^4}{119_7} = \frac{-4}{7}$

11. Which of the following are pairs of equivalent rational numbers:

c. $\frac{9}{4}, \frac{-36}{-16}$

d. $\frac{3}{-8}, \frac{-6}{16}$

12. $\frac{-1}{5}$ and $\frac{-4}{13}$

Equating the denominator

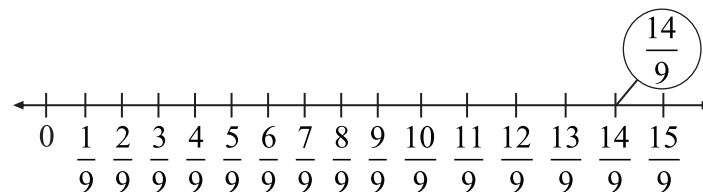
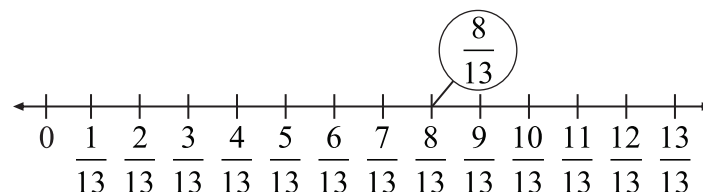
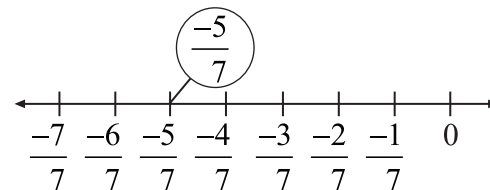
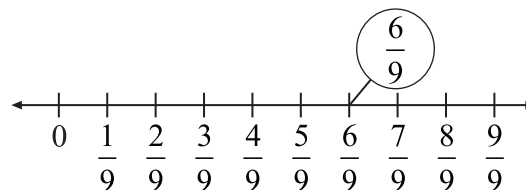
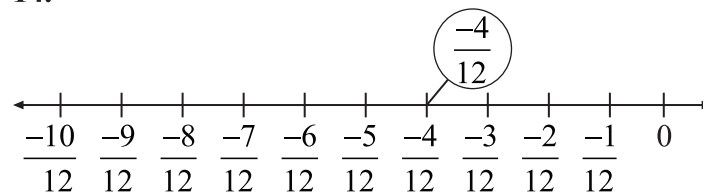
$$\frac{-1}{5} \times \frac{13}{13}, \frac{-4}{13} \times \frac{5}{5}$$

$$\frac{-13}{65}, \frac{-20}{65}$$

$$\frac{-14}{65}, \frac{-15}{65}, \frac{-16}{65}, \frac{-17}{65}$$

13. $\frac{-8}{7}$ and $\frac{-3}{8}$

14.



Exercise - 4.2

1. Find the sum of the following:

a. $\frac{5}{7}$

b. $\frac{3-5}{24} = \frac{2^1}{24_{12}} = \frac{1}{12}$

c. $\frac{-7-5}{18} = \frac{12^2}{18_3} = \frac{-2}{3}$

d. $\frac{29-2}{40} = \frac{20^1}{40_2} = \frac{1}{2}$

e. $\frac{-17-3}{30} = \frac{20}{30} = \frac{2}{3}$

f. $\frac{-18-23}{25} = \frac{-41}{25}$

2. Find the sum of the following:

a. $\frac{1}{5} - \frac{1}{6} = \frac{6-5}{30} = \frac{1}{30}$

b. $\frac{1}{9} - \frac{1}{8} = \frac{8-9}{72} = -\frac{1}{72}$

c. $\frac{-1}{5} + \frac{7}{6} = \frac{-6+35}{30} = \frac{29}{30}$

d. $\frac{-7}{8} + \frac{8}{9} = \frac{-63+64}{72} = \frac{1}{72}$

e. $\frac{4}{7} + \frac{5}{12} = \frac{48+35}{84} = \frac{83}{84}$

f. $\frac{-3}{7} + \frac{-2}{3} = \frac{-9-14}{21} = -\frac{23}{21}$

g. $\frac{3}{8} + \frac{3}{12} = \frac{9+6}{24} = \frac{15}{24}$

h. $\frac{-3}{4} + \frac{2}{15} = \frac{-45+8}{60} = -\frac{37}{60}$

i. $\frac{6}{11} + \frac{-3}{4} = \frac{24-33}{44} = -\frac{9}{44}$

3. Add:

a. $\frac{3}{5} + \frac{6}{7} = \frac{21+30}{35} = \frac{51}{35}$

b. $\frac{-8}{20} + \left(\frac{-6}{5}\right) = \frac{8-24}{20} = -\frac{16}{20} = -\frac{4}{5}$

c. $\frac{-3}{4} + \left(\frac{15}{20}\right) = \frac{-15+15}{20} = \frac{0}{20} = 0$

d. $\frac{7}{8} + \frac{1}{24} = \frac{21+1}{24} = \frac{22}{24} = \frac{11}{12}$

e. $\frac{2}{25} + \frac{1}{6} = \frac{12+25}{150} = \frac{37}{150}$

f. $\frac{-7}{18} + \left(\frac{-5}{7}\right) = \frac{-21-10}{54} = -\frac{31}{54}$

4. Subtract:

a. $\frac{-9}{20} - \frac{5}{8} = \frac{-18-25}{40} = -\frac{43}{40}$

b. $\frac{5}{9} - \left(\frac{-2}{3}\right) = \frac{5+6}{9} = \frac{11}{9}$

c. $\frac{7}{8} - \frac{-3}{4} = \frac{7-6}{8} = \frac{1}{8}$

d. $\frac{-4}{15} - \left(\frac{-2}{5}\right) = \frac{-4+6}{15} = \frac{2}{15}$

e. $\frac{4}{5} - \left(\frac{-2}{8}\right) = \frac{32+15}{40} = \frac{47}{40}$

f. $\frac{-6}{5} - \left(\frac{-4}{5}\right) = \frac{-6+4}{5} = -\frac{2}{5}$

5. Simplify:

a. $\frac{7}{8} + \frac{1}{3} - \frac{3}{4} = \frac{21+8-18}{24} = \frac{11}{24}$

b. $\frac{24}{7} - \frac{5}{14} - \frac{7}{12} + \frac{9}{4} = \frac{288-30-49+189}{84} = \frac{288+189-30-49}{84} = \frac{477-79}{84} = \frac{398}{84} = \frac{199}{42}$

c. $\frac{-7}{6} + \frac{3}{8} + \frac{3}{4} = \frac{-25+9+18}{24} = \frac{-1}{24}$

d. $\frac{39}{7} - \frac{8}{9} = \frac{401}{63} - \frac{3}{14} = \frac{13338-2128-50526-513}{2394} = \frac{13338-53167}{2394} = -\frac{39829}{2394}$

6. Add and express the sum as a mixed fraction:

a. $\frac{7}{8} + \frac{101}{6} = \frac{21+404}{24} = \frac{425}{24} = 17\frac{17}{24}$

b. $\frac{-31}{6} - \frac{27}{8} = \frac{-124-81}{24} = -\frac{205}{24} = -8\frac{13}{24}$

c. $\frac{24}{7} - \frac{11}{4} = \frac{96-77}{28} = \frac{19}{28}$

d. $\frac{43}{10} - \frac{12}{5} = \frac{43-24}{10} = \frac{19}{10} = 1\frac{9}{10}$

Exercise – 4.3

1. Multiply:

a. $5\frac{1}{3} \times \frac{-8}{15} = \frac{-8}{3}$

b. $\frac{0}{6} \times \frac{9}{27} = 0$

c. $\frac{2}{3} \times \frac{28}{3} = \frac{56}{9}$

d. $\frac{3}{4} \times \frac{5}{7} = \frac{15}{28}$

$$e. \frac{13}{8_4} \times \frac{\cancel{6}^3}{11} = \frac{-39}{44}$$

$$g. \frac{\cancel{4}^1}{9} \times \frac{\cancel{7}}{\cancel{12}_3} = \frac{-7}{27}$$

$$i. \frac{-6}{7} \times \frac{-4}{5} = \frac{24}{35}$$

$$f. \frac{\cancel{8}^{21}}{\cancel{12}_{21}} \times \frac{\cancel{3}^1}{\cancel{4}_1} = \frac{1}{2}$$

$$h. \frac{9}{10} \times \frac{-3}{7} = \frac{-27}{70}$$

2. Divide the following:

$$a. \frac{7}{10_5} \times \frac{\cancel{8}^4}{5} = \frac{28}{25}$$

$$b. \frac{-3}{5} \times \frac{11}{4} = \frac{-33}{20}$$

$$c. \frac{-7}{8} \times \frac{\cancel{12}^{21}}{\cancel{3}_2} = \frac{-7}{2}$$

$$d. \frac{5}{8} \times \frac{\cancel{8}}{\cancel{3}} = \frac{5}{3}$$

$$e. \frac{\cancel{2}^1}{9} \times \frac{7}{\cancel{4}_2} = \frac{7}{18}$$

$$f. \frac{2}{3} \times \frac{11}{5} = \frac{22}{15}$$

$$g. \frac{\cancel{21}^7}{\cancel{36}_{36}} \times \frac{\cancel{44}}{-30} = \frac{77}{-180}$$

$$h. \frac{2}{3} \times \frac{11}{4} = \frac{11}{6}$$

3. Simplify the following:

$$a. \frac{\cancel{2}^1}{\cancel{8}_8} \times \frac{\cancel{3}^1}{\cancel{4}_2} \times \frac{\cancel{3}}{4} = \frac{1}{8}$$

$$b. \frac{-2}{\cancel{8}_3} \times \frac{4}{5} \times \frac{\cancel{3}^1}{7} = \frac{-8}{105}$$

$$c. \frac{1}{2} \left(\frac{-1}{3} + \frac{5}{6} \right) = \frac{1}{2} \left(\frac{-2+5}{6} \right) = \frac{1}{2} \times \frac{\cancel{3}^1}{\cancel{6}_2} = \frac{1}{4}$$

$$d. \frac{\cancel{8}^3}{\cancel{10}_2} \times \frac{\cancel{3}^1}{\cancel{3}} \times \frac{\cancel{2}}{\cancel{3}} = 1$$

$$e. \frac{\cancel{4}^1}{\cancel{7}} \times \frac{\cancel{7}^1}{\cancel{9}_3} \times \frac{\cancel{3}^1}{\cancel{6}_2} = \frac{1}{2}$$

$$f. \frac{-3}{\cancel{4}} \times \frac{\cancel{4}}{5} \times \frac{-7}{8} = \frac{21}{40}$$

$$g. \frac{-16^2}{\cancel{8}_1} \times \frac{\cancel{3}}{\cancel{8}_1} \times \frac{10^2}{\cancel{3}} = -4$$

$$h. \frac{11}{5} \left(\frac{5}{11} + \frac{17}{11} \right) = \frac{11}{5} \times \frac{22}{11} = \frac{22}{5}$$

2. Add the following:

$$a. \frac{8}{27} - \frac{-7}{18} = \frac{16-21}{54} = \frac{-5}{24}$$

$$b. \frac{-3}{1} + \frac{3}{5} = \frac{-15+3}{5} = \frac{-12}{5}$$

$$c. \frac{-4-8}{11} = \frac{-12}{11}$$

3. Subtract:

$$a. \frac{4}{5} - \left(\frac{-7}{5} \right) = \frac{4+7}{5} = \frac{11}{5}$$

$$b. \frac{-9}{13} - \left(\frac{-2}{13} \right) = \frac{-9+2}{13} = \frac{-7}{13}$$

$$c. \frac{-11}{14} - \left(\frac{-6}{7} \right) = \frac{-11+12}{14} = \frac{1}{14}$$

4. Find the product of the following:

$$a. \frac{5}{10} \times \frac{\cancel{17}}{2} \times \frac{\cancel{10}}{\cancel{17}} = \frac{-5}{2} \quad b. \frac{9}{2} \times \frac{-7}{5} = \frac{-63}{10}$$

$$c. \frac{6}{-5} \times \frac{9}{13} = \frac{-54}{65} \quad d. \frac{\cancel{3}}{\cancel{3}} \times \frac{\cancel{3}}{\cancel{3}} \times \frac{1}{7} = \frac{1}{7}$$

$$e. \frac{4}{7} \times \frac{-2}{\cancel{3}} \times \frac{\cancel{3}}{11} = \frac{-8}{77} \quad f. \frac{16^2}{\cancel{8}_1} \times \frac{\cancel{3}}{\cancel{8}_1} \times \frac{10^2}{\cancel{3}} = -4$$

5. Find the quotient of the following:

$$a. \frac{\cancel{6}^3}{\cancel{2}_1} \times \frac{3}{\cancel{2}_1} = -9 \quad b. \frac{2}{3} \times \frac{17}{5} = \frac{34}{15}$$

$$c. \frac{\cancel{6}^1}{5} \times \frac{1}{\cancel{12}_2} = \frac{-1}{10} \quad d. \frac{12}{\cancel{13}_1} \times \frac{26^2}{\cancel{13}_1} = -24$$

$$e. \frac{3}{13} \times \frac{78^3}{\cancel{4}_2} = \frac{-9}{2} \quad f. \frac{21}{\cancel{36}_9} \times \frac{44^{11}}{40} = \frac{-213}{360}$$

6. Verify the following:

$$a. \frac{\cancel{8}^{14}}{5} \times \frac{19}{\cancel{6}_3} = \frac{19}{\cancel{6}_3} \times \frac{\cancel{8}^4}{5}$$

$$\frac{-76}{15} = \frac{-76}{15}$$

$$\text{LHS} = \text{RHS}$$

$$b. \frac{\cancel{6}^3}{11} \times \frac{14}{13} \times \frac{8}{\cancel{22}_{11}} = \frac{\cancel{6}^3}{11} \times \left(\frac{8}{\cancel{22}_{11}} \times \frac{14}{13} \right)$$

$$\frac{336}{1573} = \frac{336}{1573}$$

Revision Exercise

1. Tick (✓) the correct option:

$$a. \quad (ii) \quad \frac{-6}{11}$$

$$b. \quad (i) \quad \frac{19}{5}$$

$$c. \left(\frac{-32+11}{12} \right) \times \frac{3}{5} = \frac{-8}{\cancel{3}} \times \frac{\cancel{3}^1}{5} + \left(\frac{-11}{\cancel{12}_4} \times \frac{\cancel{3}^1}{5} \right)$$

$$= \frac{\cancel{21}}{\cancel{12}_4} \times \frac{3}{5} = \frac{-8}{5} + \left(\frac{-11}{20} \right)$$

$$\frac{43}{20} = \frac{-32-11}{20}$$

$$\frac{-43}{20} = \frac{-43}{20}$$

7. The product of two rational numbers is $\frac{-32}{18}$. If one of the numbers is $\frac{-4}{6}$, find the other.

Let the other no be x

$$x \times \frac{-4}{6} = \frac{-32}{18}$$

$$x = \frac{-32^8}{\cancel{18}_3} \times \frac{\cancel{6}^1}{\cancel{4}_1} = \frac{8}{3}$$

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

8. Write three equivalent rational numbers for the following:

$$a. -1 \times \frac{2}{2}, -1 \times \frac{3}{3}, -1 \times \frac{4}{4} = \frac{-2}{2}, \frac{-3}{3}, \frac{-4}{4}$$

$$b. \frac{3}{7} \times \frac{2}{2}, \frac{3}{7} \times \frac{3}{3}, \frac{3}{7} \times \frac{4}{4} = \frac{6}{14}, \frac{9}{21}, \frac{12}{28}$$

$$c. \frac{-3}{2} \times \frac{2}{2}, \frac{-3}{2} \times \frac{3}{3}, \frac{-3}{2} \times \frac{4}{4} = \frac{-6}{4}, \frac{-9}{6}, \frac{-12}{8}$$

$$d. \frac{-8}{17} \times \frac{2}{2}, \frac{-8}{17} \times \frac{3}{3}, \frac{-8}{17} \times \frac{4}{4} = \frac{-16}{34}, \frac{-24}{51}, \frac{-32}{68}$$

9. Find three rational numbers between:

$$a. \frac{1}{2} \times \frac{3}{3}, \frac{1}{3} \times \frac{2}{2}$$

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

$$\frac{12}{24}, \frac{8}{24}$$

$$\frac{9}{24}, \frac{10}{24}, \frac{11}{24}$$

$$b. \frac{1}{3} \text{ and } \frac{1}{5}$$

$$\frac{1}{3} \times \frac{5}{5}, \frac{1}{5} \times \frac{3}{3}, \frac{5}{15} \times \frac{4}{4}, \frac{3}{15} \times \frac{4}{4}$$

$$\frac{20}{60}, \frac{12}{60}$$

$$\frac{13}{60}, \frac{14}{60}, \frac{15}{60}$$

$$c. -4 \times \frac{4}{4}, -5 \times \frac{4}{4}$$

$$\frac{-16}{4}, \frac{-20}{4}$$

$$\frac{-17}{4}, \frac{-18}{4}, \frac{-19}{4}$$

Chapter-5 Powers of Exponents

Exercise – 5.1

1. Express each of the following in power notation:

$$a. \left(\frac{-7}{3} \right)^3 \quad b. \left(\frac{-2}{9} \right)^5 \quad c. \left(\frac{-14}{7} \right)^4 \quad d. \left(\frac{-5}{6} \right)^4$$

2. Express each of the following rational numbers in power notation:

$$a. \frac{2 \times 2 \times 2 \times 2}{5 \times 5} = \frac{4 \times 4}{5 \times 5} = \left(\frac{4}{5} \right)^2$$

$$b. \frac{2 \times 2 \times 2 \times 2 \times 2 \times 2}{2 \times 5 \times 2 \times 5} = \frac{8 \times 8}{10 \times 10} = \left(\frac{8}{10} \right)^2$$

$$c. \frac{-5 \times -5 \times -5}{6 \times 6 \times 6} = \left(\frac{-5}{6} \right)^3$$

$$d. \frac{2 \times 2 \times 2 \times 2 \times 2 \times 2}{3 \times 3 \times 3 \times 3 \times 3 \times 3} = \left(\frac{2}{3} \right)^6$$

$$e. \frac{4 \times 4 \times 4}{5 \times 5 \times 5} = \left(\frac{4}{5} \right)^3$$

$$f. \frac{-1 \times -1 \times -1 \times -1 \times -1}{3 \times 3 \times 3 \times 3 \times 3} = \left(\frac{-1}{3} \right)^5$$

$$g. \frac{2 \times 2 \times 2}{6 \times 6 \times 6} = \left(\frac{2}{6} \right)^3$$

$$h. \frac{12 \times 12}{13 \times 13} = \left(\frac{12}{13} \right)^2$$

3. Express each of the following powers of rational numbers as a rational number:

a. $\frac{-3 \times -3 \times -3 \times -3 \times -3}{5 \times 5 \times 5 \times 5 \times 5} = \frac{-243}{3125}$

b. $\frac{4 \times 4}{7 \times 7} = \frac{16}{49}$

c. $\frac{3 \times 3 \times 3}{11 \times 11 \times 11} = \frac{-27}{1331}$

d. $\frac{7 \times 7 \times 7 \times 7}{9 \times 9 \times 9 \times 9} = \frac{2401}{6561}$

4. Fill in the appropriate answers:

Base	Exponent	Expanded Form	Value
5	4	$5 \times 5 \times 5 \times 5$	625
6	6	$-2 \times -2 \times -2 \times -2 \times -2 \times -2$	64
$\frac{2}{3}$	4	$\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3}$	$\frac{16}{81}$
-6	2	-6×-6	36
-41	3	$-41 \times -41 \times -41$	-68921
10	3	$10 \times 10 \times 10$	1000

5. Simplify:

a. $\frac{-27}{64} \times \left(\frac{16}{27} - \frac{8}{27} \right)$

b. $\frac{-1}{4} \times 8^1 \times \frac{9}{16_2}$

$\frac{-27}{64_8} \times \frac{8^1}{27} = \frac{-1}{8}$

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

c. $-8^1 \times \frac{25}{144_{36_{18}}} = \frac{-25}{18}$

d. $(1-4) \div \frac{1}{25}$
 $= 5 \times 25 = 125$

6. Find the reciprocal of each of the following:

a. $\left(\frac{1}{4} \right)^3$ b. $\left(\frac{4}{3} \right)^4$ c. $(5)^6$ d. $\left(\frac{-3}{2} \right)^{105}$

7. Find the absolute value of:

a. $\frac{-2 \times -2}{5 \times 5} = \frac{4}{25}$

b. $\frac{-11 \times -11}{13 \times 13} = \frac{121}{169}$

c. $\frac{5 \times 5}{9 \times 9} = \frac{25}{81}$

d. $\frac{2 \times 2 \times 2 \times 2}{3 \times 3 \times 3 \times 3} = \frac{16}{81}$

8. Find the product of the cube of $\left(\frac{-2}{3} \right)$ and the square of $\left(\frac{-4}{-5} \right)$.

a. $\left(\frac{-2}{3} \right)^3 \times \left(\frac{-4}{-5} \right)^2$
 $= \frac{-8}{27} \times \frac{16}{25} = \frac{-128}{675}$

9. Distinguish between the rational numbers

$\frac{3^2}{2}$ and $\left(\frac{3}{2} \right)^2$, which is smaller of

the two? $\frac{9}{2}$ and $\left(\frac{3}{2} \right)^2 = \frac{3 \times 3}{2 \times 2} = \frac{9}{4}$

$\left(\frac{3}{2} \right)^2$ is smaller than $\frac{3^2}{2}$

10. Find the value of the following:

$\frac{3 \times 3 \times 3}{4 \times 4 \times 4} = \frac{27}{64}$

a. $\frac{4 \times 4 \times 4 \times 4}{5 \times 5 \times 5 \times 5} = \frac{256}{625}$

b. $\frac{-8 \times -8 \times -8 \times -8 \times -8}{9 \times 9 \times 9 \times 9 \times 9} = \frac{-32768}{59049}$

c. $\frac{-2 \times -2 \times -2 \times -2 \times -2 \times -2}{5 \times 5 \times 5 \times 5 \times 5 \times 5} = \frac{64}{15625}$

d. $\frac{-7 \times -7 \times -7}{10 \times 10 \times 10} = \frac{-343}{15625}$

e. $\frac{5 \times 5}{10 \times 10} = \frac{25}{256}$

Exercise - 5.2

1. Express each of the following as a rational number:

a. $\frac{-7 \times -7}{6 \times 6} = \frac{49}{36}$

b. $\left(\frac{5}{2} \right)^5 = \frac{5 \times 5 \times 5 \times 5 \times 5}{2 \times 2 \times 2 \times 2 \times 2} = \frac{3125}{32}$

c. $\left(\frac{5}{-2} \right)^2 = \frac{5 \times 5}{-2 \times -2} = \frac{25}{4}$

d. $\left(\frac{4}{-3} \right)^4 = \frac{4 \times 4 \times 4 \times 4}{3 \times 3 \times 3 \times 3} = \frac{256}{81}$

e. $\left(\frac{1}{-3} \right)^4 = \frac{1 \times 1 \times 1 \times 1}{-3 \times -3 \times -3 \times -3} = \frac{1}{81}$

f. $\left(\frac{-13}{-3} \right)^3 = \frac{-13 \times -13 \times -13}{-3 \times -3 \times -3} = \frac{2197}{27}$

g. $\frac{2 \times 2 \times 2}{5 \times 5 \times 5} = \frac{8}{125}$

h. $\left(\frac{1}{7} \right)^2 = \frac{1 \times 1}{7 \times 7} = \frac{1}{49}$

2. Simplify the following:
- a. 2^6 b. 10^6 c. 3^8
d. 5^6
3. Simplify if a , x and y are all whole numbers:
- a. x^{3a} b. a^{3x} c. 3^{xy}
d. a^{12}
4. Simplify:
- a. mn^3 b. 8^3 c. 12^3
d. 14^3 e. 6^2
5. Express as a single power:
- a. $(ab)^3$ b. $(xy)^a$
c. $(8 \times 7)^4 = 56^4$ d. $9 + 10 = 6$
e. $(ab)^x$
6. Simplify:
- a. $a^{x-x} = a^0 = 1$ b. $\left(\frac{2}{6}\right)^0 = 1$
c. $1 \times 1 = 1$ d. $9^0 = 1$
e. $5^0 = 1$
7. Express each of the following as a rational numbers with negative exponent:
- a. $\left(\frac{3}{2}\right)^{-2 \times (-3)} = \left(\frac{3}{2}\right)^6 = \left(\frac{2}{3}\right)^{-6}$ b. $3^{10} = \left(\frac{1}{3}\right)^{-10}$
c. 5^{-3} d. $2^9 = \left(\frac{1}{2}\right)^{-9}$
8. Express each of the following as power of a rational numbers with positive exponent:
- a. $7^{-3-7} = 7^{-10} = \left(\frac{1}{7}\right)^{10}$ b. $\left(\frac{3}{2}\right)^6$
c. $(-6)^2$ d. 8^3
e. $\left(\frac{4}{3}\right)^{-6} = \left(\frac{3}{4}\right)^6$
f. $(3^{5-8}) \times 3^{-6} = 3^{-3} \times 3^{-6} = 3^{-9} = \left(\frac{1}{3}\right)^9$
9. By what number $(-9)^{-1}$ be multiplied so that product may be equal to $(-12)^{-1}$?

Let the no be x

$$(-9)^{-1} \times x = (-12)^{-1}$$

$$x = \left(\frac{-1}{12}\right) \div \left(\frac{1}{9}\right)$$

$$x = \frac{-1}{12} \times -9$$

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

10. By what number should $(-24)^{-1}$ be divided so that the quotient may be 3^{-1} ?

Let the no be x

$$(-24)^{-1} \div x = 3^{-1}$$

$$\left(\frac{-1}{24}\right) \div \left(\frac{1}{3}\right) = x$$

$$\frac{-1}{24} \times 3 = x$$

$$\frac{-1}{8} = x$$

11. Find x so that

$$\left(\frac{5}{7}\right)^{-5} \times \left(\frac{5}{7}\right)^{-11} = \left(\frac{5}{7}\right)^{8x}$$

$$\left(\frac{5}{7}\right)^{-5-11} = \left(\frac{5}{7}\right)^{8x}$$

$$-16 = 8x$$

$$\frac{-16}{8} = x$$

$$= x = -2$$

12. If $5^{2x+1} \div 25 = 125$, find the value of x .

$$52x + 1 \div 5^2 = 5^3$$

$$2x + 1 - 2 = 3$$

$$2x - 1 = 3$$

$$2x = 3 + 1$$

$$= 2x = 4$$

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

13. Simplify:

a. $\frac{2^2 \times a^2 \times b - 4 \times c^2}{2^2 \times c^{-5} \times a^{-3} \times c^2}$

$$a^2 \div a^{-3} \times b^{-4} \div b^{-5}$$

$$a^{2-(-3)} \times b^{-7-(-5)}$$

$$a^{2+3} \times b^{-4+5}$$

$$= a^5 b$$

$$\begin{aligned} \text{b. } \frac{(2^4)^2 \times 5^3}{8^2 \times 5} &= \frac{2^8 \times 5^3}{(2^3)^2 \times 5} \\ &= \frac{2^8 \times 5^3}{2^6 \times 5} = 2^{8-6} \times 5^{3-1} \\ &= 2^2 \times 5^2 \\ &= 4 \times 25 = 100 \end{aligned}$$

$$\begin{aligned} \text{c. } \frac{11^3 \times 7^3}{12^1 \times 7} &= \frac{1331 \times 7^{3-1}}{12} \\ &= \frac{1331 \times 7^2}{12} = \frac{1331 \times 49}{12} \end{aligned}$$

$$\text{d. } (1-1) \times 1 = 0$$

$$\begin{aligned} \text{e. } \frac{5^3 \times 3^5 \times 3 \times 2^2}{3^2 \times 5^3} \\ &= 3^{6-2} \times 2^2 \\ &= 3^4 \times 2^2 \\ &= 81 \times 4 = 324 \end{aligned}$$

$$\begin{aligned} \text{g. } \left(\frac{1}{2} \div \frac{1}{5} \right) \times \frac{-5}{8} \\ \frac{1}{2} \times 5 \times \frac{-5}{8} \\ = \frac{-25}{16} \end{aligned}$$

$$\begin{aligned} \text{f. } (5^6 \times 5^4) \div 5^7 \\ 5^{6+4} \div 5^7 \\ 5^{10} \div 5^7 \\ 5^{10-7} = 5^3 = 125 \end{aligned}$$

$$\begin{aligned} \text{h. } \left(\frac{1}{4} + \frac{1}{8} \right) \times \frac{1}{2} \\ \frac{2+1}{8} \times \frac{1}{2} \\ \frac{3}{8} \times \frac{1}{2} = \frac{3}{16} \end{aligned}$$

14. Write 'True' or 'False' for each of the following statements:

- a. True b. False c. True
d. True e. False f. False

15. Fill in the blanks:

- a. $\left(\frac{1}{2} \right)^2 = \frac{1}{4}$ b. $(7)^7$ c. $\frac{-2}{3}$
d. 0 e. $\frac{-1}{27}$ f. $\frac{4}{25}$

Exercise – 5.3

1. Write the following numbers in usual notation:

- a. $\frac{3.24}{10000000} = 0.0000324$
b. $\frac{70006}{10000} \times 100000000 = 700060000$
c. $\frac{649}{10000000000000000} = 0.000000000000649$
d. $\frac{87 \times 100000000000000}{10} = 870000000000000$
e. $\frac{6.64}{100000000000} = 0.00000000664$
f. $\frac{6.69}{100} \times 100000 = 669000$
g. $\frac{1.34}{1000000000} = 0.000000134$
h. $\frac{7.93}{100} \times 100000000 = 793000000$

2. Write the following numbers in the standard form:

- a. $\frac{561}{100000} = 5.61 \times 10^3$
b. $\frac{123456}{1000000} = 1.23456 \times 10^{-1}$
c. $\frac{0123459}{100000000} = 1.234569 \times 10^{-7}$
d. $\frac{976543}{10000000000000} = 9.76543 \times 10^{-8}$
e. $675 \times 10000000 = 6.75 \times 10^9$
f. 593×10^7
g. $\frac{7}{10} = 7 \times 10^{-1}$

$$\text{h. } 837 = 837 \times 10^2$$

3. The unit of measuring the wavelength is known

as an atom (A) and is given by $1 \text{ A} = \frac{1}{10000000000}$

M. What is the distance of 620 A units?

$$1\text{A}^\circ = \frac{1}{10000000000}$$

$$260\text{A}^\circ = \frac{620}{10000000000} = 6.2 \times 10^{-8} \text{ m}$$

Revision Exercise

1. Tick (✓) the correct option:

- a. (ii) 8 b. (ii) $\left(\frac{2}{5}\right)^4$
 c. (ii) $(-3)^6$ d. (iv) $3^2 \times 10^3$

2. Convert the following into power notation:

- a. $= \frac{-2 \times -2 \times -2}{3 \times 3 \times 3} = \left(\frac{-2}{3}\right)^3$ b. $= \frac{7 \times 7}{9 \times 9} = \left(\frac{7}{9}\right)^2$
 c. $= \frac{5 \times 5}{10 \times 10} = \left(\frac{5}{10}\right)^2$ d. $= \frac{7 \times 7}{12 \times 12} = \left(\frac{7}{12}\right)^2$
 e. $= \frac{1 \times 1 \times 1}{6 \times 6 \times 6} = \left(\frac{1}{6}\right)^3$ f. $= \frac{2 \times 2 \times 2}{5 \times 5 \times 5} = \left(\frac{2}{5}\right)^3$
 g. $= \frac{-2 \times -2 \times -2 \times -2 \times -2}{3 \times 3 \times 3 \times 3 \times 3} = \left(\frac{-2}{3}\right)^5$
 h. $= \frac{5 \times 5 \times 5 \times 5}{7 \times 7 \times 7 \times 7} = \left(\frac{5}{7}\right)^4$

3. Write the base and the exponent in each of the following:

- a. Base = $\frac{1}{8}$ b. Base = $\frac{ab}{c}$
 Exp. = -4 Exp. = 5
 c. Base = $\frac{5}{7}$ d. Base = $\frac{-3}{5}$
 Exp. = 0 Exp. = 7

4. Evaluate the following:

- a. $\left(\frac{7}{4}\right)^{-3} = \left(\frac{7}{4}\right)^{-2}$ b. $\left(\frac{4}{5}\right)^{-3+2} = \left(\frac{4}{5}\right)^{-1}$
 c. $\left(\frac{2}{3}\right)^{4-6} = \left(\frac{2}{3}\right)^{-2}$ d. $\left(\frac{3}{13}\right)^{2+2} = \left(\frac{3}{13}\right)^{-4}$

5. Express the following as the square of a rational number:

- a. $\left(\frac{20}{30}\right)^2$ b. $\left(\frac{25}{40}\right)^2$ c. $\left(\frac{41}{50}\right)^2$

6. Which is greater?

- a. 16 or 27 b. 1024 or 625
 $2^4 < 3^3$ $4^5 > 5^4$
 c. $\frac{1}{4}$ or -8 = $\left(\frac{-1}{2}\right)^2 > (-2)^3$

7. Write true or false against the following statements:

- a. True b. False
 c. False d. False

Chapter-6 Algebraic Expression

Exercise – 6.1

1. From each of the given algebraic expressions, separate the terms with variables and terms which are only constants:

- a. $V = 5ab, 4ab^2, c = 70$
 b. $V = 35p^2q^2, 4p, -5q, -27pq, c = -35$
 c. $V = 89a^2b^3, 2xy, c = -6$
 d. $V = ax^3y^2, -2x^2y, v = 68$

2. List the factors of each term of the expressions given below:

- a. $x \times x \times x$ b. $7 \times p$
 c. $x \times y \times z$ d. $x \times x \times y \times y$
 e. (i) $2 \times x \times y$ (ii) $4 \times x \times x \times y$
 f. (i) $4 \times a \times a \times b$ (ii) -7
 g. (i) $x \times y \times 2$ (ii) $3 \times x \times x \times y$
 h. (i) $a \times b$ (ii) $c \times d$
 i. (i) $8 \times a \times b \times c$ (ii) $5 \times a \times b \times b \times c$
 j. (i) $b \times y$ (ii) $a \times x, c = -68$

3. Classify the following expressions as monomials, binomials and trinomials:

- a. Trinomial b. Trinomial
 c. Monomial d. Monomial
 e. Trinomial f. Binomial
 g. Binomial h. Binomial
 i. Monomial j. Trinomial

4. Write the algebraic expressions for the following:

- a. $x - 5y$ b. $\frac{x}{y} - 3$
 c. $2x - 12$ d. $d = 2x$

5. Garima spends ₹ x daily and saves ₹ y per week. What is her income for three weeks?

Money that Garima spends = ₹ x

Money that she spends in 3 week $= 3 \times 7 \times x$

$$= 21x$$

Money that she saves per week = ₹ y

Her saving for three weeks = ₹ $3y$

Her total income = ₹ $21x + 3y$

6. $9p = x - y$
7. $x + 56$
8. $5x = 2 - y$
9. Write each of the following in the expanded form:

a. $x \times x \times y \times y \times y$

b. $2 \times a \times a \times a \times b \times b \times b \times b$

c. $5 \times x \times x \times y \times y \times y \times 2 \times 2 \times 2 \times 2$

d. $4 \times a \times x \times x \times y \times y \times y$

10. Identify the monomial, binomial, trinomial and quadrinomial from the following expressions:

a. Monomial

b. Monomial

c. Binomial

d. Monomial

e. Binomial

f. Quadrinomial

Exercise – 6.2

1. Identify the like terms:

a. $(5x^2, x^2); (-2y^2, -y^2, 5y^2); (z^2, z^2)$

b. $(4ab, -3ab); (3ab^2, 4ab^2); (-ab^2b, 5a^2b)$

c. $(5xyz^2, -2xy^2z); (3xyz^2, xyz^2); (-2x^2y^2, x^2yz)$

2. If $a = 1$, $b = -1$, $c = 0$, find the value of the following expressions:

a. $3(1) + (-1) - 0$

b. $1 - 3(-1) + 0$

$= 3 - 1 = 2$

$1 + 3 = 4$

c. $1 \times (-1) - (-1) \times 0 + 3(1)^2$

$-1 + 0 + 3 = 2$

3. Find the value of:

a. $5(2)^4 - 2(2)^3 - (2)^2 + 2 - 5$

$80 - 16 - 4 + 2 - 5 = 57$

b. $(-1)^5 - (-1)^4 + (-1)^3 + (-1)^2 + (-1)^{-5}$
 $-1 - 1 - 1 - 1 - 1 - 5 = -10$

4. If $x = 6$, $y = 3$, $z = 2$, find the value of the following expressions:

a. $\frac{6}{3} + 6 \times 3 = 2 + 18 = 20$

b. $\frac{6 \times 3}{2} - 3 \times 2 = 9 - 6 = 3$

c. $4 \times 6 \times 3 + \frac{6^3}{2} + \frac{(6 \times 2)}{3}$
 $= 72 + 3 + 4 = 79$

d. $(6)^2 + (3)^2 - (2)^2$
 $= 36 + 9 - 4 = 41$

e. $(6)^2 \times 3 - 2 \times 6 \times (3)^2 + 3(2)^2$
 $108 - 108 + 12 = 12$

5. If $a = 2$, $b = 1$, $c = 0$, find the value of:

a. $2 + 1 - 0 = 3$

b. $2 \times 1 + 0 = 2$

c. $2 + 1 \times 0 = 0$

6. Simplify:

a. $8x$

b. $12x$

c. $9m$

d. $8k$

e. $4y$

f. $7x$

g. $10x$

h. $3m$

7. Simplify the following expressions by adding or subtracting the like terms:

a. $9a + 2b$

b. $9x + 3y$

c. $9x - 7x^2$

d. $4h + 3l + 2k$

e. $7x + 7y$

f. $8h - 3h - 5l = 5h - 5l$

8. Simplify the following:

a. $6y - 7y - 3y^2 + y^2 = -y - 2y^2$

b. $6m^2 - 5m^2 + 3x - 8x = m^2 - 5x$

c. $5l^2 - l^2 - 3l - 4l = 4l^2 - 7l$

d. $9y - 9y - 6z + 5z = -z$

e. $3a - a + 7 - 12 = 2a - 5$

9. Find the sum of:

a. $(5x + 3x + 5x + 3x) + (-4 + 2 + 2 - 4)$

$16x - 4$

b. $(4a + 5a + 4a) + (b + 2b - b)$

$13a + 2b$

7. How much is $2a^2 - 5$ less than $a^3 - 3a^2 + 2a - 3$?

$$a^3 - 3a^2 + 2a - 3 - (2a^2 - 7a + 5)$$

$$a^3 - 3a^2 + 2a - 3 - 2a^2 + 7a - 5$$

$$a^3 - 3a^2 - 2a^2 + 2a + 7a - 3 - 5$$

$$a^3 - 5a^2 + 9a - 8$$

8. How much does $2a^2 - 5a + 4$ exceed $3a^3 - 5a^2 + 7a - 9$?

$$2a^2 - 5a + 4 - (3a^3 - 5a^2 + 7a - 9)$$

$$2a^2 - 5a + 4 - 3a^3 + 5a^2 - 7a + 9$$

$$2a^2 + 5a^2 - 5a - 7a + 4 + 9 - 3a^3$$

$$7a^2 - 12a + 13 - 3a^3$$

d. $x + 2 = 8$

$$5 + 2 = 8$$

$$7 \neq 8$$

$$3 + 2 = 8$$

$$5 \neq 8$$

$$-3 + 2 = 8$$

$$-1 \neq 8$$

$$6 + 2 = 8$$

$$8 = 8$$

e. $2x = 18$

$$2 \times -8 = 18$$

$$-16 \neq 18$$

$$2 \times 2 = 18$$

$$4 \neq 18$$

$$2 \times 9 = 18$$

$$18 = 18$$

$$2 \times 7 = 18$$

$$14 \neq 18$$

f. $\frac{x+1}{3} = 7$

$$\frac{16+1}{3} = 7$$

$$\frac{17}{3} \neq 7$$

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

$$\frac{22}{3} \neq 7$$

$$\frac{20}{3} = 7$$

$$\frac{21^7}{\cancel{21}} = 7$$

$$7 = 7$$

$$\frac{-20+1}{3} = 7$$

$$\frac{-19}{3} \neq 7$$

Chapter-7 Simple Linear Equations

Exercise-7.1

1. Which of the following numbers satisfy the given equations? (Be sure to try each number):

a. $a^2 = 16$ b. $\frac{y}{2} = 8$ c. $5 + y = -2$

$$(-3)^2 = 16$$

$$9 \neq 16$$

$$a^2 = 16$$

$$(4)^2 = 16$$

$$16 = 16$$

$$a^2 = 16$$

$$(0)^2 = 16$$

$$0 \neq 16$$

$$a^2 = 16$$

$$(2)^2 = 16$$

$$4 \neq 16$$

$$a^2 = 16$$

$$(-6)^2 = 16$$

$$36 \neq 16$$

$$\frac{6}{2} = 8$$

$$\frac{6}{2} = 8$$

$$3 \neq 8$$

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

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

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

$$1.5 \neq 8$$

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

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

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

$$2 \neq 8$$

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

$$\frac{16}{2} = 8$$

$$\frac{16}{2} = 8$$

$$8 = 8$$

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

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

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

$$1 \neq 8$$

2. Solve the following equations by inspection:

a. $-x + 8 = 12$

$$-x + 8 - 8 = 12 - 8$$

$$-x = 4$$

c. $p^2 = 0$

$$\sqrt{p} = \sqrt{0}$$

$$p = 0$$

e. $\frac{x}{3} = 16$

$$\frac{x}{3} \times 3 = 16 \times 3$$

$$x = 48$$

g. $6 - y = -2$

$$6 - y - 6 = -2 - 6$$

$$-y = -8$$

$$y = 8$$

b. $y + 11 = 14$

$$y + 11 - 11 = 14 - 11$$

$$y = 3$$

d. $a + 3 = 9$

$$a + 3 - 3 = 9 - 3$$

$$a = 6$$

f. $10 = \frac{x}{2}$

$$10 \times 2 = \frac{x}{2} \times 2$$

$$20 = x$$

h. $3l - 4 = 2$

$$3l - 4 + 4 = 2 + 4$$

$$3l = 6$$

$$\frac{3l}{3} = \frac{6}{3}$$

$$l = 2$$

Exercise-7.2

1. Find the value of the variables:

a. $x - 9 = 30$

$$x = 90 + 9$$

$$x = 39$$

b. $\frac{y}{4} = \frac{1}{2}$

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

$$y = 2$$

$$\begin{aligned} \text{c. } 5a &= -30 \\ a &= \frac{-30}{5} \\ a &= 6 \end{aligned}$$

$$\begin{aligned} \text{d. } \frac{y+3}{4} &= 8 \\ y+3 &= 8 \times 4 \\ y+3 &= 32 \\ y &= 32-3 \\ y &= 29 \end{aligned}$$

$$\begin{aligned} \text{m. } 3x-3+6 &= 12 \\ 3x+3 &= 12 \\ 3x &= 12-3 \\ 3x &= 9 \\ x &= \frac{9}{3} = 3 \end{aligned}$$

$$\begin{aligned} \text{n. } 3a+4 &= 22 \\ 3a &= 22-4 \\ 3a &= 18 \\ a &= \frac{18}{3} \end{aligned}$$

$$\begin{aligned} \text{e. } 18x+12-30x+5 &= 3x-24-35x+30+9x \\ 18x-30x+17 &= 3x-35x+9x-24+30 \\ -12x+17 &= 12x-35x+6 \\ -12x+17-6 &= -23x \\ 11 &= -23x+12x \\ 11-11 &= -11x \\ \frac{-11}{-11} &= x \\ -1 &= x \end{aligned}$$

$$\begin{aligned} \text{f. } \frac{5}{10}x + \frac{x}{3} &= \frac{25}{10}x + 7 \\ \frac{5}{10}x + \frac{x}{3} - \frac{25}{10}x &= 7 \\ \frac{15x+10x-75x}{30} &= 7 \\ \frac{25x-75x}{30} &= 7 \\ \frac{-50x}{30} &= 7 \\ x &= \frac{7 \times 30}{-50} \\ x &= \frac{-21}{5} \end{aligned}$$

$$\begin{aligned} \text{g. } y-19 &= 20 \\ y &= 20+19 \\ y &= 39 \end{aligned}$$

$$\begin{aligned} \text{o. } \frac{2x-1}{3} &= \frac{6x-2}{5} = \frac{1}{3} \\ \frac{5(2x-1)-3(6x-2)}{15} &= \frac{1}{3} \\ 10x-5-18x+6 &= \frac{1}{3} \times 15 \\ 10x-18x+1 &= 5 \\ -8x+1 &= 5 \\ -8x &= 5-1 \\ -8x &= 4 \\ x &= \frac{-4}{8} \\ x &= \frac{-1}{2} \end{aligned}$$

$$\begin{aligned} \text{p. } \frac{2}{3}x &= 12 \\ x &= 12 \times \frac{3}{2} \\ x &= 18 \end{aligned}$$

$$\begin{aligned} \text{r. } \frac{x+2}{5} &= 15 \\ x+2 &= 15 \times 5 \\ x+2 &= 75 \\ x &= 75-2 \\ x &= 73 \end{aligned}$$

$$\begin{aligned} \text{q. } 2x+5 &= 3(3x+4) \\ 2x+5 &= 9x+12 \\ 5-12 &= 9x-2x \\ -7 &= 7x \\ \frac{-7}{7} &= 7x \\ -1 &= x \end{aligned}$$

$$\begin{aligned} \text{h. } 15x &= 45 \\ x &= \frac{45}{15} \\ x &= 3 \end{aligned}$$

$$\begin{aligned} \text{i. } 3x &= 36 \\ x &= \frac{36}{3} \\ x &= 12 \end{aligned}$$

$$\begin{aligned} \text{j. } -y+46 &= 42 \\ 46-42 &= y \\ 4 &= y \end{aligned}$$

$$\begin{aligned} \text{k. } \frac{2t+3}{-7} &= 4 \\ 2t+3 &= -7 \times 4 \\ 2t+3 &= -28 \\ 2t &= -28-3 \\ 2t &= -31 \\ t &= \frac{-31}{2} \end{aligned}$$

$$\begin{aligned} \text{l. } 6x+2 &= 20 \\ 6x &= 20-2 \\ 6x &= 18 \\ x &= \frac{18}{6} = 3 \end{aligned}$$

2. Determine by substitution if:

$$\begin{array}{ll} \text{a. } x^2=16 & \text{b. } x^2-2x+1=0 \\ (-4)^2=16 & (-1)^2-2(-1)+1=0 \\ 16=16 & 1+2+1=0 \\ & 4=0 \\ -4 \text{ is root of } x^2 & -1 \text{ is not a root of } x^2-2x+1 \end{array}$$

$$\begin{array}{ll} \text{c. } 8x=40 & \text{d. } 2x-3=5 \\ 8(5)=40 & 2(4)-3=5 \\ 40=40 \text{ Yes} & 8-3=5 \end{array}$$

$$\begin{array}{ll} \text{e. } (x-3)(x-2)=6 & 5=5 \text{ Yes} \end{array}$$

3. Solve and find the value of the variables:

$$\begin{aligned} (3-3)(5-2) &= 6 \\ 2 \times 3 &= 6 \\ 6 &= 6 \text{ Yes} \end{aligned}$$

a. $t - 4 = -20$
 $t = 4 = -20 + 4$
 $t = -16$

c. $x - 7 = 13$
 $x = 13 + 7$
 $x = 20$

e. $x - 5 = 4$
 $x = 4 + 5$
 $x = 9$

g. $l - 60 = -70$
 $l = 70 + 60$
 $l = -10$

i. $l = 60 = -70$
 $l = -70 + 60$
 $l = -10$

k. $t + 80 = 90$
 $t = 90 - 80$
 $t = 10$

m. $x + 8 = 16$
 $x = 16 - 8$
 $x = 8$

o. $p + 70 = 200$
 $p = 200 - 70$

4. Find the roots of the following equations:

a. $2x + 9 = 19$
 $2x = 19 - 9$
 $2x = 10$
 $x = \frac{10^5}{2_1} = 5$

c. $\frac{t}{3} + 5 = 20$
 $\frac{t}{3} = 20 - 5$
 $\frac{t}{3} = 15$

e. $\frac{t}{3} = 15$
 $t = 15 \times 3$
 $t = 45$

b. $x - 2 = 2$
 $x = 2 + 2$
 $x = 4$

d. $p + 2 = 30$
 $p = 30 - 2$
 $p = 28$

f. $x - 9 = 6$
 $x = 6 + 9$
 $x = 15$

h. $y - 14 = -30$
 $y = -30 + 14$
 $y = -16$

j. $y + 19 = 20$
 $y = 20 - 19$
 $y = 1$

l. $x + 15 = 15$
 $x = 15 - 15$
 $x = 0$

n. $x + 3 = -6$
 $x = -6 - 3$
 $x = -9$

p. $x = 10 = 10$
 $x = 10 - 10$

b. $8x = 6x + 10$
 $8x - 6x = 10$
 $2x = 10$

d. $x = \frac{10^5}{2_1} = 5$

f. $\frac{2a + 3}{7} = 5$
 $2a + 3 = 7 \times 5$
 $2a + 3 = 35$
 $2a = 35 - 3$
 $2a = 32$

h. $a = \frac{32^{16}}{2_1} = 16$

g. $\frac{y}{10} - 12 = 6$
 $\frac{y}{10} = 6 + 12$
 $y = 18 \times 10$
 $y = 180$

5. Solve:

a. $x + 9 = 58$
 $x = 58 - 9$
 $x = 49$

c. $c = pd$
 $= \frac{c}{p} = d$

e. $A = bh$
 $\frac{A}{b} = h$
 $l = PRT$
 $\frac{l}{PT} = R$

g. $ax = b$
 $x = \frac{b}{a}$
 $V = lbh$
 $\frac{v}{lb} = h$
 $A = bh$
 $\frac{A}{h} = b$

h. $3x + 3 = 9$
 $3x = 9 - 3$
 $3x = 6$
 $x = \frac{6^2}{3_1} = 2$

b. $-x = 2 + 3x$
 $-x - 3x = 2$
 $-4x = 2$

d. $x = \frac{-2^1}{4_2} = -\frac{1}{2}$

Exercise - 7.3

1. Frame equations for the following:

- Let the no be $x \Rightarrow 7x + 10 = 78$
- Let the no be $x \Rightarrow x - 10 = 90$
- Let the no be $x \Rightarrow 3x = 80$
- Let the no be $x \Rightarrow 8x = 48$
- Let the no be $x \Rightarrow x + 8 = 68$
- Let the no be $x \Rightarrow \frac{x}{2} - 21 = 2x$
- Let the cost of toy be x , Book = $3x \Rightarrow 3x + x = 60$

2. Frame the equations and solve:

- Let the no. be x
 $\frac{3}{2}$ of $x = 270$
 $\frac{3}{2}x = 270$
 $x = \frac{270^{90} \times 2}{3_1}$
 $x = 180$
- Let the cost of 1 pencil be x
 $5x = 100$
 $x = \frac{100^{20}}{5_1}$
 $x = 20$

c. Let the no. be x

$$\frac{3}{2}x = 192$$

$$x = 192 \times \frac{2}{3} = 128$$

e. Let the no. be x

$$\frac{5}{8}x = 5000$$

$$x = 5000 \times \frac{8}{5} = 8000$$

3. Find three consecutive numbers such that the sum of the second number and the third number exceeds the first by 12.

Let first no. be x

Second = $x + 1$,

Third = $x + 1 + 1$
= $x + 2$

$$(x + 1) + (x + 2) = x + 12$$

$$2x + 3 = x + 12$$

$$2x - x = 12 - 3$$

$$x = 9$$

The no. are 9, 10, 11

4. A number when divided by 9 gives the quotient 4. What is the number?

Let the no. be x

$$\frac{x}{9} = 4$$

$$x = 9 \times 4$$

$$x = 36$$

5. Lata is 3 times as old as her little sister Mahi, but in 3 more years she will be twice as old as Mahi will be then. Find their present ages.

Let the age of Mahi be x

Age of Lata = $3x$

After 3 years

Age of Mahi = $x + 3$

Age of Lata = $3x + 3$

$$2(x + 3) = 3x + 3$$

$$2x + 6 = 3x + 3$$

$$6 - 3 = 3x - 2x$$

$$3 = x$$

Mahi's age = 3 years, Lata age = $3 \times 3 = 9$

d. Let the no. be x

$$5x = 40 \Rightarrow x = \frac{40}{5} = 8$$

$$x = 8$$

f. Let the weight be x

$$\frac{2}{3}x = 36$$

$$x = 36 \times \frac{3}{2} = 54 \text{ kg}$$

6. After buying a toy, I am left with ₹11 out of my fifty rupee note. What is the cost of the toy?

Let the cost of toy be x

$$50 - x = 11$$

$$50 - 11 = x$$

$$39 = x$$

7. The difference in age between a boy and his younger brother is 4 years. The younger brother in turn is 4 years older than his brother. The sum of the ages of the younger brother and his brother is 16. How old are the three children?

Let the age of brother be x

Younger brother = $4x$

Age of boy = $4x + 4$

8. If one side of a square is represented by $4a - 7$ and the adjacent side is represented by $3a + 5$. Find the value of a .

$$4a - 7 = 3a + 5$$

$$4a - 3a = 7 + 5$$

$$a = 12$$

9. Find the two numbers such that one is 5 times the other and their difference is 20.

Let one no. be x

other = $5x$

$$5x - x = 20$$

$$4x = 20$$

$$x = \frac{20}{4} = 5$$

10. A chair and a table together cost ₹1600. If the cost of the table is one-third of the cost of the chair, find the cost of chair and table separately.

Let the cost of Chair be x

Cost of Table = $\frac{x}{3}$

$$\frac{x}{1} + \frac{x}{3} = 1600$$

$$\frac{3x + x}{3} = 1600$$

$$4x = 1600 \times 3 = 4800$$

$$x = \frac{4800}{4} = 1200$$

Cost of Chair = 1200

$$\text{Table} = \frac{1200}{3} = 400$$

Revision Exercise

1. Tick (✓) the correct option:

- a. (i) 8 b. (i) 5 years
c. (i) $4x+3$ d. (i) $100kg$

2. Form an equation for each of the following statements:

- a. Let the no be $x = x + 3 = 6$
b. Let the no be $x = 3x + 9 = 13$
c. Let the no be $x = x + 2x = 15$
d. Let the no be $x = \frac{x}{2} = 2x - 16$

3. Solve the following equation:

- a. $3x + 6 = 18$ b. $9m = 30 + 15$
 $3x = 18 - 6$ $9m = 45$
 $3x = 12$ $m = \frac{45}{9}$
 $x = \frac{12}{3}$ $m = 5$
 $x = 4$
- c. $9y + 126 = 27$ d. $3 = \frac{x}{2} - \frac{x}{3}$
 $9y = 27 - 126$ $3 = \frac{3x - 2x}{6}$
 $9y = -99$ $3 \times 6 = x$
 $y = \frac{-99}{9}$ $18 = x$
 $y = -11$
- e. $\frac{3x}{2} = \frac{11}{2} - 1$
 $\frac{3x}{2} = \frac{11 - 2}{2}$
 $\frac{3x}{2} = \frac{9}{2}$
 $x = \frac{9}{3} = 3$

4. Find the value of unknowns:

- a. $x + \frac{3}{8} = \frac{11}{8}$ b. $x = \frac{2}{3} + \frac{1}{3}$
 $x = \frac{11}{8} - \frac{3}{8}$ $x = \frac{3}{3}$
 $x = \frac{8}{8} = 1$ $x = 1$
- c. $y + 5 = 9$ d. $x + \frac{5}{17} = \frac{3}{17}$
 $y = 9 - 5$ $x = \frac{3}{17} - \frac{5}{17}$
 $y = 4$ $x = \frac{-2}{17}$

- e. $y - 3 = -30$ f. $z - 3 = 9$
 $y = -30 + 3$ $z = 9 + 3$
 $y = -27$ $z = 12$

5. Determine by substitution it:

- a. $x^3 - 8 = 0$ b. $x - 5 = 0$
 $(2)^3 - 8 = 0$ $-5 - 5 = 0$
 $8 - 8 = 0$ $-10 \neq 0$
 $0 \neq 0$ (Yes) (No)
- c. $5x = 10$ d. $x^2 - 16 = 0$
 $5(-2) = 10$ $(-4)^2 - 16 = 0$
 $-10 \neq 10$ $16 - 16 = 0$
(No) $0 = 0$
 (Yes)

Chapter-8 Ratio and Proportion

Exercise – 8.1

1. Find the ratio of:

- a. $1m = 100cm = 10m = 1000$
 $\frac{1000}{25} = 400:1$
- b. $₹1 = 100p = ₹60 = 6000p$
 $\frac{25}{6000} = 1:240$
- c. $\frac{20^5}{24^6} = 5:6$ d. $\frac{4^2}{8} = 2:35$
- e. $\frac{100^4}{25^1} = 40:1$ $\frac{32}{560} = 2:35$
- $\frac{280}{140} = 2:35$

2. Express the following as ratios in the simplest form:

- a. $1h = 60m$ $2h = 120m$ b. $\frac{52^{10}}{1.5^3} = 10:3$
 $\frac{120}{30} = \frac{2}{5} = 2:5$
- c. $\frac{600^{24}}{1.25^5} = 24:5$ c. $\frac{700}{1000} = 7:10$
 $\frac{7.5^{15}}{40^8} = 15:8$

3. Sarita works in a factory and earns ₹955 per month. She saves ₹185 per month from her earnings. Find the ratio of:

Sarita's earning = 955

Sarita's saving = 185

Sarita's expenditure = 955 - 185 = 770

$$\text{a. } \frac{185}{955} = 37:191 \quad \text{b. } \frac{955}{770} = 191:154$$

$$\text{c. } \frac{185}{770} = 37:154$$

4. 64 persons are working in an office. Out of them 40 are men and the remaining are women. Find the ratio of the number of:

Working person in office = 64

men = 40

women = 64 - 40

$$\text{a. } \frac{40}{24} = 5:3 \quad \text{b. } \frac{40}{64} = \frac{5}{8} = 5:8$$

$$\text{c. } \frac{64}{24} = 8:3$$

5. The ratio of boys and girls in a school is 8:5 and number of girls is 160. Find the total strength of the school.

Ratio of boys & girls = 8:5

Boys = 8x, Girls = 5x

No. of girls = 160

5x = 160

$$x = \frac{160}{5} = 32$$

No. of boys = 8 × 32 = 256

girls = 5 × 32 = 160

Total strength = 160 + 256 = 416

6. Ritika and Gaurav invested ₹1800 and ₹2400 respectively in a small business. They made a profit to ₹1400. They decided to divide the profit between them in the ratio of their investments. How much did each get as a profit?

Investment by Rohit = 1800

Investment by Gaurav = 2400

$$\text{Ratio} = x = \frac{1800}{2400} = 3:4$$

Profit earned = 140

Distribution of profit in 3 : 4

$$\text{Rohit's share} = \frac{3}{7} \times 1400 = 600$$

$$\text{Gaurav's share} = \frac{4}{7} \times 1400 = 800$$

7. The ratio of numerator and denominator of a fractions in 3 : 2. If 3 is added to the numerator and 2 is subtracted from the denominator of a fractions is formed whose value is $\frac{9}{4}$. Find the original fraction.

Let common ratio be x

$$\frac{3x+3}{2x-2} = \frac{9}{4}$$

$$4(3x+3) = 9(2x-2)$$

$$12x + 12 = 18x - 18$$

$$18x - 12x = 12 + 18$$

$$6x = 30$$

$$x = \frac{30}{6} = 5$$

$$\text{Original No.} = \frac{3x}{2x} = \frac{3 \times 5}{2 \times 5} = \frac{15}{10}$$

8. The ratio of sides of a rectangular piece of paper is 2 : 3. If the area is 150 sq cm, find the length and breadth.

Let common ratio be x

L × B = Area of Rectangle

$$2x \times 3x = 150 \text{ cm}^2$$

$$6x^2 = 150 \text{ cm}^2$$

$$x^2 = \frac{150}{6} \text{ cm}^2$$

$$x^2 = 25 \text{ cm}^2 = x = \sqrt{25 \text{ cm}^2} = x = 5 \text{ cm}$$

$$L = 2x = 2 \times 5 = 10 \text{ cm}$$

$$B = 3x = 3 \times 5 = 15 \text{ cm}$$

9. What is the number that must be added to the numerator and denominator of the fraction $\frac{6}{7}$ so that the fraction takes the new value as $\frac{9}{10}$

Let common ratio be x

$$\frac{6+x}{7+x} = \frac{9}{10}$$

$$10(6+x) = 9(7+x)$$

$$60 + 10x = 63 + 9x$$

$$10x - 9x = 63 - 60$$

$$x = 3$$

10. The sides of a triangle are in the ratio 1 : 2 : 3. If the perimeter is 42cm. Find its sides.

Let common ratio be x

$$x + 2x + 3x = 42\text{cm}$$

$$6x = 42\text{cm}$$

$$x = \frac{42}{6} \text{cm} = 7\text{cm}$$

$$\text{First side} = x = 7\text{cm}$$

$$\text{Second side} = 2x = 2 \times 7 = 14\text{cm}$$

$$\text{Third side} = 3x = 3 \times 7 = 21\text{cm}$$

Exercise – 8.2

1. Show that:

$$\text{a. } \frac{38 \times 7}{266} = \frac{49 \times 6}{294}$$

Product of mean = product of extreme

$$\text{b. } \frac{20 \times 60}{1200} = \frac{40 \times 55}{2200}$$

Product of mean = product of extreme

2. Find the fourth proportional to the numbers:

Let fourth proportional be x

$$\text{a. } 5:7::30:x$$

$$5 \times x = 30 \times 7$$

$$x = \frac{30 \times 7}{5}$$

$$x = 42$$

$$\text{b. } 8:36::6:x$$

$$8 \times x = 6 \times 36$$

$$x = \frac{6 \times 36}{8}$$

$$x = 27$$

3. What must be subtracted from each of the numbers 10, 12, 19 and 24 to get number which are in proportion?

Let x be subtracted

$$\frac{10-x}{12-x} = \frac{19-x}{24-x}$$

$$(10-x)(24-x) = (19-x)(12-x)$$

$$240 - 10x - 24x + x^2 = 228 - 19x - 12x + x^2$$

$$240 - 34x = 228 - 31x$$

$$240 - 228 = -31x + 34x$$

$$12 = 3x$$

$$\frac{12}{3} = x$$

4 must be subtracted

4. Find which of the following are in proportion:

$$\text{a. } 6 \times 3 \quad 2 \times 4$$

$$18 \neq 12$$

No

$$\text{b. } 8 \times 12 \quad 16 \times 6$$

$$96 = 96$$

Yes

$$\text{c. } 150 \times 300 \quad 250 \times 200$$

$$45000 \neq 50000$$

No

5. The ratio of the number of boys to that in class is 7:5. If the number of boys is 56 find the number of girls in the class.

$$7:5::5:x$$

$$7 \times x = 56 \times 5$$

$$x = \frac{56 \times 5}{7} = 40$$

The no. of girls are 40.

6. The sides of triangle are in the ratio 4:5:6. If the perimeter of the triangle is 30 cm, find its sides.

Let the ratio be x

$$4x + 5x + 6x = 30$$

$$15x = 30\text{cm}$$

$$x = \frac{30}{15} \quad x = 2\text{cm}$$

$$\text{First side} = 4x = 4 \times 2 = 8\text{cm}$$

$$\text{Second side} = 5x = 5 \times 2 = 10\text{cm}$$

$$\text{Third side} = 6x = 6 \times 2 = 12\text{cm}$$

7. If 36, 54, a are in continued proportion, find the value of a .

$$36:54::a$$

$$36:54::54:a$$

$$36 \times a = 54 \times 54$$

$$a = \frac{54 \times 54}{36}$$

$$a = 81$$

8. What is the mean proportion between 9 and 16?

Let mean proportion be x

$$7:x::x:16$$

$$9 \times 16 = x^2$$

$$\sqrt{144} = x$$

$$12 = x$$

9. Find x in the following which are in proportion:

a. $2 \times 27 = 9x$

$$\frac{2\cancel{7}^3 \times 2}{\cancel{9}_1} = x$$

$$6 = x$$

b. $6 \times 55 = 11x$

$$\frac{6 \times \cancel{55}^5}{\cancel{11}_1} = x$$

$$30 = x$$

c. $9 \times 12 = 8x$

$$\frac{9 \times \cancel{12}^3}{\cancel{8}_2} = x$$

$$\frac{27}{2} = x$$

$$13.5 = x$$

10. What is the third proportion to 9 and 12?

Do it yourself

Exercise – 8.3

1. The price of 3 metres of cloth is ₹79.50. Find the price of 25 metres of such cloth.

Price of cloth (₹in) 79.50 x

Length of cloth (in/cm) 3 25

$$79.50 \times 25 = 3 \times x$$

$$\frac{79.50 \times 25}{3} = x$$

$$602.5 = x$$

2. A bus runs 200km in 5 hours. How many kilometres it runs in 7 hours?

Distance (in/cm) 200 x

Time (in h) 5 7

$$200 \times 7 = 5x$$

$$\frac{\cancel{200}^{40} \times 7}{\cancel{5}_1} = x$$

$$280 = x$$

3. A man earns ₹3000 in 8 days. Find his income for 12 days.

Earning (in ₹) 3000 x

Days 8 12

$$3000 \times 12 = 8 \times x$$

$$\frac{\cancel{3000}^{1500} \times \cancel{12}^3}{\cancel{8}_{21}} = x$$

$$₹4500 = x$$

4. If the sales tax on a purchase worth ₹60 is ₹4.20, what will be the sales tax on a purchase worth ₹120?

Purchase (in ₹) = 60 120

Sales tax (in ₹) = 4.20 x

$$60 \times x = 120 \times 4.20$$

$$x = \frac{\cancel{120}^2 \times 4.20}{\cancel{60}}$$

$$x = ₹8.40$$

5. A rail journey of 75km costs ₹215. How much will a journey of 120km cost?

Distance (in km) 75 120

Cost (in ₹) 215 x

$$75 \times x = 120 \times 215$$

$$x = \frac{\cancel{120}^{24} \times \cancel{215}^{43}}{\cancel{75}_{25}} = \frac{1032}{5}$$

$$x = ₹206.4$$

6. Fifteen postcards cost ₹2.25. What would be the cost of 25 post cards? How many post cards can we buy in ₹45?

Post card 15 25 y

Cost (in ₹) 2.25 x 45

$$15 \times x = 25 \times 2.25$$

$$x = \frac{\cancel{25}^5 \times 2.25}{\cancel{15}_3} = \frac{11.25 - 3.75}{3}$$

$$25 \times 45 = 3.75 \times y$$

$$\frac{25 \times 45 \times 100}{3.75} = y$$

$$\frac{\cancel{112500}^{300}}{\cancel{3751}} = y$$

$$300 = y$$

Exercise – 8.4

1. If 48 men can d a piece of work in 25 days then how many days can 12 men finish it?

No. of men 48 12

No. of days 25 x

$$48 \times 25 = 12 \times x$$

$$\frac{48^4 \times 25}{12_1} = x$$

$$100 = x$$

2. 45 horses can graze a field in 13 days. How many cows will graze the same field in 5 days?

$$\text{No. of horses} \quad 45 \quad x$$

$$\text{No. of days} \quad 13 \quad 5$$

$$45 \times 13 = 5x$$

$$\frac{45^9 \times 13}{5_1} = x$$

$$117 = x$$

3. A boy can finish a book in 25 days. If he reads 18 pages of it every day. How many days will he take to finish it, if he reads 15 pages every day?

$$\text{No. of pages} \quad 18 \quad 15$$

$$\text{No. of days} \quad 25 \quad x$$

$$18 \times 25 = 15 \times x$$

$$\frac{18^6 \times 25^5}{15_{51}} = x$$

$$30 = x$$

4. A garrison of 500 men has provisions for 24 days. However a reinforcement of 300 men arrived. For how many days will the food last now?

$$\text{No. of men} \quad 500 \quad 500 + 300 = 800$$

$$\text{No. of days} \quad 24 \quad x$$

$$500 \times 24 = 800 \times x$$

$$\frac{500^3 \times 24^3}{8_1 00} = x$$

$$15 = x$$

5. Riya and Juhi together bought a lottery ticket costing ₹100. Riya put in ₹30 and Juhi put in ₹70. They won a prize of ₹18,000. They decided to share the prize in the ratio 30 : 70. How much money did each receive?

$$\text{Ratio} = 30 : 70 = 30 : 7$$

$$\text{Riya's share} = \frac{3}{10} \times 18000 = 5400$$

$$\text{Juhi's share} = \frac{7}{10} \times 18000 = 12600$$

6. Which of the following are in proportion?

a. $12 \times 3 = 9 \times 8$ b. $12 \times 6 = 9 \times 8$

$$36 \neq 72 \quad \quad \quad 72 = 72$$

$$\text{No} \quad \quad \quad \text{Yes}$$

c. $24 \times 12 = 8 \times 6$ d. $7 \times 49 = 21 \times 3$

$$288 \neq 48 \quad \quad \quad 343 \neq 63$$

$$\text{No} \quad \quad \quad \text{No}$$

e. $21 \times 7 = 49 \times 4$ f. $8 \times 15 = 10 \times 12$

$$147 \neq 196 \quad \quad \quad 120 \neq 120$$

$$\text{No} \quad \quad \quad \text{Yes}$$

7. Kanchan baked a cake. For every 160g of butter she used 200g of flour and 120g of sugar what is the ratio of:

$$\text{Amount of butter} = 160\text{g}$$

$$\text{Amount of flour} = 200\text{g}$$

$$\text{Amount of sugar} = 120\text{g}$$

a. $\frac{5 \cancel{20}^5}{3 \cancel{12}^3} = 5:3$ b. $\frac{5 \cancel{20}^5}{4 \cancel{10}^4} = 5:4$

c. $\frac{4 \cancel{16}^4}{3 \cancel{12}^3} = 4:3$

8. The number of males and females who attended a concept was in the ratio 7 : 4. If there were a total of 616 people there, how many men were there?

$$\text{Total people} = 616$$

$$\text{Ratio of Males to females} = 7:4$$

$$\text{No. of men} = \frac{7}{11} \times 616$$

$$= 7 \times 56 = 392$$

9. The three sides of a triangle are 9cm, 12cm and 18cm. The longest side of a similar triangle measures 12cm. What are the lengths of the other sides?

Revision Exercise

1. Tick (✓) the correct option:

a. (ii) 15 hrs b. (iv) None

c. (i) 2:3:4 d. (iii) 39

2. No 3. Yes

4. Express the following as ratios:

a. $\frac{50}{70} = 5:7$ b. $\frac{20^5}{24_6} = 5:6$

c. $\frac{2 \cancel{70}^2}{1 \cancel{35}^1} = 2:1$ e. $\frac{\cancel{6}^3}{10_5} = 3:5$

Let the sides of 1st $\triangle = a, b, c$
Let the sides of 2nd $\triangle = d, e, f$

$$\frac{a}{c} = \frac{d}{f} = \frac{9}{18} = \frac{d}{12} = \frac{6^1 \times 12^6}{8_{12}} = d$$

$$d = 6\text{cm}$$

$$\frac{a}{b} = \frac{d}{e} \Rightarrow \frac{9}{12} = \frac{c}{e} \Rightarrow 9 \times e = 12 \times 6$$

$$e = \frac{6^2 \times 12^4}{8_{31}} = e = 8\text{cm}$$

The other sides of similar triangle are 6cm and 8cm.

10. In 6 hours, a bus travelled a distance of 270km. Find the distance travelled by the bus in hours, assuming that it travelled at the same speed.

Distance (in km) 270 x

Time (in h) 6 5.5

$$270 \times 5.5 = 6x$$

$$\frac{270 \times 5.5}{6 \times 10} = x$$

$$\frac{495}{2} = x$$

$$247.5\text{km} = x$$

3. Express each of the following decimals as the percent:

a. $\frac{2}{100} \times 100 = 2\%$ b. $\frac{42}{1000} \times 100 = 4.2\%$
c. $\frac{4}{1000} \times 100 = 0.4\%$ d. $\frac{275}{1000} \times 100 = 27.5\%$
e. $\frac{12}{100} \times 100 = 120\%$ f. $\frac{3}{1000} \times 100 = 0.3\%$
g. $\frac{25}{100} \times 100 = 25\%$

4. Write each of the following as fractions or mixed fractions:

a. $\frac{1}{100}$ b. $\frac{2.55}{1000} = \frac{51}{200}$
c. $\frac{136}{100} = 1\frac{9}{25}$ d. $\frac{15}{100} = \frac{3}{20}$
e. $\frac{25}{200} = \frac{1}{8}$ f. $\frac{115}{100} = 1\frac{3}{20}$
g. $\frac{300}{100} = 3$ h. $\frac{250}{100} = 2\frac{1}{2}$

5. The marks obtained by Tarun in his exams are given below. Express these marks as percentages:

Subjects	Maximum Marks	Marks obtained	Percentage of marks (out of 100)
Biology	50	42	$\frac{42}{50} \times 100 = 84\%$
Computer	20	18	$\frac{18}{20} \times 100 = 90\%$
Maths	25	19	$\frac{19}{25} \times 100 = 76\%$
Chemistry	40	28	$\frac{28}{40} \times 100 = 70\%$
Physics	25	20	$\frac{20}{25} \times 100 = 80\%$

Chapter-9 Percentage and its Applications

Exercise – 9.1

1. Express each of the following fractions as the percent:

a. $\frac{1}{4} \times 100 = 25\%$ b. $\frac{53}{100} \times 100 = 53\%$
c. $\frac{3}{4} \times 100 = 75\%$ d. $\frac{4}{5} \times 100 = 80\%$
e. $\frac{9}{20} \times 100 = 45\%$ f. $\frac{3}{8} \times 100 = 37.5\%$
g. $\frac{5}{7} \times 100 = \frac{500}{7} = 71.4\%$

2. Express each of the following ratios as the percent:

a. $\frac{2}{3} \times 100 = 66.67\%$ b. $\frac{4}{5} \times 100 = 80\%$
c. $\frac{6}{5} \times 100 = 120\%$ d. $\frac{1}{5} \times 100 = 20\%$
e. $\frac{3}{12} \times 100 = 25\%$ f. $\frac{11}{125} \times 100 = 8.8\%$
g. $\frac{30}{80} \times 100 = 37.5\%$

Exercise – 9.2

1. Calculate the value of the given percent:

a. $\frac{6}{100} \times 300 = 18$ b. $\frac{60}{100} \times 300 = 180$
c. $\frac{75}{100} \times 400 = 300$ d. $\frac{8}{100} \times 600 = 48m$
e. $\frac{45}{100} \times 350 = 157.5$ f. $\frac{25}{100} \times 400 = 100$

2. Find:

a. $\frac{40}{100} \times 650 = 260$ b. $\frac{5}{200} \times 840 = 21$

c. $\frac{36}{100} \times 825 = 297 \text{ km}$ d.

3. a. Let total marks be x

$40\% \text{ of } x = 60$

$\frac{40}{100} \times x = 60$

$x = \frac{60 \times 100}{40} = 150$

b. Let amount of sale be x

$6\% \text{ of } x = 3$

$x = \frac{3 \times 100}{6} = 50$

c. Let the population of village be x

$5\% \text{ of } x = 150$

$\frac{5}{100} x = 150 \Rightarrow x = 1500 \times \frac{100}{5} = 30000$

d. Let the price be x

$15\% \text{ of } x = 135$

$\frac{15}{100} x = 135$

$x = \frac{13500}{15} = 900$

e. Let the journey be x

$20\% \text{ of } x = 72$

$\frac{20}{100} x = 72$

$x = 72 \times 5$

$x = 360 \text{ km}$

f. Let the price be x

$30\% \text{ of } x = 420$

$\frac{30}{100} x = 420$

$x = \frac{420 \times 100}{30} = 1400$

g. Let the sum be x

$7\% \text{ of } x = 217$

$\frac{7}{100} x = 217$

$x = \frac{21700}{7} = 3100$

4. Express first quantity as a percentage of the second:

Let the % be x

a. $x\% \text{ of } 110 = 21$

$\frac{x}{110} \times 110 = 21$

$x = \frac{21 \times 10}{11} = 19.09\%$

b. $x\% \text{ of } 280 = 80$

$\frac{x}{100} \times 280 = 80$

$x = \frac{80 \times 10}{28} = 28.5\%$

c. $x\% \text{ of } 5.6 \text{ kg} = 3.6 \text{ kg}$

$\frac{x}{10} \times \frac{56}{10} = 3.6$

$x = \frac{3.6 \times 10 \times 100}{56} = 64.2\%$

d. $x\% \text{ of } 80 = 48$

$\frac{x}{100} \times 80 = 48$

$x = \frac{48 \times 100}{8} = 600\%$

5. Ramesh stayed in a hotel for two days. The room rent was ₹3500 per days. He also had to pay a luxury tax of 7% on the room rent for 2 days. How much did he pay in all for the two day's stay?

Room rent for 1 day = 3500

Room rent for 2 day = $3500 \times 2 = ₹7000$

Luxury tax on room = $7\% \text{ of } 7000$

$= \frac{7}{100} \times 7000 = 490$

Total amount he pay = $7000 + 490$

$= ₹7490$

6. Ridhima got 72 marks in Maths out of 120 and 70 marks in Hindi out of 150. The maximum marks in the Science paper were 180. If she got 60% marks in all the three papers combined. How many marks did she get in Science.

Let marks in science be x

$\% \text{ in Maths} = \frac{72}{120} \times 100 = 60\%$

$$\% \text{ in Hindi} = \frac{70}{180} \times 100 = 46.6\%$$

$$\% \text{ in Science} = \frac{70}{180} \times 100 = \frac{10x}{18}$$

$$\frac{10}{x} + 60 + 46.6$$

$$\frac{x}{3} = 60$$

$$\frac{10}{x} + 106.6 = 60 \times 3$$

$$\frac{10}{x} = 180 - 160.6$$

$$\frac{10x}{18} = 73.4$$

$$x = \frac{73.4 \times 18}{10} = \frac{1321.2}{10}$$

$$= 132.12$$

7. Vinita got 50% marks in S.St, 75% marks in Computer and 90% marks in English. The maximum marks in each of the subjects were 100, 140, and 160 respectively. Find her aggregate percentage.

$$\text{Marks in S.St} = \frac{50}{100} \times 100 = 50$$

$$\text{Marks in computer} = \frac{75}{100} \times 140 = 105$$

$$\text{Marks in English} = \frac{90}{100} \times 160 = 144$$

$$\frac{\text{Total marks obtained}}{\text{Total marks}} \times 100$$

$$= \frac{50 + 105 + 144}{100 + 140 + 160} \times 100$$

$$= \frac{299}{400} \times 100$$

$$= 74.75\%$$

8. Akhil and Naman contested the election of panchayat committee from their village. Akhil scored 11,484 votes which was 44% of the total vote. Naman scored 26% of the votes. Calculate:

a. Let total no. of votes be x

$$44\% \text{ of } x = 11,484$$

$$= \frac{44}{100} \times x = 11,484$$

$$x = \frac{11,484 \times 100}{44}$$

$$= 26100$$

b. $\% \text{ of votes who did not vote} = 100 - 44 - 26$
 $= 30\%$

No. of voters who did not vote for either Akhil or Naman = $30\% \text{ of } 26100$

$$= \frac{30}{100} \times 26100$$

$$= 7830$$

9. Manohar receives 24,000 as his monthly salary. If he spends 30% of it as house rent, what is his house rent? If he spends 7200 for food items, what percent is he spending on food items?

$$\text{Monthly salary of Manohar} = 24,000$$

$$\% \text{ spend on house rent} = 30\%$$

$$30\% \text{ of } 24,000 = \text{house rent.}$$

$$\frac{30}{100} \times 24,000$$

$$7200 = \text{house rent}$$

$$\% \text{ of spent of food items} = 7200$$

$$= x\% \text{ of } 24,000 = 7200$$

$$\frac{x}{100} \times 24,000 = 7200$$

$$x = \frac{7200 \times 100}{24,000}$$

$$x = 30\%$$

10. 40% of the population of a town are men, 35% are women and the remaining are children. If the number of children is 28,000, what is the total population of the town?

$$\% \text{ of children} = 100 - (40 + 35)$$

$$= 100 - 75 = 25\%$$

$$\text{Let the population of town be } x$$

$$25\% \text{ of } x = 28,000$$

$$\frac{25}{100} x = 28,000$$

$$x = 28,000 \times 4$$

$$= 1,12,000$$

Exercise – 9.3

1. Some values are given below. Find the unknown values:

a. $C.P + P = 720 + 50.50 \text{ ₹} 770.5$

b. $P = \frac{S.P. - C.P \times 100}{C.P}$
 $= \frac{1350 - 1200}{1200} \times 100 = 12.5\%$

c. $S.P. + L = 1254 + 32 = 1286$

2. Rohan bought 4 dozen pencils at ₹10.80 a dozen and sold them for 80 paise each. Find his gain or loss percent.

Cost of 1 dozen pencil = 10.80

Cost of 4 dozen pencil = $10.80 \times 4 = 43.2$

Cost of 48 pencil = 43.2

Cost of 1 pencil = $\frac{43.2}{48} = 0.9$
 = 90 Paise

S.p of 1 pencil = 80 Paise

SP of 48 pencil = ₹38.4

Loss = C.P – S.P

= $43.2 - 38.4 = 4.8$

$L\% = \frac{L}{C.P} \times 100 = \frac{4.8}{43.2} \times 100 = 11.1\%$

3. Sapna purchased a house for ₹45,200 and spent ₹2800 on its repairs. He had to sell it for ₹46800. Find his loss and loss percent.

C.P of house = 45,200

Repairing cost = 2800

Total CP = 48000

S.P of home = 46800

Loss = CP – SP = $48000 - 46800 = 1200$

$L\% = \frac{L}{C.P} \times 100 = \frac{1200}{48000} \times 100 = 2.5\%$

4. An umbrella was bought for ₹400 and sold for ₹336. Find the loss percent.

C.P of Umbrella = 400

S.P of Umbrella = 336

Loss % = $\frac{C.P - S.P}{L.P} \times 100$
 $= \frac{400 - 336}{400} \times 100 = \frac{64}{400} \times 100 = 16\%$

5. A shopkeeper makes a 10% profit by selling a toy costing him ₹120. What is the selling price?

$S.P = C.P + P\%$

$= C.P + \left(\frac{P}{100} \times C.P \right)$

$= 120 + \frac{10 \times 120}{100}$

$= 120 + 12 = 132$

6. Jaya sold a book worth ₹200 at a profit 20% to Aryan. Aryan sold it at a loss of 10% to Garima. What did Garima pay for that book?

C.P of booke = 200

$P\% = 20$

S.P of book for Jaya = C.P for Aryan

$SP = \left(\frac{100 + P\%}{100} \right) \times CP$

$= \frac{100 + 20}{100} \times 200$

$= \frac{120}{100} \times 200 = 240$

C.P for Aryan = C.P for Garima

$\left(\frac{100 - L}{100} \right) \times CP$

$\frac{100 - 10}{100} \times 240$

$\frac{90}{100} \times 240$

= 216 C.P for Garima

7. The cost price of 8 fans is equal to the selling price of 6 fans. Find the gain percent.

Let CP of 1 fan be x

C.P of 8 fan = $8x$

S.P of 1 fan = $\frac{C.P \text{ of } 8 \text{ fan}}{6}$

$= \frac{48x}{6}$

S.P of 8 fans = $\frac{4}{3}x \times 8 = \frac{32x}{3}$

$P = \frac{32x}{8} - \frac{8x}{1}$

$\frac{32x - 24x}{3} = \frac{8}{3}x$

$$P = \frac{8}{3 \times 8} \times 100 = \frac{800}{24} = 33.33\%$$

8. Jitendra purchased 50 dozen bananas for ₹135 per dozen. Five dozen bananas could not be sold because they were rotten. At what price per dozen should Jitendra sell the remaining bananas so that he could make a profit of 20%?

$$\begin{aligned} \text{CP of 50 dozen} &= 135 \times 50 \\ &= 6750 \end{aligned}$$

$$P\% = 20\%$$

$$\begin{aligned} \text{CP of 45 dozen} &= \frac{100 + P}{100} \times \text{CP} \\ &= \frac{120}{100} \times 6075 = 7290 \end{aligned}$$

$$\text{CP of 5 dozen banana} = 135 \times 5 = 625$$

$$\begin{aligned} \text{SP} &= \left(\frac{100 + p}{100} \right) \times \text{CP} \\ &= \frac{120}{100} \times 625 = 810 \end{aligned}$$

$$\text{Total lost of 45 dozen} = 810 + 729 = 1539$$

$$\text{Cost of per dozen} = \frac{8100}{45} = 180$$

$$\text{S.I on 15,000}$$

$$\text{SI} = \frac{\text{PRT}}{100} = \frac{15000 \times 15 \times 3}{100} = 6750$$

$$\text{S.I on 2500}$$

$$\text{SI} = \frac{\text{PRT}}{100} = \frac{2500 \times 18 \times 3}{100} = 1350$$

$$\text{Total interest} = 6750 + 1350 = 8100$$

3. A man borrowed ₹9000 from a bank at 8% per annum. Find the amount he has to pay after two years.

$$P = 9,000, R = 8\%, T = 2 \text{ years}$$

$$\text{Amount} = \text{PSI} + P$$

$$= 9000 \left(1 + \frac{8 \times 2}{100} \right)$$

$$= 9000 \times \left(1 + \frac{16}{100} \right)$$

$$= 9000 \times \frac{116}{100} = 10,440$$

he has to pay ₹10,440

4. Kapil lent out ₹8000 for 5 years at 15% per annum and borrowed ₹6000 for 3 years at 25% per annum. Did he gain or lost?

$$\text{Money that Kapil lent} = ₹8000$$

$$\text{Time} = 5 \text{ years}, R = 15\%$$

$$A_1 = \text{SI} + P$$

$$= P \left(1 + \frac{RT}{100} \right) = 8000 \left(1 + \frac{15 \times 5}{100} \right)$$

$$= 8000 \left(1 + \frac{75}{100} \right)$$

$$= 8000 \times \frac{175}{100} = 14,000$$

$$\text{Money that Kapil borrowed} = ₹6000$$

$$T = 3 \text{ years}, R = 25\%$$

$$A_2 = \text{SI} + P$$

$$= P \left(1 + \frac{RT}{100} \right) = 6000 \left(1 + \frac{3 \times 25}{100} \right)$$

$$= 6000 \times \left(1 + \frac{75}{100} \right) = 6000 \times \frac{175}{100} = 10,500$$

Since, $A_1 > A_2$ ∴, he gain.

Exercise – 9.4

1. Lalit borrowed ₹650 from his friend at 8% per annum. He returned the amount after 6 months. How much did he pay?

$$P = 650, R = 8\%, T = 6 \text{ month} = \frac{1}{2} \text{ year}$$

$$A = \text{SI} + P$$

$$= \frac{P \times R \times T}{100} + P$$

$$= P \left(1 + \frac{RT}{100} \right) = 650 \left(1 + \frac{8}{200} \right)$$

$$650 \times \frac{208}{200} = 676$$

2. Lata lent ₹15000 to her friend. She charged the interest at 15% per annum on ₹12500 and 18% on the rest. How much interest did she earn in 3 years?

$$\text{Total amount} = 15,500$$

$$\text{First amount} = 12,500$$

$$\text{Remaining} = 2500$$

5. Find the interest on ₹500 for a period of 4 years at the rate of 8% per annum. Also, find the amount to be paid at end of the period.

$$P = 500, R = 8\%, T = 4 \text{ years}$$

$$SI = \frac{PRT}{100} = \frac{500 \times 8 \times 4}{100} = 160$$

$$\text{Amount} = P + SI = 160 + 500 = 660$$

6. If a certain principal amounts to ₹44000 at 5% per annum over 2 years, how much will it amount to in 3 years at same rate?

$$\text{Let the P be } x, = 4400, R = 5, T = 2$$

$$A = SI + P$$

$$A = P \left(1 + \frac{RT}{100} \right) = 44000 = P \left(1 + \frac{5 \times 2}{100} \right)$$

$$44000 = P \left(1 + \frac{10}{100} \right) = 44000 = P \left(\frac{110}{100} \right)$$

$$\cancel{44000}^{4000} \times \frac{100}{110} = P$$

$$40,000 = P$$

$$T = 3 \text{ years}, P = 40,000, R = 5\%$$

$$A = SI + P$$

$$= P \left(1 + \frac{RT}{100} \right) = 40,000 \left(1 + \frac{5 \times 3}{100} \right)$$

$$= 40,000 \times \left(1 + \frac{15}{100} \right) = 40,000 \times \frac{115}{100} = 46,000$$

7. Raja borrowed ₹20000 at 2% per annum at ₹10000 at 5% per annum. He cleared his debt after 2 years by giving ₹800 and a laptop. What is the cost of the laptop?

$$P_1 = 20,000, R_1 = 2\%, T = 2 \text{ years}$$

$$P_2 = 10,000, R_2 = 5\%, T = 2 \text{ years}$$

$$A_1 = P_1 \left(1 + \frac{RT}{100} \right) = 20,000 \times \left(1 + \frac{4}{100} \right)$$

$$= 20,000 \times \frac{104}{100} = 20,800$$

$$A_2 = P_2 \left(1 + \frac{RT}{100} \right) = 10,000 \times \left(1 + \frac{5 \times 2}{100} \right)$$

$$= 10,000 \times \left(1 + \frac{10}{100} \right) = 10,000 \times \frac{110}{100}$$

$$= 11,000$$

$$\begin{aligned} \text{Total Amount} &= A_1 + A_2 \\ &= 20,800 + 11,000 \\ &= 31,800 \end{aligned}$$

$$\begin{aligned} \text{Cost of Laptop} &= \text{Total amount} - 800 \\ &= 31,800 - 800 \\ &= 31,000 \end{aligned}$$

8. Mahak deposited ₹2000 in a bank which pays 6% simple interest. She withdrew ₹700 at the end of the first year. What will be her balance after 3 years?

$$P = 20,000, R = 6\%, T = 1$$

$$\begin{aligned} A &= P \left(1 + \frac{RT}{100} \right) = 2000 \left(1 + \frac{6}{100} \right) \\ &= 2000 \times \frac{106}{100} = 2120 \end{aligned}$$

$$\text{She withdrew} = ₹700$$

$$= 2120 - 700 = 1420$$

$$\text{Amount after 3 years}$$

$$\begin{aligned} &P \left(1 + \frac{RT}{100} \right) \\ &= 2120 \left(1 + \frac{6 \times 3}{100} \right) = 2120 \left(\frac{118}{100} \right) \\ &= 2120 \times \frac{118}{100} = 2501.6 \end{aligned}$$

9. Simple interest on a certain sum is $\frac{16}{25}$ of the sum. Find the rate percent and the time if both are numerically equal.

$$\text{Let the sum be } x$$

$$R = x$$

$$T = x$$

$$SI = \frac{16}{25} \%$$

$$SI = \frac{PRT}{100}$$

$$\frac{16\%}{25} = \frac{\%RT}{100}$$

$$\frac{1600}{25} = x \times x$$

$$64 = x^2$$

$$\sqrt{64} = x$$

$$8 = x$$

$$R = 8\%, T = 8 \text{ years}$$

Revision Exercise

1. Tick (✓) the correct option:

- a. (i) 480 b. (i) 30%
c. (iii) ₹28.80 d. (iii) 1900

2. Find the given percentage:

- a. $\frac{32}{100} \times 70 = 22.4$ b. $\frac{25}{100} \times 420 = 105$
c. $\frac{18}{100} \times 600 = 108$ d. $\frac{35}{100} = 200 =$
e. $\frac{5}{100} \times 125 = 36.25$ f. $\frac{12}{100} \times 620 = 74.4$

3. The cost of fan a decreases from ₹500 to ₹480. What is the percentage of decrease?

$$\text{Decrease in cost} = 500 - 480 \\ = 20$$

$$\% = \frac{20}{500} \times 100 = 4\%$$

4. The population of a town was 75,000 in 2001. In 2011, the population became 93,000. What is the increase percentage during these ten years?

$$\text{Population in 2001} = 75,000$$

$$\text{Population in 2011} = 93,000$$

$$\text{Increase} = 93,000 - 75,000 = 18,000$$

$$\% = \frac{18000}{75000} \times 100 = 24\%$$

5. What sum of money should be invested for 5 years of 8% per annum to earn the same interest as ₹3,600 at 10% per annum for 4 years?

$$P = 3600, \quad R = 10\%, \quad T = 4 \text{ year}$$

$$SI = \frac{R_1 \times R_2 \times R_3}{100} = 1440 = \frac{P \times 8 \times 5}{100}$$

$$144000 = 40 \times P_1$$

$$\frac{144000}{40} = P_1$$

$$3600 = P_1$$

6. By selling a machine for ₹1,275, Mukesh lost 15%. At what price should he sell to make a profit of 10%?

$$\text{S.P of machine} = 1,275, \quad L\% = 15\%$$

$$CP = \frac{SP \times 100}{100 - L} = \frac{1275 \times 100}{100 - 15} = \frac{127500}{85} = 1500$$

$$CP = 1500$$

$$P\% = 10\%$$

$$SP = \left(\frac{100 + P}{100} \right) \times CP$$

$$= \frac{100 + 10}{100} \times 1500$$

$$= \frac{110}{100} \times 1500$$

$$SP = 1650$$

7. Prakhar got 215 marks in an examination. If he had got 10 marks more. He would have scored 60% of the total marks. What are the maximum marks for the examination?

$$\text{Marks Prakhar got} = 215 + 10 = 225$$

$$\text{Let total marks be } x$$

$$60\% \text{ of } x = 225$$

$$\frac{60}{100} \times x = 225$$

$$x = \frac{225 \times 10}{6}$$

$$= 375$$

8. Find the profit and profit percentage:

	C.P (₹)	S.P (₹)	PROFIT (₹)	PROFIT %
Chair	200	230	230 - 200 = 30	$\frac{30}{200} \times 100 = 15\%$
File	50	54	54 - 50 = 4	$\frac{4}{50} \times 100 = 8\%$
Auto	3,50,000	3,95,500	3,95,500 - 3,50,000 = 45,500	$\frac{45,500}{3,50,000} \times 100 = 13\%$
House	25,00,000	27,00,000	27,00,000 - 25,00,000 = 2,00,000	$\frac{2,00,000}{25,00,000} \times 100 = 8\%$

Chapter-10 Parallel Lines and Angles

Exercise – 10.1

1. Identify the following pairs of angles as complementary, supplementary or equal:

- a. Equal b. Supplementary
c. Equal supplementary d. Equal
e. Complementary f. Supplementary

2. Identify the following pairs of angles as complementary, supplementary or equal:
- $90 - 6 = 84$
 - $90 - 45 = 45$
 - $90 - 46 = 44$
 - $70 - 37 = 19$
 - $90 - 54 = 36$
 - $90 - 20 = 70$
 - $90 - 28 = 62$
 - $90 - 37 = 53$
3. Write the supplements of the following angles:
- $180 - 22 = 158$
 - $180 - 180 = 0$
 - $180 - 72 = 108$
 - $180 - 90 = 90$
 - $180 - 111 = 69$
 - $180 - 80 = 100$
 - $180 - 25 = 55$
 - $180 - 114 = 66$
4. Find magnitude of an angle which is:
- $\frac{1}{2} \times \cancel{90}^{45} = 45^\circ$
 - $\frac{2}{3} \times \cancel{180}^{60} = 120^\circ$
5. Name the adjacent angles in the following figures:
- $(\angle MOD, \angle DOE)(\angle DOE, \angle EON)$
 $(\angle MOE, \angle EON)(\angle MOD, \angle DON)$
 - $(\angle ROX, \angle XOS)(\angle SOY, \angle XOS)$
 $(\angle ROY, \angle SOY)(\angle ROY, \angle ROX)$
6. Identify the vertically opposite angles in fig (b) in Q.5.
- $(\angle SOY, \angle ROY)(\angle ROX, \angle SOY)$
7. Identify the linear pairs in fig (a) and (b) in Q.5.
- Linear Pair (a)
- $(\angle MON, \angle DOE, \angle EON); (\angle MOD, \angle DON);$
 $(\angle MOE, \angle EON)$
- (b) $(\angle ROY, \angle YOS); (\angle ROX, \angle SOX);$
 $(\angle SOX, \angle SOY); (\angle ROY, \angle ROX)$
8. An angle is equal to its complement. Find its measure.
- Let the angle be x
- $$x + x = 90$$
- $$2x = 90$$
- $$x = \frac{90}{2} = 45^\circ$$
9. One of the angles of linear pair is 38. Find the other angle.
- Let the angle be x
- $$8 + x = 180$$
- $$x = 180 - 38 = 142$$
10. An angle is 85. Find its complement.
- Let the complement be x
- $$85 + x = 90$$
- $$x = 90 - 85 = 5^\circ$$
11. In the following figure, measure of one angle is given. Find measure of all the other angles:
- $\angle AOD = 180 - 30 \text{ (L.P)} = 150^\circ$
 $\angle LOB = \angle AOD \text{ (V.O.A)}$
 $\angle AOC = \angle BOD \text{ (V.O.A)}$
 - $\angle POD = \angle ROS \text{ (V.O.A)}$
 $\angle POS = 180 - \angle POD \text{ (L.P)}$
 $= 180 - 99$
 $= 86$
12. Find the measure of 'x' in the following figures:
- $2x + 40 = 3x - 20 \text{ (V.O.A)}$
 $40 + 20 = 3x - 2x$
 $60 = x$
 - $5x + 10 + 2x - 20 = 180^\circ \text{ (L.P)}$
 $7x - 30 = 180^\circ$
 $7x - 30 = 180^\circ$
 $7x = 180 + 30^\circ$
 $7x = 210^\circ$
 $x = \frac{210^\circ}{7} = 30^\circ$
 - $10x = 360^\circ$
 $x = \frac{360}{10} = 36$
 - $x + 2x = 180^\circ \text{ (L.P)}$
 $3x = 180^\circ$
 $3x = 180^\circ$
 $x = \frac{180}{3} = 60^\circ$
 - $x + 140 = 180^\circ \text{ (L.P)}$
 $x = 180 - 140$
 $= 40^\circ$
 - $x - 20 + x = 180^\circ \text{ (L.P)}$
 $2x = 180 + 20$
 $x = \frac{200}{2} = 100^\circ$

$$\begin{aligned}
 \text{g. } x &= 60^\circ \text{ (V. O. P)} \\
 \text{h. } x + x - 60 &= 180^\circ \text{ (L. P)} \\
 2x &= 180 + 60^\circ \\
 2x &= 240^\circ \\
 x &= \frac{240}{2} = 120^\circ
 \end{aligned}$$

Exercise – 10.2

- In each of the following figures, state whether the line m is a transversal:
 - No
 - yes
 - No
- In the following figures, $AB \parallel CD \parallel EF$. Answer the following questions.
 - Yes, Corresponding angle
 - Yes, Corresponding angle
 - Yes, because $AB \parallel CD \parallel EF$
- Given $x \parallel y$, find the measure of x in the following figures:
 - $\angle 1 + 32 = 180^\circ \text{ (L.P)}$
 $\angle 1 = 180 - 32$
 $= 148^\circ$
 - $x + 87 = 180^\circ \text{ (L. P)}$
 $x = 180 - 87$
 $= 93^\circ$
 - $x = 53^\circ \text{ (A.I.A)}$
- In the adjoining figure, it is given that $\angle P = 60^\circ$, $RT \parallel QP$ and $\angle TRS = 65^\circ$, Find $\angle PRQ$.

$$\begin{aligned}
 \angle PRT &= \angle OPR = 60^\circ \text{ (A.I.A)} \\
 \angle PRQ &= 180^\circ - 60^\circ - 65^\circ \text{ (L.P)} \\
 &= 55^\circ
 \end{aligned}$$

Revision Exercise

- Tick (✓) the correct option:
 - (ii) 90°
 - (iii) 110°
 - (ii) $\angle 1$ & $\angle 2$
 - (iii) 1900

2. Find the degree measure of unknown angles in the following linear pairs:

- $x + 140 = 180^\circ \text{ (L. P)}$
 $x = 180 - 140$
 $= 40^\circ$
- $2x + 4x = 180^\circ \text{ (L. P)}$
 $6x = 180^\circ$
 $x = \frac{180}{6} = 30^\circ$
- $x + 85 = 180^\circ \text{ (L. P)}$
 $x = 180 - 85^\circ$
 $x = 95^\circ$
- $x - 44 + x = 180^\circ \text{ (L. P)}$
 $2x = 180 + 44$
 $x = \frac{224}{2} = 112$

3. Check whether the following pairs of angles are adjacent:

- Yes
- Yes
- No

4. Lines x and y are intersected by transversal n . The measures of two angles are given in the figure. Is $x \parallel y$? Give reason.

$$\begin{aligned}
 118 + \angle 1 &= 180^\circ \text{ (L.P)} \\
 \angle 1 &= 180 - 118 \\
 \angle 1 &= 62 \\
 \angle 1 &= 62^\circ = 62^\circ \text{ (Corresponding Angle)} \\
 \therefore, x &\parallel y
 \end{aligned}$$

Chapter-11 Properties of Triangles

Exercise – 11.1

1. Calculate the magnitude of x in the following triangles:

- $2x + 3x + 40 = 180$
 $5x + 40 = 180$
 $= 5x = 180 - 40$
 $5x = 140$
 $x = \frac{140}{5} = 28$
 $2x = 2 \times 28 = 56$
 $3x = 28 \times 3 = 84$

$$\begin{aligned} \text{b. } 5x + 50 + 80 &= 180 \\ 5x &= 180 - 130 \\ 5x &= 50 = x \frac{50^{10}}{5_1} = x = 10 \end{aligned}$$

$$\begin{aligned} \text{c. } 60 + x &= 140 \\ x &= 140 - 60 = 80 \end{aligned}$$

$$\begin{aligned} \text{d. } 2x + 55 + 70 &= 180 \\ 2x &= 180 - 125 \\ 2x &= 55 \\ x &= \frac{55}{2} = 27.5 \end{aligned}$$

$$\begin{aligned} \text{e. } 90 + 40 + x &= 180^\circ \\ x &= 180 - 130 = 50^\circ \end{aligned}$$

$$\begin{aligned} \text{f. } x + 60 + 60 &= 180^\circ \\ x &= 180 - 120 \\ x &= 60^\circ \end{aligned}$$

$$\begin{aligned} \text{g. } x + 60 + 60 &= 180^\circ \\ x &= 180 - 130^\circ = 50 \end{aligned}$$

2. State which of the following are triangles:

$$\text{a. } \angle A + \angle Q + \angle R > 180^\circ \quad \text{No.}$$

$$\text{b. } \angle A + \angle B + \angle C > 180^\circ \quad \text{No.}$$

$$\text{C. } \angle A + \angle B + \angle C < 180^\circ \quad \text{No.}$$

3. In the given fig., the three sides of the $\triangle KLM$ are produced in order to generate three exterior angles. Complete the following statements.

$$\text{a. } \angle LK \quad \text{b. } \angle KLM + \angle KML$$

$$\text{c. } \angle LKM + \angle LMK$$

Exercise – 11.2

1. Which of the following are Pythagorean triplets?

$$\begin{aligned} \text{a. } (5)^2 + (12)^2 & \quad (13)^2 \\ 25 + 144 & \quad 169 \\ 169 & = 169 \text{ Yes} \end{aligned}$$

$$\begin{aligned} \text{b. } (16)^2 + (63)^2 & \quad (65)^2 \\ 256 + 3969 & \quad 4225 \\ 4225 & = 4225 \text{ Yes} \end{aligned}$$

$$\begin{aligned} \text{c. } (10)^2 + (22)^2 & \quad (24)^2 \\ 100 + 484 & \quad 576 \\ 584 & > 576 \text{ No} \end{aligned}$$

$$\begin{aligned} \text{d. } (15)^2 + (24)^2 & \quad (28)^2 \\ 225 + 576 & \quad 784 \\ 801 & > 784 \text{ No} \end{aligned}$$

$$\begin{aligned} \text{e. } (6)^2 + (8)^2 & \quad (10)^2 \\ 36 + 64 & \quad 100 \\ 100 & = 100 \text{ Yes} \end{aligned}$$

$$\begin{aligned} \text{f. } (9)^2 + (10)^2 & \quad (12)^2 \\ 81 + 100 & \quad 144 \\ 181 & > 144 \text{ No} \end{aligned}$$

2. A ladder $3.7m$ long is placed against a wall in such a way that the feet of the ladders is $1.2m$ away from the wall. Find the height of the wall to which the ladder reaches.

$$h^2 = p^2 + b^2$$

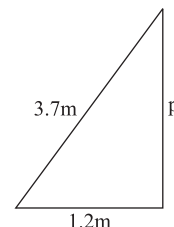
$$(3.7m)^2 = p^2 + 1.2m^2$$

$$13.69m^2 = p^2 + 1.44m^2$$

$$13.69 - 1.44m^2 = p^2$$

$$\sqrt{12.25m} = p^2$$

$$3.5m = p$$



3. A ladder $17m$ long reaches a window of a building $15m$ above the ground. Find the distance of the feet of the ladder from the building.

$$h^2 = p^2 + b^2$$

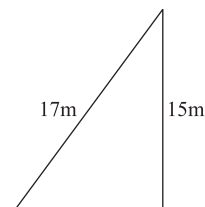
$$(17m)^2 = (15m)^2 + (b)^2$$

$$289m^2 = 225m^2 + b^2$$

$$289m^2 - 225m^2 = b^2$$

$$\sqrt{64} = b$$

$$8m = b$$



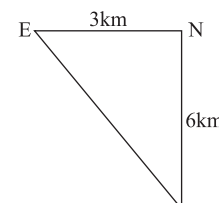
4. Amit drives $4km$ to the north and $3km$ to the east. Find the diagonal distance.

$$h^2 = p^2 + b^2$$

$$h^2 = (4km)^2 + (3km)^2$$

$$= 16km^2 + 9km^2$$

$$h = \sqrt{25km^2} = 5km$$



5. Two towers of height $28m$ and $36m$ were built at a distance of $15m$. Find the distance between the tops of the towers.

$$2m \triangle PTQ$$

$$PT = 36 - 28 = 8m$$

$$ST = 15m$$

$$SR = ?$$

$$h^2 = p^2 + b^2$$

$$h^2 = (8m)^2 + (15m)^2$$

$$h^2 = 64m^2 + 225m^2$$

$$h^2 = \sqrt{289m^2} = 17m$$

6. The sides of a triangle are $29cm$, $21cm$ and $20cm$. Show that it is a right triangle.

$$(20cm)^2 + (21cm)^2 = (29cm)^2$$

$$400cm^2 + 441cm^2 = 841cm^2$$

$$841cm^2 = 841cm^2$$

These sides form a right triangle.

7. A boy goes $15m$ due west, then $8m$ due north. How far is he from the starting point?

$$h^2 = p^2 + b^2$$

$$h^2 = (8m)^2 + (15m)^2$$

$$h^2 = 64m^2 + 225m^2$$

$$h = \sqrt{289m^2} = 17m$$

He is $17m$ far from starting point.

3. Find out which of these are triangles:

a. $\angle A + \angle B + \angle C > 180$ b. No

c. $\angle P + \angle Q + \angle R > 180$ d. No

4. State which of the following are right triangles:

a. $(15)^2 + (20)^2 = (25)^2$ It form right triangle.

b. No

5. In the given figure, $AB = AC$ and $BD = DC$

a. In $\triangle ABD$ and $\triangle ACD$

$$AB = AC$$

$$AC = DC$$

$$AD = AD$$

$$\triangle ABD \cong \triangle ACD$$

b. $\angle ADB = \angle ADC$ (BYCPCT)

$$\angle ADB + \angle ADC = 180^\circ \text{ (L.P)}$$

$$\angle ADB + \angle ADB = 180^\circ$$

$$2\angle ADB = 180^\circ$$

$$\angle ADB = \frac{180^\circ}{2} = 90^\circ$$

c. $\angle B = \angle C$ (BYCPCT)

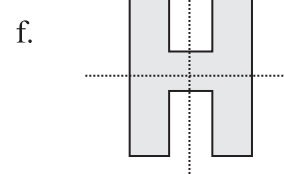
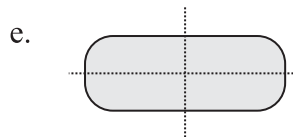
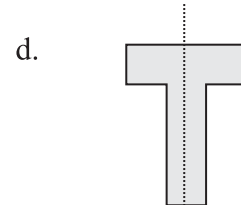
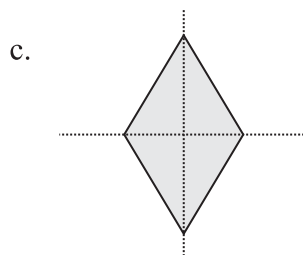
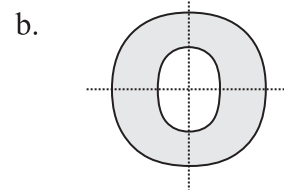
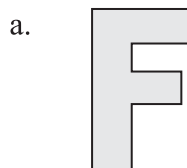
d. $\angle BAD = \angle CAD$ (BYCPCT)

Chapter-12 Symmetry

Exercise – 12.1

1. Which of the following have lines of symmetry?

Also draw the lines:



Revision Exercise

1. Tick (✓) the correct option:

- a. (ii) 23° b. (iv) 90°
c. (i) $6m$ d. (ii) $15km$
e. (iv) $60^\circ, 28^\circ$

2. Find the given fig. $PQ \perp QR$. Find $\angle 1$, $\angle 2$, $\angle 3$ and $\angle 4$.

$$\angle 3 = 180 - (57 + 64)$$

$$\angle 3 = 59$$

$$\angle 3 = \angle 33 + \angle 4$$

$$59 - 33 = \angle 4$$

$$26^\circ = \angle 4$$

$$\angle 1 = \angle 4 \text{ (A.I.A)}$$

$$26^\circ = \angle 4$$

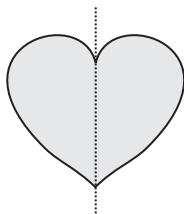
$$\angle 2 = \angle SPE \text{ (A.I.A)}$$

$$\angle 2 = 33^\circ$$

g.

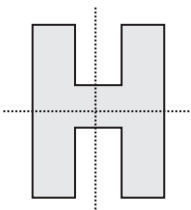


h.

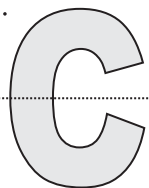


2. Draw as many lines of symmetry as possible for each figure:

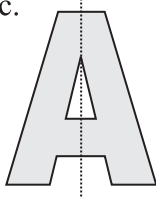
a.



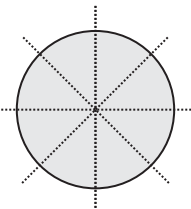
b.



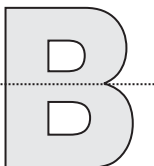
c.



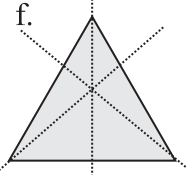
d.



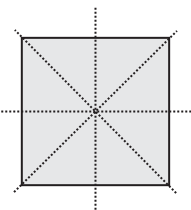
e.



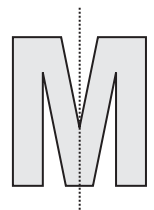
f.



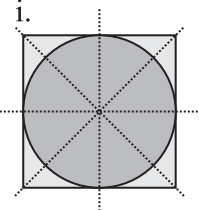
g.



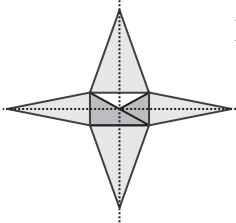
h.



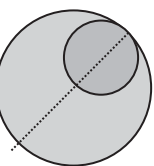
i.



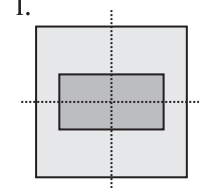
j.



k.

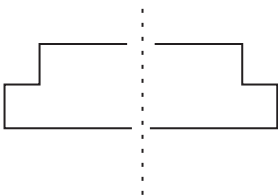


l.

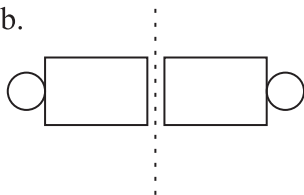


3. Keeping the mirror on the dotted line, draw the following images:

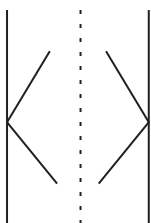
a.



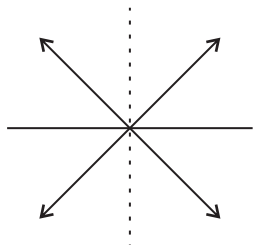
b.



c.



d.



Exercise – 12.2

1. In the following figures, find the angle of rotation given that the centre of rotation is O. State also the order of rotational symmetry :

a. 360° , Order = $\frac{360}{360} = 1$

b. $90^\circ, 180^\circ, 270^\circ, 360^\circ$
Order = $\frac{360}{90} = 4$

c. 360° , Order = $\frac{360}{360} = 1$

2. The following figures make a rotation to come to the new position about a given centre of rotation. Estimate the angle through which the figure is rotated :

a. 180° b. 90° c. 180°

3. Write the angle of rotation and the order of rotation for the following alphabets :

a. 360° , Order = 1 b. 360° Order = 2

c. $180^\circ, 360^\circ$, Order = 2

d. $180^\circ, 360^\circ$, Order = 2

e. $120^\circ, 240^\circ, 360^\circ$, Order = 3

f. 360° , Order = 1

g. 360° , Order = 1

4. Write three letters which have neither rotational symmetry nor reflection symmetry.

F, G, J

5. Write three letters which have reflection symmetry but not rotational symmetry.

B, C, D

6. Write three letters which have rotational symmetry and reflection symmetry.

H, I, D

7. Give an example of a figure that has a line of symmetry but does not have rotational symmetry.

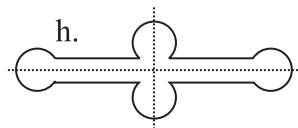
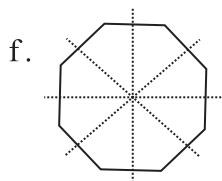
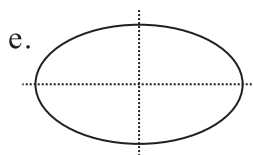
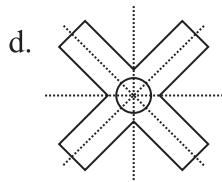
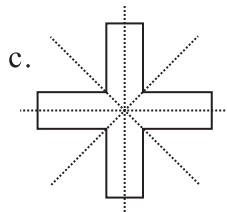
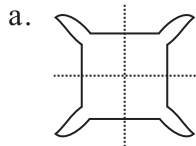
Isosceles triangle

8. A circular wheel has eight spikes. What is its angle of rotation and the order of rotational symmetry ?

$120^\circ, 240^\circ, 360^\circ$, Order = 3

Revision Exercise

1. In the following figures, draw the dotted line to indicate the line of symmetry :



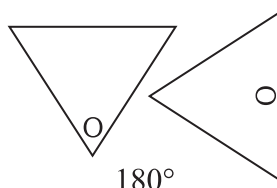
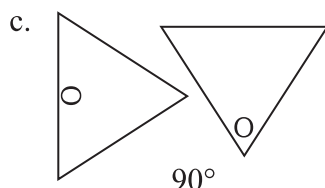
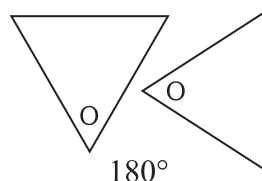
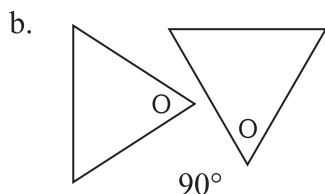
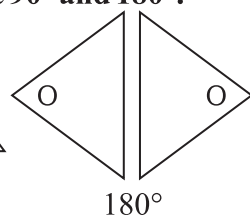
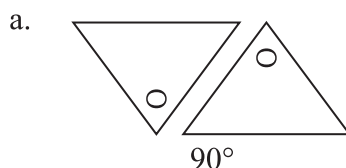
2. Write three letters in English alphabet which exhibit only one line of symmetry.

U.V.W

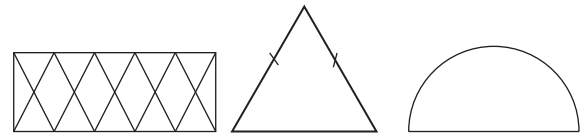
3. In the word 'STATIC', which letters show rotational symmetry?

I

4. Rotate the following figures (anti clockwise) about the point O at angle 90° and 180° .



5. Draw two figures which neither has the rotational nor reflection symmetry.



6. Tell if every trapezium has a line of symmetry . Give reason.

No, only isosceles triangles has a line of symmetry.

7. Write the order of rotational symmetry of :

- a. 2 b. 2 c. 4
d. 4

Chapter-13 Representation of 3D in 2D

Exercise – 13.1

- Do it yourself
- Do it yourself
- Do it yourself

Exercise – 13.2

1. Tell the number of vertices and edges in the following figures :

- a. Vertices = 7, edges = 7
b. Vertices = 9, edges = 9

2. Name any four objects from environment, which have form of (i) a cuboid (ii) a cylinder.

- a. i. Dice, book, brick, bus
b. ii. Pipe, pen, jar, wire

3. Look at the following figure and answer the following :

- a. WS, TW, VW b. PQRS, PQUT
c. PTWS, QUVR, SWVR, PTUQ

4. Do it yourself
5. Do it yourself

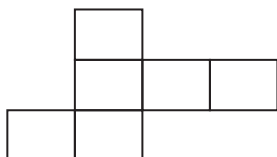
Revision Exercise

- Do it yourself
- In the following solid cube, name the hidden vertices, edges and faces :
Hidden vertices: F
Hidden edges: BF, EG, FH
Hidden faces: EG HF ABFE, QSWV
- Draw the rough 3-D diagram of a picture in which an iron rod is passing from the middle of the solid cylinder perpendicular to the axis of a

cylinder. Use dotted line to show the hidden part of the rod.



4. Draw the net of a cuboid and place the number 1, 2, 3, 4, 5 and 6, so that opposite faces have a sum of 7.



5. Write the number of vertices and edges of the given figure :
Vertices : 4, Edge : 5
6. Which of the following nets shows a cube ?
b. Represents a cube
7. Do it yourself
8. Do it yourself
9. Do it yourself
10. Do it yourself

Chapter-14 Congruence

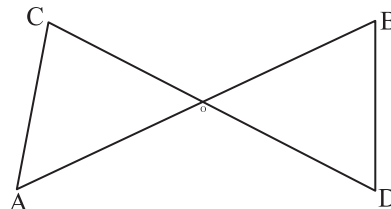
Exercise – 14.1

1. In the following figure, $\angle AOB \cong \angle COD$. Can we say that $\angle AOC \cong \angle BOD$?
Justify your answer.
 $\angle AOB \cong \angle COD$
 $\angle AOB + \angle BOC \cong \angle COD + \angle BOC$
 $\angle AOC \cong \angle BOD$
2. In the following figure, $x = y = c$. Name the angle which is congruent to $\angle MON$.
3. Is it correct to say that any two right angles are congruent? Give reasons to justify your answer.
Yes

4. In the following figures $\angle AXB \cong \angle CXB$. Classify the following as true or false.
- | | |
|----------|----------|
| a. False | b. False |
| c. True | d. True |

Exercise – 14.2

1. State the correspondence between the angles and sides in the following cases :
- a. $PQ = LM, QR = MN, PR = LN$
 $LP = LL, LQ = CM, LR = CN$
- b. $BC = KL, CA = LM, BA = KM$
 $LB = LK, LC = LL, LA = LM$
- c. $XY = QP, YZ = PR, XZ = QR$
 $LX = LQ, LY = LP, LZ = LR$
2. AB and CD bisect each other at 'O'. Which of the following statements is true ?



3. In the given figure ABCD, $AD = BC$ and $AB = CD$. Show $\triangle DAB \cong \triangle DCB$
In $\triangle ABD$ and $\triangle CDB$
 $AD = BC$ (given)
 $AB = CD$ (given)
 $\angle 1 = \angle 3$ (A.I.A)
By SAS congruence criterion
 $\triangle ABD \cong \triangle CDB$
4. In $\triangle KLM$, KO is the bisector of $\angle K$. If $KO \perp LM$, Prove the $KL = KM$.
In $\triangle KOL$ and $\triangle KOM$
 $KO = KO$ (common)
 $\angle KOM = \angle KOL$ (each 90°)
 $\angle LKO = \angle OKM$ (ko is bisector)
 $\therefore \triangle KOL \cong \triangle KOM$, (any AAS)
 $KL = KM$ (By C.P.C.T)
5. $\triangle PQR$ is an isosceles triangle such that $PQ = PR$ and $PS \perp QR$. Prove that $\angle Q = \angle R$.

In $\triangle PRQ$ and $\triangle PRS$

$PQ = PS$ (given)

$PR = PR$ (common)

$\angle PRQ = \angle PRS$ (each 90°)

By RHS, $\triangle PRQ \cong \triangle PRS$

$\angle Q = \angle R$ (By CPCT)

6. In the given figure $LM = LN$ and $MO = NO$.
Prove that :

- a. In $\triangle LOM$ and $\triangle LON$

$LO = LO$ (common)

$LM = LN$ (given)

$MO = ON$ (given)

By SSS, $\triangle LOM \cong \triangle LON$

- b. In $\triangle LON$ and $\triangle LON$ (By CPCT)

$\angle LON + \angle LOM = 180^\circ$ (L.P)

$\angle LON + \angle LON = 180^\circ$

$2\angle LON = 180^\circ$

$\angle LON = \frac{180}{2} = 90^\circ$

- c. $\angle M = \angle N$ (By CPCT)

- d. $\angle MLO = \angle NLO$ (By CPCT)

7. In the following figure $\angle P$ bisects $\angle MLO$ as well as $\angle MNO$. State the three facts needed to ensure that $\triangle LMN \cong \triangle LON$

In $\triangle LMN$ and $\triangle LON$

$LN = LN$ (common)

$\angle NLM = \angle OLN$ (given)

$\angle ONL = \angle LNM$ (given)

By AAS, $\triangle LMN \cong \triangle LON$

Chapter-15 Constructions

Exercise – 15.1

Do it yourself

Exercise – 15.2

Do it yourself

Chapter-16 Perimeter and Area

Exercise – 16.1

1. Find the perimeter of square in which the side is :

- a. $4 \times 16 = 64m$ b. $4 \times 25 = 100m$
c. $4 \times 35 = 140cm$ d. $4 \times 15 = 60cm$

2. Find the perimeter of following rectangle in which :

- a. $2(L + B) = 2(2.6 + 4.2)cm = 13.6cm$
b. $2(L + B) = 2(30 + 20)cm = 100cm$
c. $2(L + B) = 2(13 + 14)cm = 54cm$
d. $2(L + B) = 2(14 + 19)m = 66.6m$
e. $2(L + B) = 2(41 + 35)m = 152m$

3. The length of a rectangular garden is twice its breadth. If its perimeter is $36m$. Find its length and breadth.

Let the breadth be x

Length = $2x$

Perimeter of Rectangle = $2(L + B)$

$36m = 6x$

$$\frac{36}{6} = x$$

$x = 6$

Breadth = $6m$, Length = $12m$

4. The perimeter of two squares are $196cm$ and $76cm$. Find the side of each square.

$$\text{Side of square} = \frac{\text{Perimeter}}{4}$$

$$= \frac{196}{4}cm = 49cm$$

$$\text{Side of square} = \frac{\text{Perimeter}}{4}$$

$$= \frac{76}{4}cm = 19cm$$

5. Some bamboo pillars are to be planted around a rectangular lawn $25m$ long and $20m$ wide. If the pillars are planted at a distance of $5m$. How many pillars are needed to plant ?

Perimeter of Rectangular lawn = $90m$

$= 2(25m + 20m) = 90m$

Distance b/w pillars = $5m$

$$\text{No. of pillars} = \frac{90m}{5m} = 18$$

6. The perimeter of rectangle is equal to the perimeter of square with side 14 cm. If the breadth of rectangle is 9 cm. Find its length.

Perimeter of Square = Perimeter of Rectangle

$$4 \times 14 \text{ cm} = 2(l + b)$$

$$56 \text{ cm} = 2(l + b)$$

$$\frac{56 \text{ cm}^{28}}{2} - 9 = l$$

$$28 - 9 \text{ cm} = l$$

$$19 \text{ cm} = l$$

7. A rectangular shaped wire has length 40 cm and breadth 22 cm. It is rebent in the shape of square. Find the side of the square.

Perimeter of Rectangle = Perimeter of Square

$$2(l + b) = 4 \times \text{side}$$

$$(2 \times 40 \text{ cm} + 22 \text{ cm}) = 4 \times \text{side}$$

$$\frac{124 \text{ cm}^{31}}{4} = \text{side}$$

$$\text{Side of Square} = 31 \text{ cm}$$

8. The two sides of parallelogram are in the ratio of 3 : 4. The length of the parallelogram is 4.2 cm. Find its perimeter.

Ratio = 3:4, Length = 4.2 cm

Breadth = 5.6 cm

Perimeter = $2(l + b)$

$$= 2(4.2 \text{ cm} + 5.6 \text{ cm}) = 19.6 \text{ cm}$$

9. The length of a parallelogram is four more than its width. If the perimeter of the parallelogram is 144 m. Find its length and breadth.

Let the width be x

Length = $x + 4$

$$2(l + b) = 144$$

$$2(x + 4 + x) = 144$$

$$2(2x + 4) = 144$$

$$4x + 8 = 144$$

$$x = \frac{144 - 8}{4} = \frac{136}{4} = 34$$

Width = 34 m, Length = $34 + 4 = 38 \text{ m}$

10. The measure of a rectangular hall 290 m by 210 m. How long will it take for a girl to take two rounds around the hall, if she walks at the rate of 2.5 m/sec ?

Total distance = Perimeter of Rectangle

$$= 2(l + b)$$

$$= 2(290 \text{ m} + 210 \text{ m})$$

$$= 1000 \text{ m}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{10000}{2.5} = 400 \text{ Seconds}$$

11. Find the perimeter of the given figures

a. 30 m

b. 30 m

c. 42 m

e. 48 m

Exercise – 16.2

1. Find the area of the parallelogram whose base and corresponding altitude are given :

a. $B \times h = 33500 \text{ cm} \times 6.5 \text{ cm} = 217750 \text{ cm}^2$

b. $B \times h = 12 \text{ m} \times 4 \text{ m} = 48 \text{ m}^2$

c. $B \times h = 30 \text{ cm} \times 6 \text{ cm} = 180 \text{ cm}^2$

2. Find the base of the parallelogram having the following measurements :

a. $B = \frac{\text{Area}}{\text{Altitude}} = \frac{348}{40} \text{ cm}^2 = 8.7 \text{ cm}$

b. $B = \frac{\text{Area}}{\text{Altitude}} = \frac{545}{0.5} \text{ cm}^2 = 1090 \text{ cm}$

c. $B = \frac{\text{Area}}{\text{Altitude}} = \frac{856 \text{ cm}^2}{60 \text{ cm}^2} = 14.2 \text{ cm}$

3. Find the area of square whose sides are :

a. $(14)^2 = 196 \text{ cm}^2$

b. $(17)^2 = 289 \text{ cm}^2$

c. $(15.7 \text{ dm})^2 = 246.49 \text{ dm}^2$

d. $(30.1)^2 = 906.01 \text{ m}^2$

e. $(6 \text{ m})^2 = 36 \text{ cm}^2$

4. Find the area of triangle PQR in which :

a. $\frac{1}{2} \times b \times h = \frac{1}{2} \times \frac{12^6}{2} \times 700 = 4200 \text{ cm}^2$

b. $QR = \sqrt{PR^2 - PQ^2}$
 $= \sqrt{(10)^2 - (8)^2} = \sqrt{100 - 64} = \sqrt{36} = 6 \text{ cm}$

$$\text{Area} = \frac{1}{2} \times b \times h = \frac{1}{2} \times 8^3 \times 8 = 24 \text{ cm}$$

c. $\text{Area} = \frac{1}{2} \times b \times h$
 $= \frac{1}{2} \times 8^4 \times 9 = 36 \text{ cm}^2$

$$d. \quad PQ = \sqrt{PR^2 - QR^2} = \sqrt{25 - 9} = \sqrt{16}$$

$$\text{Area} = \frac{1}{2} \times b \times h$$

$$= \frac{1}{2} \times 3 \times 4^2 = 6m^2$$

5. The area of a rectangular room is $784 m^2$. If the length of the room is $112 m$. Find its breadth.

$$\text{Area of Rectangle} = L \times B$$

6. A bedsheet measures $30 m$ by $20 m$. A strip of $4 m$ width is cut from it all around. Find the area of the remaining bedsheet and also the area of the strip cut out.

$$\frac{784 m^2}{112 m} = B$$

$$7m = B$$

m width is cut from it all around. Find the area of the remaining bedsheet and also the area of the strip cut out.

$$\text{Length} = 30m, B = 20m, \text{Width} = 4m$$

$$\text{New length} = 30 - 8 = 22m, \text{New breadth} = 20 - 8 = 12m$$

$$\text{Area of Remaining bedsheet} = L \times B$$

$$= 22m \times 12m$$

$$= 264m^2$$

$$\text{Area of strip} = \text{Area of sheet} - \text{Area of Remaining sheet}$$

$$= (30m)^2 - (22m)^2$$

$$= 900m^2 - 484m^2$$

$$= 416m^2$$

7. One meter wide path is built inside a square park of side $30 m$ along its sides. The remaining part of the park is covered by grass. If the total cost of covering by grass is ₹ 1176. Find the rate per square meter at which the park is covered by the grass.

$$\text{Path} = 30 - 2 = 28m$$

$$\text{Area of path} = \text{Area of square} - \text{Area of cast}$$

$$= (30m)^2 - (28m)^2$$

$$= 900m^2 - 784m^2$$

$$= 116m^2$$

$$\text{Rate} = ₹ 1176, \text{Area} = 784m^2$$

$$\text{Per square rate} =$$

8. The area of right angled triangle is $50 m^2$. If one of its legs is $10 m$, find the length of the other leg.

9. A photo of size $(12 \times 10) cm$ is pasted on a sheet of

$$\text{Area of triangle} = \frac{1}{2} \times b \times h$$

$$50m^2 = \frac{1}{2} \times 10^5 m \times h$$

$$= \frac{50^{10} m^2}{5m_1} = h$$

$$= 10m = h$$

cardboard so that there is a margin of width $1.75 cm$ along each side of the poster. Find the total area of the margin.

$$\text{Length of frame} = 12 + 1.75 + 1.75 = 15.5m$$

$$\text{Breadth of frame} = 10 + 1.75 + 1.75 = 13.5$$

$$\text{Area of margin} = \text{Area of frame} - \text{Area of photo}$$

$$= L \times B - l \times b$$

$$= 15.5 \times 13.5m^2 - 12m \times 10m$$

$$= 209.25m^2 - 120m^2$$

$$= 89.25m^2$$

10. The area of rectangular hall is same as that of a square garden of side $64 m$. If the breadth of the hall is $32 m$. Find the length.

$$\text{Area of Rectangle} = \text{Area of Square}$$

$$L \times B = (\text{side})^2$$

$$L \times 32m = (64m)^2$$

$$L = \frac{64^2 \times 64}{32} = 128m$$

11. ABCD is a parallelogram in which $CM \perp AB$ and $BL \perp AD$.

$$a. \quad \text{Area of } \triangle BMC = \text{Area of } \triangle BLA$$

$$B_1 \times H_1 = B_2 \times H_2$$

$$16cm \times BL = 12cm \times 10cm$$

$$BL = \frac{12^3 cm \times 10cm}{16cm} = \frac{30}{4} = 7.5cm$$

$$ab. \quad \text{Area of } \triangle BMC = \text{Area of } \triangle BLA$$

$$B_1 \times H_1 = B_2 \times H_2$$

$$AB \times 12cm = 10cm \times 8cm$$

$$AB = \frac{10cm \times 8cm}{12} = \frac{80}{12} = 6.6cm$$

12. The area of a triangle is $30 cm^2$. Its three sides are $5 m$, $13 m$ and $12 m$. Find the perpendicular distance from the vertex to the side of length $12 m$.

$$\text{Area of triangle} =$$

13. The perimeter of the parallelogram is $1500 m$ and the distance between the opposite sides is 10

$$30m^2 = \frac{1}{2} \times 3m \times B$$

$$\frac{30\cancel{m^2} \times 2}{13\cancel{m}} = B$$

$$4.61m = B$$

m. Its area is 2000 sq. m. Find the length of its sides.

$$\text{Area of } 11gm = B \times h$$

$$2000m^2 = b \times 10m$$

$$= b$$

$$\text{Perimeter of } 11gm \frac{2000(\cancel{m}b)}{1500m} = b$$

$$1500m = 10(200m)$$

$$\left(\frac{1500^{750}}{21} \right) - 200m = l$$

- 14. If the base of an isosceles triangle is 12 cm and its perimeter is 32 cm. Find its area.**

$$\text{Perimeter of isosceles } \Delta = a + a + b$$

$$32cm = 2a + 12cm$$

$$\frac{32cm - 12cm}{2} = a$$

$$\text{Area } \frac{20^{10}cm}{21} = a$$

$$= \frac{1}{2} \times b \times \sqrt{a^2 - \frac{b^2}{4}}$$

$$= \frac{1}{2} \times 12^6cm \times \sqrt{(10)^2 - \frac{(12)^2}{4}}$$

- 15. The measure of a sheet of paper is 125 cm by 85 cm. If one envelope requires a paper of size 17**

$$= 6cm \times \sqrt{\frac{400 - 144}{4}}$$

$$= 6cm \times \sqrt{\frac{256}{4}} = 6cm \times \frac{16^4}{41}$$

$$= 24cm^2$$

cm by 5 cm, how many envelope can be made out of the sheet?

- 16. Find the area of square whose perimeter is 80 cm.**

$$\text{No. of envelope} = \frac{\text{Area of sheet}}{\text{Area of envelope}}$$

$$= \frac{125cm \times 85^5cm}{171cm \times 21cm}$$

$$= 125cm$$

$$\text{Perimeter of square} = 4 \times \text{side}$$

$$= \text{side}$$

$$\text{Area of square} = (\text{side})^2$$

$$41(20cm)^2 = 400cm^2$$

- 17. Find the area of the given figure.**

$$\text{Area of } \Delta PQR + \text{Area of } \Delta PSR$$

$$\frac{1}{2} \times b \times h + \frac{1}{2} \times b \times h$$

$$\frac{1}{2} \times 50 \times 40^{20} + \frac{1}{2} \times 50^{25} \times 5$$

$$= 100cm^2 + 125cm^2$$

$$= 1125cm^2$$

Exercise – 16.3

- 1. Find the circumference of each of the circles with the following radius :**

a. $2\pi r$

$$= 2 \times \frac{22}{7} \times 6.4cm = 40.2cm$$

b. $2\pi r$

$$= 2 \times \frac{22}{7} \times 1.3cm = 8.17cm$$

c. $2\pi r$

$$= 2 \times \frac{22}{71} \times 14^2m = 88m$$

d. $2\pi r$

$$= 2 \times \frac{22}{71} \times 133m^{836} = 836m$$

e. $2\pi r$

$$= 2 \times \frac{22}{71} \times 84^{12}cm = 528cm$$

2. Find the radius of the following circles whose circumferences are :

$$\begin{aligned} \text{a. } \frac{C}{2\pi} &= r \\ \frac{81\text{cm} \times 7}{2 \times 22} &= r \end{aligned}$$

$$12.8 = r$$

$$\begin{aligned} \text{c. } \frac{C}{2\pi} &= r \\ \frac{126\text{mm} \times 7}{22 \times 2} &= r \end{aligned}$$

$$20.04 = r$$

$$\begin{aligned} \text{b. } \frac{C}{2\pi} &= r \\ \frac{25.12 \times 7}{2 \times 22} &= r \end{aligned}$$

$$3.9 = r$$

$$\begin{aligned} \text{d. } \frac{C}{2\pi} &= r \\ \frac{3.17 \times 7}{22 \times 2} &= r \end{aligned}$$

$$0.49 = r$$

3. Find the circumference of each of the circles with the following diameters :

$$\begin{aligned} \text{a. } 2\pi \times \frac{d}{2} \\ \cancel{2} \times \frac{22}{7} \times \frac{225}{\cancel{2}} &= 707.1\text{cm} \end{aligned}$$

$$\begin{aligned} \text{b. } 2\pi \times \frac{d}{2} \\ \cancel{2} \times \frac{22}{7} \times \frac{56^8}{\cancel{2}} &= 176\text{cm} \end{aligned}$$

$$\begin{aligned} \text{c. } 2\pi \times \frac{d}{2} \\ \cancel{2} \times \frac{22}{7} \times \frac{3.8}{\cancel{2}} &= 11.9\text{cm} \end{aligned}$$

$$\begin{aligned} \text{d. } 2\pi \times \frac{d}{2} \\ \cancel{2} \times \frac{22}{7} \times \frac{37}{\cancel{2}} &= 116.2\text{cm} \end{aligned}$$

4. The radius of the circle is 14 cm. Find the radius of circle whose area is double the area of the given circle.

$$\text{Area of 1 circle} = 2 \times \text{Area of 2}^{\text{nd}} \text{ circle}$$

$$\pi R^2 = 2 \times \pi r^2$$

$$R^2 = 2 \times (14)^2$$

$$R = \sqrt{392} = 19.7\text{cm}$$

5. A circular plot of land, 42 m in diameter, has a path 3.5 m wide running round it, on its outside. Find the cost of making the path at ₹ 4 per square metre.

$$d = 42\text{m}, r = \frac{42}{2} = 21\text{m}, r = 21\text{m} + 3.5\text{m}$$

$$\text{Area of path} = \text{Area of big circle} - \text{Area of small circle}$$

$$= \pi R^2 - \pi r^2$$

$$= \pi (R^2 - r^2)$$

$$= \frac{22}{7} ((24.5)^2 - (21\text{m})^2)$$

$$= \frac{22}{7} (600.25 - 441)$$

$$= \frac{22}{7} \times 159.25$$

$$= 500.5$$

6. Find the area of circle whose circumference is 44 cm.

$$\text{Circumference} = 2\pi r$$

$$\frac{\cancel{66}^8 \times 7}{\cancel{22}_2 \times \cancel{2}_1} = r$$

$$10.5 = r$$

$$\text{Area of circle} = \pi r^2$$

$$= \frac{22}{7} \times 10.5\text{cm} \times 10.5\text{cm}$$

$$= 346.5\text{cm}^2$$

7. The radius of the base of circular house is 14 m. Find the circumference of the house.

$$\text{Circumference} = 2\pi r$$

$$= 2 \times \frac{22}{7} \times \cancel{14}^2 \text{m}^2$$

$$= 88\text{m}$$

8. An iron washer is made by cutting out from a circular plate of radius 5 cm, a concentric circular plate of radius 2 cm. Find the area of the remaining portion.

$$R = 5\text{cm}, r = 2\text{cm}$$

$$\text{Area of Remaining} = \text{Area of Big circle} - \text{Area of small circle}$$

$$\pi (R^2 - r^2)$$

$$\frac{22}{7} ((5)^2 - (2)^2)$$

$$= \frac{22}{7} (25\text{cm}^2 - 4\text{cm}^2)$$

$$= \frac{22}{7} \times \cancel{21}^3 = 66\text{cm}^2$$

9. A steel wire when bent in the form of square encloses an area of 121 cm^2 . If the same wire is bent in circle. Find its area.

Area of square = Area of circle

$$121 \text{ cm}^2 = \pi r^2$$

$$121 \text{ cm}^2 = \frac{22}{7} \times r^2$$

$$\frac{121 \times 7}{22} = r^2$$

$$38.5 = r^2$$

$$\sqrt{38.5} = r$$

10. Find the radius of the circular garden whose cost of fencing is ₹30800 at the rate of ₹40 per metre.

$$\text{Area of garden} = \frac{\text{Cost of fencing}}{\text{Rate per m}^2}$$

$$\pi r^2 = \frac{30800}{40}$$

$$\pi r^2 = 770 \text{ m}^2$$

$$r^2 = \frac{770 \times 7}{22}$$

$$r^2 = \sqrt{\frac{490}{2}} = \sqrt{245}$$

$$r = 15.6 \text{ m}$$

11. The length and the breadth of a rectangular sheet are 1.80 m and 90 cm respectively. 3 circular sheets of radius 14 cm are cut out. Find the area of the remaining sheet.

Ar. of remaining sheet = Ar. of Rectangular sheet – $3 \times$ Ar. of circle

$$= L \times B - 3 \times \pi r^2$$

$$1.80 \times 0.9 \text{ m}^2 - 3 \times \frac{22}{7} \times 14^2 \times .14$$

$$= 1.62 \text{ m}^2 - 0.1848 \text{ m}^2$$

$$= 1.4352 \text{ m}^2$$

12. A circus tent has a radius of 77 cm . A rope at the centre, of length 22 cm , is tied for the performance of artist. How much area is left for the audience?

Area for audience = Area of Big circle – Area of small circle

$$= \pi (R^2 - r^2)$$

$$= \frac{22}{7} ((77)^2 - (22)^2)$$

$$= \frac{22}{7} (5929 - 484)$$

$$= \frac{22}{7} \times 5445 \text{ cm}^2$$

$$= 17112.85 \text{ cm}^2$$

13. Find the area of shaded portions of the given figures :

a. Area of Remaining square = Ar. of square – Ar. of circle

$$= (\text{Side})^2 - \pi r^2$$

$$= (21)^2 - \frac{22}{7} \times \frac{21^3}{21} \times \frac{21}{2}$$

$$= 441 - 346.5$$

$$= 94.5 \text{ cm}^2$$

$$\text{Ar. of remaining circle} = \frac{\text{Ar. of circle}}{2}$$

$$= \frac{346.5}{2} = 173.25 \text{ cm}^2$$

b. Ar. of 1 quadrant = $\frac{\text{Area of circle}}{4} = 3$

$$= \frac{\pi r^2}{4} = \frac{22}{7} \times \frac{21^3}{21} \times \frac{21}{4}$$

$$= 3.465 \text{ cm}^2$$

$$\text{Ar. of 3 quadrant} = 3 \times \frac{\pi r^2}{4}$$

$$= 3 \times \frac{22}{7} \times \frac{4.2 \text{ cm}^{0.6 \times 0.3} \times 4.2 \text{ cm}}{4}$$

$$= 41.58 \text{ cm}^2$$

c. Area of square – Area of circle

$$(\text{side})^2 - \pi r^2$$

$$= (84 \text{ cm})^2 - \frac{22}{7} \times \frac{84^3}{21} \times \frac{84}{2}$$

$$= 7056 \text{ cm}^2 - 5544$$

$$= 1512 \text{ cm}^2$$

d. Area of shaded portion – Area of rectangle

$$= 2 \times \text{Area of circle}$$

$$= L \times B - 2 \times \pi r^2$$

$$= 8 \times 6 \text{ m}^2 - 2 \times \frac{22}{7} \times 2 \times 2 \text{ m}^2$$

$$= 48 \text{ m}^2 - 25 = 23 \text{ m}^2$$

$$= 23 \text{ m}^2$$

Revision Exercise

1. Tick (✓) the correct option:

- a. (iii) $169m^2$ b. (ii) $175m^2$
c. (ii) $64cm$ d. (i) $42cm^2$

2. The radius of a circular metallic sheet is 14 cm . A circular piece of sheet is cut out from it. The radius of the remaining piece is 7 cm . What is the area of the cut out piece?

$$\text{Area of cut out piece} = \pi(R^2 - r^2)$$

$$\begin{aligned} &= \frac{22}{7} \left((14)^2 - (7)^2 \right) \\ &= \frac{22}{7} \times (196 - 49) \\ &= \frac{22}{7} \times 147 = 462cm^2 \end{aligned}$$

3. Find the breadth of a playground whose area is 1547 m^2 and length is 45 m .

$$\text{Area of playground} = L \times B$$

$$1547m^2 = 45m \times B$$

$$\frac{1547m^2}{45m} = B$$

$$34.3 = B$$

4. Find the cost of fencing a rectangle field 35 m long and 20 m wide at ₹ 2.50 per metre. What is the cost of cultivating the field at ₹ 5.00 per square meter?

$$\text{Per metre of rectangle} = 2(l + b)$$

$$= 2(35m + 20m)$$

$$= 2(55m)$$

$$= 110m$$

$$\text{Cost of fencing} = \frac{\text{₹}2.50}{100} \times 1100$$

$$= \text{₹}275$$

$$\text{Area of Rectangle} = L \times B$$

$$= 35m \times 20m$$

$$= 700m^2$$

$$\text{Cost of cultivating} = \text{₹}5.00 \times 700$$

$$= \text{₹}3500$$

5. The radius of a wheel is 28 cm . How many revolutions will it make to travel 704 m ?

$$\text{Circumference of wheel} = 2\pi r$$

$$= 2 \times \frac{22}{7} \times 28cm$$

$$= 176cm = \frac{176}{100} = 1.7cm$$

$$\begin{aligned} \text{No. of Revolution} &= \frac{704m}{1.76} \\ &= 400 \end{aligned}$$

6. Find the area of the shaded region shown below :

- a. $49cm^2$ b. $25cm^2$

Chapter-17 Data Interpretation

Exercise – 17.1

1. The heights of 15 boys of a school are given cm :

128, 132, 139, 139, 140, 142, 142, 143, 146, 148, 149, 152, 154, 157, 165.

- a. $165cm$
b. $128cm$
c. $\frac{128+132+139+139+140+142+142+143+146+148+149+152+154+157+165}{15}$

$$= \frac{2176}{15} = 145$$

2. The weight of 6 students are 49 kg, 52 kg, 51 kg, 58 kg, and 55 kg respectively. Find the mean weight.

$$\begin{aligned} \text{Mean} &= \frac{49 + 52 + 51 + 58 + 55}{5} \\ &= \frac{265}{5} = 53 \end{aligned}$$

3. Find the mean of first 5 prime numbers.

2, 3, 5, 7, 11

$$\text{Mean} = \frac{2 + 3 + 5 + 7 + 11}{5} = \frac{28}{5} = 5.6$$

4. Find the mean of first 5 even numbers.

2, 4, 6, 8, 10

$$\text{Mean} = \frac{2 + 4 + 6 + 8 + 10}{5} = \frac{30}{5} = 6$$

5. Find the mean of the first 10 odd numbers.

1, 3, 5, 7, 9, 11, 13, 15, 17, 19

$$\begin{aligned} \text{Mean} &= \frac{1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19}{10} \\ &= \frac{100}{10} = 10 \end{aligned}$$

6. Find the mean of the first 15 natural numbers.

$$1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15$$

$$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9$$

$$\text{Mean} = \frac{+10 + 11 + 12 + 13 + 14 + 15}{15}$$

$$= \frac{120}{15} = 8$$

7. Calculate the mean for the following frequency table :

Exi Marks	fi No. of students	fixi
10	5	50
20	12	240
30	32	960
40	40	1600
50	45	2250
60	48	2880
	182	7980

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i}$$

$$= \frac{7980}{182} = 43.8$$

8. The following data shows the daily pocket expenses of 100 employees of a company. Find the mean pocket expenses of each.

xi expenses	fi No. of employees	fixi
1000	28	28000
1200	16	19200
1400	10	14000
1600	40	64000
1800	6	10800
	100	1,36,000

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i}$$

$$= \frac{1,36,000}{100} = 1360$$

b. $11, 12, 15, 17, 19, 20, 21, 27, 28$

$$\frac{n+1}{2} = \frac{9+1}{2} = \frac{10}{2} = 5^{\text{th}}$$

c. $1.8, 2.6, 3.4, 4.3, 5.6, 5.8, 7.2, 9.1$

$$\left(\frac{\left(\frac{n}{2} \right) + \left(\frac{n}{2} + 1 \right)}{2} \right) = \left(\frac{\left(\frac{8}{2} \right) + \left(\frac{8}{2} + 1 \right)}{2} \right)$$

$$= \frac{4+5}{2} = \frac{4.3+5.6}{2}$$

$$= \frac{9.9}{2} = 4.95$$

2. Find the median of first 10 even numbers.

$$2, 4, 6, 8, 10, 12, 14, 16, 18, 20$$

$$\text{Median} = \left(\frac{\left(\frac{10}{2} \right) + \left(\frac{10}{2} + 1 \right)}{2} \right)$$

$$= \frac{5^{\text{th}} + 6^{\text{th}}}{2} = \frac{9+11}{2} = \frac{20}{2} = 10$$

3. Find the median of first 10 odd numbers.

$$2, 4, 6, 8, 10, 12, 14, 16, 18, 20$$

$$\text{Median} = \frac{5^{\text{th}} + 6^{\text{th}}}{2} = \frac{9+11}{2} = \frac{22}{2} = 11$$

4. Find the mode of the following data :

a. $3, 3, 6, 8, 8, 9, 9, 1, 11, 11, 12, 12, 13, 13, 18, 19, 25, 42$

11 comes more time

$$\text{Mode} = 11$$

b. $4, 4, 4, 5, 5, 6, 6, 7, 7, 7, 7, 8, 8, 9, 9, 9, 10$

7 comes more time

$$\text{Mode} = 7$$

Exercise – 17.2

1. Find the median and range of the following data:

a. $0, 7, 9, 13, 13, 17, 19, 20, 25, 25, 32, 37, 50, 57$

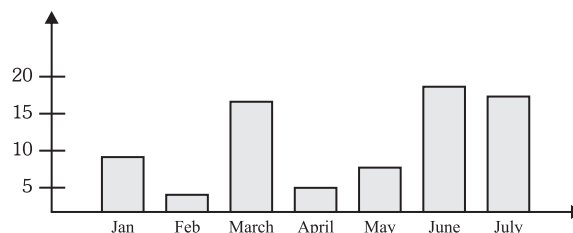
No. of observation = 15, odd

$$\frac{15+1}{2} = \frac{16}{2} = 8$$

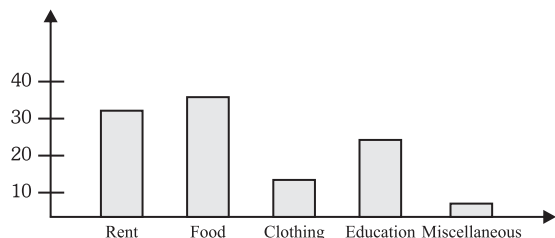
$$\text{Median} = 19$$

Exercise – 17.3

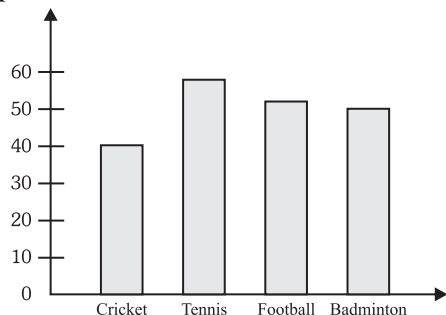
1. Draw a bar graph for the information given below.



2. Construct a bar graph to show the following information.



3. The following table shows the sports of 200 students of a school. Present the data by a bar graph.



4. A dice is thrown 150 times and the outcomes are noted as given below :

Find the probability of getting

- a. $\frac{25}{150} = \frac{1}{6}$ b. $\frac{21}{150}$
- c. $\frac{19}{150}$ d. $\frac{24}{150} = \frac{4}{25}$
- e. $\frac{28}{150} = \frac{14}{75}$

Chapter-18 Probability

Exercise – 18.1

1. Find the Probability of the following :

- a. 0 b. $\frac{1}{4}$
- c. $\frac{\cancel{8}^3}{\cancel{8}_4} = \frac{3}{4}$ d. $\frac{1}{2}$

2. The letters of the word “BREAK” are placed in a bag and one letter is taken out :

- a. 5
- b. i. $\frac{2}{5}$ ii. $\frac{3}{5}$
- iii. $\frac{1}{5}$ iv. $\frac{1}{5}$
- v. $\frac{1}{5}$ vi. $\frac{1}{5}$
- vii. $\frac{1}{5}$ viii. 0

3. Six friends were deciding where to go out during the coming weekend. Everyone wrote his intentions on a slip of paper to show his choice :

What is the probability of the following.

- a. $\frac{1}{6}$ b. $\frac{\cancel{2}^1}{\cancel{6}_3} = \frac{1}{3}$
- c. $\frac{1}{6}$

GROW *With* MATHS

