Exercise 9.1

1. (a) $\frac{36}{42}=\frac{6}{7}$ or $6:7$

(b) $\frac{AB}{CD}=\frac{9}{7}=9:7$

(c) $\frac{\text{passing students}}{\text{appeared students}}=\frac{\frac{3}{4}}{1}=\frac{3}{4}=3:4$

(d) defective bulbs $= 25$

good bulbs $= 70-25=45$

$\therefore$ ratio $=\frac{25}{45}=\frac{5}{9}=5:9$

2. (a) $16:18=\frac{16}{18}=\frac{8}{9}$ or $8:9$

(b) $25:45=\frac{25}{45}=\frac{5}{9}$ or $5:9$

(c) $33:39=\frac{33}{99}=\frac{1}{3}$ or $1:3$

(d) $100:150=\frac{100}{150}=\frac{2}{3}$ or $2:3$

(e) $70:42=\frac{70}{42}=\frac{5}{3}$ or $5:3$

(f) $50:225=\frac{50}{225}=\frac{2}{9}$ or $2:9$

(g) $65:91=\frac{65}{91}=\frac{5}{7}$ or $5:7$

(h) $17:34=\frac{17}{34}=\frac{1}{2}$ or $1:2$

(i) $450:270=\frac{450}{270}=\frac{5}{3}$ or $5:3$

(j) $500:1000=\frac{500}{1000}=\frac{1}{2}$ or $1:2$

3. (a) $\frac{3.6\,\text{m}}{54\,\text{m}}=\frac{36}{540}=\frac{1}{15}=1:15$

(b) $\frac{4\,\text{cm}}{5\,\text{m}}=\frac{4\,\text{cm}}{500\,\text{cm}}=\frac{4}{500}=\frac{1}{125}=1:125$

(c) $\frac{45\,\text{kg}}{180\,\text{kg}}=\frac{45}{180}=\frac{1}{4}=1:4$

(d) $\frac{70\,\text{minutes}}{210\,\text{seconds}}=\frac{70\times 60\,\text{seconds}}{210\,\text{seconds}}=\frac{4200}{210}=\frac{20}{1}=20:1$

(e) $\frac{25\,\text{Paise}}{₹\,50}=\frac{25\,\text{Paise}}{5000\,\text{Paise}}=\frac{1}{200}=1:200$

(f) $\frac{2.3}{9.2}=\frac{23}{92}=\frac{1}{4}=1:4$

4. (a) $3:4$ or $5:6$

$\frac{3}{4}$ or $\frac{5}{6}$

3×6 or 5×4

$\because\ 18<20$

$\therefore\ 3:4<5:6$

(b) $9:11$ or $7:3$

$\frac{9}{11}$ or $\frac{7}{3}$

9×3 or 7×11

$\because\ 27<77$

$\therefore\ 9:11<7:3$

(c) $1:2$ or $3:7$

$\frac{1}{2}$ or $\frac{3}{7}$

(d) $5:13$ or $2:5$

$\frac{5}{13}$ or $\frac{2}{5}$

1×7 or 3×2 $\qquad\qquad$ 5×5 or 2×13

$\because$ $7>6$ $\qquad\qquad$ $\because$ $25<26$

$\therefore$ $1:2>3:7$ $\qquad\qquad$ $\therefore$ $5:13<2:5$

5. (a) The first term of a ratio is called as **antecedent.**

(b) The second term of a ratio is called the **consequent.**

(c) Ratio has no unit.

6. $\dfrac{18.6\text{ m}}{6.2\text{ m}}=\dfrac{186}{62}=\dfrac{3}{1}$ or 3 : 1

7. sum of the terms of ratio $=8+5=13$

$$\text{Ist part}=\frac{8}{13}\times 65=8\times 5=40$$

$$\text{IInd part}=\frac{5}{13}\times 65^{5}=25$$

8. ratio is $\dfrac{12}{13}:1$ or 12 : 13

$\therefore$ sum of the terms of ratio = 12 + 13 = 25

$$\text{Ist part}=\frac{12}{25}\times 1000=12\times 40=480$$

$$\text{IInd part}=\frac{13}{25}\times 1000=13\times 40=520$$

9. sum of the terms of ratio = 2 + 5 = 7

$$\text{Ist number}=\frac{2}{7}\times 49=2\times 7=14$$

$$\text{IInd number}=\frac{5}{7}\times 49=5\times 7=35$$

10. sum of the terms of ratio $=3+2+2=7$

$$\text{A get}=\frac{3}{7}\times 3500=3\times 500=₹\,1500$$

$$\text{B get}=\frac{2}{7}\times 3500\quad =₹\,1000$$

$$\text{C get}=\frac{2}{7}\times 3500=2\times 500=₹\,1000$$

11. Let male teachers $=3x$

Let female teachers $=2x$

$\because$ male teachers = 30

$\therefore$ $3x=30$ $\qquad\Rightarrow\qquad$ $x=10$

$\therefore$ female teachers $=2x=2\times 10=20$

12. $\dfrac{1}{3000000}=\dfrac{3}{x}$

$x=3\times 3000000$ $\qquad\Rightarrow\qquad$ $x=9000000\text{ cm}$

$x=90000\text{ m}$ $\qquad\Rightarrow\qquad$ $x=90\text{ km}$

$\therefore$ towns are 90 km apart in actual

13. Let height of taller brother $=8x$

Let height of shorter brother $=7x$

$\because$ shorter brother = 161 cm

$7x=161$ $\qquad\Rightarrow\qquad$ $x=23$

$\therefore$ height of taller brother $=8x=8\times 23=184$ cm

14. (a) $1 : 5$ or $3 : 17$

$\frac{1}{5}$ or $\frac{3}{17}$

1×17 or 3×5

$\because$ $17 > 15$

$\therefore$ $1 : 5 > 3 : 7$

(b) $5 : 13$ or $2 : 5$

$\frac{5}{13}$ or $\frac{2}{5}$

5×5 or 2×13

$\because$ $25 < 26$

$\therefore$ $5 : 13 < 2 : 5$

(c) $2 : 15$ or $4 : 7$

$\frac{2}{15}$ or $\frac{4}{7}$

2×7 or 4×15

$\because$ $14 < 60$

$\therefore$ $2 : 15 < 4 : 7$

(d) $11 : 9$ or $3 : 5$

$\frac{11}{9}$ or $\frac{3}{5}$

11×5 or 3×9

$\because$ $55 > 27$

$\therefore$ $11 : 9 > 3 : 5$

15. (a) $10 : 7$ or $15 : 22$

$\frac{10}{7}$ or $\frac{15}{22}$

10×22 or 15×7

$\because$ $220 > 105$

$\therefore$ $10 : 7 > 15 : 22$

(b) $5 : 9$ or $23 : 14$

$\frac{5}{9}$ or $\frac{23}{14}$

5×14 or 23×9

$\because$ $70 < 207$

$\therefore$ $5 : 9 < 23 : 14$

(c) $9 : 16$ or $4 : 11$

$\frac{9}{16}$ or $\frac{4}{11}$

9×11 or 4×16

$\because$ $99 > 64$

$\therefore$ $9 : 16 > 4 : 11$

(d) $7 : 21$ or $2 : 5$

$\frac{7}{21}$ or $\frac{2}{5}$

7×5 or 2×21

$\because$ $35 < 41$

$\therefore$ $7 : 21 < 2 : 5$

Exercise 9.2

1. (a) Extremes of $4 : 5 :: 20 : 25$ are 4 and 25

(b) Extremes of $22 : 11 :: 88 : 44$ are 22 and 44

(c) Extremes of $1 : 2 :: 3 : 6$ are 1 and 6

(d) Extremes of $3 : 4 :: 6 : 8$ are 3 and 8

(e) Extremes of $16 : 24 :: 24 : 36$ are 16 and 36

(f) Extremes of $5 : 7 :: 25 : 35$ are 5 and 35

(g) Extremes of $1 : 6 :: 4 : 24$ are 1 and 24

(h) Extremes of $50 : 150 :: 100 : 300$ are 50 and 300

2. (a) Means of $25 : 5 :: 20 : 4$ are 5 and 20

(b) Means of $1 : 4 :: 8 : 32$ are 4 and 8

(c) Means of $4 : 12 :: 12 : 36$ are 12 and 12

(d) Means of $2 : 5 :: 16 : 40$ are 5 and 16

(e) Means of $2 : 3 :: 24 : 36$ are 3 and 24

(f) Means of $4 : 5 :: 16 : 20$ are 5 and 16

(g) Means of $25 : 30 :: 16 : 36$ are 30 and 16

(h) Means of $15 : 32 :: 135 : 288$ are 32 and 135

3. (a) $10 : 15 :: 20 : 25$

Product of Means $= 15 \times 20 = 300$

Product of Extremes $= 10 \times 25 = 250$

$\because$ Product of Means $\neq$ Product of Extremes

$\therefore$ false

(b) 24 : 96 :: 16 : 54

Product of Means $= 96 \times 16 = 1536$

Product of Extremes $= 24 \times 54 = 1296$

$\because$ Product of means $\neq$ Product of Extremes

$\therefore$ False

(c) 1 : 2 :: 3 : 6

Product of means $= 2 \times 3 = 6$

Product of Extremes $= 1 \times 6 = 6$

$\because$ Product of means = Product of Extremes

$\therefore$ False

(d) 75 : 150 :: 3 : 18

Product of means $= 150 \times 3 = 450$

Product of Extremes $= 75 \times 18 = 1350$

$\because$ Product of means $\neq$ Product of Extremes

$\therefore$ False

(e) 63 : 105 :: 18 : 30

Product of means $= 105 \times 18 = 1890$

Product of Extremes $= 63 \times 30 = 1890$

$\because$ Product of means = Product of Extremes

$\therefore$ true

(f) 5 : 25 :: 30 : 150

Product of means $= 25 \times 30 = 750$

Product of Extremes $= 5 \times 150 = 750$

$\because$ Product of means = Product of Extremes

$\therefore$ true

(g) 66 : 22 :: 22 : 66

Product of means $= 22 \times 22 = 484$

Product of Extremes $= 66 \times 66 = 4356$

$\because$ Product of means $\neq$ Product of Extremes

$\therefore$ Not true

(h) 18 : 24 :: 15 : 20

Product of means $= 24 \times 15 = 360$

Product of Extremes $= 18 \times 20 = 360$

$\because$ Product of means = Product of Extremes

$\therefore$ true

4. (a) Product of means $= 1 \times 8 = 8$

Product of Extremes $= 4 \times 2 = 8$

$\because$ Product of means = Product of Extremes

$\therefore$ 4 : 1 :: 8 : 2

(b) Product of means $= 8 \times 16 = 128$

Product of Exremes $= 4 \times 32 = 128$

$\because$ Product of means = Product of Extremes

$\therefore$ 4 : 8 : : 16 : 32

(c) Product of means $= 42 \times 5 = 210$

Product of Extremes $= 7 \times 30 = 210$

$\because$ Product of means = Product of Extremes

$\therefore$ 7 : 42 :: 5 : 30

(d) Product of means $= 6 \times 15 = 90$
Product of Extremes $= 9 \times 10 = 90$
$\because$ Product of means = Product of Extremes
$\therefore$ $9 : 6 :: 15 : 10$

(e) Product of means $= 7 \times 25 = 175$
Product of Extremes $= 5 \times 35 = 175$
$\because$ Product of means = Product of Extremes
$\therefore$ $5 : 7 :: 25 : 35$

(f) Product of means $= 30 \times 12 = 360$
Product of Extremes $= 24 \times 15 = 360$
$\because$ Product of means = Product of Extremes
$\therefore$ $24 : 30 :: 12 : 15$

(g) Product of means $= 21 \times 10 = 210$
Product of Extremes $= 35 \times 6 = 210$
$\because$ Product of means = Product of Extremes
$\therefore$ $35 : 21 :: 10 : 6$

(h) Product of means $= 45 \times 40 = 1800$
Product of Extremes $= 60 \times 30 = 1800$
$\because$ Product of means = Product of Extremes
$\therefore$ $60 : 45 :: 40 : 30$

5. (a) $169 : x :: x : 1$
Product of means = Product of Extremes
$x \times x = 169 \times 1$
$x^2 = 169$
$\Rightarrow$ $x = \sqrt{169}$ $\Rightarrow$ $x = 13$

(b) $80 : 32 :: x : 16$
Product of means = Product of Extremes
$32 \times x = 16 \times 80$
$\Rightarrow$ $x = \dfrac{16 \times \overset{40}{80}}{\underset{2}{32}}$ $\Rightarrow$ $x = 40$

(c) $x : 3 :: 57 : 19$
Product of means = Product of Extremes
$3 \times 57 = x \times 19$
$\Rightarrow$ $\dfrac{3 \times 57}{19} = x$ $\Rightarrow$ $9 = x$

(d) $18 : x :: 27 : 3$
Product of means = Product of Extremes
$x \times 27 = 3 \times 18$
$\Rightarrow$ $x = \dfrac{3 \times 18}{27}$ $\Rightarrow$ $x = 2$

(e) $125 : x :: x : 5$
Product of means = Product of Extremes
$x \times x = 5 \times 125$
$\Rightarrow$ $x^2 = 625$ $\Rightarrow$ $x = \sqrt{625}$
$\Rightarrow$ $x = 25$

(f) $10:15::12:x$

Product of means = Product of Extremes

$$15\times 12 = x\times 10$$

$$\Rightarrow \quad \frac{15\times 12}{10} = x \quad \Rightarrow \quad 18 = x$$

(g) $60:x::52:39$

Product of means = Product of Extremes

$$x\times 52 = 39\times 60$$

$$\Rightarrow \quad x = \frac{39\times 60}{52} \quad \Rightarrow \quad x = 3\times 15$$

$$\Rightarrow \quad x = 45$$

(h) $11:121::x:23$

Product of means = Product of Extremes

$$121\times x = 231\times 11$$

$$\Rightarrow \quad x = \frac{231\times 11}{121} \quad \Rightarrow \quad x = 21$$

6. (a) Let fourth proportion be x

$\therefore \quad 21:27::14:x$

Product of means = Product of Extremes

$$27\times 14 = x\times 21$$

$$\Rightarrow \quad \frac{27\times 14}{21} = x \quad \Rightarrow \quad 18 = x$$

$\therefore$ fourth proportion is 18.

(b) Let fourth proportion be x

$\therefore \quad 57:76::108:x$

$\because$ Product of means = Product of Extremes

$\therefore \quad 76\times 108 = 57\times x$

$$\Rightarrow \quad \frac{76\times 108}{57} = x \quad \Rightarrow \quad 144 = x$$

$\therefore$ fourth proportion is 144.

(c) Let the fourth proportion be x

$\therefore \quad 3:9::x:27:x$

$\because$ Product of means = Produt of Extremes

$$9\times 27 = 3\times x$$

$$\Rightarrow \quad \frac{9\times 27}{3} = x \quad \Rightarrow \quad 81 = x$$

$\therefore$ fourth proportion is 81.

(d) Next fourth proportion be x

$\therefore \quad 1:10::100:x$

$\because$ Product of means = Produc of Extremes

$\therefore \quad 10\times 100 = 1\times x$

$\Rightarrow \quad 1000 = x$

$\therefore$ fourth proportion is 1000.

7. (a) Let mean proportion be x

$\therefore$ $36 : x :: x : 16$

$\because$ Product of mean = Produc of Extremes

$$x \times x = 36 \times 16$$

$$x^2 = 36 \times 16$$

$$x = \sqrt{36 \times 36}$$

$$x = 6 \times 4$$

$\Rightarrow$ $$x = 24$$

$\therefore$ mean proportion is 24.

(b) Let mean proportion be x

$\therefore$ $4 : x :: x : 9$

$\because$ Product of means = Product of Extremes

$$x \times x = 4 \times 9$$

$$x^2 = 36$$

$$x = \sqrt{36}$$

$$x = 6$$

$\therefore$ mean proportion is 6.

(c) Let mean proportion be x

$\therefore$ $4 : x :: x : 16$

$\because$ Product of means = Product of Extremes

$$x \times x = 4 \times 16$$

$\Rightarrow$ $x^2 = 4 \times 16$ $\Rightarrow$ $x = \sqrt{4 \times 16}$

$$x = 8$$

$\therefore$ fourth proportion is 8.

(d) Let the fourth proportion be x

$\therefore$ $125 : x :: x : 5$

$\because$ Product of means = Product of Extremes

$x \times x = 125 \times 5$ $\Rightarrow$ $x^2 = 625$

$x = \sqrt{625}$ $\Rightarrow$ $x = 25$

fourth proportion is 25.

(e) Let fourth proportion be x

$\therefore$ $121 : x :: x : 100$

$\because$ Product of means = Product of Extremes

$\therefore$ $$x \times x = 121 \times 100$$

$\Rightarrow$ $x^2 = 12100$ $\Rightarrow$ $x = \sqrt{12100}$

$\Rightarrow$ $$x = 110$$

$\therefore$ fourth proportion is 110.

(f) Let fourth proportion be x

$\therefore$ $32 : x :: x : 50$

$\because$ Product of means = Product of Extremes

$\therefore$ $$x \times x = 50 \times 32$$

$\Rightarrow$ $x^2 = 1600$ $\Rightarrow$ $x = \sqrt{1600}$

$\Rightarrow$ $$x = 40$$

$\therefore$ fourth proportion is 40.

(g) Let fourth proportion be x

$\therefore \quad 4 : x :: x : 36$

$\because$ Product of means = Product of Extremes

$\therefore \quad x \times x = 36 \times 4$

$\Rightarrow \quad x^2 = 36 \times 4 \quad \Rightarrow \quad x^2 = \sqrt{36 \times 4}$

$\Rightarrow \quad x = 12$

$\therefore$ fourth proportion is 12.

(h) Let fourth proportion be x

$\therefore \quad 25 : x :: x : 36$

$\because$ Product of means = Product of Extremes

$x \times x = 36 \times 25$

$\Rightarrow \quad x^2 = 36 \times 25 \quad \Rightarrow \quad x = \sqrt{36 \times 25}$

$\Rightarrow \quad x = 30$

$\therefore$ fourth proportion is 30.

8. Let number be x

$\therefore \quad x : 32 :: 18 : 24$

$\because$ Product of means = Product of Extremes

$$\overset{4}{32} \times \overset{6}{18} = x \times 24$$

$$\Rightarrow \quad \frac{32 \times 18}{\underset{3}{24}} = x \quad \Rightarrow \quad 24 = x$$

$\therefore$ 24 has the same ratio to 32 as 18 has to 24.

9. If x, y, z are in proportion then,

$y^2 = xz \quad \Rightarrow \quad 6^2 = x \times 12$

$\Rightarrow \quad 3 = x$

10. Let 2nd proportion be x

$\therefore \quad 42 : x :: 70 : 35$

$\because$ Product of means = Product of Extremes

$x \times 70 = 35 \times 42$

$$x = \frac{35 \times 42}{70}$$

$x = 21$

$\therefore$ 2nd proportion is 21.

11. $l : b = 6 : 3 \qquad 80 : b = 6 : 3$

$\because$ Product of means = Product of Extremes

$b \times 6 = 3 \times 80 \quad \Rightarrow \quad b = 40$

$\because$ breadth = 40 cm

12. scale actual

$1 : 90 :: x : 270$

$\because$ Product of means = Product of Extreme

$90 \times x = 270 \times 1 \quad \Rightarrow \quad x = 3$

$\therefore$ 270 m represent 3 units on map.

13. Let mean proportion be x

$\therefore \quad 9 : x :: x : 4 \quad \Rightarrow \quad x \times x = 4 \times 9$

$x^2 = 36 \quad \Rightarrow \quad x = 6$

$\therefore$ mean proportion is 6.

14. high : l = high : l

$$8 : 352 = 12.5 : l$$

$\because$ Product of means = Product of Extremes

$$352 \times 12.5 = 8 \times l \quad \Rightarrow \quad \frac{352 \times 12.5}{8} = l$$

$$44 \times 12.5 = l \quad \Rightarrow \quad 550 = l$$

$\therefore$ 12.5 cm high tin hold 550 litres of oil.

15. Let fourth proportion be x

$\therefore$ $15 : 20 :: 30 : x$

$\because$ Product of means = Product of Extremes

$$20 \times 30 = 15 \times x$$

$$\Rightarrow \quad \frac{20 \times 30}{15} = x$$

$$\Rightarrow \quad 40 = x$$

$\therefore$ fourth proportion is 40.

Exercise 9.3

1. 10 kg of rice cost = ₹ 245

1 kg of rice cost = ₹ $\frac{245}{10}$

$\therefore$ 3 kg of rice cost $= \frac{245}{10} \times 3$

$= 24.5 \times 3$

$=$ ₹ 73.5

2. 35 in land letters o cost = ₹ 105

1 in land letters o cost $= \frac{105}{35}$

60 in land letters o cost $= \frac{105}{35} \times 60$

$=$ ₹ 180

3. 12 tables of weight = 132 kg

1 tables of weight $= \frac{132}{12}$

5 tables of weight $= \frac{132}{12} \times 5$

$= 11 \times 5$

$= 55$ kg

4. The last four days was rainfall = 366 mm

1 days was rainfall $= \frac{366}{4}$

$\therefore$ 9 week rainfall is expected $= \frac{366}{4} \times 7$

$= 91.5 \times 7$

$= 640.5$ mm

5. 12 eggs of cost = ₹ 30

1 eggs of cost $= \frac{30}{12}$

15 eggs of cost $= \frac{30}{12} \times 15 = \frac{75}{2}$

$= ₹\ 37.5$

6. Cost of 7 pens purchased by Himanshu $= ₹\ 91$

Cost of 1 pens purchased by Himanshu $= \frac{91}{7} = ₹\ 13$

cost of 9 pens purchased by Shubham $= ₹\ 108$

cost of 1 pens purchased by Shubham $= \frac{108}{9} = ₹\ 12$

Shubham bought the pens cheaper.

7. 265 km of distance is cover $= 162$

1 km of distance is cover $= \frac{16}{256}$

$\therefore$ 400 km of distance is cover $= \frac{16}{256} \times 400 = 252$

8. 3 hours of distance is cover an aeroplane $= 2550\,\text{km}$

1 hours of distance is cover an aeroplane $= \frac{2550}{3}$

7 hours of distance is cover an aeroplane $= \frac{2550}{3} \times 7$

$= 850 \times 7$

$= 5950\,\text{km}$

9. 24 boxes only A transport charges $= ₹\ 1800$

1 boxes only A transport charges $= \frac{1800}{24}$

18 boxes only A transport charges $= \frac{1800}{24} \times 18$

10. 594 km distance covering for a truck $= 108\,\text{L}$

1 km distance covering for a truck $= \frac{108}{594}$

1,650 km distance covering for a truck $= \frac{108}{594} \times 1650$

$= \frac{2 \times 1650}{11}$

$= 300\,\text{L Diesel}$

11. 4 hours Machine produces of cloth $= 240\,\text{m}$

1 hours machine product of cloth $= \frac{240}{4}$

Then 108 hours A machine produces of cloth $= \frac{240}{4} \times 108$

$= 60 \times 108$

$= 6{,}480\,\text{m}$

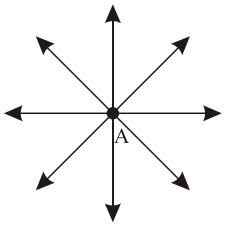
Multiple Choice Questions

1. (a) Same units **2.** (c) 1 : 4 **3.** (d) 1 : 3 **4.** (d) 6 **5.** (a) 2,160 **6.** (b) 20 **7.** (c) $\sqrt{pr}$ **8.** (c) $q : p :: r : s$ **9.** (a) 15 : 4 **10.** (d) 32

Exercise 10.1

1. (a) $\overleftrightarrow{PQ}$ (b) $\overleftrightarrow{a}$

2.



Yes, we can draw more lives through A.

3. (i) Points are A, B, C, D, E, F, G, H
lines are $AB, BC, CD, DA, EF, FG, GH, HE, AE, BF, CG, DH$
(ii) Points are O, P, Q, R and S
lines are $PQ, QR, RS, SP, OP, OQ, OR$ and OS.

4. Line is of infinite length.

5. Only one line can pass through P and Q.

6. (a) $\overleftrightarrow{CD}$ (line) (b) $\overline{AB}$ (line segment) (c) $\overrightarrow{AB}$ (ray)

7. (a) $AE \parallel BF \parallel CH \parallel DI$.
(b) AE and AD; AG and GJ; AE and EF; BF and BC, JG and GI are 5 pairs of inter-secting lines.
(c) JG and DI have point of intersection J.
(d) AG and BF have point of intersection K.

8. A ray have one end point whereas line have no end point.

9. (a) true (b) true (c) true (d) false (e) false (f) false (g) true (h) false (i) false (j) false (k) true.

Exercise 10.2

1. (a) Open figure (b) closed figure
(c) closed figure (d) open figure

2. Point outside the figure $= E, Q, L, B, A, P$
Point inside the figure $= Z, D, S, C, N$
Points on the figure $= R, F, M, K, T$

3. (i) and (iv) have curvilinear figure.

Exercise 10.3

1. (a) $\angle AOB$ (b) $\angle XYZ$ (c) $\angle POR$ (d) $\angle KLM$

2. Angles are $\angle EOD$, $\angle EOC$, $\angle EOB$, $\angle EOA$, $\angle DOC$, $\angle DOB$, $\angle DOA$, $\angle COB$, $\angle COA$, $\angle BOA$

3. Points in the interior of $\angle ABC = P, Q, R$
Points in outside of $\angle ABC = H, J, F$

4. $\angle 1 > \angle 2$

5. $\angle 1 = \angle AOB$; $\angle 2 = \angle BOC$ $\angle 3 = \angle COD$; $\angle 4 = \angle DOE$
$\angle 5 = \angle EOF$; $\angle 6 = \angle AOF$

Exercise 10.4

1. Triangles are $\Delta POQ, \Delta QOR, \Delta ROS, \Delta SOP, \Delta PQR, \Delta QRS, \Delta RSP, \Delta SPQ,$

2. (a) Side opposite to $\angle P = PQ.$

(b) Side opposite to $\angle R = PQ.$

(c) angle opposite to side $QR = \angle P.$

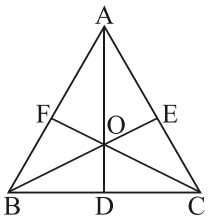
3. (a) Points interior of ΔPQR are $D, N, C.$

(b) Points on the ΔPQR are $M, S, Z.$

(c) Points in the exterior of ΔPQR are A, B, L and $Y.$

4. Altitudes are $PT, RU, QS.$

5.



Exercise 10.5

1. (a), g and (h) are quadrilaterals

2. Name four side is $\overline{CD}, \overline{BC}, \overline{AB}$ and $\overline{AD}$ and the four angles are $\angle A, \angle B, \angle C, \angle D$ and $\overline{AC}$ and $\overline{BD}$ are the two diagonals.

3. (a) adjacent side $\overline{AB}, \overline{BC}$ (b) adjacent angles $\angle A, \angle B$

(c) opposite angles $\angle A, \angle C$ (d) opposite side $\overline{AB}, \overline{DC}$

4. (a) and (c) are convex quadrilaterals figure.

5. (a) exterior of the quadrilateral F, H

(b) The quadrilateral are A, B, C, D, I, M, Y

(c) interior of the quadrilateral E, U, G

Exercise 10.6

1. (a) A radius is **Never** a chord.

(b) A chord is **Sometimes** a diameter.

(c) A diameter divides a circle **always** into two equal parts.

(d) A diameter is **always** the longest chord in 9 circle.

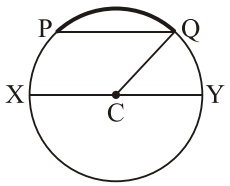
(e) A diameter **always** passes through the centre of the circle.

(f) The centre is always in the intern of the circle.

(g) The centre is **Never** a point of the circle.

(h) All radii of a circle are **always** equal in length.

2.



3. (a) The centre (b) $\overline{PQ}$ and $\overline{AB}$ are could

(c) $\overline{OC}$ is radius (d) $\overline{AB}$ is diameter

4. (a) a minor are is $\overline{AXB}$ (b) a major are is AXB
(c) a semi - circle PXQ (d) a minor segment region AXB
(e) a minor sector region OBQ

5. Given the radius of a circle is 7 cm
$\therefore \quad r = 7\,\text{cm}$
Then circumference of the circle is $= 2\pi r$

$$= 2 \times \frac{22}{7} \times 7$$

$$= 44\,\text{cm}$$

6. Given the circumference $(2\pi r) = 132\text{cm}$

$$\Rightarrow \qquad 2\pi r = 132$$

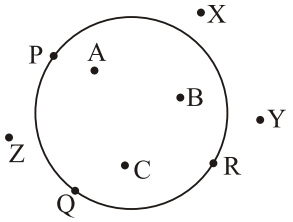
$$\Rightarrow \qquad r = \frac{132 \times 7}{2 \times 22}$$

$$r = 21\,\text{cm}$$

$\therefore$ diameter $= 2r$

$$= 2 \times 21 = 42\text{cm}$$

7.



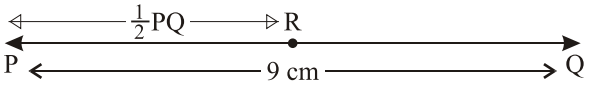
Multiple Choice Questions

1. (c) two segments **2.** (b) perpendicular **3.** (a) 15° **4.** (b) $\frac{1}{4}$ **5.** (c) 3 right angles **6.** (d) acute **7.** (b) The adjacent angles of a parallelogram are equal **8.** (d) a trapezium **9.** (d) an equilateral triangle **10.** (c) 190° **11.** (c) isosceles

11 Understanding Elementary Shapes

Exercise 11.1

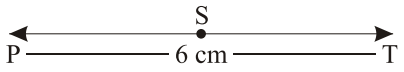
1. Draw
$\overline{PQ} = 9\,\text{cm}$



Mark any point R that lies on $\overline{PQ}$
Using the ruler, measure PR and RQ.
Then $\quad PR = \frac{1}{2} PQ = 4.5$
$\therefore \quad PQ = 4.5\,\text{cm}$
Hence, verified $PR = RQ$

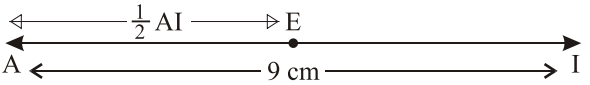
2. (a) The longest side in a triangle PR
(b) The longest side in a triangle AC
(c) The longest side in a triangle SP

3. Draw $\overline{PT} = 6\,\text{cm}$



Mark any point S that
lies on PT
using the ruler, measure PS and ST
$\overline{PS} = 2\,\text{cm}$ and $ST = 4\,\text{cm}$
$\therefore \quad PT = PS + ST = 4 + 2 = 6\,\text{cm}$
Hence verified $\quad \overline{PS} = \overline{PT} - \overline{ST}$

4. (a) Draw
$\overline{AI} = 9\,\text{cm}$



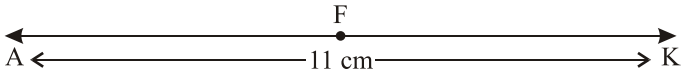
Mark any point E that lies on AI
using the ruler, measure AE and EI
Then E is midpoint of AI

$$\Rightarrow \quad AE = \frac{1}{2} AI = 4.5$$

$$EI = \frac{1}{2} AI = 4.5$$

Hence verified $AI = AE + EI$
E is midpoint of AI.

(b) Draw $\overline{AK} = 11\,\text{cm}$



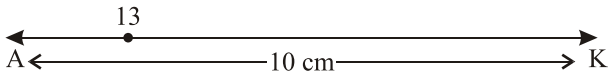
Mark any point F that lies on AK
Using the ruler, measure AF and FK
$\overline{AF} = 6\,\text{cm}$ and $FK = 5\,\text{cm}$

$$\Rightarrow \quad \overline{AK} = \overline{AF} + \overline{FK}$$

$$= 6 + 5 = 11\,\text{cm}$$

Hence verified $\quad \overline{AK} = \overline{AF} + \overline{FK}$

(c) Draw $\overline{AJ} = 10\,\text{cm}$



Marks any point B that lies on AJ
Using the ruler, measure AB and BJ
Then $\quad AB = 1\,\text{cm}$
$BJ = 9\,\text{cm}$

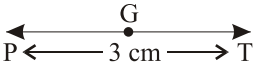
$\Rightarrow \quad \overline{AJ} = \overline{AB} + \overline{BJ}$

$\Rightarrow \quad \overline{AJ} - \overline{AJ} = \overline{AB}$

$\Rightarrow \quad 10 - 9 = \overline{AB}$

Hence verified $\quad \overline{AB} = \overline{AJ} - \overline{BJ}$

(d) Draw $FH = 3$ cm



Mark any point G that lies on $\overline{FH}$

Using the ruler, measure FG and GH

$\therefore \quad FG + GH = FH$

$\because$ G is mid point of $\overline{FH}$

hence verified G is midpoint of $\overline{FH}$

Exercise 11.2

1. Match the following :

(a) $1\frac{1}{2}$ right angles — (ii) 135°

(b) more than $\frac{3}{4}$th revolution — (i) 285°

(c) Half of the revolution — (ii) 180°

(d) Less than $\frac{1}{4}$ m of revolution — (v) 52°

(e) between $\frac{1}{4}$ m and $\frac{1}{2}$ of revolution — (iv) 115°

2. (a) The revolution at 2.

(b) The revolution at 6.

3. (a) 5 to 8

3 hours $= \frac{1}{4}$ of a revolution

(b) 2 to 11

9 hours $= \frac{3}{4}$ of a revolution

4. (a) West (b) South (c) North

5. (a) 3 to 9

$\therefore$ 6 hours = 2 right angles

(b) 2 to 11

$\therefore$ 9 hours = 3 right angles

(c) 10 to 4

$\therefore$ 6 hours = 2 right angles

(d) 1 to 4

$\therefore$ 3 hours = 0 right angles

6. (a) South to South

$\therefore$ 12 hours = 4 right angles

(b) West to East

$\therefore$ 6 hour = 2 right angles

(c) North to West

$\therefore$ 9 hours = 3 right angles

7. (a) 8 to 3 right angle

$\therefore$ at 5

(b) 9 to 1 right angle

$\therefore$ at 12

(c) 6 to 2 right angles

$\therefore$ at 12

8. (a) acute angle (b) reflex angle (c) obtuse angle

(d) straight angle (e) right angle

9. $\angle COE =$ $\angle AOE =$ $\angle BOE =$
$\angle FOC =$ $\angle AOB =$ $\angle DOC =$
$\angle AOC =$

10. (a) 5 : 05 pm
the angle is 120°

(b) 6 : 40 am
the angle is 60°

(c) 8 : 15 pm
the angle is 210°

(d) 10 : 00 am
the angle is 60°

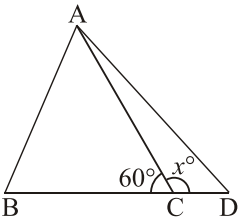
11. (a) $2\frac{1}{2}$ right angle
$= \frac{5}{2} \times 90 = 225°$

(b) $\frac{2}{5}$ of complete angle
$= \frac{2}{5} \times 360 = 144°$

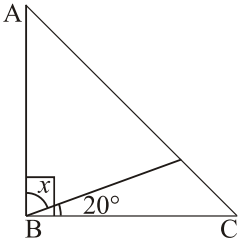
(c) $\frac{1}{2}$ of straight angle
$= \frac{1}{2} \times 180 = 90°$

(d) $\frac{4}{5}$ of straight angle
$= \frac{4}{5} \times 180 = 144°$

12. (a) So, $\angle ACB = 60°$
and $\angle ACD = x°$
$\therefore$ in a straights line.
Now $\angle ACB + \angle ACD = 180°$
$60° + x° = 180°$
$x° = 180° - 60°$
$x° = 120°$



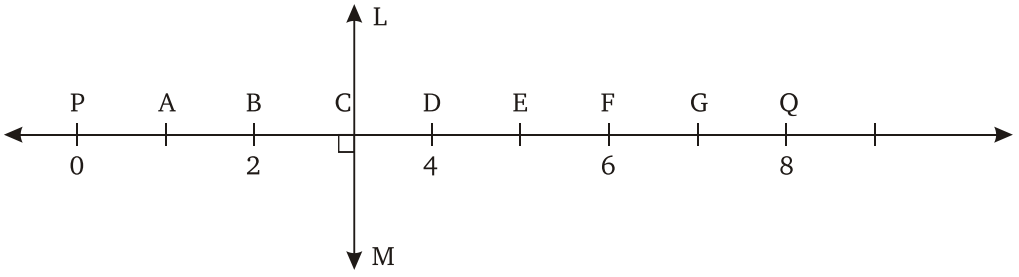
(b) So, $\angle ABD = x°$
and $\angle DBC = 20°$
$\therefore$ in a right angle
Now $\angle ABD + \angle DBC = 90°$
$x + 20° = 90$
$x = 90 - 20$
$\Rightarrow$ $x° = 70°$



Exercise 11.3

1. Draw $AB = 8$cm
Mark point O on it help of the protractor.
The $\overrightarrow{PQ}$ is perpendicular $\overrightarrow{AB}$
Hence $PO \perp AB$

2.



(a) Is $\overline{BC} = \overline{CD}$ yes, each 1 unit.

(b) Is $\angle LCD = \angle LCF$ yes.

(c) $\overline{LM}$ is perpendicular vector of line segment $\overrightarrow{BD}, \overrightarrow{AE}, \overrightarrow{PE}$ three line segment.

(d) $\angle BCM = 90°$

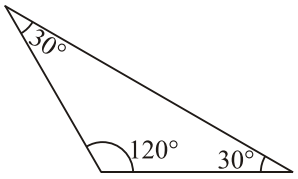
(e) $\overrightarrow{DQ}$ of mid point F.

Exercise 11.4

1. Match the following :

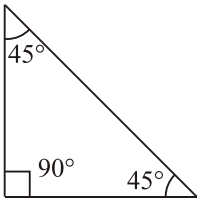
	Measure of the triangle		**Type of triangle**
(a)	3 equal sides	(vi)	equilateral triangle
(b)	2 equal sides	(v)	isosceles triangle
(c)	3 acute angles	(iv)	acute-angled triangle
(d)	One right angle	(ii)	right-angled triangle
(e)	One obtuse with two equal sides	(i)	obtuse-isosceles triangle
(f)	all acute angles with all different sides	(iii)	acute scalene triangle

2. (a)



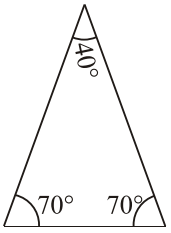
obtuse angled triangle

(b)



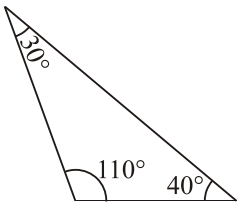
right angled triangle

(c)



acute angled triangle

(d)



obtuse angled triangle

3. (a) (i) right angled triangle, (ii) isosceles triangle

(b) (i) acute angled triangle (ii) equilateral triangle

(c) (i) obtuse angled triangle (ii) scalene triangle

(d) (i) acute angled triangle (ii) isosceles triangle.

4. Let first angle $= x°$

and second angle $= x°$ [$\because$ isosceles triangle is two angle equal]

Then we know that

$$\Rightarrow \quad x° + x° + 130° = 180°$$

$$\Rightarrow \quad 2x° + 130° = 180°$$

$$2x° = 180° - 130°$$

$$2x° = 50°$$

$$x° = \frac{50}{2}$$

$$\Rightarrow \quad x = 25°$$

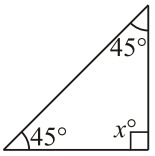
Therefore first angle is 25° and second angle is 25°.

5. Let $\angle PRQ = x°$

We know that

$$\angle RPQ + \angle RQP + \angle PRQ = 180°$$
$$45° + 45° + x° = 180°$$
$$90° + x° = 180°$$
$$x° = 180 - 90°$$
$$x° = 90°$$

$\therefore \quad \angle PRQ = 90°$



6. So, an equilateral triangle is 9 triangle that has all side equal and three angles equal and each angle is 60°.

7. No, sum of three angles of triangle is 180°

Exercise 11.5

1. True or False :

(a) True
(b) False, every rectangle is a parallelogram
(c) True
(d) True
(e) False, A square is a special from o rectangle

2. (a) Kite (b) rectangle (c) square (d) trapezium

3. Match the columns :

	Column A		**Column B**
(a)	Opposite sides and parallel and equal	(iii)	Parallelogram
(b)	All angles are equal	(ii)	Rectangle
(c)	Diagonals bisect each other at right angles	(i)	Rhombus

4. (i) equilateral triangle $\rightarrow \Delta ABC$
(ii) right triangle $\rightarrow \Delta ACD$
(iii) rectangle $\rightarrow AGCE$
(iv) trapezium $\rightarrow AGFC$
(v) parallelogram $\rightarrow AGFO$

5. Do it your self

6. (a) **Square**
(i) opposite sides are
(ii) The diagonals bisect each other at 90°
(iii) All sides are equal

Rhombus
(i) opposite sides are parallel
(ii) The diagonals bisect each at 90°
(iii) All side are equal

(b) **Rectangle**
(i) All angles measure 90°
(ii) Diagonals bisect each other
(iii) Diagonals are equal in length

Square
(i) All angles are right angles
(ii) The diagonals bisect each other at 90°
(iii) The diagonals are equal in length.

(c) **Parallelogram**
(i) Opposite side are parallel
(ii) Diagonals bisect each other

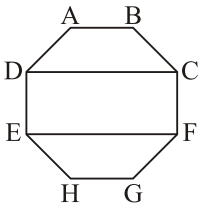
Rectangle
(i) Opposite sides are parallelogram and parallel
(ii) Diagonals bisect each other

Rhombus

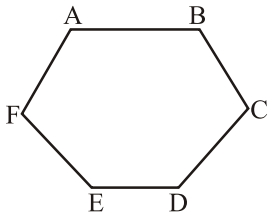
(i) Opposite sides are parallel

(ii) The diagonals bisect each other at 90°

7. Given
a octagon *ABCDEFGH*
and *A* rectangle *DCEF*



8. Irregular hexagon has unequal sides whereas in a regular hexagon all sides and all angles are equal.



9. Heptagon has 4 diagonals

Exercise 11.6

1. Match the following :

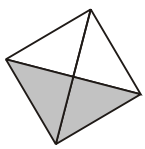
Shapes	**Objects**
(a) Sphere	(ii) A cricket ball
(b) Cylinder	(i) A coke can
(c) Cuboid	(iv) A chalk duster
(d) Cube	(iii) A dice

2.

	Shape	**Edges**	**Vertices**	**Faces**
(a)	Cuboid	12	8	6
(b)	Cube	12	8	6
(c)	Cylinder	0	0	3
(d)	Cone	0	1	2
(e)	Share	0	0	1
(f)	Triangular prism	9	6	3
(g)	Triangular pyramid	6	4	4
(h)	Square pyramid	8	5	4

3. (a) 2 triangles (b) 4 triangles

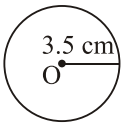
4. Triangular prism

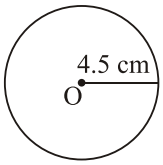


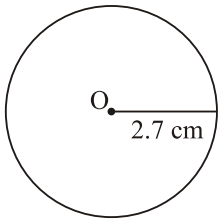
Multiple Choice Questions

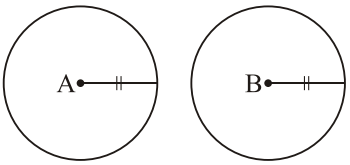
1. (a) straight angle **2.** (c) *C* lies between *A* and *D* **3.** (c) Two straight angles **4.** (c) Three right angles **5.** (d) 60° **6.** (b) reflex angles **7.** (a) Obtuse angle **8.** (c) both (a) and (b) **9.** (a) rhombus **10.** (b) Hexagonal shape

Exercise 12.1

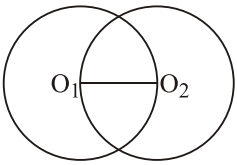
1. (a) 

(b) 

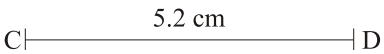
(c) 

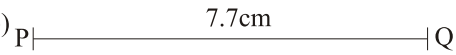
2. 

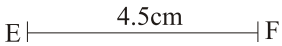
First circle in centre A in radius is equal to second circle in central

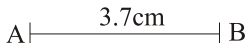
3. 

Draw one of the circle in such a way that it passes through the lengths of the other circle.
So, centre O_1 and centre O_2.

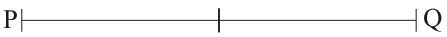
4. (a) 

(b) 

(c) 

5. (a) 

$\therefore \quad AB + CD$



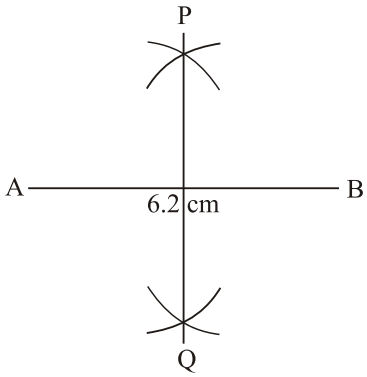
$PQ = AB + CD$

(b) 

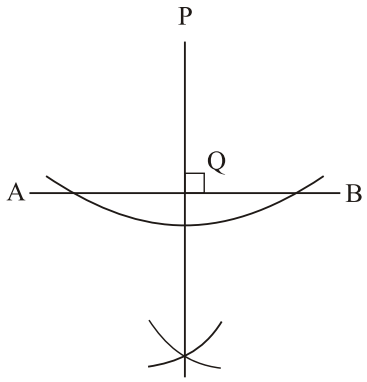
$$EF = CD - AB$$
$$= 5.5 - 3.7$$
$$= 1.8$$

$\therefore \quad EF = CD - AB$

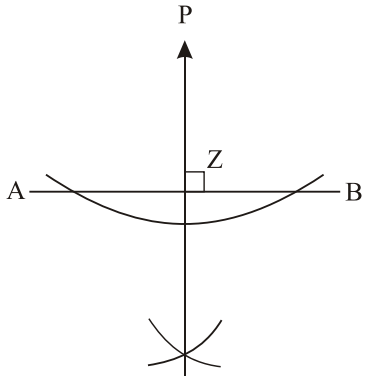
6. PQ is perpendicular bisector of $AB = 6.2$ cm.



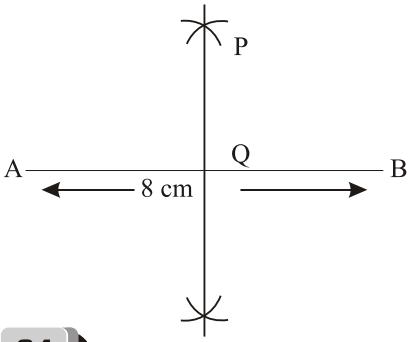
7. PQ is perpendicular to $AB = 5$ cm where P is outside the line.



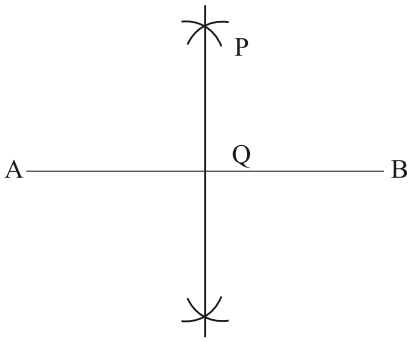
8. PQ is perpendiclar to $AB = 6.1$ cm where Z is lying.



9. PQ is perpendicular to $AB = 8$ cm, where P is outside the line



10. PQ is perpendicular to AB,



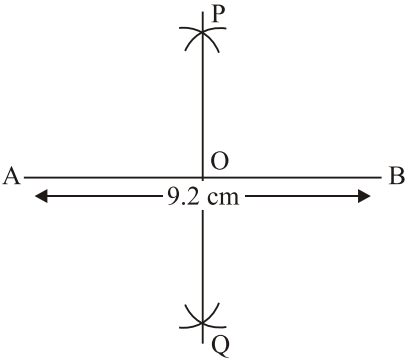
11. PQ in perpendicular bisector of $AB = 9.2$ cm

Step 1. Draw a line segment AB of length 9.2 cm.

Step 2. Taking A as the centre and with any radius move than half of AB, draw an are on either side of AB.

Step 3. Join P and Q crossing AB at O.

Step 4. Join P and Q crossing AB at O.



12. PQ is perpendicular bisector of $AB = 10$ cm

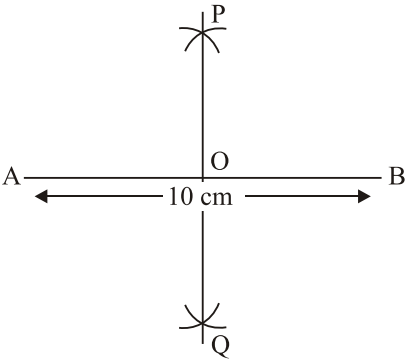
Step 1. Draw a line segment AB of length 10 cm.

Step 2. Taking A as the centre and with any radius more than half of AB draw an are on either side of AB.

Step 3. Similarly, taking B as the centre and radius as in step2 2, draw another are on either side of AB intersecting the previous area at P and Q.

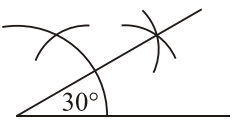
Step 4. Joint P, Q crossing AB at Q.

Hence, PQ in the required perpendicular bisector of line segment AB.

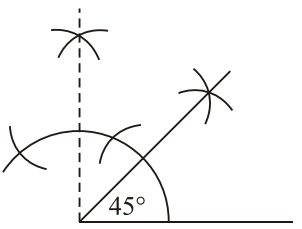


Exercise 12.2

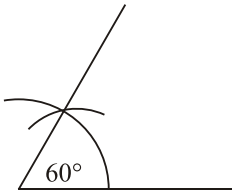
1. (a)



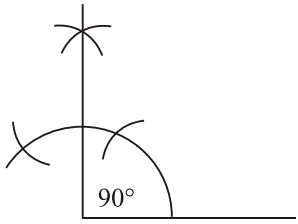
(b)



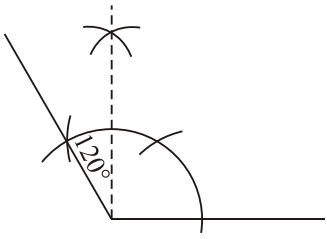
(c)



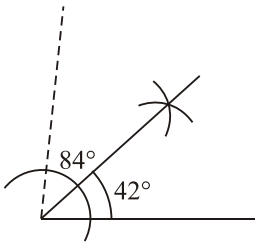
(d)



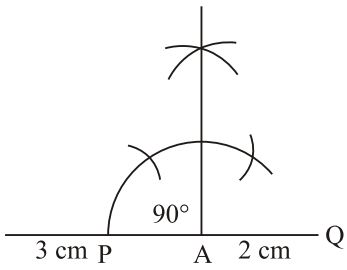
(e)



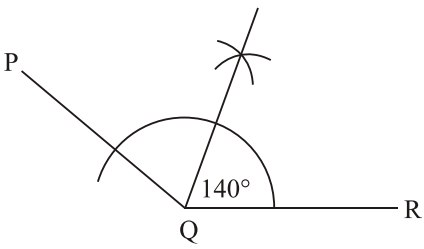
2.



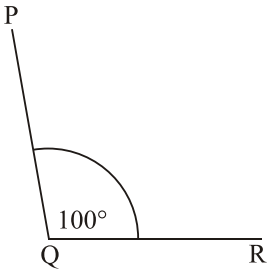
3.

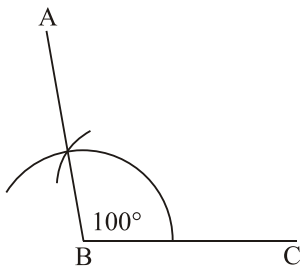


4.

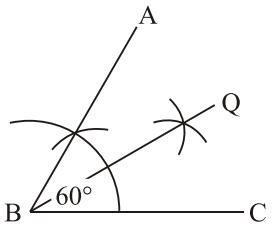


5.





6.



BQ is bisector $\angle ABC = 60°$