

12. We have,

$$P = ₹ 4500, A = ₹ 5400, \text{time} = 3 \text{ years}$$

$$\therefore \text{S.I.} = ₹ (5400 - 4500) = ₹ 900$$

$$\therefore \text{S.I.} = \frac{P \times R \times t}{100}$$

$$900 = \frac{4500 \times R \times 3}{100}$$

$$\frac{900}{45 \times 3} = R$$

$$R = 6\frac{2}{3}\%$$

13. Let ₹ x yield ₹ 1416 in 5 years at $\frac{19}{2}\%$.

$$\therefore \text{S.I.} = 1416 - x$$

$$(1416 - x) = \frac{x \times 19 \times 5}{100 \times 2}$$

$$(1416 - x) = \frac{95x}{200}$$

$$200(1416 - x) = 95x$$

$$283200 - 200x = 95x$$

$$283000 = 295x$$

$$960 = x$$

$$\therefore ₹ 960 \text{ yield ₹ } 1416 \text{ in 5 years at } \frac{19}{2}\%$$

14. (i) Rohit borrowed Rate (P) = ₹ 4000

time = 2 years, Rate = 15 %

\therefore Interest paid by Rohit

$$= \frac{P \times r \times t}{100}$$

$$= \frac{4000 \times 15 \times 2}{100}$$

$$= 40 \times 30$$

$$= ₹ 1200$$

(ii) \therefore Amount paid by Rohit to clear the debt

$$= 4000 + 1200$$

$$= ₹ 5200$$

15. We have Principal = ₹ 400

$$\text{Amount} = ₹ 448$$

$$\therefore \text{S.I.} = ₹ 48$$

$$\therefore \text{(i)} \quad \text{S.I.} = \frac{P \times r \times t}{100}$$

$$48 = \frac{400 \times 4 \times t}{100}$$

$$\frac{48 \times 100}{400 \times 4} = t$$

\therefore In 3 years ₹ 400 Amounts to ₹ 448 at 4% p.a.

MCQs

1. (a) 2. (d) 3. (a) 4. (d) 5. (b) 6. (c)

Mental Maths

1. Profit

2. Yes, we convert percent into a fraction.

$$3. ₹ 4000 \times \frac{30}{100} = ₹ 1200$$

4. $A = P + S.I$

$$5. \frac{\text{Loss}}{\text{C.P.}} \times 100$$

Lines and Angles

10

Exercise-10.1

1. (i) Supplement of 70° = $180^\circ - 70^\circ$
 $= 110^\circ$

$$(ii) " " 135° = 180 - 135° = 45°$$

$$(iii) " " 50° = 180 - 50 = 130°$$

$$(iv) " " 120° = 180° - 120° = 60°$$

$$(v) " " 90° = 180° - 90° = 90°$$

2. (i) Complement of 55° = $90^\circ - 55^\circ = 35^\circ$

$$(ii) " " 73 = 90 - 73 = 17^\circ$$

$$(iii) " " 45° = 90 - 45° = 45°$$

$$(iv) " " 40° = 90 - 40 = 50°$$

$$(v) " " 30° = 90° - 30° = 60°$$

3. Sum of two complement angle = 90° .

Let one angle = x

other angle = $x + 12$

Then, $\angle a + \angle b = 90^\circ$

$$x + x + 12 = 90$$

$$2x + 12 = 90$$

$$2x = 90 - 12$$

$$x = \frac{78}{2}$$

$$x = 39^\circ$$

One angle is 39° .

And, other angle is $39^\circ + 12^\circ = 51$

4. Let smaller angle = x

$$\therefore \text{larger angle} = 3x + 15$$

$$\therefore x + (3x + 15) = 135$$

$$4x + 15 = 135$$

$$4x = 120$$

$$x = 30$$

$$\therefore \text{smaller angle} = 30^\circ$$

$$\text{larger angle} = 3 \times 30 + 15$$

$$= 105^\circ$$

5. Let the angles be x .

$$\text{Its complementary} = 90 - x$$

$$\text{given, } x = \frac{1}{2}(90 - x) + 30$$

$$x = 45 - \frac{x}{2} + 30$$

$$x = 75 - \frac{x}{2}$$

$$x + \frac{x}{2} = 75$$

$$\frac{3x}{2} = 75$$

$$x = \frac{75 \times 2}{3} \Rightarrow x = 50$$

$$\therefore \text{angles} = 50^\circ$$

6. Let smaller angle = x

$$\therefore \text{larger angle} = 3x - 20$$

$$\therefore x + (3x - 20) = 180$$

$$4x = 180 + 20$$

$$4x = 200$$

$$x = 50$$

$$\therefore \text{smaller angle} = 50^\circ$$

$$\text{larger angle} = 130^\circ$$

7. Let supplementary angles be $2x, 7x$

$$\therefore 2x + 7x = 180$$

$$9x = 180$$

$$x = 20$$

\therefore Supplementary angles are

$$= 2 \times 20, 7 \times 20$$

$$= 40^\circ, 140^\circ$$

8. We have, $(2x + 5) + 3x = 180$ straight line

$$5x + 5 = 180$$

$$5x = 175$$

$$x = 35$$

$$\therefore \text{Angles are} = (2 \times 35 + 5), 3 \times 35$$

$$= 75^\circ, 105^\circ$$

9. (i) $\because \angle AOC + \angle COB = 180^\circ$

straight line

$$\therefore 62 + x = 180$$

$$x = 118^\circ$$

(ii) $\because \angle POR + \angle ROQ = 180^\circ$

(straight line)

$$2x + 1 + x + 2 = 180^\circ$$

$$3x + 3 = 180^\circ$$

$$3x = 180^\circ - 3$$

$$x = \frac{177}{3} = 59^\circ$$

$$(2x + 1)^\circ = 59 \times 2 + 1 = 119^\circ$$

$$(x + 2)^\circ = 59 + 2 = 61^\circ$$

(iii) $\because \angle AOC + \angle COD + \angle DOE + \angle EOB = 180^\circ$

(Straight line)

$$x + 2x + 3x + 4x = 180^\circ$$

$$10x = 180^\circ$$

$$x = \frac{180^\circ}{10} = 18$$

$$x = 18^\circ$$

$$2x = 18 \times 2 = 36^\circ$$

$$3x = 18 \times 3 = 54^\circ$$

$$4x = 18 \times 4 = 72^\circ$$

(iv) $\therefore \angle AOC + \angle BOC = 180^\circ$

$$3x + 10 + 2x - 40 = 180^\circ$$

$$3x + 10 + 2x - 40 = 180^\circ$$

$$5x - 30 = 180^\circ$$

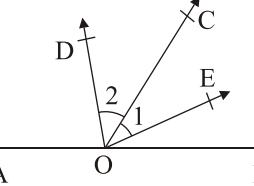
$$5x = 180^\circ + 30^\circ$$

$$x = \frac{210^\circ}{5} = 42$$

$$(3x + 10) = 3 \times 42 + 10 = 136^\circ$$

$$(2x - 40) = 2 \times 42 - 40 = 44$$

10. Given : OD, OE are bisectors of $\angle AOC$ and $\angle BOC$



To prove : $\angle DOE = 90^\circ$

(1) $\angle AOC + \angle BOC = 180^\circ$ straight line

(2) $2\angle 2 + 2\angle 1 = 180^\circ$ bisector

$$2(\angle 2 + \angle 1) = 180$$

$$\begin{aligned}(\angle DOE) &= \frac{180}{2} \\ \text{or } \angle DOE &= 90 \\ 11. \quad \angle AOC + \angle BOC &= 180^\circ\end{aligned}$$

$$\begin{aligned}(\text{Straight Line}) \\ (3a - 5)^\circ + 2a^\circ &= 180^\circ \\ 5a^\circ - 5 &= 180^\circ \\ 5a^\circ &= 180^\circ + 5 \\ a^\circ &= \frac{185}{5} = 37^\circ\end{aligned}$$

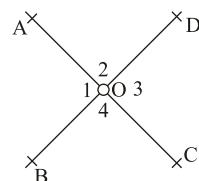
$$\begin{aligned}\angle BOC &= 2a^\circ = 37 \times 2 = 74^\circ \\ \angle AOC &= (3a - 5)^\circ = (3 \times 37 - 5)^\circ = 106^\circ \\ 12. \quad \angle BOD + \angle BOE + \angle COE &= 180^\circ\end{aligned}$$

$$\begin{aligned}40 + (x + 5) + (3x + 7) &= 180 \\ (\text{straight line}) \\ \Rightarrow 4x + 52 &= 180 \\ \Rightarrow 4x &= 180 - 52 \\ 4x &= 128 \\ x &= 32\end{aligned}$$

$$\begin{aligned}\text{(i)} \quad \angle AOC &= 180 - (\angle COE + \angle BOE) \\ &= 180 - [(3x + 7) + (x + 5)] \\ &= 180 - [4x + 12] \\ &= 180 - [4 \times 32 + 12] \\ &= 180 - [128 + 12] \\ &= 180 - 140 \\ \angle AOC &= 40^\circ \\ \text{(ii)} \quad \angle AOD &= 180 - 40 \\ &= 140^\circ \\ \text{(iii)} \quad \angle COE &= 3x + 7 \\ &= 3 \times 40 + 7 \\ \Rightarrow \angle COE &= 127^\circ\end{aligned}$$

13. (i) 180° (ii) complementary (iii) supplementary (iv) equal (v) line (vi) two (vii) one (viii) angle (ix) 45° (x) 90°

14. Given,



$$\angle 1 = 48$$

To find : $\angle 2, \angle 3, \angle 4$

$$\begin{aligned}\because \angle 1 + \angle 2 &= 180^\circ \\ 48 + \angle 2 &= 180^\circ\end{aligned}$$

$$\begin{aligned}\angle 2 &= 180 - 48 \\ \angle 2 &= 132^\circ \\ \angle 3 &= \angle 1 = 48^\circ \\ &\text{Vertically opposite angles} \\ \angle 4 &= \angle 2 = 132^\circ \\ &\text{Vertically opposite angles}\end{aligned}$$

15. Given : $\angle COE = 90$

- (i) Linear pairs $(\angle 5, \angle 1), (\angle 5, \angle 4)$
- (ii) Supplementary angles $(\angle 5, \angle 1), (\angle 5, \angle 4)$
- (iii) Vertically opposite angles $(\angle 1, \angle 4)$
- (iv) Complementary angles $(\angle 1, \angle 2)$

Exercise-10.2

$$\begin{aligned}1. \quad \text{We have, } \angle 1 &= 65^\circ \\ \therefore \angle 1 + \angle 2 &= 180 \quad \text{Linear pair} \\ \therefore 65 + \angle 2 &= 180 \\ \angle 2 &= 115^\circ \\ \therefore \angle 5 &= \angle 1 = 65^\circ \\ &\text{Corresponding angles} \\ \angle 6 &= \angle 2 = 115^\circ \\ \angle 3 &= \angle 1 = 65^\circ \\ \angle 4 &= \angle 2 = 115^\circ \\ \angle 8 &= \angle 4 = 115^\circ \\ \angle 7 &= \angle 3 = 65^\circ\end{aligned}$$

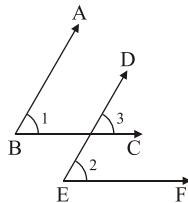
- Corresponding angles
2. (i) Pairs of corresponding angle $= (\angle 1, \angle 5); (\angle 2, \angle 6); (\angle 3, \angle 7); (\angle 4, \angle 8)$
(ii) Corresponding angles to $\angle 7$ is $\angle 3$.
(iii) Alternative angle of $\angle 4$ is $\angle 6$.
(iv) Alternative angle of $\angle 1$ is $\angle 7$.
(v) Pair of consecutive interior angle $= (\angle 3, \angle 6); (\angle 4, \angle 5)$
(vi) Pair of linear angles $= (\angle 1, \angle 2); (\angle 2, \angle 3); (\angle 3, \angle 4); (\angle 1, \angle 4); (\angle 6, \angle 5); (\angle 6, \angle 7); (\angle 7, \angle 8); (\angle 8, \angle 5)$.

- (vii) Pair of vertically opposite angle $= (\angle 1, \angle 3); (\angle 2, \angle 4); (\angle 5, \angle 7); (\angle 8, \angle 6)$

3. $(2x - 3) + (3x - 2) = 180$
Cointerior angles are supplementary
 $\therefore 5x - 5 = 180^\circ$

$$5x = 185 \\ x = 37$$

4. We have,



$$\angle 1 = 75^\circ \\ \therefore \angle 3 = \angle 1 = 75^\circ \quad (\text{Corresponding angles}) \\ \angle 2 = \angle 3 = 75^\circ$$

5. $\angle BAD + \angle GBA = 180^\circ$
 $(\angle BAD \text{ and } \angle GBA \text{ are co-interior angle, } DA \parallel GB)$

$$(3x + 40^\circ) + (x - 60^\circ) = 180^\circ \\ 3x + x + 40^\circ - 60^\circ = 180^\circ \\ 4x - 20^\circ = 180^\circ \\ 4x = 180^\circ + 20^\circ \\ x = \frac{200}{4} \\ x = 50^\circ$$

$$\angle EAH + \angle HCE = 180^\circ \quad (\angle EAC \text{ and } \angle HCA \text{ are cointerior angle, } AE \parallel CH) \\ \angle(2y + 25)^\circ + (y + 20)^\circ = 180^\circ$$

$$3y + 45^\circ = 180^\circ \\ 3y = 180^\circ - 45^\circ \\ y = \frac{135}{3} = 45^\circ \\ y = 45^\circ$$

6. $\angle DEC = 45^\circ$;

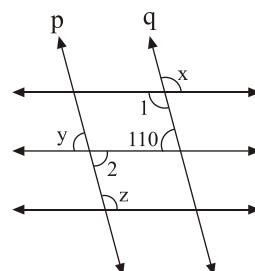
$$\angle EDC = 35^\circ; \\ \angle E = \angle b = 45^\circ \quad (\text{alternate angles}) \\ \angle D = \angle a = 35^\circ \quad (\text{alternate angles})$$

7. $\angle qst + \angle tsq = 180^\circ$ (starlight line)

$$74^\circ + x = 180^\circ \\ x = 180^\circ - 74^\circ = 106^\circ \\ x^\circ = 106^\circ \\ \angle x = \angle z = 106^\circ \quad (\text{corresponding angles are equal}) \\ \angle s = \angle w = 74^\circ \quad (\text{corresponding angles are equal}) \\ \angle w = \angle y = 74^\circ \quad (\text{corresponding angles are equal}) \\ \angle u = \angle w = 74^\circ$$

$$\angle x = 106^\circ, \quad \angle y^\circ = 74^\circ, \\ \angle z = 106^\circ, \quad \angle w = 74^\circ, \quad \angle u = 74^\circ$$

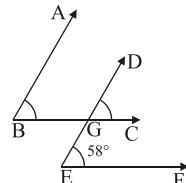
8.



$$y = 110^\circ \quad \text{corresponding angles} \\ \angle 1 = x \quad \text{vertically opposite angles} \\ \angle 1 + 110^\circ = 180^\circ \quad \text{cointerior angles} \\ x + 110 = 180 \\ x = 70^\circ \\ \angle 2 = y \quad \text{Vertically opposite angles} \\ \angle 2 + z = 180 \quad \text{Cointerior angles} \\ y + z = 180 \\ 110^\circ + z = 180 \\ \therefore z = 70^\circ$$

9. $\angle GEF = 58^\circ$

(i) $\angle GEF = \angle DGC = 58^\circ$



(ii) $\angle ABC = \angle DGC = 58^\circ$

(corresponding angles are equal)

(iii) $\angle EGC = \angle GEF + \angle CGD = 180^\circ$

$$\angle EGC = 180^\circ - 58^\circ = 122^\circ$$

$$10. \left. \begin{array}{l} x = 60^\circ \\ y = 50^\circ \end{array} \right\} \text{ alternate angles}$$

11. $x + 125 = 180 \quad \text{Linear pair}$

$$x = 180 - 125$$

$$x = 55^\circ$$

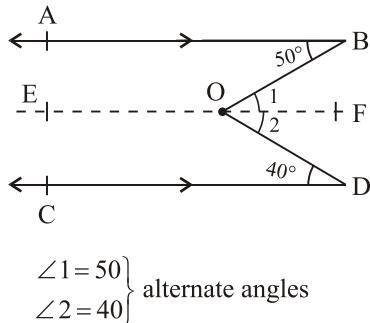
$x + y = 180^\circ \quad \text{cointerior angles}$

$$55^\circ + z = 180$$

$$z = 180 - 55^\circ$$

$$z = 125^\circ$$

12. Draw a line EOF parallel to AB and CD



11

Exercise-11.1

1. (i) $x + 40 + 105^\circ = 180$

Sum angle property of triangle

$$x + 145 = 180$$

$$x = 35^\circ$$

(ii) $x + 90 + 60 = 180$

$$x + 150 = 180$$

$$x = 30^\circ$$

(iii) $x + 2x + 90^\circ = 180^\circ$

$$3x + 90^\circ = 180^\circ$$

$$3x = 180^\circ - 90^\circ$$

$$3x = 90^\circ$$

$$x = 30^\circ$$

2. (i) $\angle PRD = \angle P + \angle Q$

$$110 = y + 40$$

$$110 - 40 = y$$

$$80^\circ = y$$

$$x + 110^\circ = 180^\circ \text{ (Linear pair)}$$

$$x = 70^\circ$$

(ii) $x = 70^\circ$ (vertically opposite angles)

$$x + 60 + y = 180$$

(sum angle property of triangle)

$$70 + 60 + y = 180$$

$$130 + y = 180$$

$$y = 50^\circ$$

(iii) $140 = 90 + x$

Exterior angle equal to sum of interior opposite angles

$$140 - 90 = x$$

$$50^\circ = x$$

$$y = 140^\circ$$

$$\therefore \angle BOD = \angle 1 + \angle 2 \\ = 50 + 40 \\ \angle BOD = 90^\circ$$

MCQs

1. (d) 2. (b) 3. (d) 4. (a) 5. (d) 6. (a) 7. (b)

Mental Maths

1. linear pairs 2. none 3. $180^\circ - 125^\circ = 55^\circ$
 4. A line that intersect two or more lines at distinct points. 5. straight angle 6. complete angle

Triangles and Their Properties

Vertically opposite angles

$$(iv) \angle SRP = \angle P + \angle Q$$

Exterior angle equal to sum of interior opposite angles

$$x = 90 + 30$$

$$x = 120$$

$$y = 180 - x$$

$$= 180 - 120$$

$$y = 60^\circ$$

Linear pair

3. Let angles of triangle be $4x, 3x, 2x$

$$\therefore 4x + 3x + 2x = 180^\circ$$

(sum angle property of triangle)

$$9x = 180$$

$$x = 20$$

∴ angles of triangle are

$$= 4 \times 20, 3 \times 20, 2 \times 20$$

$$= 80, 60, 40$$

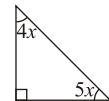
4. Let acute angles by $4x, 5x$

$$4x + 5x + 90 = 180^\circ$$

$$9x + 90 = 180^\circ$$

$$9x = 90^\circ$$

$$x = \frac{90^\circ}{9} = 10^\circ$$



Acute angle are $40^\circ, 50^\circ, 90^\circ$.

5. Let equal angles of triangle be x .

$$x + x + 100 = 180$$

$$2x = 180 - 100$$

$$2x = 80$$

$$x = 40$$

∴ equal angles are $40^\circ, 40^\circ$

6. Let acute angle be $1x$ and $4x$

∴ sum of all angles of triangle = 180°

$$\therefore 1x + 4x + 90 = 180^\circ$$

$$\begin{aligned}15x &= 180 - 90 \\15x &= 90 \\x &= 6\end{aligned}$$

\therefore Acute angles = $11 \times 6, 4 \times 6 = 66, 24$

7. Let interior opposite angles be $2x, 3x$.

\because Exterior angle = sum of interior opposite angles

$$\therefore 100 = 2x + 3x$$

$$100 = 5x$$

$$20^\circ = x$$

\therefore Interior opposite angles

$$= 2 \times 20, 3 \times 20$$

$$= 40, 60$$

$$\text{third angle} = 180 - (40 + 60)$$

$$= 80$$

8. $\because \angle F + \angle B + \angle C = 180^\circ$

$$\therefore 50 + 30 + z = 180$$

$$80 + z = 180$$

$$z = 100^\circ$$

$$y = 30^\circ; z = x = 100$$

(corresponding angles)

9. $y = \angle C + \angle A$

(Exterior angle property)

$$= 18 + 50$$

$$y = 68^\circ$$

$$x = y + \angle D$$

(Exterior angle property)

$$= 68 + 35$$

$$x = 103^\circ$$

11. (i) Exterior angle = sum of interior angle

$$\angle DAC = \angle B + \angle C$$

$$107 = x + 57$$

$$50^\circ = x$$

(ii) In $\triangle CAD$

$$x + 45^\circ + 105^\circ = 180$$

$$x + 150 = 180$$

$$= 180 - 150$$

$$x = 30$$

$$\angle x + 65 + y = 180$$

(Linear pair)

$$30 + 65 + y = 180$$

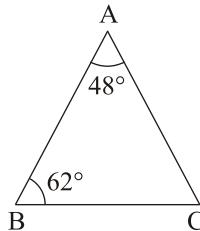
$$95 + y = 180$$

$$y = 180 - 195 = 85$$

$$\therefore y = 85^\circ$$

Exercise-11.2

1.



$$\because \angle A + \angle B + \angle C = 180$$

$$48 + 62 + \angle C = 180$$

$$110 + \angle C = 180$$

$$\angle C = 70^\circ$$

\therefore Largest side = AB ($\because \angle C$ is largest)
smallest side = BC

($\because \angle A$ is smallest)

2. $\angle P + \angle Q + \angle R = 180^\circ$

$$\angle P + 49 + 85^\circ = 180$$

$$\angle P + 134 = 180$$

$$\angle P = 180 - 134$$

$$\angle P = 46^\circ$$

$\therefore PQ$ is largest side

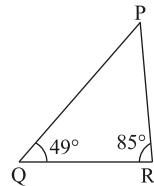
($\because \angle R$ is largest)

QR is smallest side

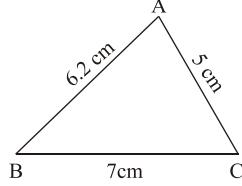
($\because \angle P$ is smallest)

\therefore Ascending order of side are

$$QR < PR < PQ$$



3.



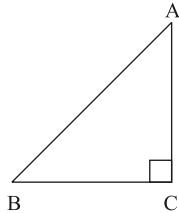
$\angle A$ is largest $\therefore BC$ is largest

$\angle B$ is smallest $\therefore AC$ is smallest

\therefore descending order of angles

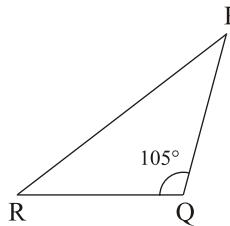
$$\angle A < \angle C < \angle B$$

4. If $\angle C = 90^\circ$



$\therefore AB$ is longest because in right angled triangle 90° is largest angle and side opposite to it is longest.

5. $\because \angle Q = 105^\circ$



$\therefore PR$ is longest because in obtuse angled triangle obtuse angle is largest angle and side opposite to it is longest.

6. We have, $\angle A : \angle B : \angle C = 3:5:7$

Let $\angle A = 3x, \angle B = 5x, \angle C = 7x$

$\therefore 3x + 5x + 7x = 180$

$15x = 180$

$x = 12$

$\therefore \angle A = 3 \times 12$,

$\angle B = 5 \times 12$,

$\angle C = 7 \times 12$

$\angle A = 36^\circ, \angle B = 60^\circ, \angle C = 84^\circ$

$\therefore AB$ is longest $\therefore \angle C$ is largest
 BC is smallest $\therefore \angle A$ is smallest

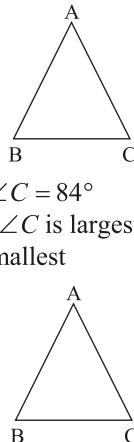
7. We have,

$AB : BC : CA = 3 : 8 : 5$

$\therefore \angle A$ is largest

($\because BC$ is longest)

$\angle C$ is smallest and AB is smallest.



8. $\angle A = 180 - 100$ Linear pair

$\angle A = 80^\circ$

$\angle C = 180 - 135$ Linear pair
 $= 45^\circ$

$\therefore \angle A + \angle B + \angle C = 180$

$80 + \angle B + 45 = 180$

$\angle B + 125 = 180$

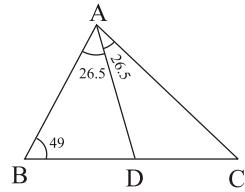
$\angle B = 55^\circ$

$\therefore \angle A = 80^\circ, \angle B = 55^\circ, \angle C = 45^\circ$

$AB < AC < BC \quad \therefore \angle C < \angle B < \angle A$

9. $\angle BAD = \angle CAD = \frac{\angle A}{2}$ bisector

$= \frac{53}{2} = 26.5$



$\angle A + \angle B + \angle C = 180$

$53 + 49 + \angle C = 180$

$102 + \angle C = 180$

$\angle C = 78^\circ$

$\angle ADC = 26.5 + 49 = 75.5$

Exterior angle = sum of interior opposite angle

\therefore In $\triangle ADC$

$\angle DAC = 26.5, \angle C = 78^\circ,$

$\angle ADC = (75.5)^\circ$

\therefore Descending order of sides in $\triangle ADC$

$AD < AC < DC$

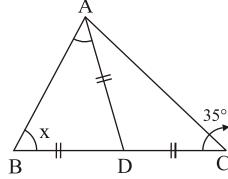
$\therefore \angle ADC < \angle C < \angle DAC$

10. $\angle DAC = \angle C = 35^\circ \quad \therefore AD = DC$

$\angle ADB = \angle DAC + \angle C$

$= 35 + 35^\circ$

$\angle ADB = 70^\circ$



Let $\angle BAD = \angle DBA = x$

(angles opposite to equal sides)

In $\triangle ABD$

$x + x + 70 = 180$

$2x = 110$

$x = 55^\circ$

$\therefore AC > DC \quad \therefore \angle ADC > \angle A$

$AB > AD \quad \therefore \angle ADB > \angle B$

Exercise-11.3

1. (i) $XY^2 = XZ^2 + YZ^2$

(Pythagoras theorem)

$26^2 = XZ^2 + 24^2$

$676 = XZ^2 + 576$

$676 - 576 = XZ^2$

$$100 = XZ^2$$

$$10^2 = XZ^2$$

$$10 \text{ cm} = XZ$$

(ii) $AB^2 = AC^2 + BC^2$

(Pythagoras theorem)

$$= (4.5)^2 + 6^2$$

$$= 20.25 + 36$$

$$AB^2 = 56.25 = (7.5)^2$$

$$AB = 7.5 \text{ cm}$$

(iii) $PR^2 = QP^2 + QR^2$

(Pythagoras Theorem)

$$(10.1)^2 = QP^2 + (9.9)^2$$

$$102.01 = QP^2 + 98.01$$

$$102.01 - 98.01 = QP^2$$

$$4 = QP^2$$

$$2^2 = QP^2$$

$$2 \text{ cm} = QP$$

(iv) $AC^2 = AB^2 + BC^2$

(Pythagoras theorem)

$$= 15^2 + 8^2$$

$$= 225 + 64 = 289$$

$$AC^2 = 17^2$$

$\therefore AC = 17 \text{ cm}$

2. $\because (\text{Hypotenuse})^2 = (\text{1st side})^2 + (\text{other side})^2$

$$17^2 = 8^2 + (\text{2nd side})^2$$

$$289 = 64 + (\text{2nd side})^2$$

$$289 - 64 = (\text{2nd side})^2$$

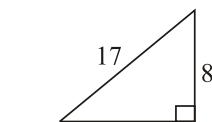
$$225 = (\text{2nd side})^2$$

$$15^2 = (\text{2nd side})^2$$

\therefore other side is 15 cm.

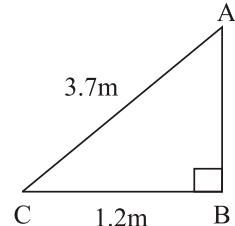
3. AC is ladder and AB is wall

$$\therefore AC^2 = AB^2 + BC^2$$



$$(3.7)^2 = AB^2 + (1.2)^2$$

$$13.69 = AB^2 + 1.44$$

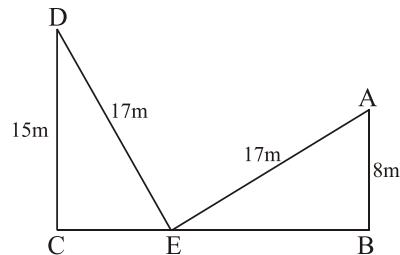


$$12.25 = AB^2$$

$$(3.5)^2 = AB^2$$

\therefore ladder will reach upto 3.5 m on the wall.

4. A and D are windows BC is street



In $\triangle AEB$,

$$17^2 = 8^2 + BE^2$$

$$289 = 64 + BE^2$$

$$225 = BE^2$$

$$15^2 = BE^2$$

$$15 = BE$$

In $\triangle DCE$

$$DE^2 = DC^2 + CE^2$$

$$17^2 = 15^2 + CE^2$$

$$289 = 225 + CE^2$$

$$64 = CE^2$$

$$8^2 = CE^2$$

$$8 = CE$$

\therefore Width of street = $CE + BE$

$$= 8 + 15$$

$$= 23 \text{ m}$$

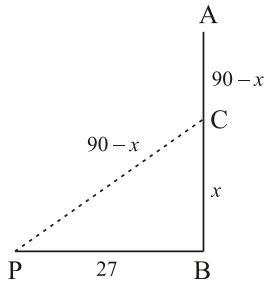
5. Let AB is plant broken at C touches the ground at P .

Let from x cm from the ground it is broken.

$$\therefore AC = PC = 90 - x$$

$$\therefore PC^2 = BC^2 + PB^2$$

$$(90-x)^2 = x^2 + 27^2$$



$$8100 + x^2 - 180x = x^2 + 729$$

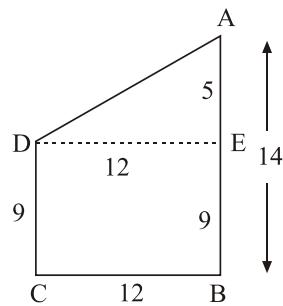
$$8100 - 729 = 180x$$

$$7371 = 180x$$

$$40.95 = x$$

\therefore Plant is broken 40.95 cm from the ground

6. Let AB and CD are two poles
Draw $DE \perp AB$



$$\therefore DE = BC = 12$$

$$BE = DC = 9$$

$$\therefore AE = 14 - 9 = 5$$

In $\triangle ADE$

$$AD^2 = DE^2 + AE^2$$

$$= 12^2 + 5^2$$

$$= 144 + 25$$

$$= 169$$

$$AD^2 = 13^2$$

$$AD = 13$$

\therefore Distance between their tops is 13 cm.

7. In $\triangle ABO$

$$AB^2 = BO^2 + AO^2$$

$$(13)^2 = (5)^2 + (AO)^2$$

$$(AO)^2 = 169 - 25$$

$$(AO)^2 = 144$$

$$(AO) = 12$$

In $\triangle AOC$

$$(AC)^2 = (AO)^2 + (OC)^2$$

$$(15)^2 = (12)^2 + (OC)^2$$

$$(OC)^2 = 225 - 144$$

$$(OC)^2 = 81$$

$$(OC) = 9$$

Now $BC = BO + OC$

$$= (5 + 9) \text{ cm}$$

$$= 14 \text{ cm}$$

8. In $\triangle ABC$

$$AC^2 = AB^2 + BC^2$$

$$= 20^2 + (4\sqrt{11})^2$$

$$= 400 + 16 \times 11$$

$$= 400 + 176$$

$$= 576$$

$$AC^2 = 24^2$$

$$\therefore AC = 24 \text{ cm}$$

In $\triangle CDE$

$$CE^2 = DE^2 + CD^2$$

$$= 6^2 + 8^2$$

$$= 36 + 64$$

$$CE^2 = 100$$

$$CE^2 = 10^2$$

$$CE = 10 \text{ cm}$$

$$\therefore AE^2 = 26^2 = 676$$

$$AC^2 + CE^2 = 576 + 100 = 676$$

$$\therefore AC^2 = AC^2 + CE^2$$

$$\therefore \angle ACE = 90^\circ$$

MCQs

1. (b) 2. (b) 3. (a) 4. (c) 5. (c) 6. (d)

Mental Maths

1. 180° 2. equal

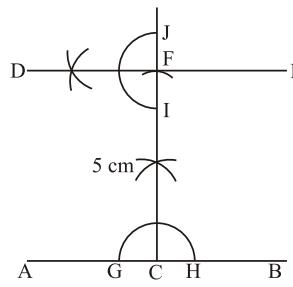
3. two opposite interior angles

4. one 5. no 6. 180° 7. right triangle

8. BC^2

Exercise-12.1

1. Steps of constructions

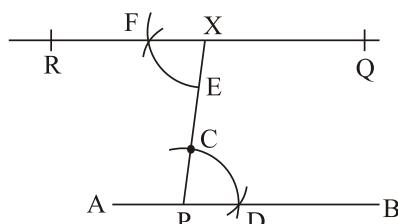


- (1) Draw any line AB .
- (2) Take any point C on it.
- (3) Draw perpendicular at C .
- (4) With C as centre and radius equal to 5 cm cut an arc on perpendicular at F .
- (5) At F draw perpendicular and produce it to form line DE .

$$\therefore DE \parallel AB$$

2. Steps of constructions

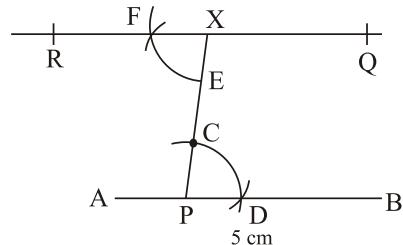
- (1) Draw $PQ = 6.3$.
- (2) Take any point X outside it.



- (3) Join X with PQ at E .
- (4) With E as centre and any radius draw an arc cutting XE at A and B .
- (5) With X as centre and same radius draw an arc cutting XC at C .
- (6) With C as centre and radius $= AB$ cut previous arc at D .
- (7) Join XD and produce it to form line RS .

RS
 $\therefore RS \parallel PQ$
Steps of Construction.

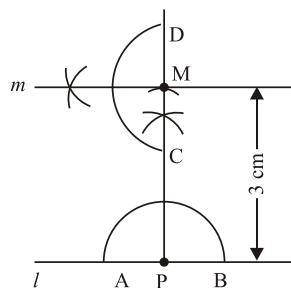
- (1) Draw $AB = 5\text{ cm}$.



- (2) Take any point X outside of AB .
- (3) Join X with AB at a point P .
- (4) At P draw an arc of any radius meeting XP at C and D .
- (5) At X draw an arc with same radius meeting PX at E .
- (6) With E as centre and radius $= CD$ cut the previous arc at F .
- (7) Draw a line passing through F and X call it RQ .

$$\therefore RQ \parallel AB$$

4. Steps of constructions :



- (1) Draw a line AB .
- (2) Take any point P on it.
- (3) With P as centre and radius equal to 3 cm cut an arc on the perpendicular.
- (4) At M draw perpendicular and produce it to form a line m .

$$\therefore m \parallel l$$