Lines and Angles

1.

i) NO

ii) Yes

iii) Yes

iv) Yes

v) Yes

vi) Yes

vii) Yes

2.

i) Let x be Complement angle for 25°

$\therefore x + 25 = 90$

$x = 90 - 25$

$x = 65^\circ$

$\therefore 65^\circ$ is Complementary angle for 25°

ii) Let x be Complement angle for 63°

$\therefore x + 63 = 90$

$x = 90 - 63$

$x = 27^\circ$

$\therefore 27^\circ$ is Complementary angle for 63°

iii) let x be Complementary angle for given angle

$\therefore x + 57^\circ = 90$

$x = 90 - 57$

$x = 33^\circ$

$\therefore$ 33° is Complementary angle for 57°

3. given angle $= 105^\circ$

let x be Supplementary angle for given angle

$\therefore x + 105 = 180$

$x = 180 - 105$

$x = 75^\circ$

$\therefore$ 75° is Supplementary angle for 105°

4. (i) given angle $= 87^\circ$

let x be Supplementary angle for 87°

$\therefore x + 87 = 180$

$x = 180 - 87$

$x = 93^\circ$

$\therefore$ 93° is Supplementary angle for 87°

(ii) Given angle = 87°

Let x be the Supplement of to the $\angle 87^\circ$

$\therefore x + 87^\circ = 180$

$x = 180 - 87$

$x = 93^\circ$

$\therefore 93^\circ$ is Supplement to 87°

(iii) Given angle = 142°

Let x be the Supplement to 142°

$\therefore x + 142 = 180^\circ$

$x = 180 - 142$

$x = 38^\circ$

$\therefore 38^\circ$ is Supplement to 142°

4.

i) $55^\circ, 125^\circ$

Given angles = $55^\circ, 125^\circ$

Sum = $55 + 125 = 180^\circ$

$\therefore$ Given angles are Supplementary.

(ii) $34^\circ, 56^\circ$

Given angles = $34^\circ, 56^\circ$

Sum = $34 + 56 = 90^\circ$

$\therefore$ Given angles are Complementry.

(iii) $137^\circ, 43^\circ$

Given angles = $137^\circ, 43^\circ$

Sum = $137 + 43 = 180^\circ$

$\therefore$ Given angles are Supplementry

(v) $112^\circ, 68^\circ$

Given angles = $112^\circ, 68^\circ$

Sum = $112^\circ + 68 = 180^\circ$

$\therefore$ Given angles are Sq Supplementry

(vi) $45^\circ, 45^\circ$

Given angles = $45^\circ, 45^\circ$

Sum = $45 + 45 = 90^\circ$

$\therefore$ Given angles are Complementry.

(vi) $72°, 18°$

Given angles $= 72°, 18°$

Sum $= 72 + 18 = 90°$

$\therefore$ Given angles are Complementry

5.

(i) let 'x' be the angle and its Complement is also 'x'

$\therefore x + x = 90°$

$2x = 90°$

$x = 45°$

Hence, Required angle $= 45°$

$45°$ is the angle which equals to its Complement

(ii) let 'x' be the angle and it's Supplement is also 'x'

$\therefore x + x = 180°$

$2x = 180°$

$x = \frac{180}{2}$

$x = 90$

$\therefore$ $90°$ is the angle which equals to its Supplement.

6. Given Complementry angles = $(x+4)^\circ, (2x-7)^\circ$

$\therefore \quad x+4+2x-7 = 90$

$3x-3 = 90$

$3x = 90+3$

$3x = 93$

$x = \frac{93}{3}$

$\boxed{x = 31^\circ}$

7. Given Supplementry angles ratio = 2 : 7

Let the Supplementy angles = $2x, 7x$

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

$9x = 180$

$x = \frac{180}{9}$

$\boxed{x = 20}$

$\therefore$ The given angles = $2x = 2 \times 20 = 40^\circ$

$7x = 7 \times 20 = 140^\circ$

8. let the smaller angle be $= x^\circ$

Larger angle $= x^\circ + 44^\circ$

x°, $x+44^\circ$ are Supplementary angles

$\therefore x + x + 44 = 180$

$2x + 44 = 180$

$2x = 136$

$x = \frac{136}{2}$

$\boxed{x = 68^\circ}$

$\therefore$ Angles $= x = 68^\circ$

$x + 44 = 68 + 44 = 112^\circ$

$\therefore$ Supplementy angles $= 68^\circ, 112^\circ$

9. let 'x' be acw angles

given x equal to half of its complement.

Complement angle to 'x' $= 90 - x$.

$\therefore x = \frac{90 - x}{2}$

$2x = 90 - x$

$2x + x = 90$

$3x = 90$

$x = 90/3.$

$\boxed{x = 30^\circ}$

Angles = $x = 30^\circ$

$90 - x = 60^\circ$.

9.

10.

Given

adjacent angles ratio = 5:3

Let the adjacent angles = $5x, 3x$.

Sum of adjacent angles = 128°

$\therefore 5x + 3x = 128^\circ$

$8x = 128$

$x = \frac{128}{8}$

$\boxed{x = 16^\circ}$

$\therefore$ Adjacent angles = $5x = 5 \times 16 = 80^\circ$

$3x = 3 \times 16 = 48^\circ$

11.

i)

Sum of angles at a point = 360°

$x + 41 + 105 + 130 = 360$

$x + 276 = 360$

$x + 276 = 360$

$x = 360 - 276$

$\boxed{x = 84^\circ}$

(ii)

Angles $3x, x, 40^\circ$ forms a linear pair

$$3x + x + 40^\circ = 180^\circ$$

$$4x + 40 = 180$$

$$4x = 180 - 40$$

$$4x = 140$$

$$x = \frac{140}{4}$$

$$\boxed{x = 35^\circ}$$

(iii)

Angles $2x + 10^\circ$, $3x - 10^\circ$, 40° forms a linear pair

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

$$5x + 40 = 180$$

$$5x = 180 - 40$$

$$5x = 140$$

$$x = \frac{140}{5}$$

$$\boxed{x = 28^\circ}$$

12.

(i) $y = 135^\circ$ (∵ Vertically opposite angle)

$z = x$ (∵ Vertically opposite angles)

x & 135° angles forms a linear pair

$x + 135^\circ = 180^\circ$

$x = 180 - 135$

$\boxed{x = 45^\circ}$

$\boxed{z = x = 45^\circ}$

(ii) $\therefore \quad x = 45^\circ, \; y = 135^\circ, \; z = 45^\circ$

(ii)

According to given diagram

$31 + y = 90^\circ$

$y = 90 - 31$

$\boxed{y = 59^\circ}$

$x = z = 59^\circ$ (∵ Vertically opposite angles)

$x = 31^\circ$

$y = z = 59^\circ$ (∵ Vertically opposite angles)

$\therefore \quad x = 31^\circ, \; y = 59^\circ, \; z = 59^\circ$

(iii)

$x = 44^\circ$ (∵ Vertically opposite angles)

$z = 51^\circ$ (∵ Vertically opposite angles)

x, y, z angles forms a linear pair

$$x + y + z = 180^\circ$$

$$44 + y + 51 = 180$$

$$y + 95 = 180$$

$$y = 180 - 95$$

$$\boxed{y = 85^\circ}$$

$\therefore x = 44^\circ,\ y = 85^\circ,\ z = 51^\circ$

13. From the given diagram

$\angle AFD = \angle CFB$ (∵ Vertically opposite angles)

$\angle AFD = 50^\circ$

Given $\angle EFA = \angle AFD = 50^\circ$

$\angle EFC + \angle AFD + \angle EFA = 180^\circ$ (∵ Forms a linear pair)

$\angle EFC + 50 + 50 = 180$

$\angle EFC + 100 = 180$

$\angle EFC = 180 - 100$

$$\boxed{\angle EFC = 80^\circ}$$

Exercise - 10.2

1.

i) $\angle 2, \angle 6 \rightarrow$ Corresponding angles

ii) $\angle 1, \angle 6 \rightarrow$

iii) $\angle 3, \angle 5 \rightarrow$ Alternative co-interior angles

iv) $\angle 2, \angle 7 \rightarrow$

v) $\angle 3, \angle 6 \rightarrow$ Co-interior angles

vi) $\angle 4, \angle 8 \rightarrow$ Corresponding angles

2.

i) If a transverse line cuts two parallel lines, then Corresponding angles are equal.

ii) If two lines are cut by a transversal line such that a pair of Alternative angles are equal, then the lines are parallel.

iii) If two lines are cut by a transversal line such that a pair of co-interior angles are supplementary then the lines are parallel.

5.

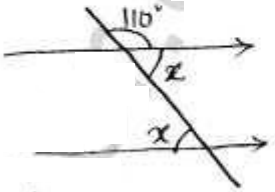
(i) $x = 100^\circ$ ($\because$ Corresponding angles)

(ii) $x + 110^\circ = 180$ ($\because$ pairs of Co-interior angles are supplementry)

$x = 180 - 110$

$\boxed{x = 70^\circ}$

(iii) From figure



$x + 110^\circ = 180^\circ$ ($\because$ forms a linear pair)

$x = 180 - 110$

$\boxed{x = 70^\circ}$

4.

(i) From the figure

given angles $2x+6^\circ$, $3x+54^\circ$ are co-interior angles. When pair of parallel lines cut by transversal line, pair of Co-interior angles are Supplementry.

$2x + 6 + 3x + 54 = 180^\circ$

$5x + 60 = 180$

$5x = 180 - 60$

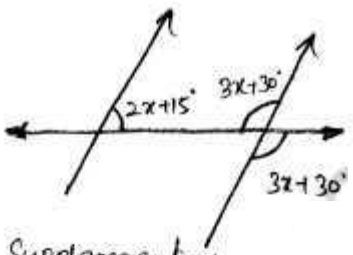
$5x = 120$

$x = \frac{120}{5}$

$\boxed{x = 24^\circ}$

(ii) From the figure

$2x+15°$, $3x+30°$ are Co-interior angles



$\therefore$ Co-interior angles are Supplementry.

$$2x+15+3x+30 = 180$$

$$5x+45 = 180$$

$$5x = 180-45$$

$$5x = 135$$

$$\frac{5x}{5} = \frac{135}{5}$$

$$\boxed{x = 27°}$$

5.

(i) From given figure

$x = 60°$ ($\because$ Vertically opposite angles)

$x = y = 60°$ ($\because$ Corresponding angles)

(ii) From given figure

$q = 135°$ ($\because$ Vertically opposite angles)

$q + P = 180°$ ($\because$ a pair of Co-interior angles are Supplementry)

$135 + P = 180°$

$P = 180-135$

$P = 45°$

(iii) From given figure

$a = 70°$ (∵ Alternetative interior angles are equal)

$a + b = 180°$ (∵ Forms a linear pair)

$70 + b = 180$

$b = 180 - 70$

$b = 110°$

(iv) From given figure

$z = 128°$ (∵ Corresponding angles are equal)

$x + 128° = 180$ (∵ Forms a linear pair)

$x = 180 - 128°$

$x = 52°$

$x = y = 52°$ (∵ corresponding angles are equal)

∴ $x = 52°$, $y = 52°$, $z = 128°$

(v) From given figure

$b = 75°$ (∵ Vertically opposite angles)

$a + 75° = 180°$ (∵ Forms a linear pair)

$a = 180 - 75$

$\boxed{a = 105°}$

(v) $b = d = 105°$

$c = 75°$ (∵ corresponding angles are equal)

$d + c = 180°$

$d + 75 = 180$

$d = 180 - 75$

$\boxed{d = 105°}$

(vi) From given figure

$p = 62°$ (∵ Vertically opposite angles)

$q + p = 180°$ (∵ forms a linear pair)

$q + 62 = 180$

$q = 180 - 62$

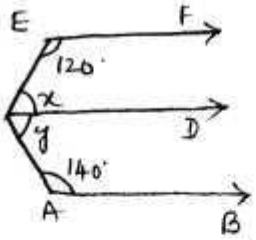
$q = 118°$

$p = s = 62°$ (∵ corresponding angles are equal)

$q = r = 118°$ (∵ Alternative interior angles)

6.

Consider EF ∥ CD, EC transversal line



$\therefore \quad x = x$

$x + 120 = 180^\circ$ (∵ pair of Co-interior angles are Supplementry)

$x = 180 - 120$

$\boxed{x = 60^\circ}$

Consider CD ∥ AB, AC transversal line

$y + 140 = 180$ (∵ pair of Co-interior angles are Supplementry)

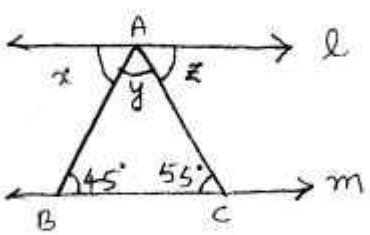
$y = 180 - 140$

$\boxed{y = 40^\circ}$

$\angle ECA = x + y = 60 + 40 = 100^\circ.$

7.

$l \parallel m$, AC is transversal line



$\therefore \quad z = 55^\circ$ (∵ Alternative Co-interior angles)

$l \parallel m$, AB is transversal line

$x = 45^\circ$ (∵ Alternative Co-interior angles)

Ans

In $\triangle^{le}$ ABC

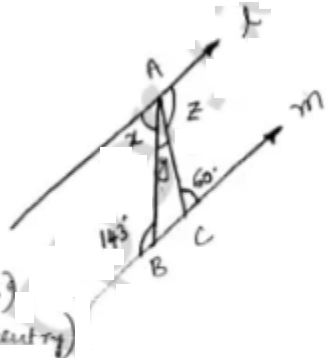
$45 + 55 + y = 180$

$y + 100 = 180$

$y = 180 - 100$

$\boxed{y = 80^\circ}$

8. $l \parallel m$, AC transversal line



$Z + 60^\circ = 180^\circ$ ($\because$ Pair of Co-interior angles are supplementary)

$Z = 180 - 60$

$\boxed{Z = 120^\circ}$

$x + y = 60^\circ$ ($\because$ Alternative interior angles are equal) → (1)

$l \parallel m$, AB transversal line

$y + Z = 143^\circ$ ($\because$ Alternative interior angles are equal)

$y + 120 = 143^\circ$

$y = 143 - 120$

$\boxed{y = 23^\circ}$

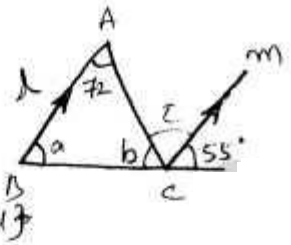
Substitute y value in eq (1)

$x + 23 = 60$

$x = 60 - 23$

$\boxed{x = 37^\circ}$

(ii) $l \parallel m$, BC is transversal line



$a = 55°$ (∵ Corresponding angles are equal)

In $\triangle ABC$

$$72 + a + b = 180°$$

$$72 + 55 + b = 180°$$

$$b + 127 = 180°$$

$$b = 180 - 127$$

$$\boxed{b = 53°}$$

• $b + c + 55 = 180°$ (∵ Forms a linear pair)

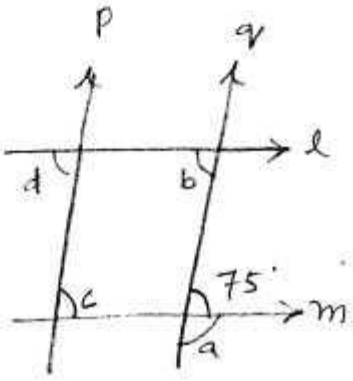
$$53 + c + 55 = 180°$$

$$c + 108 = 180$$

$$c = 180 - 108$$

$$\boxed{c = 72°}$$

(iii) From the given figure



$75 + a = 180$ (∵ Forms a linear pair)

$$a = 180 - 75$$

$$a = 105°$$

$l \parallel m$, q is transversal line

$b = 75°$ (∵ Alternative interior angles are equal)

$p \parallel q$, l is transversal line

$d = b = 75°$ (∵ corresponding angles are equal)

$l \parallel m$, p is transversal line

$d = c = 75°$ (∵ Alternative interior angles are equal)

9.

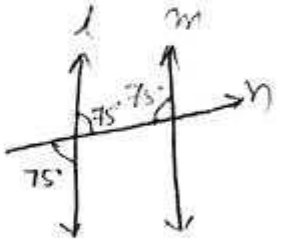
(i) From the given figure

106, 64 are co-interior angles

Sum = $106 + 64 = 170° \neq 180°$

∴ l, m are not parallel.

(ii) From the given figure



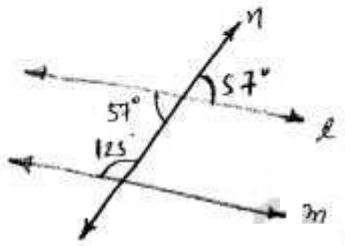
pair of co-interior angles $75°, 75°$

Sum = $75 + 75 = 150 \neq 180$

∴ l is m are not parallel.

(iii)

From the given figure



Pair of co-interior angles are 57°, 123°

Sum = $123^\circ + 57^\circ = 180$

$\therefore$ ℓ ; m are parallel to each other.