

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

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

$$x = 90 - 57$$

$$x = 33^\circ$$

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

3.

given angle = 105°

let x be ~~Com~~Supplementary angle for given angle

$$\therefore x + 105 = 180$$

$$x = 180 - 105$$

$$x = 75^\circ$$

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

4. (i) given angle = 87°

let x be Supplementary angle for 87°

$$\therefore x + 87 = 180$$

$$x = 180 - 87$$

$$x = 93^\circ$$

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

(ii)

Given angle = 87°

Let x be the Supplement of to the 87°

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

$$x = 180 - 87$$

$$x = 93^\circ$$

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

(iii)

Given angle = 142°

Let x be the Supplement to 142°

$$\therefore x + 142 = 180$$

$$x = 180 - 142$$

$$x = 38^\circ$$

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

4.

\rightarrow

$55^\circ, 125^\circ$

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

$$\text{Sum} = 55 + 125 = 180$$

\therefore Given angles are Supplementary.

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

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

$$\text{Sum} = 34 + 56 = 90^\circ$$

\therefore Given angles are Complementary.

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

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

$$\text{Sum} = 137 + 43 = 180^\circ$$

\therefore Given angles are Supplementary

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

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

$$\text{Sum} = 112 + 68 = 180^\circ$$

\therefore Given angles are Supplementary

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

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

$$\text{Sum} = 45 + 45 = 90^\circ$$

\therefore Given angles are Complementary.

(vi) $72^\circ, 18^\circ$

Given angles = $72^\circ, 18^\circ$

$$\text{Sum} = 72 + 18 = 90^\circ$$

\therefore Given angles are Complementary

5.

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

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

$$2x = 90^\circ$$

$$x = 45^\circ$$

Hence, Required angle = 45°

45° is the angle which equals to its Complement

(ii)

Let 'x' be the angle and its Supplement is also 'x'

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

$$2x = 180^\circ$$

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

$$x = 90$$

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

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

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

$$3x-3=90$$

$$3x=90+3$$

$$3x=93$$

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

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

7.

Given Supplementary angles ratio = 2:7

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

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

$$9x=180$$

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

$$\boxed{x=20}$$

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

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

8. let the smaller angle be x°

$$\text{larger angle} = x^\circ + 44^\circ$$

$x^\circ, x^\circ + 44^\circ$ are supplementary angles.

$$\therefore x + x + 44 = 180$$

$$2x + 44 = 180$$

$$2x = 136$$

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

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

$$\therefore \text{Angles} = x = 68^\circ$$

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

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

9.

let 'x' be an angle

given x equal to half of its complement.

$$\text{Complement angle to } x = 90 - x$$

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

$$2x = 90 - x$$

$$2x + x = 90$$

$$3x = 90$$

$$x = 90/3$$

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

$$\begin{aligned}\text{Angles} &= x = 30^\circ \\ 90 - x &= 60^\circ\end{aligned}$$

10.

Given

adjacent angles ratio = 5:3

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

Sum of adjacent angles = 128°

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

$$8x = 128^\circ$$

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

$$x = 16^\circ$$

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

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

11.
6)

Sum of angles at a point = 360°

$$x + 41 + 105 + 130 = 360$$

$$x + 276 = 360$$

$$x + 276 = 360$$

$$x = 360 - 276$$

$$x = 84^\circ$$

(ii)

Angles $3x$, x , 40° 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

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

$$5x + 40 = 180$$

$$5x = 180 - 40$$

$$5x = 140^\circ$$

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

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

12.

(i)

$$y = 135^\circ \quad (\because \text{Vertically opposite angle})$$

$$z = x \quad (\because \text{Vertically opposite angles})$$

$x, 135^\circ$ angles forms a linear pair

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

$$x = 180 - 135$$

$$x = 45^\circ$$

$$z = x = 45^\circ$$

(ii)

$$\therefore x = 45^\circ, y = 135^\circ, z = 45^\circ$$

(i)

According to given diagram

$$31 + y = 90$$

$$y = 90 - 31$$

$$y = 59^\circ$$

$$x = z = 59^\circ \quad (\because \text{Vertically opposite angles})$$

$$x = 31^\circ \rightarrow$$

$$y = z = 59^\circ \quad (\because \text{Vertically opposite angles})$$

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

(iii)

$$x = 44^\circ \quad (\because \text{vertically opposite angles})$$

$$z = 51^\circ \quad (\because \text{vertically opposite angles})$$

x, y, z ~~at~~ 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

$$\angle AFD = \angle CFB \quad (\because \text{vertically opposite angles})$$

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

$$\text{Given } \angle EFA = \angle AFD = 50^\circ$$

$$\angle EFC + \angle AFD + \angle EFA = 180^\circ \quad (\because \text{Forms a linear pair})$$

$$\angle EFC + 50 + 50 = 180$$

$$\angle EFC + 100 = 180$$

$$\angle EFC = 180 - 100$$

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

Exercise - 10.2

12

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 transversal 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.

3.

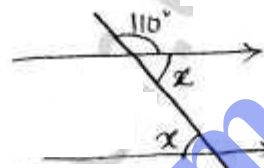
(i) $x = 100^\circ$ (\because Corresponding angles)

(ii) $x + 110^\circ = 180$ (\because ^{pair of} Co-interior angles are supplementary)

$$x = 180 - 110$$

$$\boxed{x = 70}$$

(iii) From figure



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

$$x = 180 - 110$$

$$\boxed{x = 70}$$

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 supplementary.

$$2x + 6 + 3x + 54 = 180$$

$$5x + 60 = 180$$

$$5x = 180 - 60$$

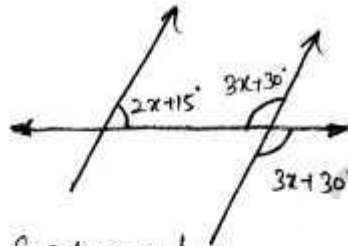
$$5x = 120$$

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

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

(ii) From the figure

$2x+15^\circ$, $3x+30^\circ$ are
Co-interior angles



\therefore Co-interior angles are Supplementary.

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

$$5x+45=180$$

$$5x=180-45$$

$$5x=135$$

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

$$x=27^\circ$$

5.

(i) From given figure

$$x=60^\circ \quad (\because \text{Vertically opposite angles})$$

$$x=y=60^\circ \quad (\because \text{Corresponding angles})$$

(ii) From given figure

$$q=135^\circ \quad (\because \text{Vertically opposite angles})$$

$$q+p=180^\circ \quad (\because \text{adjacent Co-interior angles are Supplementary})$$

$$135+p=180$$

$$p=180-135$$

$$p=45^\circ$$

(iii)

From given figure

$$a = 70^\circ \quad (\because \text{Alternate interior angles are equal})$$

$$a + b = 180^\circ \quad (\because \text{Forms a linear pair})$$

$$70 + b = 180$$

$$b = 180 - 70$$

$$b = 110^\circ$$

(iv)

From given figure

$$z = 128^\circ \quad (\because \text{Corresponding angles are equal})$$

$$x + 128^\circ = 180^\circ \quad (\because \text{Forms a linear pair})$$

$$x = 180 - 128^\circ$$

$$x = 52^\circ$$

$$x = y = 52^\circ \quad (\because \text{Corresponding angles are equal})$$

$$\therefore x = 52^\circ, y = 52^\circ, z = 128^\circ$$

(v)

From given figure

$$b = 75^\circ \quad (\because \text{Vertically opposite angles})$$

$$a + 75^\circ = 180^\circ \quad (\because \text{Forms a linear pair})$$

$$a = 180 - 75$$

$$\boxed{a = 105^\circ}$$

(v)

$$b \hat{=} d = 105^\circ$$

$$c = 75^\circ \quad (\because \text{Corresponding angles are equal})$$

$$d + c = 180^\circ$$

$$d + 75 = 180$$

$$d = 180 - 75$$

$$\boxed{d = 105^\circ}$$

(vi)

From given figure

$$p = 62^\circ \quad (\because \text{Vertically opposite angles})$$

$$q + p = 180^\circ \quad (\because \text{forms a linear pair})$$

$$q + 62 = 180$$

$$q = 180 - 62$$

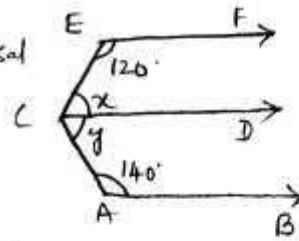
$$q = 118^\circ$$

$$r = s = 62^\circ \quad (\because \text{Corresponding angles are equal})$$

$$q = r = 118^\circ \quad (\because \text{Alternative interior angles})$$

6.

Consider $EF \parallel CD$, EC transversal line



$$\therefore x = 12$$

$$x + 170 = 180 \quad (\because \text{Co-pair of Co-interior angles are Supplementary})$$

$$x = 180 - 170$$

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

Consider $CD \parallel AB$, AC transversal line

$$y + 140 = 180 \quad (\because \text{pair of Co-interior angles are Supplementary})$$

$$y = 180 - 140$$

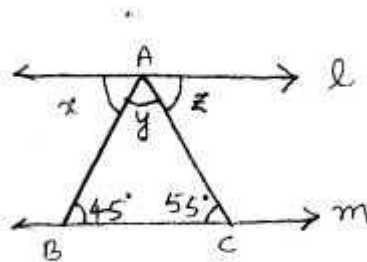
$$\boxed{y = 40^\circ}$$

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

7.

$l \parallel m$, AC is transversal line

$$\therefore z = 55^\circ \quad (\because \text{Alternative Co-interior angles})$$



$l \parallel m$, AB is transversal line

$$x = 45^\circ \quad (\because \text{Alternative Co-interior angles})$$

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In $\triangle ABC$

$$45 + 55 + y = 180$$

$$y + 100 = 180$$

$$y = 180 - 100$$

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

8. $\parallel m$, AC transversal line

$$z + 60^\circ = 180^\circ \quad (\because \text{Pair of}$$

Co-interior angles are supplementary)

$$z = 180 - 60$$

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

$$x + y = 60^\circ \quad (\because \text{Alternative interior angles are equal})$$

\hookrightarrow ①

$\parallel m$, AB transversal line

$$y + z = 143^\circ \quad (\because \text{Alternative interior angles are equal})$$

$$y + 120 = 143$$

$$y = 143 - 120$$

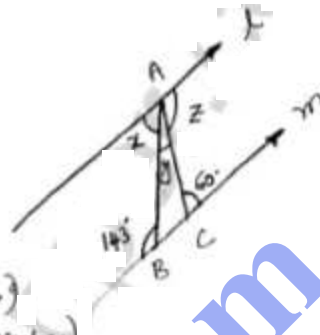
$$\boxed{y = 23^\circ}$$

Substitute y value in eq ①

$$x + 23 = 60$$

$$x = 60 - 23$$

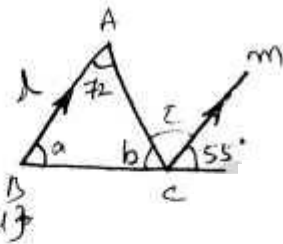
$$\boxed{x = 37^\circ}$$



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

$$a = 55^\circ \quad (\because \text{Corresponding angles are equal})$$

angles are equal



In $\triangle ABC$

$$72 + a + b = 180$$

$$72 + 55 + b = 180$$

$$b + 127 = 180$$

$$b = 180 - 127$$

$$b = 53$$

$$b + c + 55 = 180 \quad (\because \text{forms a linear pair})$$

$$53 + c + 55 = 180$$

$$c + 108 = 180$$

$$c = 180 - 108$$

$$c = 72$$

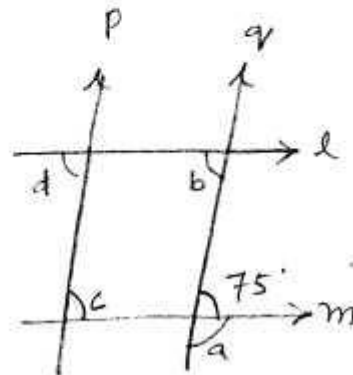
(iii)

from the given figure

$$75 + a = 180 \quad (\because \text{forms a linear pair})$$

$$a = 180 - 75$$

$$a = 105$$



$l \parallel m$, q is transversal line

$$b = 75^\circ \quad (\because \text{Alternative interior angles are equal})$$

$p \parallel q$, l is transversal line

$$d = b = 75^\circ \quad (\because \text{Corresponding angles are equal})$$

$l \parallel m$, q is transversal line

$$d = c = 75^\circ \quad (\because \text{Alternative interior angles are equal})$$

9.

(i) From the given figure

106, 64 are co-interior angles

$$\text{Sum} = 106 + 64 = 170 \neq 180$$

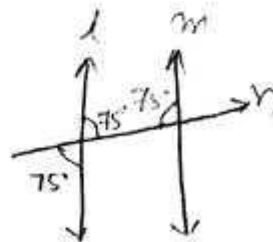
\therefore l, m are not parallel

(ii) From the given figure

pair of co-interior angles $75^\circ, 75^\circ$

$$\text{Sum} = 75 + 75 = 150 \neq 180$$

\therefore l, m are not parallel.



(iii)

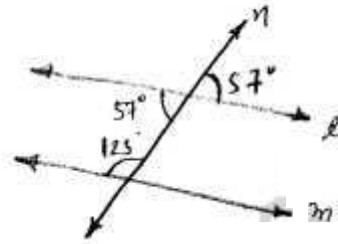
From the given figure

Pair of Co-interior angles

are 57° , 123°

$$\text{Sum} = 123^\circ + 57^\circ = 180$$

\therefore l, m are parallel to each other.



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