chapter-14 Lines and angles
Exercise-14.1

Solution-01:-

$\angle AOB$, $\angle BOC$; $\angle AOC$, $\angle COD$;

$\angle BOC$, $\angle COD$;

$\angle AOB$, $\angle BOD$.

Solution-02:-

(i) $\angle DAC$, $\angle CAB$;

$\angle ACB$, $\angle FCB$;

$\angle ABC$, $\angle ABE$.

(ii) $\angle ADB$, $\angle ADC$;

$\angle BAD$, $\angle DAC$.

Solution-03:-

(i) $\angle 1$, $\angle 2$;

$\angle 2$, $\angle 4$;

$\angle 3$, $\angle 4$;

$\angle 1$, $\angle 3$;

$\angle 5$, $\angle 6$;

$\angle 5$, $\angle 7$;

$\angle 7$, $\angle 8$;

$\angle 6$, $\angle 8$.

(ii) $\angle 1$, $\angle 4$;

$\angle 2$, $\angle 3$;

$\angle 5$, $\angle 8$;

$\angle 6$, $\angle 7$.

Solution-04:-

No, Angles 1 and 2 are not adjacent angles.

Solution-05:-

If the sum of the measures of two angles is 90°, then the angles are called complementary angles and each is called complement of the other.

(i) 35°.

Let the measure of the angle be x°, then.

$x + 35^\circ = 90^\circ$ [complementary]

$x = 55^\circ$.

(ii) 72°.

Let the measure of the angle be x°. Then, the measure of its complement is given to be x°.

Since the sum of the measure of an angle and its complement is 90°

$x + 72^\circ = 90^\circ$

$x = 90^\circ - 72^\circ$

$x = 18^\circ$.

(iii) 45°.

Let the measure of the angle be x°. Then, the measure of its complement is given to be x°

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

$x = 90^\circ - 45^\circ$

$x = 45^\circ$

(iv) 85°

Let the measure of the angle be x°. Then, the measure of its complement is given to be x°

$x + 85^\circ = 90^\circ$

$x = 90^\circ - 85^\circ$

$x = 5^\circ$

Q 6

(ii) 120°

Let the measure of the angle be x° then, the measure of its supplementa is given to be x°

$x + 120^\circ = 180^\circ$

$x = 180^\circ - 120^\circ$

$x = 60^\circ$

Supplement of 120° is 60°

(iii) 135°

Let the measure of the angle be x°. Then, The measure of its supplement is given to be x°

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

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

$x = 45^\circ$

(iv) 90°

Let the measure of the angle be x°. Then, The measure of its supplement is given to be x°

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

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

$x = 90^\circ$

Solution-06:-

(i) 70°

Let the measure of the angles be x°. Then, the measure of its supplement is given to be x°

$x + 70^\circ = 180^\circ$

$x = 180^\circ - 70^\circ$

$x = 110^\circ$

[Two angles are said to be supplementary angle if the sum of their measures is 180°, and each of them is called a supplement of the other]

Solution-07:-

(i) $25^\circ + 65^\circ = 90^\circ$

$\rightarrow$ complementary

(ii) $120^\circ + 60^\circ = 180^\circ$

$\rightarrow$ supplementary

(iii) $63^\circ + 27^\circ = 90^\circ$

$\rightarrow$ complementary

(iv) $100^\circ + 80^\circ$

$\rightarrow$ supplementary.

Solution-08:-

(i) No

(ii) Yes

(iii) No.

Solution-09:-

$\angle AOC, \angle COB$;

$\angle COB, \angle BOD$;

$\angle BOD, \angle BOA$;

$\angle DOA, \angle AOC$.

Solution-10:-

(i) $\angle ABE, \angle EBC$;

$\angle ABD, \angle DBC$

(ii) $\angle ABE, \angle EBC$;

$\angle ABD, \angle DBC$.

Solution-11:-

Let the measure of the angle be x°. Then.

It is given that ~~g~~ two supplementary angles have equal measure

$x + x = 180^\circ$ [supplementary]

$2x = 180^\circ$

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

$x = 90^\circ$.

Solution-12:-

Let the measure of the angle be x°. Then.

Given angle $\rightarrow 28^\circ$

$28^\circ + x = 180^\circ$

$x = 180^\circ - 28^\circ$ [supplementary].

$x = 152^\circ$

Solution-13:-

Linear pairs:-

$\angle 1, \angle 2$;

$\angle 2, \angle 3$;

$\angle 3, \angle 4$;

$\angle 4, \angle 1$;

$\angle 5, \angle 6$;

$\angle 6, \angle 7$;

$\angle 7, \angle 8$;

$\angle 8, \angle 5$;

$\angle 9, \angle 10$;

$\angle 10, \angle 11$;

$\angle 11, \angle 12$;

$\angle 12, \angle 9$.

Pairs of vertically opposite angles:-

$\angle 1, \angle 3$;

$\angle 2, \angle 4$;

$\angle 5, \angle 7$;

$\angle 8, \angle 6$;

$\angle 9, \angle 11$;

$\angle 10, \angle 12$.

Solution-14:-

Given that,

$\angle 1 = 70^\circ$

$\angle 3 = 2(\angle 1)$

$= 2(70^\circ)$

$= 140^\circ$

$\angle 2 = \angle 4$

OE is the angle bisector so

$\angle DOB = 2(\angle 1)$

$= 2(70^\circ)$

$= 140^\circ$

$\angle DOA + \angle AOC + \angle COB + \angle DOB = 360^\circ$

$\Rightarrow 140^\circ + 140^\circ + 2\angle COB = 360^\circ \quad [(\angle COB) = \angle AOD]$

$\Rightarrow 2\angle COB = 360^\circ - 280^\circ$

$\Rightarrow \angle COB = \frac{80^\circ}{2}$

$\Rightarrow \angle COB = 40^\circ$

$\angle COB = \angle AOD = 40^\circ$

The angles are

$\angle 1 = 70^\circ, \angle 2 = 40^\circ, \angle 3 = 140^\circ$ & $\angle 4 = 40^\circ$.

Solution-15:-

Angle forming a linear pair is a right angle then the other angle is 90°.

Exercise-14.2

Solution - 01:-

(i) Alternative angles:-

$\angle BGH$ and $\angle CHG$;

$\angle AGH$ and $\angle DHG$.

(ii) corresponding angles:-

$\angle EGB$ and $\angle GHD$;

$\angle EGA$ and $\angle GHC$;

$\angle BGH$ and $\angle DHF$;

$\angle AGH$ and $\angle CHF$.

(ii) Alternate to $\angle d$ and $\angle g$ are $\angle e$, $\angle b$

corresponding to angles $\angle f$ and $\angle h$ are $\angle c$, $\angle a$

(iii) Angle alternate $\angle PQR$ is $\angle QRA$

Angle corresponding to $\angle RQF$ is $\angle BRA$

Angle alternate to $\angle PQE$ is $\angle BRA$

(iv) Interior angles

$\angle d$, $\angle f$;

$\angle a$, $\angle e$

Exterior Angles.

$\angle c$, $\angle g$;

$\angle b$, $\angle h$.

Solution - 02:-

Given that,

$\angle CMQ = 60^\circ$; $\angle LMD = 60^\circ$ [corresponding angles]

$\angle PLB = 60^\circ$ [Alternative angles]

$\angle APL$ and $\angle PLB$ is a Linear pair

$\angle APL + \angle PLB = 180^\circ$

$\angle APL = 180^\circ - 60^\circ$

$\angle APL = 120^\circ$.

$\angle CMQ$ and $\angle QMD$ is a Linear pair

$\angle CMQ + \angle QMD = 180^\circ$

$60^\circ + \angle QMD = 180^\circ$

$\angle QMD = 120^\circ$.

$\angle CML$ and $\angle LMD$ is a Linear pair

$\angle CML + \angle LMD = 180^\circ$

$\angle CML + 60^\circ = 180^\circ$

$\angle CML = 120^\circ$

$\angle EGB = 60^\circ$

$\angle EGB$ and $\angle AGH$ are alternative angle,

$\angle EGB = \angle AGH = 60^\circ$

$\angle CMQ = 60^\circ$. $\angle QMD = 120^\circ$, $\angle PLB = 60^\circ$, $\angle ALM = 60^\circ$, $\angle MLB = 120^\circ$, $\angle DML = 60^\circ$, $\angle CML = 120^\circ$, $\angle ALP = 120^\circ$

Solution-03:-

It is given that

$\angle LMD = 35^\circ$

$\angle LMD$ and $\angle LMC$ is a Linear pair

$\angle LMD + \angle LMC = 180^\circ$

$\angle LMC = 180^\circ - 35^\circ$

$= 145^\circ$

$\angle LMC = an\ 145^\circ$

$\therefore \angle LMC = \angle PLA = 145^\circ$

$\angle LMC = \angle MLB = 145^\circ$

$\angle MLB$ and $\angle ALM$ is a Lineal pair

$\angle MLB + \angle ALM = 180^\circ$

$\angle ALM = 180^\circ - 145^\circ$

$\angle ALM = 35^\circ$

$\therefore \angle ALM = 35^\circ$, $\angle PLA = 145^\circ$.

Solution-04:-

the angle alternate to $\angle 3$ is $\angle 7$

the angle corresponding to $\angle 5$ is $\angle 7$

the angle alternate to $\angle 5$ is $\angle 5$.

Solution-05:-

It is Given that

$\angle 1 = 40^\circ$

$\angle 1$ and $\angle 2$ is a Lineal pair

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

$\angle 2 + 40^\circ = 180^\circ$

$\angle 2 = 180^\circ - 40^\circ$

$\angle 2 = 140^\circ$.

$\angle 2 = \angle 6$ [corresponding angles]

$\angle 6 = 140^\circ$

$\angle 6$ and $\angle 5$ is a Linear pair

$\angle 6 + \angle 5 = 180^\circ$

$\angle 5 = 180^\circ - 140^\circ$

$\angle 5 = 40^\circ$.

$\angle 3$ and $\angle 5$ are alternative interior angles.

$\angle 3 = \angle 5 = 40^\circ$

$\angle 3$ and $\angle 4$ is a Linear pair

$\angle 3 + \angle 4 = 180^\circ$

$\angle 4 = 180^\circ - 40^\circ$

$\angle 4 = 140^\circ$.

$\angle 4$ and $\angle 6$ form pair of interior angles

$\angle 4 = \angle 6 = 140^\circ$

$\therefore \angle 6 = 140^\circ$

$\angle 3$ and $\angle 7$ are pair of corresponding angles

$\angle 3 = \angle 7 = 40^\circ$

$\therefore \angle 7 = 40^\circ$

$\angle 4$ and $\angle 8$ are pair of corresponding angles

$\angle 4 = \angle 8 = 140^\circ$

$\therefore \angle 8 = 140^\circ$

$\therefore \angle 1 = 40^\circ, \angle 2 = 140^\circ, \angle 3 = 40^\circ, \angle 4 = 140^\circ, \angle 5 = 40^\circ, \angle 6 = 140^\circ,$

$\angle 7 = 40^\circ, \angle 8 = 140^\circ$.

Solution-06:-

we have,

$\angle 1 = 75^\circ$

$\angle 1$ and $\angle 2$ is a Linear Pair

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

$75^\circ + \angle 2 = 180^\circ$

$\angle 2 = 180^\circ - 75^\circ$

$\angle 2 = 105^\circ$.

$\angle 2$, $\angle 6$ are pair of corresponding angles

$\therefore \angle 2 = \angle 6$

$\therefore \angle 6 = 105^\circ$

$\angle 6$ and $\angle 5$ is a Linear pair

$\angle 6 + \angle 5 = 180^\circ$

$\angle 5 = 180^\circ - 105^\circ$

$\angle 5 = 75^\circ$.

$\angle 2$ and $\angle 8$ are pair of alternative exterior angles

$\therefore \angle 2 = \angle 8$

$\therefore \angle 8 = 105^\circ$

$\angle 7$ and $\angle 8$ is a Linear Pair

$\angle 7 + \angle 8 = 180^\circ$

$\angle 7 = 180^\circ - 105^\circ$

$\angle 7 = 75^\circ$.

$\angle 3$ and $\angle 5$ are pair of alternative interior angles

$\angle 3 = \angle 5$

$\therefore \angle 5 = 75^\circ$, $\angle 3 = 75^\circ$

$\angle 3$ and $\angle 4$ is a Linear pair

$\angle 3 + \angle 4 = 180^\circ$

$\angle 4 = 180^\circ - 75^\circ$

$\angle 4 = 105^\circ$.

$\therefore \angle 1 = 75^\circ, \angle 2 = 105^\circ, \angle 3 = 75^\circ, \angle 4 = 105^\circ, \angle 5 = 75^\circ, \angle 6 = 105^\circ,$
$\angle 7 = 75^\circ, \angle 8 = 105^\circ$.

Solution-07:-

It is Given that,

$\angle QMD = 100^\circ$

$\angle QMD$ and $\angle QMC$ is a Linear pair

$\angle QMD + \angle QMC = 180^\circ$

$\angle QMC = 180^\circ - 100^\circ$

$\angle QMC = 80^\circ$

$\angle PLA$ and $\angle QMD$ are alternative exterior angles

$\therefore \angle PLA = \angle QMD$

$\therefore \angle PLA = 100^\circ$

$\angle PLA$ and $\angle PLB$ is a Linear pair

$\angle PLA + \angle PLB = 180^\circ$

$\angle PLB = 180^\circ - 80^\circ$

$\angle PLB = 100^\circ$.

$\angle PLB$ & $\angle LMD$ are corresponding angles

$\therefore \angle PLB = \angle LMD$

$\therefore \angle LMD = 100^\circ$

$\angle LMD$ and $\angle LMC$ is a Linear pair

$\angle LMD + \angle LMC = 180^\circ$

$\angle LMC = 180^\circ - 100^\circ$

$\angle LMC = 80^\circ$.

$\angle MLB$ and $\angle QMD$ are corresponding angles.

$\therefore \angle MLB = \angle QMD$

$\therefore \angle MLB = 100^\circ$

$\angle MLB$ and $\angle MLA$ is a Linear pair

$\angle MLB + \angle MLA = 180^\circ$

$\angle MLA = 180^\circ - 100^\circ$

$\angle MLA = 80^\circ$

$\therefore \angle QMD = 100^\circ, \angle PLB = 80^\circ, \angle PLA = 100^\circ, \angle ALM = 80^\circ,$
$\angle MLB = 100^\circ, \angle LMD = 80^\circ, \angle LMC = 100^\circ, \angle QMC = 80^\circ$.

Solution -08:-

Given that. angle is 80°.

$\angle z$ and 80° are vertically opposite angles

$\angle z = 80^\circ$.

$\angle z$ and $\angle t$ are corresponding angles

$\angle z = \angle t$

$\therefore \angle t = 80^\circ$.

$\angle z$ and $\angle y$ are corresponding angle

$\angle z = \angle y$

$\therefore \angle y = 80^\circ$.

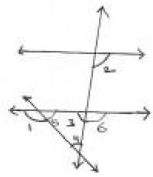
$\angle y$ and $\angle x$ are corresponding angle

$\angle y = \angle x$

$\angle x = 80$.

Solution -09:-

Given $\angle 1 = 120^\circ$, $\angle 2 = 100^\circ$



$\angle 5$ and $\angle 1$ is a Linear pair

$\angle 1 + \angle 5 = 180^\circ$

$\angle 5 = 180^\circ - 120^\circ$

$\angle 5 = 60^\circ$.

$\angle 2$ and $\angle 6$ are corresponding angles

$\angle 2 = \angle 6 = 100^\circ$ $\therefore \angle 6 = 100^\circ$.

$\angle 6$ and $\angle 3$ form a Linear pair

$\angle 6 + \angle 3 = 180^\circ$

$\angle 3 = 180^\circ - 100^\circ$

$\angle 3 = 80^\circ$.

By using Angle sum property of a Δ^{le} we have

$\angle 3 + \angle 5 + \angle 4 = 180^\circ$

$\angle 4 = 180^\circ - 80^\circ - 60^\circ$

$\angle 4 = 40^\circ$

$\therefore \angle 3 = 80^\circ$, $\angle 4 = 40^\circ$.

Solution -10:-

Given $l \parallel m$

$a^\circ = 110^\circ$ [vertically opposite angles]

$a^\circ = b^\circ$ [corresponding angles]

$b^\circ = 110^\circ$.

$d^\circ = 85^\circ$ [vertically opposite angle]

$d^\circ = c^\circ$ [correspondingangles]

$d^\circ = 85^\circ$

$c^\circ = 85^\circ$

$\therefore \angle a = 110^\circ$, $b = 110^\circ$, $c = 85^\circ$, $d = 85^\circ$