

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) L_1, L_2 ;
 L_2, L_4 ;
 L_3, L_4 ;
 L_1, L_3 ;
 L_5, L_6 ;
 L_5, L_7 ;
 L_7, L_8 ;
 L_6, L_8 .

(ii) L_1, L_4 ;
 L_2, L_3 ;
 L_5, L_8 ;
 L_6, L_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.

$$x + 35^\circ = 90^\circ \quad [\text{complementary}]$$

$$x = 55^\circ.$$

(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°

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

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

$$x = 18^\circ.$$

(ii) 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°

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

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

$$x = 5^\circ$$

Q6

(ii) 120°

Let the measure of the angle be x° . Then, the measure of its complement 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 angles if the sum of their measures is 180° and each of them is called a supplement of the other]

Solution-07:-

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

→ complementary

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

→ supplementary

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

→ complementary

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

→ 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 two supplementary angles have equal measure

$$x + x = 180^\circ \quad [\text{supplementary}]$$

$$2x = 180^\circ$$

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

$$x = 90^\circ$$

Solution-12:-

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

Given angle $\rightarrow 25^\circ$

$$25^\circ + x = 180^\circ$$

$$x = 180^\circ - 25^\circ \quad [\text{supplementary}]$$

$$x = 155^\circ$$

Solution-13:-

Linear pairs:-

$$L1, L2;$$

$$L2, L3;$$

$$L3, L4;$$

$$L4, L5;$$

$$L5, L6;$$

$$L6, L7;$$

$$L7, L8;$$

$$L8, L9;$$

$$L9, L10;$$

$$L10, L11;$$

$$L11, L12;$$

$$L12, L13.$$

Pairs of vertically opposite angles:-

$$L1, L3;$$

$$L2, L4;$$

$$L5, L7;$$

$$L8, L6;$$

$$L9, L11;$$

$$L10, L12.$$

Solution-14:-

Given that,

$$L1 = 70^\circ$$

$$L3 = 2(L1)$$

$$= 2(70^\circ)$$

$$= 140^\circ$$

$$L2 = L4$$

OE is the angle bisector so

$$LPOB = 2(L1)$$

$$= 2(70^\circ)$$

$$= 140^\circ$$

$$LDOA + LAOC + LCOB + LPOB = 360^\circ$$

$$\Rightarrow 140^\circ + 140^\circ + 2LCOB = 360^\circ \quad [LCOB = LAOC]$$

$$\Rightarrow 2LCOB = 360^\circ - 280^\circ$$

$$\Rightarrow LCOB = \frac{80^\circ}{2}$$

$$\Rightarrow LCOB = 40^\circ$$

$$LCOB = LAOC = 40^\circ$$

The angles are

$$L1 = 70^\circ, L2 = 40^\circ, L3 = 140^\circ \text{ \& } L4 = 40^\circ.$$

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 $\angle CHF$.

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

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

(iv) Angle alternate $\angle PAR$ is $\angle QRA$.

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

Angle alternate to $\angle PAE$ is $\angle BRA$.

(v) Interior angles

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

$\angle a$, $\angle e$

Exterior Angles.

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

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

Solution -02:-

Given that,

$\angle CMA = 60^\circ$; $\angle LMD = 60^\circ$ [Corresponding angles]

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

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

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

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

$\angle APL = 120^\circ$.

$\angle CNB$ and $\angle BMD$ is a linear pair

$\angle CNB + \angle BMD = 180^\circ$

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

$\angle BMD = 120^\circ$.

$\angle CML$ 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 angles,

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

$\therefore \angle CMA = 60^\circ$, $\angle BMD = 120^\circ$, $\angle PLB = 60^\circ$, $\angle ALM = 60^\circ$, $\angle LMB = 120^\circ$, $\angle PML = 60^\circ$, $\angle CML = 120^\circ$, $\angle APL = 120^\circ$.

Solution-03:-

It is given that

$$\angle LMD = 35^\circ$$

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

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

$$\begin{aligned}\angle LMC &= 180^\circ - 35^\circ \\ &= 145^\circ\end{aligned}$$

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

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

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

$\angle MLB$ and $\angle ALM$ is a linear 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 $\angle B$ 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 linear pair

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

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

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

$$\angle 2 = 140^\circ$$

$\angle 3 = \angle 8$ [corresponding angles]

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

$\angle 6$ 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 alternate 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,

$$L1 = 75^\circ$$

$L1$ and $L2$ is a Linear pair

$$L1 + L2 = 180^\circ$$

$$75^\circ + L2 = 180^\circ$$

$$L2 = 180^\circ - 75^\circ$$

$$L2 = 105^\circ$$

$L2$, $L6$ are pair of corresponding angles

$$\therefore L2 = L6$$

$$\therefore L6 = 105^\circ$$

$L6$ and $L5$ is a Linear pair

$$L6 + L5 = 180^\circ$$

$$L5 = 180^\circ - 105^\circ$$

$$L5 = 75^\circ$$

$L2$ and $L8$ are pair of alternative exterior angles

$$\therefore L2 = L8$$

$$\therefore L8 = 105^\circ$$

$L7$ and $L8$ is a Linear pair

$$L7 + L8 = 180^\circ$$

$$L7 = 180^\circ - 105^\circ$$

$$L7 = 75^\circ$$

$L3$ and $L5$ are pair of alternative interior angles

$$L3 = L5$$

$$\therefore L5 = 75^\circ, L3 = 75^\circ$$

$L3$ and $L4$ is a Linear pair

$$L3 + L4 = 180^\circ$$

$$L4 = 180^\circ - 75^\circ$$

$$L4 = 105^\circ$$

$$\therefore L1 = 75^\circ, L2 = 105^\circ, L3 = 75^\circ, L4 = 105^\circ, L5 = 75^\circ, L6 = 105^\circ$$

$$L7 = 75^\circ, L8 = 105^\circ$$

Solution-07:-

It is given that,

$$\angle QMP = 100^\circ$$

$\angle QMD$ 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 $\angle LMD$ are corresponding angles

$$\therefore \angle MLB = \angle LMD$$

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

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

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

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

$$\angle MLA = 80^\circ$$

$\therefore \angle LMD = 100^\circ, \angle PLB = 80^\circ, \angle PLA = 100^\circ, \angle LML = 80^\circ$

$\angle MLB = 100^\circ, \angle LMD = 80^\circ, \angle LMC = 100^\circ, \angle LMC = 80^\circ$

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

$$\angle y = \angle x$$

$$\angle x = 80^\circ$$

Solution -09:

Given $L = 120^\circ$, $L2 = 100^\circ$

$L5$ and $L1$ are a linear pair

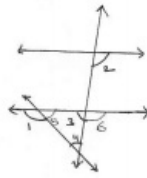
$$L + L5 = 180^\circ$$

$$L5 = 180^\circ - 120^\circ$$

$$L5 = 60^\circ$$

$L9$ and $L6$ are corresponding angles

$$L9 = L6 = 100^\circ \quad \therefore L6 = 100^\circ$$



$L6$ and $L3$ form a linear pair

$$L6 + L3 = 180^\circ$$

$$L3 = 180^\circ - 100^\circ$$

$$L3 = 80^\circ$$

By using Angle sum property of a Δ we have

$$L3 + L5 + L4 = 180^\circ$$

$$L4 = 180^\circ - 80^\circ - 60^\circ$$

$$L4 = 40^\circ$$

$$\therefore L3 = 80^\circ, L4 = 40^\circ$$

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]

$$d^\circ = c^\circ$$

[Corresponding angles]

$$d^\circ = 85^\circ$$

$$c^\circ = 85^\circ$$

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

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