

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) $\angle DAC, \angle CAB$;
 $\angle ACB, \angle ECB$;
 $\angle ABC, \angle ABE$.

(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.

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

$$x = 55^\circ.$$

(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 ^{sup}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 2 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 $\rightarrow 28^\circ$

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

$$x = 180^\circ - 28^\circ \quad [\text{supplementary}].$$

$$x = 152^\circ$$

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

$$LPOB = 2(L1)$$

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

$$= 140^\circ$$

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

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

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

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

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

$$LCOB = LAOB = 40^\circ$$

The angles are

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

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 $\angle PAQ$ is $\angle BRA$.

Angle corresponding to $\angle RAQ$ is $\angle BRA$.

Angle alternate to $\angle PAQ$ 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,

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

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

$$\therefore \angle CMQ = 60^\circ, \angle QMD = 120^\circ, \angle PLB = 60^\circ, \angle ALM = 60^\circ, \angle MLD = 60^\circ, \angle CML = 120^\circ, \angle APL = 120^\circ$$

Solution-03:-

It is given that

$$\angle M D = 35^\circ$$

$\angle M D$ and $\angle M C$ is a linear pair

$$\angle M D + \angle M C = 180^\circ$$

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

$$\angle M C = 145^\circ$$

$$\therefore \angle M C = \angle P A = 145^\circ$$

$$\angle M C = \angle M B = 145^\circ$$

$\angle M B$ and $\angle A M$ is a linear pair

$$\angle M B + \angle A M = 180^\circ$$

$$\angle A M = 180^\circ - 145^\circ$$

$$\angle A M = 35^\circ$$

$$\therefore \angle A M = 35^\circ, \angle P A = 145^\circ$$

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 $\angle 6$.

Solution-05:-

It is given that

$$\angle 1 = 40^\circ$$

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

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

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

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

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

$$\angle 3 = \angle 6 \quad [\text{corresponding angles}]$$

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

$\angle 6$ 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,

$$L1 = 75^\circ$$

$L1$ 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,

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

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

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

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

$$\angle QMC = 80^\circ$$

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

$$\therefore \angle PLA = \angle QMP$$

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

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

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

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

$$\angle PLB = 100^\circ$$

$\angle PLB$ and $\angle LMD$ 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

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

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

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

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

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 $L_1 = 120^\circ$, $L_2 = 100^\circ$

L_1 and L_5 are a linear pair

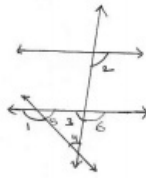
$$L_1 + L_5 = 180^\circ$$

$$L_5 = 180^\circ - 120^\circ$$

$$L_5 = 60^\circ$$

L_2 and L_6 are corresponding angles

$$L_2 = L_6 = 100^\circ \quad \therefore L_6 = 100^\circ$$



L_6 and L_3 form a linear pair

$$L_6 + L_3 = 180^\circ$$

$$L_3 = 180^\circ - 100^\circ$$

$$L_3 = 80^\circ$$

By using Angle sum property of a Δ we have

$$L_3 + L_5 + L_4 = 180^\circ$$

$$L_4 = 180^\circ - 80^\circ - 60^\circ$$

$$L_4 = 40^\circ$$

$$\therefore L_3 = 80^\circ, L_4 = 40^\circ$$

Solution -10:-

Given $\angle a = 110^\circ$

$$a^\circ = 110^\circ$$

[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]

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

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

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