Exercise – 8.1

1. Write the complement of each of the following angles:
(i) 20° (ii) 35° (iii) 90° (iv) 77° (v) 30°

Sol:

(i) Given angle is $20°$
Since, the sum of an angle and its complement is $90°$.
$\therefore$ its, complement will be $(90-20=70°)$

(ii) Given angle is $35°$
Since, the sum of an angle and its complement is $90°$.
$\therefore$ its, complements will be $(90-35°=55°)$

(iii) The given angle is $90°$
Since, the sum of an angle and its complement is $90°$.
$\therefore$ [its, complement will be $(90-90°=0°)$]

(iv) The given angle is $77°$
Since, the sum of an angle and its complement is $90°$.
$\therefore$ its, complement will be $(90-77°=13°)$

(v) The given angle is $30°$.
Since, the sum of an angle and its complement is $90°$.
$\therefore$ its, complement will be $(90-30°=60°)$

2. Write the supplement of each of the following angles:
(i) 54° (ii) 132° (iii) 138°

Sol:

(i) The given angle is $54°$
Since, the sum of an angle and its supplement is $180°$.
$\therefore$ its, supplement will be $180°-54°=126°$

(ii) The given angle is $132°$
Since, the sum of an angle and its supplement is $180°$.
$\therefore$ its, supplement will be $180°-132°=48°$

(iii) The given angle is $138°$
Since, the sum of an angle and its supplement is $180°$.
$\therefore$ its, supplement will be $180°-138°=42°$

3. If an angle is 28° less than its complement, find its measure.

Sol:

Angle measured will be ‘x’ say

$\therefore$ its complement will be $(90-x)^\circ$

It is given that

Angle = Complement –28°

$\Rightarrow x=(90-x)^\circ-28^\circ$

$\Rightarrow x^\circ=90^\circ-28^\circ-x^\circ$

$\Rightarrow 2x^\circ=62^\circ$

$\Rightarrow x=31^\circ$

$\therefore$ Angle measured is 31°

4. If an angle is 30° more than one half of its complement, find the measure of the angle.

Sol:

Angle measured will be ‘x’ say.

$\therefore$ its complement will be $(90-x)^\circ$

It is given that

Angle $=30^\circ+\frac{1}{2}$ Complement

$\Rightarrow x^\circ=30^\circ+\frac{1}{2}(90-x)$

$\Rightarrow 3\frac{x}{2}=30^\circ+45^\circ$

$\Rightarrow 3x=150^\circ$

$\Rightarrow x=\frac{150}{3}$

$\Rightarrow x=50^\circ$

$\therefore$ Angle is 50°

5. Two supplementary angles are in the ratio 4 : 5. Find the angles.

Sol:

Supplementary angles are in the ratio $4:5$

Let the angles be 4x and 5x

It is given that they are supplementary angles

$\therefore 4x+5x=180^\circ x$

$\Rightarrow 9x=180^\circ$

$\Rightarrow x=20^\circ$

Hence, $4x=4(20)=80^\circ$

$5(x)=5(20)=100^\circ$

$\therefore$ Angles are 80° and 100°

6. Two supplementary angles differ by 48°. Find the angles.

Sol:

Given that two supplementary angles are differ by $48°$

Let the angle measured is $x°$

$\therefore$ Its supplementary angle will be $(180-x)°$

It is given that

$(180-x)-x=98°$

$\Rightarrow 180-48°=2x$

$\Rightarrow 132=2x$

$\Rightarrow x=\frac{132}{2}$

$\Rightarrow x=66°$

Hence, $180-x=114°$

Therefore, angles are $66°$ and $114°$

7. An angle is equal to 8 times its complement. Determine its measure.

Sol:

It is given that angle = 8 times its complement

Let 'x' be measured angle

$\Rightarrow$ angle = 8 complements

$\Rightarrow$ angle = $8(90-x)°$ [$\because$ complement $=(90-x)°$]

$\Rightarrow x°=8(90)-8x°$

$\Rightarrow 9x°=720°$

$\Rightarrow x=\frac{720}{9}=80$

$\therefore$ The measured angle is $80°$

8. If the angles (2x −10)° and (x − 5)° are complementary angles, find x.

Sol:

Given that,

$(2x-10)°$ and $(x-5)°$ are complementary angles.

Let x be the measured angle.

Since the angles are complementary

$\therefore$ Their sum will be $90°$

$\Rightarrow (2x-10)+(x-5)=90°$

$\Rightarrow 3x-15=90$

$\Rightarrow 3x=90°+15°$

$\Rightarrow x = \frac{105°}{3} = \frac{105°}{3} = 35°$

$\Rightarrow x = 35°$

9. If the complement of an angle is equal to the supplement of the thrice of it. Find the measure of the angle.

Sol:

The angle measured will be $'x'$ say.

Its complementary angle is $(90° - x°)$ and

Its supplementary angle is $(180° - 3x°)$

Given that,

Supplementary of thrice of the angle $= (180° - 3x°)$

According to the given information

$(90 - x)° = (180 - 3x)°$

$\Rightarrow 3x° - x° = 180° - 90°$

$\Rightarrow 2x° = 90°$

$\Rightarrow x = 45°$

The angle measured is $45°$

10. If an angle differs from its complement by 10°, find the angle.

Sol:

The measured angle will be '*x*' say

Given that,

The angles measured will be differed by $10°$

$x° - (90 - x)° = 10°$

$\Rightarrow x - 90 + x = 10$

$\Rightarrow 2x = 100$

$\Rightarrow x = 50°$

$\therefore$ The measure of the angle will be $= 50°$

11. If the supplement of an angle is three times its complement, find the angle.

Sol:

Given that,

Supplementary of an angle = 3 times its complementary angle.

The angles measured will be $x°$

Supplementary angle of x will be $180° - x°$ and

The complementary angle of x will be $(90° - x°)$.

It's given that
Supplementary of angle = 3 times its complementary angle

$180° - x° = 3(90° - x°)$

$\Rightarrow 180° - x° = 270° - 3x°$

$\Rightarrow 3x° - x° = 270° - 180°$

$\Rightarrow 2x° = 90°$

$\Rightarrow x = 45°$

$\therefore$ Angle measured is $45°$.

12. If the supplement of an angle is two-third of itself. Determine the angle and its supplement.
Sol:
Given that

Supplementary of an angle $= \frac{2}{3}$ of angle itself.

The angle measured be 'x' say.

Supplementary angle of x will be $(180 - x)°$

It is given that

$(180 - x)° = \frac{2}{3}x°$

$\Rightarrow 180° - x° = \frac{2}{3}x°$

$\Rightarrow \frac{2}{3}x° + x° = 180°$

$\Rightarrow 2x° + 3x° = 3 \times 180°$

$\Rightarrow 5x° = 540°$

$\Rightarrow x = 108°$

Hence, supplement $= 180 - 108 = 72°$

$\therefore$ Angle will be $108°$ and its supplement will be $72°$.

13. An angle is 14° more than its complementary angle. What is its measure?
Sol:
Given that,
An angle is $14°$ more than its complementary angle
The angle measured is 'x' say
The complementary angle of 'x' is $(90 - x)$

It is given that

$x - (90 - x) = 14$

$\Rightarrow x-90+x=14$

$\Rightarrow 2x^\circ = 90^\circ + 14^\circ$

$\Rightarrow x^\circ = \dfrac{104^\circ}{2}$

$\Rightarrow x = 52^\circ.$

$\therefore$ The angle measured is 52°

14. The measure of an angle is twice the measure of its supplementary angle. Find its measure.

Sol:

Given that

The angle measure of an angle is twice of the measure of the supplementary angle.

Let the angle measured will be 'x' say

$\therefore$ The supplementary angle of x is $180-x$ as per question

$x^\circ = 2(180-x)^\circ$

$x^\circ = 2(180^\circ) - 2x^\circ$

$\Rightarrow 3x^\circ = 360^\circ$

$\Rightarrow x^\circ = 120^\circ$

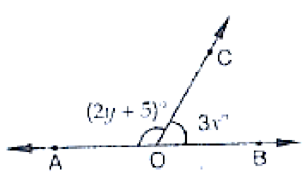
$\therefore$ The angle measured is $120^\circ.$

Exercise – 8.2

1. In the below Fig, OA and OB are opposite rays:

(i) If x = 25°, what is the value of y?

(ii) If y = 35°, what is the value of x?



Sol:

(i) Given that $x = 25^\circ$

Since $\angle AOC$ and $\angle BOC$ form a linear pair

$\angle AOC + \angle BOC = 180^\circ$

Given that

$\angle AOC = 2y+5$ and $\angle BOC = 3x$

$\therefore \angle AOC + \angle BOC = 180^\circ$

$(2y+5)^\circ + 3x = 180^\circ$

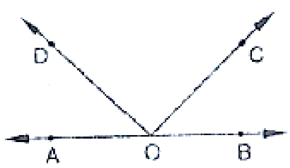
$(2y+5)^\circ + 3(25^\circ) = 180^\circ$

$$2y° + 5° + 75° = 180°$$
$$2y° + 80° = 180°$$
$$2y° = 180° - 80° = 100°$$
$$y° = \frac{100°}{2} = 50°$$
$$\Rightarrow \boxed{y = 50°}$$

(ii) Given that if $y = 35°$

$$\angle AOC + \angle BOC = 180°$$
$$(2y + 5) + 3x = 180°$$
$$(2(35) + 5) + 3x = 180°$$
$$(70 + 5) + 3x = 180°$$
$$3x = 180° - 75°$$
$$3x = 105°$$
$$x = 35°$$
$$\boxed{x = 35°}$$

2. In the below fig, write all pairs of adjacent angles and all the linear pairs.



Sol:

Adjacent angles are

(i) $\angle AOC, \angle COB$

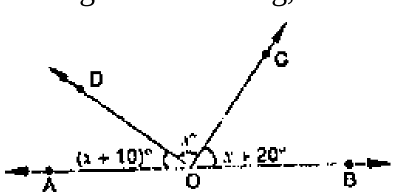
(ii) $\angle AOD, \angle BOD$

(iii) $\angle AOD, \angle COD$

(iv) $\angle BOC, \angle COD$

Linear pairs : $\angle AOD, \angle BOD; \angle AOC, \angle BOC.$

3. In the given below Fig, find x. Further find ∠BOC, ∠COD and ∠AOD.



Sol:

Since $\angle AOD$ and $\angle BOD$ are form a line pair

$\angle AOD + \angle BOD = 180°$

$\angle AOD + \angle COD + \angle BOC = 180°$

Given that

$\angle AOD = (x+10)°, \angle COD = x°, \angle BOC = (x+20)°$

$\Rightarrow (x+10)° + x° + (x+20)° = 180°$

$\Rightarrow 3x + 30° = 180°$

$\Rightarrow 3x = 180° - 30°$

$\Rightarrow 3x = 150°$

$\Rightarrow x = 50°$

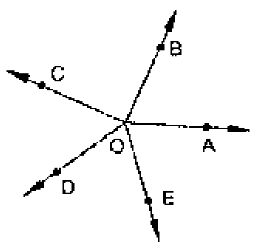
$\therefore \angle AOD = x + 10°$

$= 50° + 10° = 60°$

$\angle COD = x° = 50°$

$\angle BOC = x + 20° = 50 + 20 = 70°$

4. In the given below fig, rays OA, OB, OC, OP and 0E have the common end point O. Show that ∠AOB + ∠BOC + ∠COD + ∠DOE + ∠EOA = 360°.



Sol:

Given that

Rays OA, OB, OD and OE have the common end point O.

A ray of opposite to OA is drawn

Since $\angle AOB, \angle BOF$ are linear pairs

$\angle AOB + \angle BOF = 180°$

$\angle AOB + \angle BOC + \angle COF = 180°$ ....(1)

Also

$\angle AOE, \angle EOF$ are linear pairs

$\angle AOE + \angle EOF = 180°$

$\angle AOE + \angle DOF + \angle DOE = 180°$ ....(2)

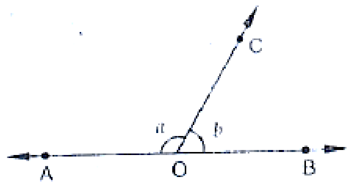
By adding (1) and (2) equations we get

$\angle AOB + \angle BOC + \angle COF + \angle AOE + \angle DOF + \angle DOE = 360°$

$\angle AOB + \angle BOC + \angle COD + \angle DOE + \angle EOA = 360°$

Hence proved.

5. In the below Fig, ∠AOC and ∠BOC form a linear pair. if a − 2b = 30°, find a and b.



Sol:

Given that,

$\angle AOC$ and $\angle BOC$ form a linear pair

If $a-2b=30°$

$\angle AOC=a°, \angle BOC=b°$

$\therefore a+b=180°$ ....(i)

Given $a-2b=30°$ ....(ii)

By subtracting (i) and (ii)

$a+b-a+2b=180°-30°$

$\Rightarrow 3b=150°$

$\Rightarrow b=\frac{150°}{3}$

$\Rightarrow b=50°$

Hence $a-2b=30°$

$a-2(50)°=30°$ $[\because b=50°]$

$a=30°+100°$

$a=130°$

$\therefore a=130°, b=50°.$

6. How many pairs of adjacent angles are formed when two lines intersect in a point?

Sol:

Four pairs of adjacent angle formed when two lines intersect in a point they are

$\angle AOD, \angle DOB$

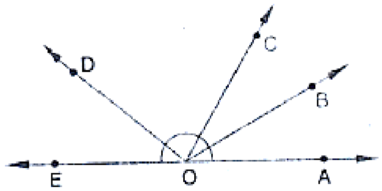
$\angle DOB, \angle BOC$

$\angle COA, \angle AOD$

$\angle BOC, \angle COA$

Hence 4 pairs

7. How many pairs of adjacent angles, in all, can you name in below fig.?



Sol:

Pairs of adjacent angles are

$\angle EOC, \angle DOC$

$\angle EOD, \angle DOB$

$\angle DOC, \angle COB$

$\angle EOD, \angle DOA$

$\angle DOC, \angle COA$

$\angle BOC, \angle BOA$

$\angle BOA, \angle BOD$

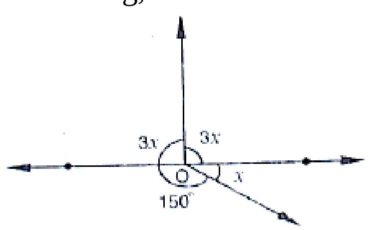
$\angle BOA, \angle BOE$

$\angle EOC, \angle COA$

$\angle EOC, \angle COB$

$\therefore$ Hence 10 pairs of adjacent angles

8. In below fig, determine the value of x.



Sol:

Since sum of all the angles round a point is equal to $360°$. Therefore

$\Rightarrow 3x + 3x + 150 + x = 360°$

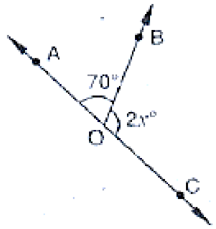
$\Rightarrow 7x° = 360° - 150°$

$\Rightarrow 7x = 210°$

$\Rightarrow x = \frac{210}{7}$

$\Rightarrow x = 30°$

9. In the below fig, AOC is a line, find x.



Sol:

Since $\angle AOB$ and $\angle BOC$ are linear pairs

$\angle AOB + \angle BOC = 180°$

$\Rightarrow 70° + 2x° = 180°$

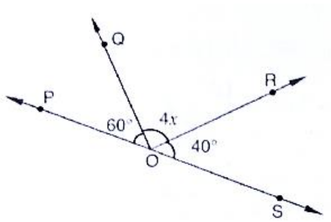
$\Rightarrow 2x° = 180° - 70°$

$\Rightarrow 2x = 110°$

$\Rightarrow x \frac{110}{2}$

$\Rightarrow x = 55°$

10. In the below fig, POS is a line, find x.



Sol:

Since $\angle POQ$ and $\angle QOS$ are linear pairs

$\angle POQ + \angle QOS = 180°$

$\Rightarrow \angle POQ + \angle QOR + \angle SOR = 180°$

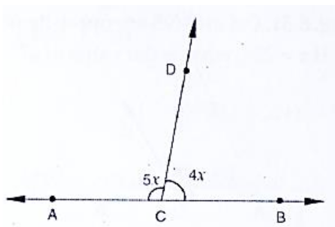
$\Rightarrow 60° + 4x° + 40° = 180°$

$\Rightarrow 4x° = 180° - 100°$

$\Rightarrow 4x° = 80°$

$\Rightarrow \boxed{x = 20°}$

11. In the below fig, ACB is a line such that ∠DCA = 5x and ∠DCB = 4x. Find the value of x.



Sol:

Here, $\angle ACD + \angle BCD = 180°$

[Since $\angle ACD, \angle BCD$ are linear pairs]

$\angle ACD = 5x, \angle BCD = 4x$

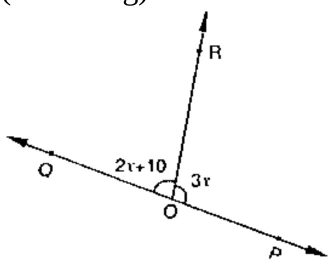
$\Rightarrow 5x + 4x = 180°$

$\Rightarrow 9x = 180°$

$\Rightarrow x = 20°$

$\therefore x = 20°$

12. Given ∠POR = 3x and ∠QOR = 2x + 10, find the value of x for which POQ will be a line. (Below fig).



Sol:

Since $\angle QOR, \angle POP$ are linear pairs

$\angle QOR + \angle POR = 180°$

$\Rightarrow 2x + 10 + 3x = 180°$ $\left[\because \angle QOR = 2x + 10, \angle POR = 3x\right]$

$\Rightarrow 5x + 10 = 180°$

$\Rightarrow 5x = 180° - 10$

$\Rightarrow 5x = 170°$

$\Rightarrow x = 34°$

13. In Fig. 8.42, a is greater than b by one third of a right-angle. Find the values of a and b.

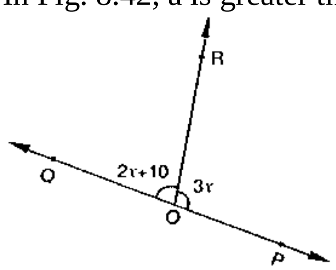


Fig. 8.41

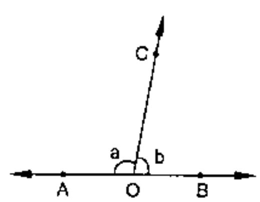


Fig. 8.42

Sol:

Since a, b are linear pair

$\Rightarrow a + b = 180°$

$\Rightarrow a = 180 - b$ ....(1)

Now,

$\Rightarrow a = b + \frac{1}{3} \times 90°$ [given]

$\Rightarrow a = b + 30°$ ....(2)

$\Rightarrow a - b = 30°$

Equating (1) and (2) equations

$180 - b = b + 30°$

$\Rightarrow 180° - 30° = b + b$

$\Rightarrow 150° = 2b$

$\Rightarrow b = \frac{150°}{2}$

$\Rightarrow b = 75°$

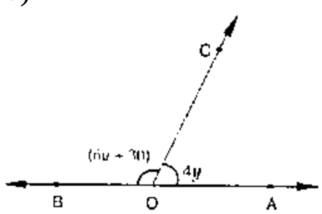
Hence $a = 180 - b$

$= 180 - 75°$ $[\because b = 75°]$

$a = 105°$

$\therefore a = 105°, b = 75°$

14. What value of y would make AOB a line in below fig, if ∠AOC = 4y and ∠BOC = (6y + 30)



Sol:

Since $\angle AOC, \angle BOC$ are linear pair

$\Rightarrow \angle AOC + \angle BOC = 180°$

$\Rightarrow 6y + 30 + 4y = 180°$

$\Rightarrow 10y + 30 = 180°$

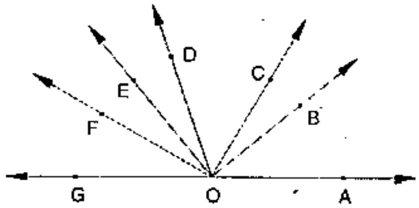
$\Rightarrow 10y = 180° - 30°$

$\Rightarrow 10y = 150°$

$\Rightarrow y = \frac{150°}{10}$

$\Rightarrow y = 15°$

15. If below fig, ∠AOF and ∠FOG form a linear pair.



∠EOB = ∠FOC = 90° and ∠DOC = ∠FOG = ∠AOB = 30°

(i) Find the measures of ∠FOE, ∠COB and ∠DOE.

(ii) Name all the right angles.

(iii) Name three pairs of adjacent complementary angles.

(iv) Name three pairs of adjacent supplementary angles.

(v) Name three pairs of adjacent angles.

Sol:

(i) $\angle FOE = x, \angle DOE = y$ and $\angle BOC = z$ sat

Since $\angle AOF, \angle FOG$ is Linear pair

$\Rightarrow \angle AOF + 30° = 180°$ $\quad [\angle AOF + \angle FOG = 180°$ and $\angle FOG = 30°]$

$\Rightarrow \angle AOF = 180° - 30°$

$\Rightarrow \angle AOF = 150°$

$\Rightarrow \angle AOB + \angle BOC + \angle COD + \angle DOE + \angle EOF = 150°$

$\Rightarrow 30° + z + 30° + y + x = 150°$

$\Rightarrow x + y + z = 150° - 30° - 30°$

$\Rightarrow x + y + z = 90°$ .....(1)

Now $\angle FOC = 90°$

$\Rightarrow \angle FOE + \angle EOD + \angle DOC = 90°$

$\Rightarrow x + y + 30° = 90°$

$\Rightarrow x + y = 90° - 30°$

$\Rightarrow x + y = 60°$ ....(2)

Substituting (2) in (1)

$x + y + z = 90°$

$\Rightarrow 60 + z = 90° \Rightarrow z = 90° - 60° = 30°$

i.e., $\angle BOC = 30°$

Given $\angle BOE = 90°$

$\Rightarrow \angle BOC + \angle COD + \angle DOE = 90°$

$\Rightarrow 30° + 30° + \angle DOE = 90°$

$\Rightarrow \angle DOE = 90° - 60° = 30°$

$\therefore \angle DOE = x = 30°$

Now, also we have

$x+y=60°$

$\Rightarrow y=60°-x=60°-30°=30°$

$\angle FOE=30°$

(ii) Right angles are

$\angle DOG, \angle COF, \angle BOF, \angle AOD$

(iii) Three pairs of adjacent complementary angles are

$\angle AOB, \angle BOD;$

$\angle AOC, \angle COD;$

$\angle BOC, \angle COE.$

(iv) Three pairs of adjacent supplementary angles are

$\angle AOB, \angle BOG;$

$\angle AOC, \angle COG;$

$\angle AOD, \angle DOG.$

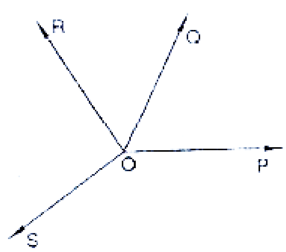
(v) Three pairs of adjacent angles

$\angle BOC, \angle COD;$

$\angle COD, \angle DOE;$

$\angle DOE, \angle EOF,$

16. In below fig, OP, OQ, OR and OS arc four rays. Prove that:
∠POQ + ∠QOR + ∠SOR + ∠POS = 360°



Sol:

Given that

OP, OQ, OR and OS are four rays

You need to produce any of the ray OP, OQ, OR and OS backwards to a point in the figure.

Let us produce ray OQ backwards to a point

T so that TOQ is a line

Ray OP stands on the TOQ

Since $\angle TOP, \angle POQ$ is linear pair

$\angle TOP+\angle POQ=180°$ ....(1)

Similarly, ray OS stands on the line TOQ

$\therefore \angle TOS+\angle SOQ=180°$ ....(2)

But $\angle SOQ = \angle SOR + \angle QOR$

So, (2), becomes

$\angle TOS + \angle SOR + \angle OQR = 180°$

Now, adding (1) and (3) you get

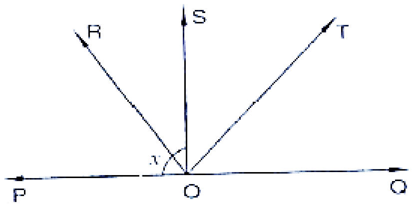
$\angle TOP + \angle POQ + \angle TOS + \angle SOR + \angle QOR = 360°$

$\Rightarrow \angle TOP + \angle TOS = \angle POS$

$\therefore (4)$ becomes

$\angle POQ + \angle QOR + \angle SOR + \angle POS = 360°$

17. In below fig, ray OS stand on a line POQ. Ray OR and ray OT are angle bisectors of ∠POS and ∠SOQ respectively. If ∠POS = x, find ∠ROT.



Sol:

Given,

Ray OS stand on a line POQ

Ray OR and Ray OT are angle bisectors of $\angle POS$ and $\angle SOQ$ respectively

$\angle POS = x$

$\angle POS$ and $\angle QOS$ is linear pair

$\angle POS + \angle QOS = 180°$

$x + \angle QOS = 180°$

$\angle QOS = 180 - x$

Now, ray or bisector $\angle POS$

$\therefore \angle ROS = \frac{1}{2}\angle POS$

$= \frac{1}{2} \times x \qquad [\because \angle POS = x]$

$\angle ROS = \frac{x}{2}$

Similarly ray OT bisector $\angle QOS$

$\therefore \angle TOS = \frac{1}{2}\angle QOS$

$= \frac{180 - x}{2}$ $\quad [\because \angle QOS = 180 - x]$

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

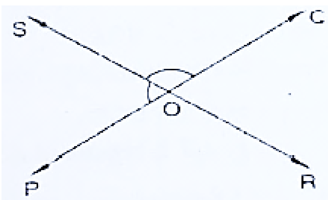
$\therefore \angle ROT = \angle ROS + \angle ROT$

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

$= 90°$

$\therefore \angle ROT = 90°$

18. In the below fig, lines PQ and RS intersect each other at point O. If ∠POR: ∠ROQ − 5 : 7, find all the angles.



Sol:

Given $\angle POR$ and $\angle ROP$ is linear pair

$\angle POR + \angle ROP = 180°$

Given that

$\angle POR : \angle ROP = 5 : 7$

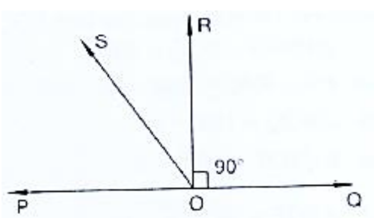
$\therefore \angle POR = \frac{5}{12} \times 180 = 75°$

Similarly $\angle ROQ = \frac{7}{5+7} \times 180° = 105°$

Now, $\angle POS = \angle ROQ = 105°$ [∵ Vertically opposite angles]

$\therefore \angle SOQ = \angle POR = 75°$ [∵ Vertically opposite angles]

19. In the below fig, POQ is a line. Ray OR is perpendicular to line PQ. OS is another ray lying between rays OP and OR. Prove that ∠ROS = $\frac{1}{2}$ (∠QOS − ∠POS).



Sol:

Given that, OR perpendicular

$\therefore \angle POR = 90°$

$\angle POS + \angle SOR = 90°$ $\quad [\because \angle POR = \angle POS + \angle SOR]$

$\angle ROS = 90° - \angle POS$ $\quad$ ....(1)

$\angle QOR = 90°$ $\quad (\because OR \perp PQ)$

$\angle QOS - \angle ROS = 90°$

$\angle ROS = \angle QOS - 90°$ $\quad$ ....(2)

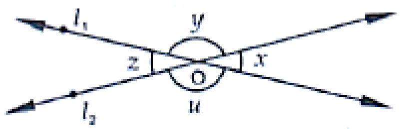
By adding (1) and (2) equations, we get

$2\angle ROS = \angle QOS - \angle POS$

$\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$

Exercise – 8.3

1. In the below fig, lines l_1 and l_2 intersect at O, forming angles as shown in the figure. If x = 45, Find the values of x, y, z and u.



Sol:

Given that

$x = 45°, y = ?, z = ?, u = ?$

Vertically opposite sides are equal

$\therefore z = x = 45°$

z and u angles are linear pair of angles

$\therefore z + u = 180°$

$z = 180° - 4$

$\Rightarrow u = 180° - x$

$\Rightarrow u = 180° - 45°$ $\quad [\because x = 45°]$

$\Rightarrow u = 135°$

x and y angles are linear pair of angles

$\therefore x + y = 180°$

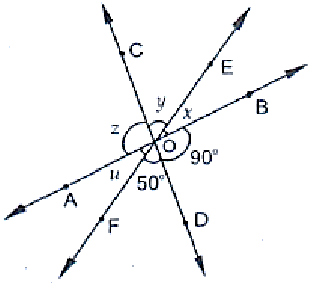
$y = 180° - x$

$y = 180° - 45°$

$y = 135°$

$\therefore x = 45°, y = 135°, z = 135°$ and $u = 45°$

2. In the below fig, three coplanar lines intersect at a point O, forming angles as shown in the figure. Find the values of x, y, z and u.



Sol:

Vertically opposite angles are equal

So $\angle BOD = z = 90°$

$\angle DOF = y = 50°$

Now, $x + y + z = 180°$ [Linear pair]

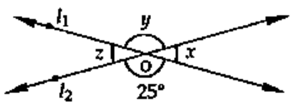
$\Rightarrow x + y + z = 180°$

$\Rightarrow 90° + 50° + x = 180°$

$\Rightarrow x = 180° - 140°$

$\Rightarrow x = 40°$

3. In the given fig, find the values of x, y and z.



Sol:

From the given figure

$\angle y = 25°$ [$\because$ Vertically opposite angles are equal]

Now

$\angle x + \angle y = 180°$ [Linear pair of angles are *x* and *y*]

$\Rightarrow \angle x = 180° - 25°$

$\Rightarrow \angle x = 155°$

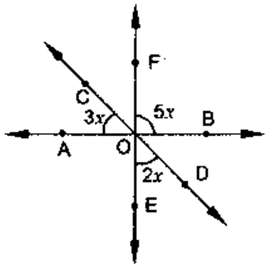
Also

$\angle z = \angle x = 155°$ [Vertically opposite angle]

$\angle y = 25°$

$\angle z = \angle z = 155°$

4. In the below fig, find the value of x.



Sol:

Vertically opposite angles are equal

$\angle AOE = \angle BOF = 5x$

Linear pair

$\angle COA + \angle AOE + \angle EOD = 180°$

$\Rightarrow 3x + 5x + 2x = 180°$

$\Rightarrow 10x = 180°$

$\Rightarrow x = 18°$

5. Prove that the bisectors of a pair of vertically opposite angles are in the same straight line.

Sol:

Given,

Lines AOB and COD intersect at point O such that

$\angle AOC = \angle BOD$

Also OE is the bisector $\angle ADC$ and OF is the bisector $\angle BOD$

To prove: EOF is a straight line vertically opposite angles is equal

$\angle AOD = \angle BOC = 5x$ ....(1)

Also $\angle AOC + \angle BOD$

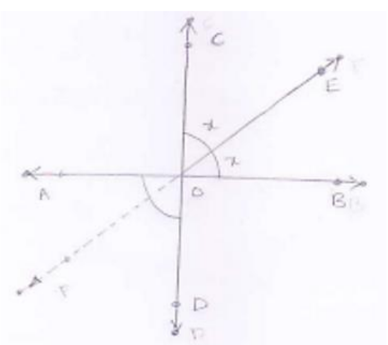
$\Rightarrow 2\angle AOE = 2\angle DOF$ ....(2)

Sum of the angles around a point is $360°$

$\Rightarrow 2\angle AOD + 2\angle AOE + 2\angle DOF = 360°$

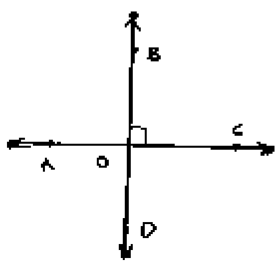
$\Rightarrow \angle AOD + \angle AOF + \angle DOF = 180°$

From this we conclude that EOF is a straight line.



Given that :- AB and CD intersect each other at O
OE bisects $\angle COB$
To prove: $\angle AOF = \angle DOF$
Proof: OE bisects $\angle COB$
$\angle COE = \angle EOB = x$
Vertically opposite angles are equal
$\angle BOE = \angle AOF = x$ ....(1)
$\angle COE = \angle DOF = x$ ....(2)
From (1) and (2)
$\angle AOF = \angle DOF = x$

6. If one of the four angles formed by two intersecting lines is a right angle, then show that each of the four angles is a right angle.
Sol:
Given,
AB and CD are two lines intersecting at O such that
$\angle BOC = 90°$
$\angle AOC = 90°, \angle AOD = 90°$ and $\angle BOD = 90°$
Proof:
Given that $\angle BOC = 90°$
Vertically opposite angles are equal

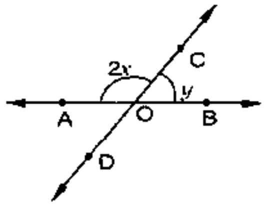


$\angle BOC = \angle AOD = 90°$
$\angle AOC, \angle BOC$ are Linear pair of angles
$\angle AOC + \angle BOC = 180°$ [LinearPair]
$\Rightarrow \angle AOC + 90° = 180°$
$\Rightarrow \angle AOC = 90°$
Vertically opposite angles
$\therefore \angle AOC = \angle BOD = 90°$
Hence, $\angle AOC = \angle BOC = \angle BOD = \angle AOD = 90°$

7. In the below fig, rays AB and CD intersect at O.

(i) Determine y when x = 60°

(ii) Determine x when y =40



Sol:

(i) Given $x = 60°$

$y = ?$

$\angle AOC, \angle BOC$ are linear pair of angles

$\angle AOC + \angle BOC = 180°$

$\Rightarrow 2x + y = 180°$

$\Rightarrow 2 \times 60 + y = 180°$ $\quad [\because x = 60°]$

$\Rightarrow y = 180° - 120°$

$\Rightarrow \boxed{y = 60°}$

(ii) Given $y = 40°, x = ?$

$\angle AOC$ and $\angle BOC$ are linear pair of angles

$\angle AOC + \angle BOC = 180°$

$\Rightarrow 2x + y = 180°$

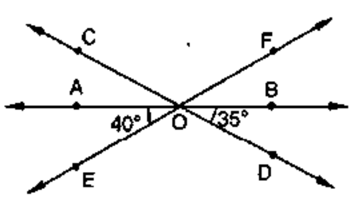
$\Rightarrow 2x + 40 = 180°$

$\Rightarrow 2x = 140°$

$\Rightarrow x = \frac{140°}{2}$

$\Rightarrow \boxed{y = 70°}$

8. In the below fig, lines AB, CD and EF intersect at O. Find the measures of ∠AOC, ∠COF, ∠DOE and ∠BOF.



Sol:

$\angle AOE$ and $\angle EOB$ are linear pair of angles

$\angle AOE + \angle EOB = 180°$

$\angle AOE + \angle DOE + \angle BOD = 180°$

$\Rightarrow \angle DOE = 180° - 40° - 35° = 105°$

Vertically opposite side angles are equal

$\angle DOE = \angle COF = 105°$

Now, $\angle AOE + \angle AOF = 180°$ [$\because$ Linear pair]

$\Rightarrow \angle AOE + \angle AOC + \angle COF = 180°$

$\Rightarrow 40° + \angle AOC + 105° = 180°$

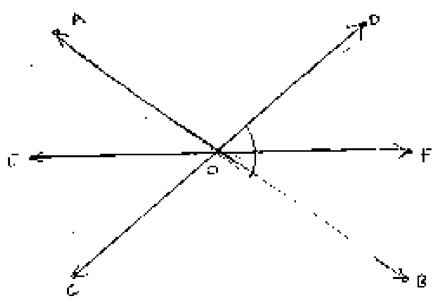
$\Rightarrow \angle AOC = 180° - 145°$

$\Rightarrow \angle AOC = 35°$

Also, $\angle BOF = \angle AOE = 40°$ [$\because$ Vertically opposite angle are equal]

9. AB, CD and EF are three concurrent lines passing through the point O such that OF bisects ∠BOD. If ∠BOF = 35°, find ∠BOC and ∠AOD.

Sol:



Given

OF bisects $\angle BOD$

OF bisects $\angle BOD$

$\angle BOF = 35°$

$\angle BOC = ?$

$\angle AOD = ?$

$\therefore \angle BOD = 2\angle BOF = 70°$ [$\because$ of bisects $\angle BOD$]

$\angle BOD = \angle AOC = 70°$ [$\angle BOD$ and $\angle AOC$ are vertically opposite angles]

Now,

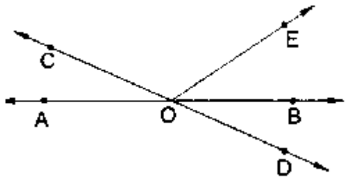
$\angle BOC + \angle AOC = 180°$

$\Rightarrow \angle BOC + 70° = 180°$

$\Rightarrow \angle BOC = 110°$

$\therefore \angle AOD = \angle BOC = 110°$ [Vertically opposite angles]

10. In below figure, lines AB and CD intersect at O. If ∠AOC + ∠BOE = 70° and ∠BOD = 40°, find ∠BOE and reflex ∠COE.



Sol:

Given that

$\angle AOC + \angle BOE = 70°$ and $\angle BOD = 40°$

$\angle BOE = ?$

Here, $\angle BOD$ and $\angle AOC$ are vertically opposite angles

$\angle BOD = \angle AOC = 40°$

Given $\angle AOC + \angle BOE = 70°$

$40° + \angle BOF = 70°$

$\angle BOF = 70° - 40°$

$\angle BOE = 30°$

$\angle AOC$ and $\angle BOC$ are linear pair of angles

$\Rightarrow \angle AOC + \angle COF + \angle BOE = 180°$

$\Rightarrow \angle COE = 180° - 30° - 40°$

$\Rightarrow \angle COE = 110°$

$\therefore$ Reflex $\angle COE = 360° - 110° = 250°$.

11. Which of the following statements are true (T) and which are false (F)?

(i) Angles forming a linear pair are supplementary.

(ii) If two adjacent angles are equal, and then each angle measures 90°.

(iii) Angles forming a linear pair can both the acute angles.

(iv) If angles forming a linear pair are equal, then each of these angles is of measure 90°.

Sol:

(i) True

(ii) False

(iii) False

(iv) true

12. Fill in the blanks so as to make the following statements true:

(i) If one angle of a linear pair is acute, then its other angle will be _____

(ii) A ray stands on a line, then the sum of the two adjacent angles so formed is _______

(iii) If the sum of two adjacent angles is 180°, then the ______ arms of the two angles are opposite rays.

Sol:

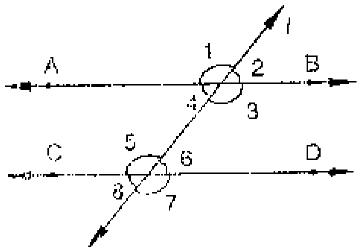
(i) Obtuse angle

(ii) 180°

(iii) uncommon

Exercise – 8.4

1. In below fig, AB CD and $\angle 1$ and $\angle 2$ are in the ratio 3 : 2. Determine all angles from 1 to 8.



Sol:

Let $\angle 1 = 3x$ and $\angle 2 = 2x$

$\angle 1$ and $\angle 2$ are linear pair of angle

Now, $\angle 1 + \angle 2 = 180°$

$\Rightarrow 3x + 2x = 180°$

$\Rightarrow 5x = 180°$

$\Rightarrow x = \frac{180°}{5}$

$\Rightarrow x = 36°$

$\therefore \angle 1 = 3x = 108°, \angle 2 = 2x = 72°$

Vertically opposite angles are equal

$\angle 1 = \angle 3 = 108°$

$\angle 2 = \angle 4 = 72°$

$\angle 6 = \angle 7 = 108°$

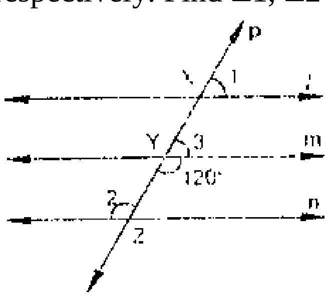
$\angle 5 = \angle 8 = 72°$

Corresponding angles

$\angle 1 = \angle 5 = 108°$

$\angle 2 = \angle 6 = 72°$

2. In the below fig, *l*, m and n are parallel lines intersected by transversal p at X, Y and Z respectively. Find $\angle 1$, $\angle 2$ and $\angle 3$.



Sol:

From the given figure:

$\angle 3 + \angle m\ YZ = 180°$ [Linear pair]

$\Rightarrow \angle 3 = 180° - 120°$

$\Rightarrow \angle 3 = 60°$

Now line l parallel to m

$\angle 1 = \angle 3$ [Corresponding angles]

$\Rightarrow \angle 1 = 60°$

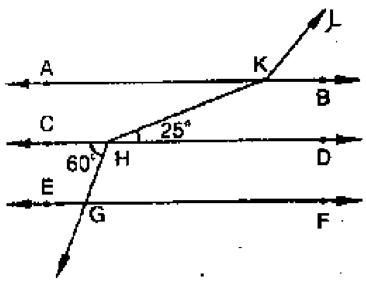
Also $m \parallel n$

$\Rightarrow \angle 2 = 120°$ [Alternative interior angle]

$\therefore \angle 1 = \angle 3 = 60°$

$\angle 2 = 120°$

3. In the below fig, AB || CD || EF and GH || KL. Find ∠HKL



Sol:

Produce LK to meet GF at N.

Now, alternative angles are equal

$\angle CHG = \angle HGN = 60°$

$\angle HGN = \angle KNF = 60°$ [Corresponding angles]

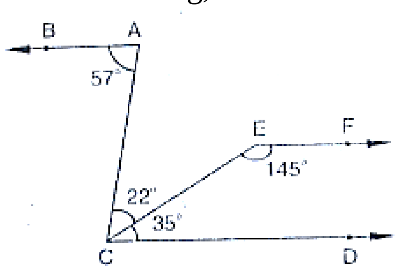
$\therefore \angle KNG = 180° - 60° = 120°$

$\angle GNK = \angle AKL = 120°$ [Corresponding angles]

$\angle AKH = \angle KHD = 25°$ [Alternative angles]

$\therefore \angle HKL = \angle AKH + \angle AKL = 25° + 120° = 145°.$

4. In the below fig, show that AB || EF.



Sol:

Produce EF to intersect AC at K.

Now, $\angle DCE + \angle CEF = 35° + 145° = 180°$

$\therefore EF \parallel CD$ [$\because$ Sum of Co-interior angles is 180°] ……(1)

Now, $\angle BAC = \angle ACD = 57°$

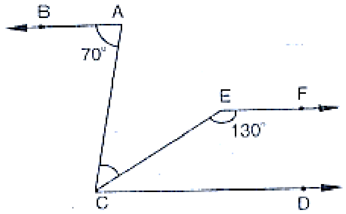
$\Rightarrow BA \| CD$ [$\because$ Alternative angles are equal] ……(2)

From (1) and (2)

$AB \| EF$ [Lines parallel to the same line are parallel to each other]

Hence proved.

5. If below fig, if AB || CD and CD || EF, find ∠ACE.



Sol:

Since $EF \| CD$

$\therefore EFC + \angle ECD = 180°$ [co-interior angles are supplementary]

$\Rightarrow \angle ECD = 180° - 130° = 50°$

Also $BA \| CD$

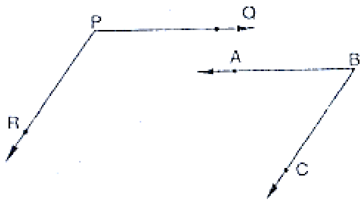
$\Rightarrow \angle BAC = \angle ACD = 70°$ [alternative angles]

But

$\angle ACE + \angle ECD = 70°$

$\Rightarrow \angle ACE = 70° - 50° = 20°$

6. In the below fig, PQ || AB and PR || BC. If ∠QPR = 102°, determine ∠ABC. Give reasons.



Sol:

AB is produce to meet PR at K

Since $PQ \| AB$

$\angle QPR = \angle BKR = 102°$ [corresponding angles]

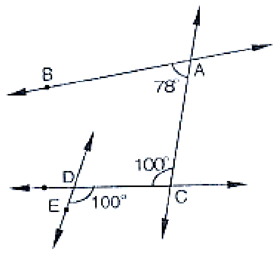
Since $PR \| BC$

$\therefore \angle RKB + \angle CBK = 180°$ [$\because$ Corresponding angles are supplementary]

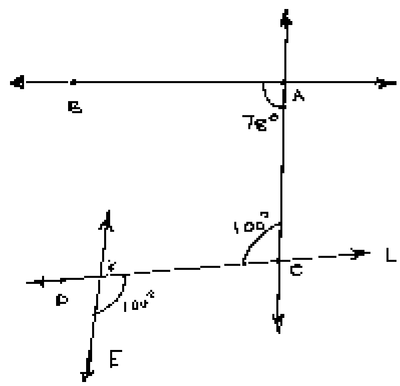
$\Rightarrow \angle CKB = 108 - 102 = 78°$

$\therefore \angle CKB = 78°.$

7. In the below fig, state which lines are parallel and why?



Sol:



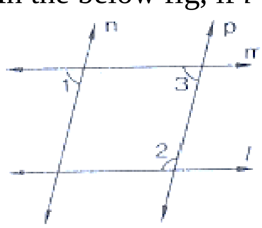
Vertically opposite angles are equal

$\angle EOC = \angle DOK = 100°$

Angle $\angle DOK = \angle ACO = 100°$

Here two lines EK and CA cut by a third line '*l*' and the corresponding angles to it are equal $\therefore EK \parallel AC$.

8. In the below fig, if *l* || m, n || p and ∠1 = 85°, find ∠2.



Sol:

Corresponding angles are equal

$\angle 1 = \angle 3 = 85°$

By using the property of co-interior angles are supplementary

$\angle 2 + \angle 3 = 180°$

$\angle 2 + 55° = 180°$

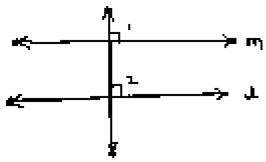
$\angle 2 = 180° - 55°$

$\angle 2 = 95°$

$\therefore \angle 2 = 95°$

9. If two straight lines are perpendicular to the same line, prove that they are parallel to each other.

Sol:



Given m perpendicular t and $l \perp t$

$\angle 1 = \angle 2 = 90°$

$\because l$ and m are two lines and it is transversal and the corresponding angles are equal

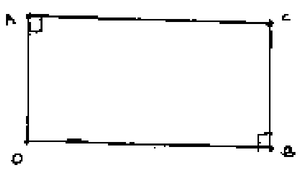
$\therefore l \parallel m$

Hence proved

10. Prove that if the two arms of an angle are perpendicular to the two arms of another angle, then the angles are either equal or supplementary.

Sol:

Consider be angles AOB and ACB



Given $OA \perp AO, OB \perp BO$

To prove: $\angle AOB = \angle ACB$ (or)

$\angle AOB + \angle ACB = 180°$

Proof:- In a quadrilateral [Sum of angles of quadrilateral]

$\Rightarrow \angle A + \angle O + \angle B + \angle C = 360°$

$\Rightarrow 180 + \angle O + \angle C = 360°$

$\Rightarrow \angle O + \angle C = 360 - 180 = 180°$

Hence, $\angle AOB + \angle ACB = 180°$ ......(i)

Also,

$\angle B + \angle ACB = 180°$ ......(i)

Also,

$\angle B + \angle ACB = 180°$ ......(i)

Also,

$\angle B + \angle ACB = 180°$

$\Rightarrow \angle ACB = 180° - 90°$

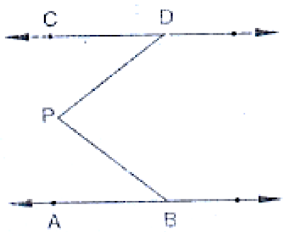
$\Rightarrow \angle ACB = 90°$ .....(ii)

From (i) and (ii)

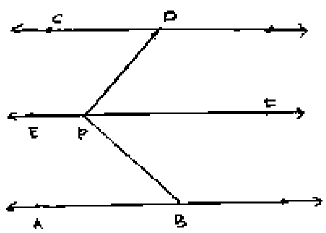
$\therefore \angle ACB = \angle AOB = 90°$

Hence, the angles are equal as well as supplementary.

11. In the below fig, lines AB and CD are parallel and P is any point as shown in the figure. Show that ∠ABP + ∠CDP = ∠DPB.



Sol:



Given that $AB \parallel CD$

Let EF be the parallel line to AB and CD which passes through P.

It can be seen from the figure

Alternative angles are equal

$\angle ABP = \angle BPF$

Alternative angles are equal

$\angle CDP = \angle DPF$

$\Rightarrow \angle ABP + \angle CDP = \angle BPF + \angle DPF$

$\Rightarrow \angle ABP + \angle CDP = \angle DPB$

Hence proved

AB parallel to CD, P is any point

To prove: $\angle ABP + \angle BPD + \angle CDP = 360°$

Construction: Draw $EF \parallel AB$ passing through P

Proof:

Since $AB \parallel EF$ and $AB \parallel CD$

$\therefore EF \parallel CD$ [Lines parallel to the same line are parallel to each other]

$\angle ABP + \angle EPB = 180°$ [Sum of co-interior angles is $180°$ $AB \parallel EF$ and BP is the transversal]

$\angle EPD + \angle COP = 180°$

[Sum of co-interior angles is $180°$ $EF \parallel CD$ and DP is transversal] …....(1)

$\angle EPD + \angle CDP = 180°$

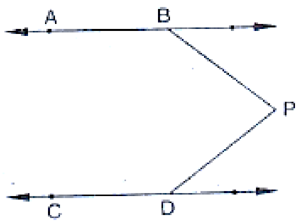
[Sum of Co-interior angles is $180°$ $EF \| CD$ and DP is the transversal] …(2)

By adding (1) and (2)

$\angle ABP + \angle EPB + \angle EPD + \angle CDP = 180° + 180°$

$\angle ABP + \angle EPB + \angle COP = 360°$

12. In the below fig, AB || CD and P is any point shown in the figure. Prove that:
∠ABP+∠BPD+∠CDP = 36O°



Sol:

Through P, draw a line PM parallel to AB or CD.

Now,

$AB \| PM \Rightarrow \angle ABP + \angle BPM = 180°$

And

$CD \| PM \Rightarrow \angle MPD + \angle CDP = 180°$

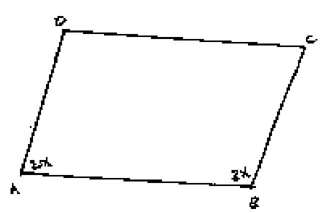
Adding (i) and (ii), we get

$\angle ABP + (\angle BPM + \angle MPD) \angle CDP = 360°$

$\Rightarrow \angle ABP + \angle BPD + \angle CDP = 360°$

13. Two unequal angles of a parallelogram are in the ratio 2 : 3. Find all its angles in degrees.

Sol:



Let $\angle A = 2x$ and $\angle B = 3x$

Now,

$\angle A + \angle B = 180°$ [Co-interior angles are supplementary]

$2x + 3x - 180°$ [$AD \| BC$ and AB is the transversal]

$\Rightarrow 5x = 180°$

$\Rightarrow x = \frac{180°}{5} = 36°$

$\therefore \angle A = 2 \times 36° = 72°$

$\angle B = 3 \times 36° = 108°$

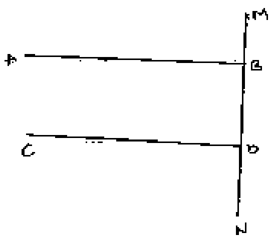
Now,

$\angle A = \angle C = 72°$ [Opposite side angles of a parallelogram are equal]

$\angle B = \angle D = 108°$

14. If each of the two lines is perpendicular to the same line, what kind of lines are they to each other?

Sol:



Let AB and CD be perpendicular to MN

$\angle ABD = 90°$ $[AB \perp MN]$ $....(i)$

$\angle CON = 90°$ $[CD \perp MN]$ $....(ii)$

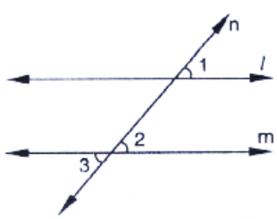
Now,

$\angle ABD = \angle CDN = 90°$ [From (i) and (ii)]

$\therefore AB$ parallel to CD,

Since corresponding angle are equal

15. In the below fig, ∠1 = 60° and ∠2 = $\left(\frac{2}{3}\right)^{rd}$ of a right angle. Prove that $l \parallel$ m.



Sol:

Given:

$\angle 1 = 60°, \angle 2 = \left(\frac{2}{3}\right)^{\text{rd}}$ to right angle

To prove: parallel to m

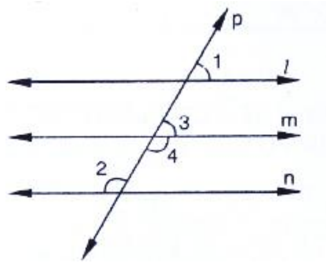
Proof $\angle 1 = 60°$

$\angle 2 = \frac{2}{3} \times 90° = 60°$

Since, $\angle 1 = \angle 2 = 60°$

$\therefore$ Parallel to m as pair of corresponding angles are equal

16. In the below fig, if $l \parallel m \parallel n$ and $\angle 1 = 60°$, find $\angle 2$.



Sol:

Since l parallel to m and p is the transversal

$\therefore$ Given: $l \parallel m \parallel n, \angle 1 = 60°$

To find $\angle 2$

$\angle 1 = \angle 3 = 60°$ [Corresponding angles]

Now,

$\angle 3$ and $\angle 4$ are linear pair of angles

$\angle 3 + \angle 4 = 180°$

$60° + \angle 4 = 180°$

$\angle 4 = 180° - 60°$

$\angle 4 = 120°$

Also, $m \parallel n$ and P is the transversal

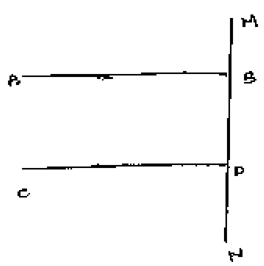
$\therefore \angle 4 = \angle 2 = 120°$ [Alternative interior angle]

Hence $\angle 2 = 120°$

17. Prove that the straight lines perpendicular to the same straight line are parallel to one another.

Sol:

Let AB and CD perpendicular to the Line MN



$\angle ABD = 90°$ $[\because AB \perp MN]$ ......(i)

$\angle CON = 90° \quad [\because CD \perp MN]$ ......(ii)

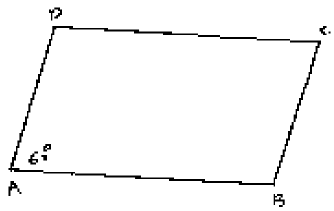
Now,

$\angle ABD = \angle CDN = 90°$ [From (i) and (ii)]

$\therefore AB \parallel CD,$ Since corresponding angles are equal.

18. The opposite sides of a quadrilateral are parallel. If one angle of the quadrilateral is 60°, find the other angles.

Sol:



Given $AB \parallel CD$

$AD \parallel BC$

Since $AB \parallel CD$ and AD is the transversal

$\therefore \angle A + \angle D = 180°$ [Co-interior angles are supplementary]

$60° + \angle D = 180°$

$\angle D = 180° - 60°$

$\angle D = 120°$

Now, $AD \parallel BC$ and AB is the transversal

$\angle A + \angle B = 180°$ [Co-interior angles are supplementary]

$60° + \angle B = 180°$

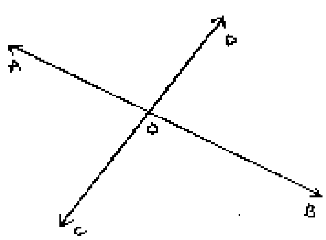
$\angle B = 180° - 60° = 120°$

Hence $\angle A = \angle C = 60°$

$\angle B = \angle D = 120°$

19. Two lines AB and CD intersect at O. If ∠AOC + ∠COB + ∠BOD = 270°, find the measures of ∠AOC, ∠COB, ∠BOD and ∠DOA.

Sol:



Given: $\angle AOC + \angle COB + \angle BOP = 270°$

To find: $\angle AOC, \angle COB, \angle BOD$ and $\angle DOA$

Here, $\angle AOC + \angle COB + \angle BOD + \angle AOD = 360°$ [Complete angle]

$\Rightarrow 270 + \angle AOD = 360°$

$\Rightarrow \angle AOD = 360° - 270°$

$\Rightarrow \angle AOD = 90°$

Now,

$\angle AOD + \angle BOD = 180°$ [Linear pair]

$90 + \angle BOD = 180°$

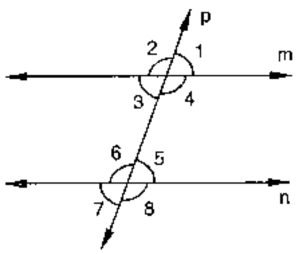
$\Rightarrow \angle BOD = 180° - 90°$

$\therefore \angle BOD = 90°$

$\angle AOD = \angle BOC = 90°$ [Vertically opposite angles]

$\angle BOD = \angle AOC = 90°$ [Vertically opposite angles]

20. In the below fig, p is a transversal to lines m and n, ∠2 = 120° and ∠5 = 60°. Prove that m || n.



Sol:

Given that

$\angle 2 = 120°, \angle 5 = 60°$

To prove

$\angle 2 + \angle 1 = 180°$ [$\because$ Linear pair]

$120° + \angle 1 = 180°$

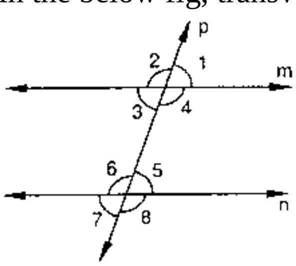
$\angle 1 = 180° - 120°$

$\angle 1 = 60°$

Since $\angle 1 = \angle 5 = 60°$

$\therefore m \parallel n$ [As pair of corresponding angles are equal]

21. In the below fig, transversal l intersects two lines m and n, ∠4 = 110° and ∠7 = 65°. Is m || n?



Sol:

Given:

$\angle 4 = 110°, \angle 7 = 65°$

To find: Is $m \| n$

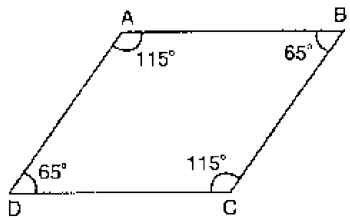
Here, $\angle 7 = \angle 5 = 65°$ [Vertically opposite angle]

Now,

$\angle 4 + \angle 5 = 110 + 65° = 175°$

$\therefore m$ is not parallel to n as the pair of co-interior angles is not supplementary.

22. Which pair of lines in the below fig, is parallel? Given reasons.



Sol:

$\angle A + \angle B = 115 + 65 = 180°$

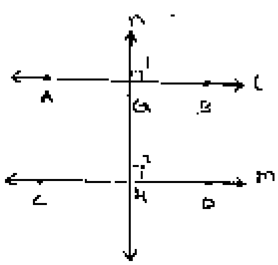
$\therefore AB \| BC$ [As sum of co-interior angles we supplementary]

$\angle B + \angle C = 65 + 115 = 180°$

$\therefore AB \| CD$ [As sum of interior angles are supplementary]

23. If l, m, n are three lines such that l || m and n ⊥ l, prove that n ⊥ m.

Sol:



Given $l \| m, n$ perpendicular l

To prove: $n \perp m$

Since $l \| m$ and n intersects them at G and H respectively

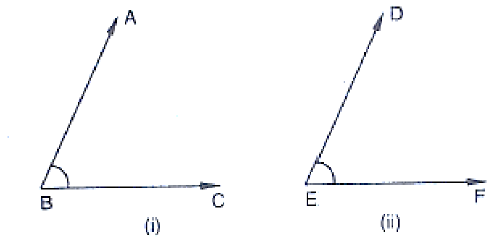
$\therefore \angle 1 = \angle 2$ [Corresponding angles]

But, $U = 90°$ $[n \perp l]$

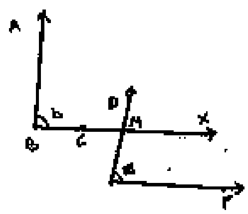
$\Rightarrow \angle 2 = 90°$

Hence n perpendicular m

24. In the below fig, arms BA and BC of ∠ABC are respectively parallel to arms ED and EF of ∠DEF. Prove that ∠ABC = ∠DEF.



Sol:



Given $AB \parallel DE$ and $BC \parallel^{lry} EF$

To prove: $\angle ABC = \angle DEF$

Construction: Produce BC to x such that it intersects DE at M.

Proof: Since $AB \parallel DE$ and BX is the transversal

$\therefore \angle ABC = \angle DMX$ [Corresponding angle] ……..(i)

Also,

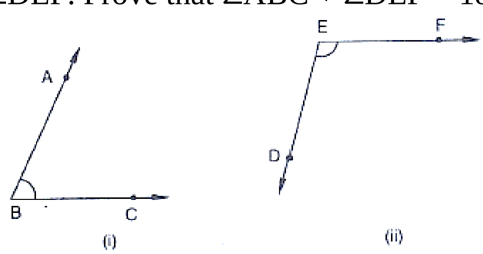
$BX \parallel EF$ and DE is the transversal

$\therefore \angle DMX = \angle DEF$ [Corresponding angles] ……..(ii)

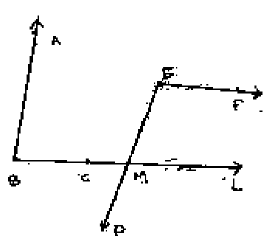
From (i) and (ii)

$\therefore \angle ABC = \angle DEF$

25. In the below fig, arms BA and BC of ∠ABC are respectively parallel to arms ED and EF of ∠DEF. Prove that ∠ABC + ∠DEF = 180°.



Sol:



Given $AB \parallel DE, BC \parallel EF$

To prove: $\angle ABC + \angle DEF = 180°$

Construction: produce BC to intersect DE at M

Proof: Since $AB \parallel EM$ and BL is the transversal

$\angle ABC = \angle EML$ [Corresponding angle] ……(1)

Also,

$EF \parallel ML$ and EM is the transversal

By the property of co-interior angles are supplementary

$\angle DEF + \angle EML = 180°$

From (i) and (ii) we have

$\therefore \angle DEF + \angle ABC = 180°$

26. Which of the following statements are true (T) and which are false (F)? Give reasons.

(i) If two lines are intersected by a transversal, then corresponding angles are equal.

(ii) If two parallel lines are intersected by a transversal, then alternate interior angles are equal.

(iii) Two lines perpendicular to the same line are perpendicular to each other.

(iv) Two lines parallel to the same line are parallel to each other.

(v) If two parallel lines are intersected by a transversal, then the interior angles on the same side of the transversal are equal.

Sol:

(i) False
(ii) True
(iii) False
(iv) True
(v) False

27. Fill in the blanks in each of the following to make the statement true:

(i) If two parallel lines are intersected by a transversal, then each pair of corresponding angles are _______

(ii) If two parallel lines are intersected by a transversal, then interior angles on the same side of the transversal are _______

(iii) Two lines perpendicular to the same line are _______ to each other.

(iv) Two lines parallel to the same line are _______ to each other.

(v) If a transversal intersects a pair of lines in such a way that a pair of alternate angles are equal, then the lines are _______

(vi) If a transversal intersects a pair of lines in such a way that the sum of interior angles on the same side of transversal is 180°, then the lines are _______.

Sol:

(i) Equal
(ii) Supplementary
(iii) Parallel
(iv) Parallel
(v) Parallel
(vi) Parallel