RD SHARMA

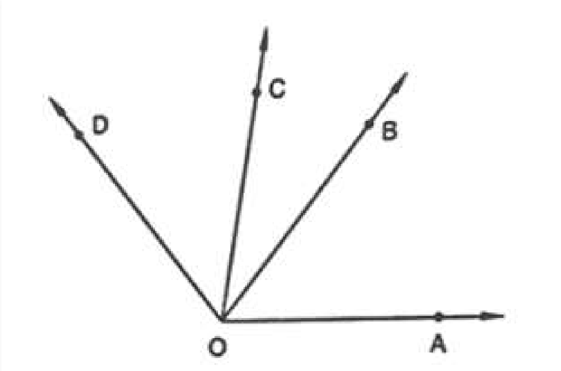
Solutions

Class 7 Maths

Chapter 14

Ex 14.1

Q1. Write down each pair of adjacent angles shown in Figure



Sol:

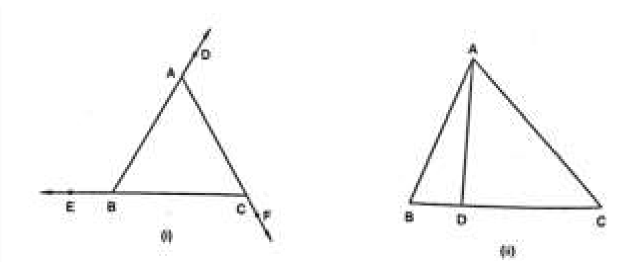
The angles that have common vertex and a common arm are known as adjacent angles

The adjacent angles are :

∠DOC and ∠BOC

∠COB and ∠BOA

Q2. In figure, name all the pairs of adjacent angles.



Sol:

In fig (i), the adjacent angles are

∠EBA and ∠ABC

∠ACB and ∠BCF

∠BAC and ∠CAD

In fig(ii), the adjacent angles are

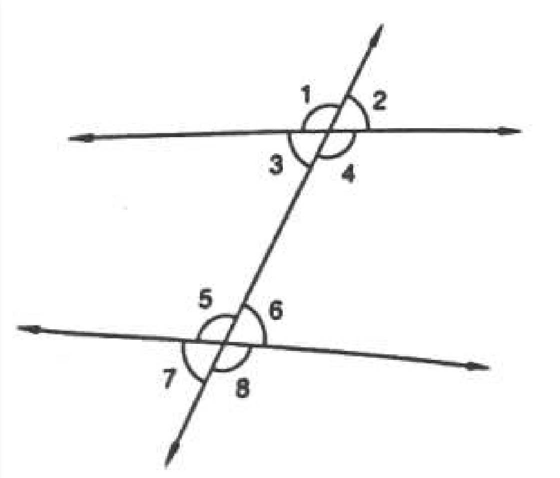
∠BAD and ∠DAC

∠BDA and ∠CDA

Q3. In fig , write down

(i) each linear pair

(ii) each pair of vertically opposite angles.



Sol:

(i) The two adjacent angles are said to form a linear pair of angles if their non – common arms are two opposite rays.

$\angle 1$ and $\angle 3$

$\angle 1$ and $\angle 2$

$\angle 4$ and $\angle 3$

$\angle 4$ and $\angle 2$

$\angle 5$ and $\angle 6$

$\angle 5$ and $\angle 7$

$\angle 6$ and $\angle 8$

$\angle 7$ and $\angle 8$

(ii) The two angles formed by two intersecting lines and have no common arms are called vertically opposite angles.

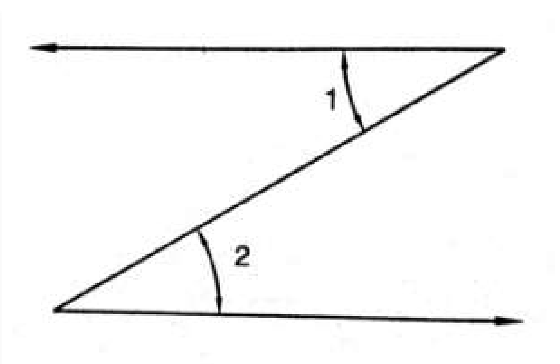
$\angle 1$ and $\angle 4$

$\angle 2$ and $\angle 3$

$\angle 5$ and $\angle 8$

$\angle 6$ and $\angle 7$

Q4. Are the angles 1 and 2 in figure adjacent angles?



Sol:

No, because they do not have common vertex.

Q5. Find the complement of each of the following angles:

(i) 35°

(ii) 72°

(iii) 45°

(iv) 85°

Sol:

The two angles are said to be complementary angles if the sum of those angles is 90°

Complementary angles for the following angles are :

(i) $90^\circ - 35^\circ = 55^\circ$

(ii) $90^\circ - 72^\circ = 18^\circ$

(iii) $90^\circ - 45^\circ = 45^\circ$

(iv) $90^\circ - 85^\circ = 5^\circ$

Q6. Find the supplement of each of the following angles :

(i) 70°

(ii) 120°

(iii) 135°

(iv) 90°

Sol:

The two angles are said to be supplementary angles if the sum of those angles is 180°

(i) $180^\circ - 70^\circ = 110^\circ$

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

(iii) $180^\circ - 135^\circ = 45^\circ$

(iv) $180^\circ - 90^\circ = 90^\circ$

Q7. Identify the complementary and supplementary pairs of angles from the following pairs

(i) 25° , 65°

(ii) 120° , 60°

(iii) 63° , 27°

(iv) 100° , 80°

Sol:

(i) $25^\circ + 65^\circ = 90^\circ$ so, this is a complementary pair of angle.

(ii) $120^\circ + 60^\circ = 180^\circ$ so, this is a supplementary pair of angle.

(iii) $63^\circ + 27^\circ = 90^\circ$ so, this is a complementary pair of angle.

(iv) $100^\circ + 80^\circ = 180^\circ$ so, this is a supplementary pair of angle.

Here, (i) and (iii) are complementary pair of angles and (ii) and (iv) are supplementary pair of angles.

Q8. Can two obtuse angles be supplementary, if both of them be

(i) obtuse?

(ii) right?

(iii) acute?

Sol:

(i) No, two obtuse angles cannot be supplementary

Because, the sum of two angles is greater than 90 degrees so their sum will be greater than 180degrees.

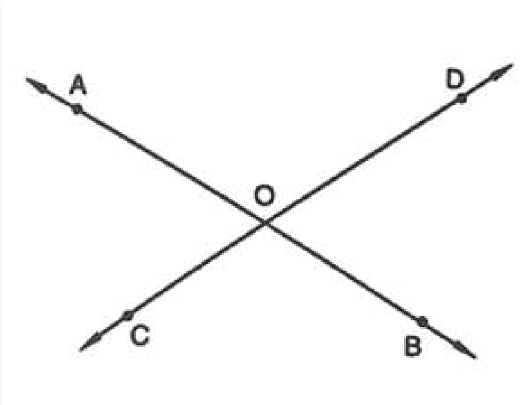
(ii) Yes, two right angles can be supplementary

Because, $90^\circ + 90^\circ = 180^\circ$

(iii) No, two acute angle cannot be supplementary

Because, the sum of two angles is less than 90 degrees so their sum will also be less tha 90 degrees.

Q9. Name the four pairs of supplementary angles shown in Fig.



Sol:

The supplementary angles are

$\angle AOC$ and $\angle COB$

$\angle BOC$ and $\angle DOB$

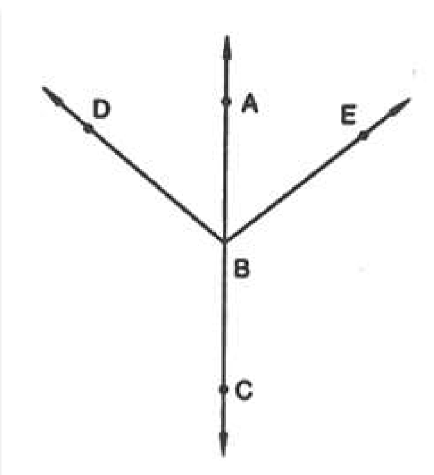
$\angle BOD$ and $\angle DOA$

$\angle AOC$ and $\angle DOA$

Q10. In Figure, A,B,C are collinear points and $\angle DBA = \angle EBA$.

(i) Name two linear pairs.

(ii) Name two pairs of supplementary angles.



Sol:

(i) Linear pairs

$\angle ABD$ and $\angle DBC$

$\angle ABE$ and $\angle EBC$

Because every linear pair forms supplementary angles, these angles are

$\angle ABD$ and $\angle DBC$

$\angle ABE$ and $\angle EBC$

Q11. If two supplementary angles have equal measure, what is the measure of each angle?

Sol:

Let p and q be the two supplementary angles that are equal

$\angle p = \angle q$

So,

$\angle p + \angle q = 180°$

=> $\angle p + \angle p = 180^\circ$

=> $2\angle p = 180^\circ$

=> $\angle p = \frac{180^\circ}{2}$

=> $\angle p = 90^\circ$

Therefore, $\angle p = \angle q = 90^\circ$

Q12. If the complement of an angle is 28°, then find the supplement of the angle.

Sol:

Here, let p be the complement of the given angle 28°

Therefore, $\angle p + 28^\circ = 90^\circ$

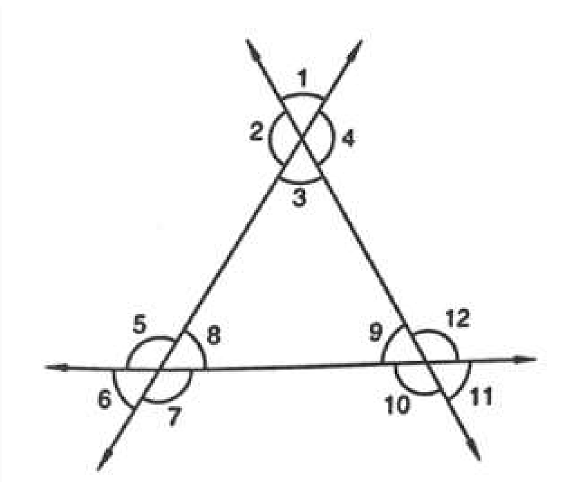
=> $\angle p = 90^\circ - 28^\circ$

$= 62^\circ$

So, the supplement of the angle = $180^\circ - 62^\circ$

$= 118^\circ$

Q13. In Fig. 19, name each linear pair and each pair of vertically opposite angles.



Sol:

Two adjacent angles are said to be linear pair of angles, if their non-common arms are two opposite rays.

$\angle 1$ and $\angle 2$

$\angle 2$ and $\angle 3$

$\angle 3$ and $\angle 4$

$\angle 1$ and $\angle 4$

$\angle 5$ and $\angle 6$

$\angle 6$ and $\angle 7$

$\angle 7$ and $\angle 8$

$\angle 8$ and $\angle 5$

$\angle 9$ and $\angle 10$

$\angle 10$ and $\angle 11$

$\angle 11$ and $\angle 12$

$\angle 12$ and $\angle 9$

The two angles are said to be vertically opposite angles if the two intersecting lines have no common arms.

$\angle 1$ and $\angle 3$

$\angle 4$ and $\angle 2$

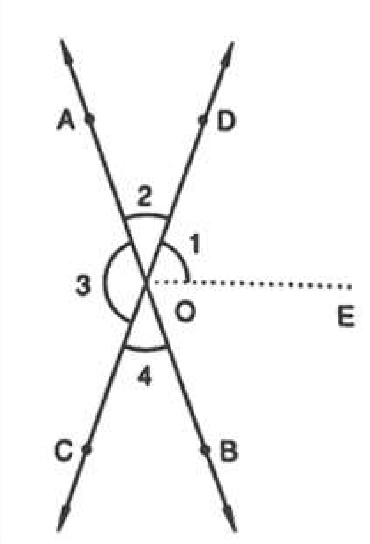
$\angle 5$ and $\angle 7$

$\angle 6$ and $\angle 8$

$\angle 9$ and $\angle 11$

$\angle 10$ and $\angle 12$

Q14. In Figure, OE is the bisector of $\angle BOD$. If $\angle 1 = 70^\circ$, Find the magnitude of $\angle 2$, $\angle 3$, $\angle 4$



Sol:

Given,

$\angle 1 = 70^\circ$

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

$= 2(70^\circ)$

$= 140^\circ$

$\angle 3 = \angle 4$

As, OE is the angle bisector,

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

$= 2(70^\circ)$

$= 140^\circ$

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

=> $140^\circ + 140^\circ + 2(\angle COB) = 360^\circ$

Since, $\angle COB = \angle AOD$

=> $2(\angle COB) = 360^\circ - 280^\circ$

=> $2(\angle COB) = 80^\circ$

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

=> $\angle COB \quad = 40^\circ$

Therefore, $\angle COB = \angle AOB = 40^\circ$

The angles are,

$\angle 1 = 70^\circ$,

$\angle 2 = 40^\circ$,

$\angle 3 = 140^\circ$,

$\angle 4 = 40^\circ$

Q15. One of the angles forming a linear pair is a right angle. What can you say about its other angle?

Sol:

One of the Angle of a linear pair is the right angle (90°)

Therefore, the other angle is

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

Q16. One of the angles forming a linear pair is an obtuse angle. What kind of angle is the other?

Sol:

One of the Angles of a linear pair is obtuse, then the other angle should be acute, only then their sum will be 180°.

Q17. . One of the angles forming a linear pair is an acute angle. What kind of angle is the other?

Sol:

One of the Angles of a linear pair is acute, then the other angle should be obtuse, only then their sum will be 180°.

Q18. Can two acute angles form a linear pair?

Sol:

No, two acute angles cannot form a linear pair because their sum is always less than 180°.

Q19. If the supplement of an angle is 65°, then find its complement.

Sol:

Let x be the required angle

So,

=> $x + 65^\circ = 180^\circ$

=> $x = 180^\circ - 65^\circ$

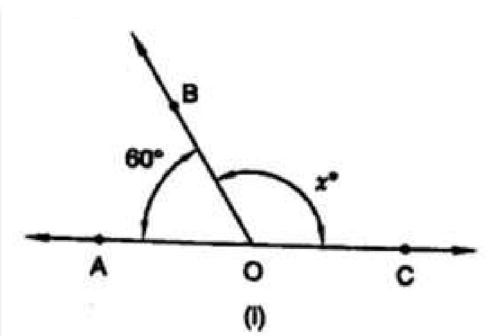
$= 115^\circ$

But the complement of the angle cannot be determined.

Q20. Find the value of x in each of the following figures

Sol:

(i)



Since, $\angle BOA + \angle BOC = 180^\circ$

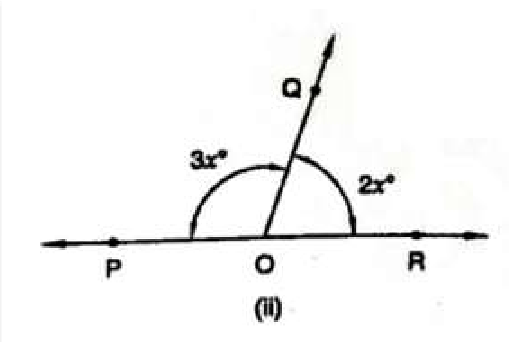
Linear pair :

=> $60^\circ + x^\circ = 180^\circ$

=> $x^\circ = 180^\circ - 60^\circ$

=> $x^\circ = 120^\circ$

(ii)



Linear pair :

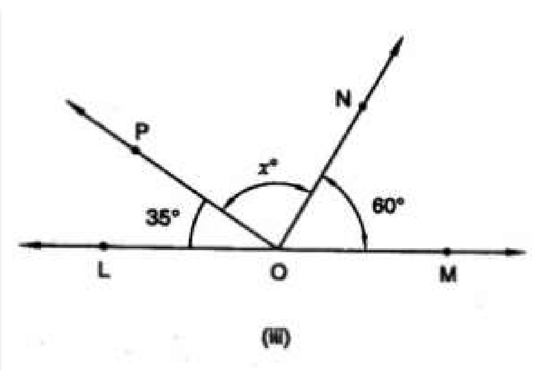
=> $3x° + 2x° = 180°$

=> $5x° = 180°$

=> $x° = \frac{180°}{5}$

=> $x° = 36°$

(iii)



Linear pair,

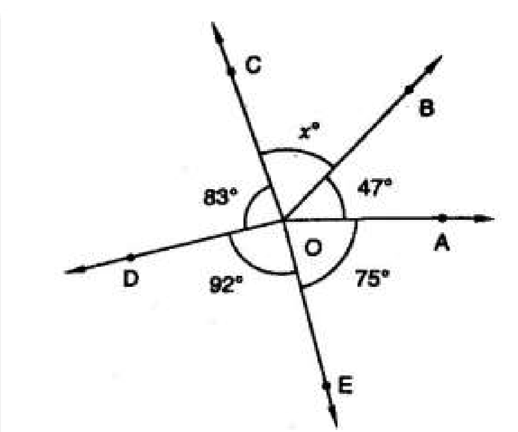
Since, $35° + x° + 60° = 180°$

=> $x° = 180° - 35° - 60°$

=> $x° = 180° - 95°$

=> $x° = 85°$

(iv)



Linear pair,

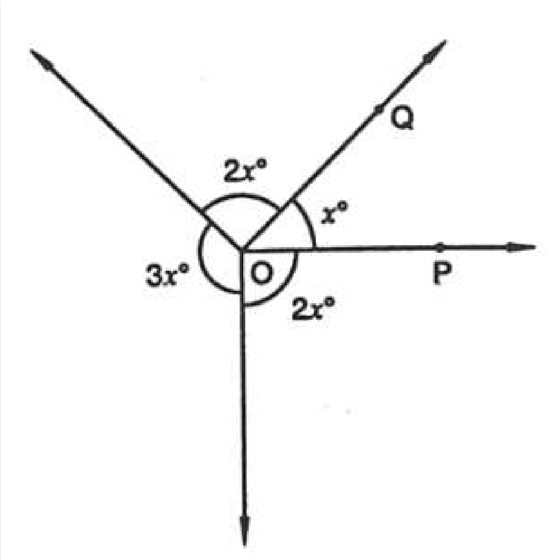
$83° + 92° + 47° + 75° + x° = 360°$

=> $x° + 297° = 360°$

=> $x° = 360° - 297°$

$\Rightarrow x^\circ = 63^\circ$

(v)



Linear pair,

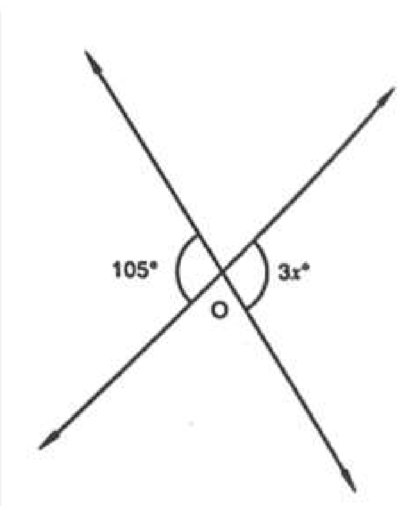
$3x^\circ + 2x^\circ + x^\circ + 2x^\circ = 360^\circ$

$\Rightarrow 8x^\circ = 360^\circ$

$\Rightarrow x^\circ = \frac{360^\circ}{8}$

$\Rightarrow x^\circ = 45^\circ$

(vi)



(vi)

Linear pair :

$3x^\circ = 105^\circ$

$\Rightarrow x^\circ = \frac{105^\circ}{3}$

$\Rightarrow x^\circ = 45^\circ$

Q21. In Fig. 22, it being given that $\angle 1 = 65^\circ$, find all the other angles.

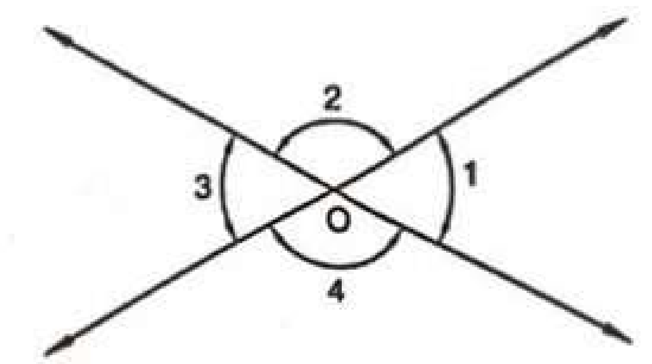


Fig. 22

Sol:

Given,

$\angle 1 = \angle 3$ are the vertically opposite angles

Therefore, $\angle 3 = 65^\circ$

Here, $\angle 1 + \angle 2 = 180^\circ$ are the linear pair

Therefore, $\angle 2 = 180^\circ - 65^\circ$

$= 115^\circ$

$\angle 2 = \angle 4$ are the vertically opposite angles

Therefore, $\angle 2 = \angle 4 = 115^\circ$

And $\angle 3 = 65^\circ$

Q22. In Fig. 23 OA and OB are the opposite rays :

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

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

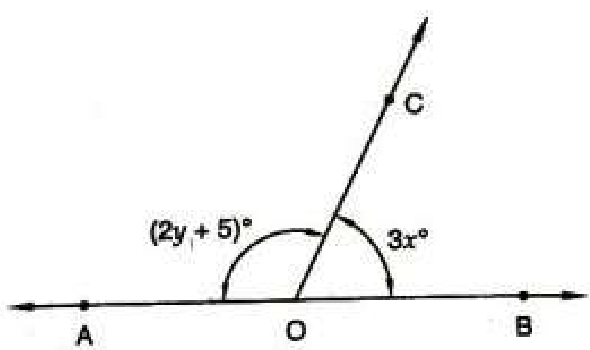


Fig. 23

Sol:

$\angle AOC + \angle BOC = 180^\circ$ – Linear pair

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

=> $3x + 2y = 175^\circ$

(i) If $x = 25^\circ$, then

=> $3(25^\circ) + 2y = 175^\circ$

=> $75^\circ + 2y = 175^\circ$

=> $2y = 175^\circ - 75^\circ$

=> $2y = 100^\circ$

=> $y = \frac{100^\circ}{2}$

=> $y = 50^\circ$

(ii) If $y = 35^\circ$, then

$3x + 2(35^\circ) = 175^\circ$

=> $3x + 70^\circ = 175^\circ$

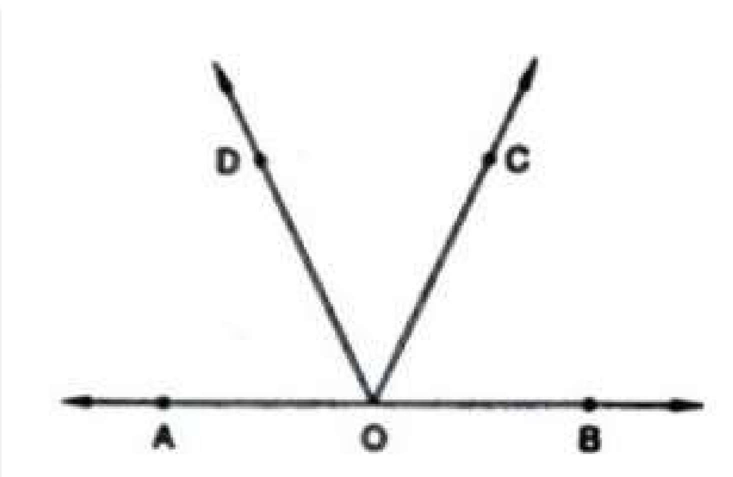
=> $3x = 175^\circ - 70^\circ$

=> $3x = 105^\circ$

=> $x = \frac{105^\circ}{3}$

=> $x = 35^\circ$

Q23. In Fig. 24, write all pairs of adjacent angles and all the linear pairs.



Sol:

Pairs of adjacent angles are:

$\angle DOA$ and $\angle DOC$

$\angle BOC$ and $\angle COD$

$\angle AOD$ and $\angle BOD$

$\angle AOC$ and $\angle BOC$

Linear pairs:

$\angle AOD$ and $\angle BOD$

$\angle AOC$ and $\angle BOC$

Q24. In Fig. 25, find $\angle x$. Further find $\angle BOC$, $\angle COD$, $\angle AOD$.

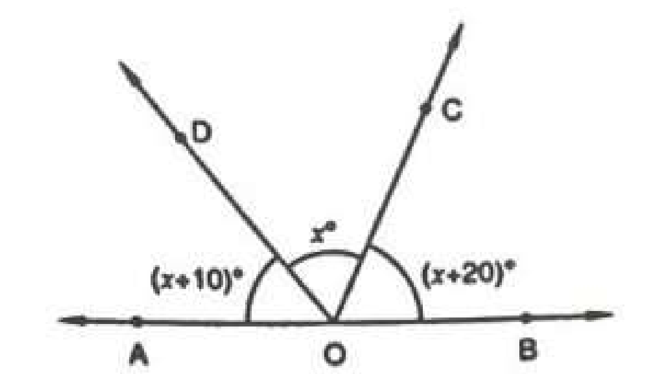


Fig. 25

Sol:

$(x + 10)° + x° + (x + 20)° = 180°$

=> $3x° + 30° = 180°$

=> $3x° = 180° - 30°$

=> $3x° = 150°$

=> $x° = \frac{150°}{3}$

=> $x° = 50°$

Here,

$\angle BOC = (x + 20)°$

$= (50 + 20)°$

$= 70°$

$\angle COD = 50°$

$\angle AOD = (x + 10)°$

$= (50 + 10)°$

$= 60°$

Q25. How many pairs of adjacent angles are formed when two lines intersect in a point?

Sol:

If the two lines intersect at a point, then four adjacent pairs are formed and those are linear.

Q26. How many pairs of adjacent angles, in all, can you name in Figure?

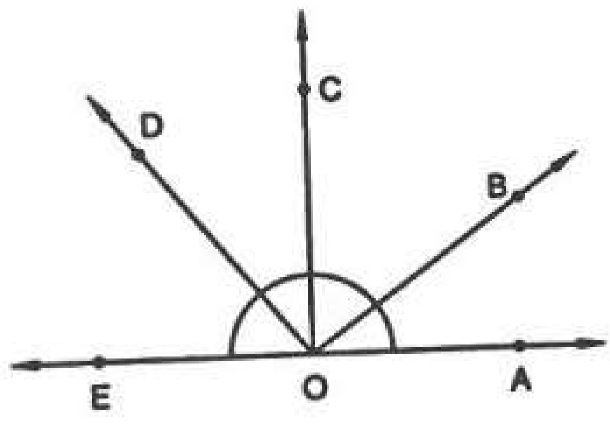


Fig. 26

Sol:

There are 10 adjacent pairs

∠EOD and ∠DOC

∠COD and ∠BOC

∠COB and ∠BOA

∠AOB and ∠BOD

∠BOC and ∠COE

∠COD and ∠COA

∠DOE and ∠DOB

∠EOD and ∠DOA

∠EOC and ∠AOC

∠AOB and ∠BOE

Q27. In Figure, determine the value of x.

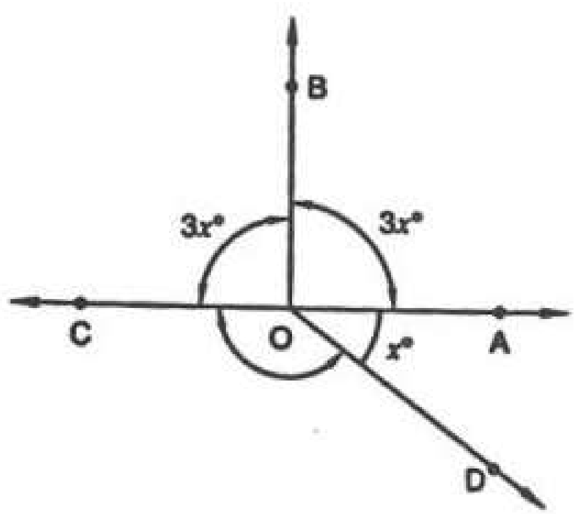


Fig. 27

Sol:

Linear pair :

$\angle COB + \angle AOB = 180^\circ$

=> $3x^\circ + 3x^\circ = 180^\circ$

=> $6x^\circ = 180^\circ$

=> $x^\circ = \frac{180^\circ}{6}$

=> $x^\circ = 30^\circ$

Q28. In Figure, AOC is a line, find x.

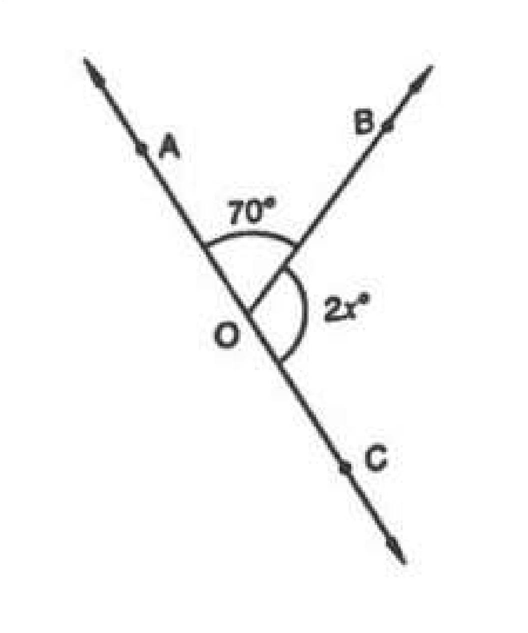


Fig. 28

Sol:

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

Linear pair

=> $2x + 70^\circ = 180^\circ$

=> $2x = 180^\circ - 70^\circ$

=> $2x = 110^\circ$

=> $x = \frac{110^\circ}{2}$

=> $x = 55^\circ$

Q29. In Figure, POS is a line, find x.

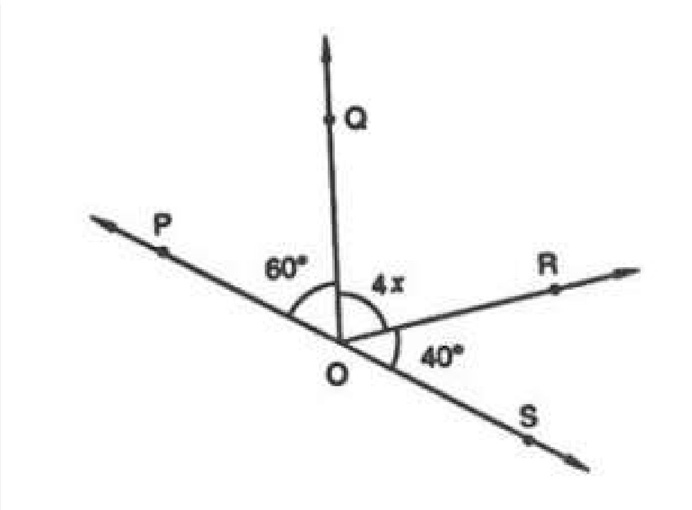


Fig. 29

Sol:

Angles of a straight line,

$\angle QOP + \angle QOR + \angle ROS = 108^\circ$

=> $60^\circ + 4x + 40^\circ = 180^\circ$

=> $100^\circ + 4x = 180^\circ$

=> $4x = 180^\circ - 100^\circ$

=> $4x = 80^\circ$

=> $x = \frac{80^\circ}{4}$

=> $x = 20^\circ$

Q30. In Figure, lines l_1 and l_2 intersect at O, forming angles as shown in the figure. If x = 45°, find the values of y, z and u.

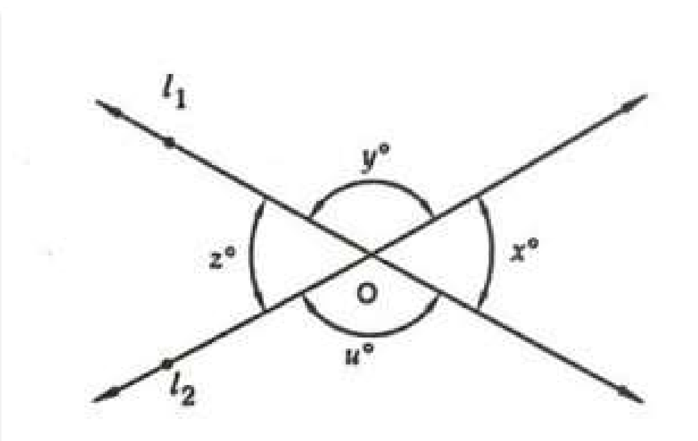


Fig. 30

Sol:

Given that,

$\angle x = 45^\circ$

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

$\angle y = \angle u$

$\angle x + \angle y + \angle z + \angle u = 360^\circ$

=> $45^\circ + 45^\circ + \angle y + \angle u = 360^\circ$

=> $90^\circ + \angle y + \angle u = 360^\circ$

=> $\angle y + \angle u = 360^\circ - 90^\circ$

=> $\angle y + \angle u = 270^\circ$

=> $\angle y + \angle z = 270^\circ$

=> $2\angle z = 270^\circ$

=> $\angle z = 135^\circ$

Therefore, $\angle y = \angle u = 135^\circ$

So, $\angle x = 45^\circ$,

$\angle y = 135^\circ$,

$\angle z = 45^\circ$,

$\angle u = 135^\circ$

Q31. In Fig. 31, three coplanar lines lines intersect at a point O, forming angles as shown in the figure. Find the values of x,y,z and u

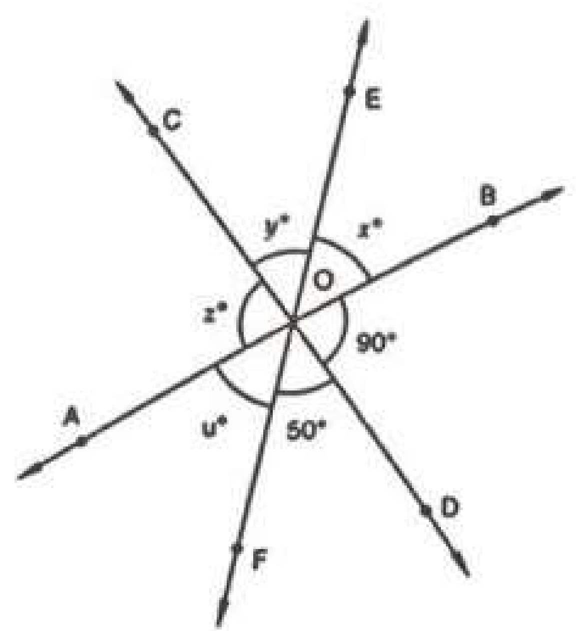


Fig. 31.

Sol:

Given that,

$\angle x + \angle y + \angle z + \angle u + 50^\circ + 90^\circ = 360^\circ$

Linear pair,

$\angle x + 50^\circ + 90^\circ = 180^\circ$

=> $\angle x + 140^\circ = 180^\circ$

=> $\angle x = 180^\circ - 140^\circ$

=> $\angle x = 40^\circ$

$\angle x = \angle u = 40^\circ$ are vertically opposite angles

=> $\angle z = 90^\circ$ is a vertically opposite angle

=> $\angle y = 50^\circ$ is a vertically opposite angle

Therefore, $\angle x = 40^\circ$,

$\angle y = 50^\circ$,

$\angle z = 90^\circ$,

$\angle u = 40^\circ$

Q32. In Figure, find the values of x, y and z

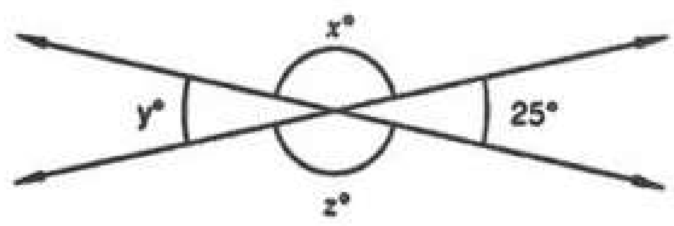


Fig. 32

Sol:

$\angle y = 25^\circ$ vertically opposite angle

$\angle x = \angle y$ are vertically opposite angles

$\angle x + \angle y + \angle z + 25^\circ = 360^\circ$

=> $\angle x + \angle z + 25^\circ + 25^\circ = 360^\circ$

=> $\angle x + \angle z + 50^\circ = 360^\circ$

=> $\angle x + \angle z = 360^\circ - 50^\circ$

=> $2\angle x = 310^\circ$

=> $\angle x = 155^\circ$

And , $\angle x = \angle z = 155^\circ$

Therefore, $\angle x = 155^\circ$,

$\angle y = 25^\circ$,

$\angle z = 155^\circ$