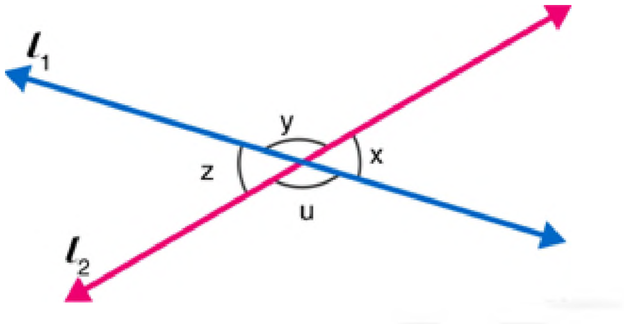
Exercise 8.3

Question 1: 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.



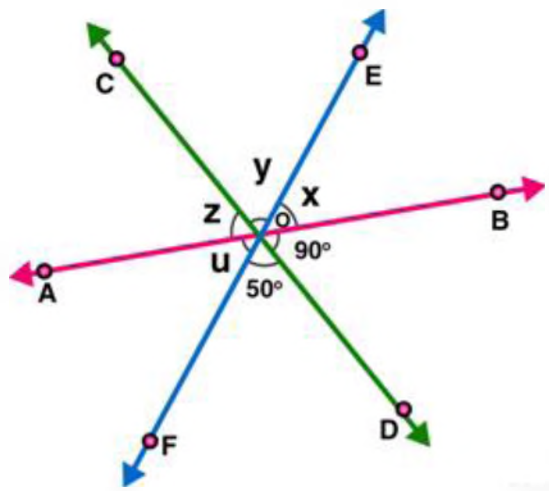
Solution:
Given: $x = 45^0$

Since vertically opposite angles are equal, therefore $z = x = 45^0$

z and u are angles that are a linear pair, therefore, $z + u = 180^0$
Solve, $z + u = 180^0$, for u
$u = 180^0 – z$
$u = 180^0 – 45$
$u = 135^0$

Again, x and y angles are a linear pair.
$x+ y = 180^0$
$y = 180^0 – x$
$y =180^0 – 45^0$
$y = 135^0$
Hence, remaining angles are $y = 135^0$, $u = 135^0$ and $z = 45^0$.

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



Solution:
(∠BOD, z); (∠DOF, y) are pair of vertically opposite angles.

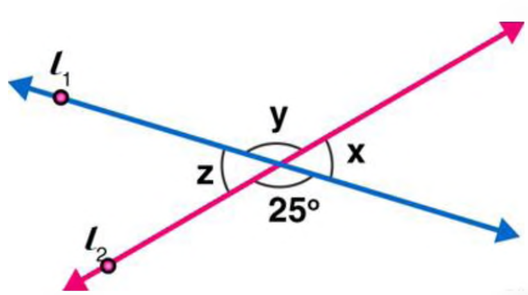
So, ∠BOD = z = 90^0

∠DOF = y = 50^0
[Vertically opposite angles are equal.]

Now, x + y + z = 180 [Linear pair]
[AB is a straight line]

x + y + z = 180
x + 50 + 90 = 180
x = 180 – 140
x = 40
Hence values of x, y, z and u are 40^0, 50^0, 90^0 and 40^0 respectively.

Question 3 : In figure, find the values of x, y and z.



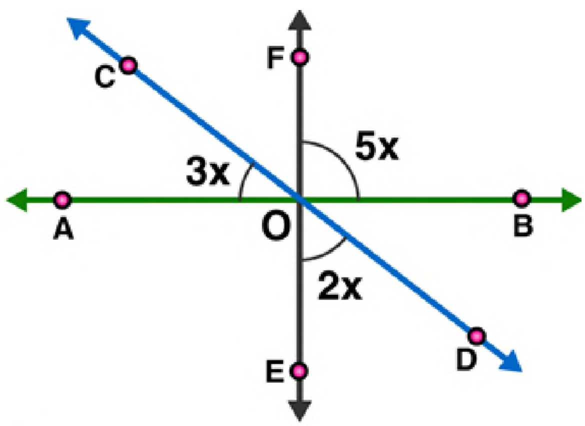
Solution:
From figure,

$y = 25^0$ [Vertically opposite angles are equal]
Now $\angle x + \angle y = 180^0$ [Linear pair of angles]

$x = 180 – 25$
$x = 155$

Also, $z = x = 155$ [Vertically opposite angles]
Answer: $y = 25^0$ and $z = 155^0$

Question 4 : In figure, find the value of x.



Solution:

$\angle AOE = \angle BOF = 5x$ [Vertically opposite angles]

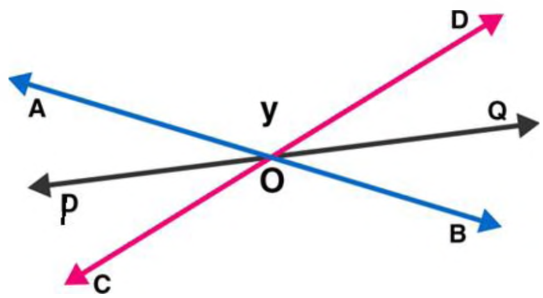
$\angle COA+\angle AOE+\angle EOD = 180^0$ [Linear pair]

$3x + 5x + 2x = 180$
$10x = 180$
$x = 180/10$
$x = 18$

The value of $x = 18^0$

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

Solution:



Lines AB and CD intersect at point O, such that

$\angle AOC = \angle BOD$ (vertically angles) ...(1)

Also OP is the bisector of AOC and OQ is the bisector of BOD

To Prove: POQ is a straight line.

OP is the bisector of $\angle AOC$:
$\angle AOP = \angle COP$ ...(2)
OQ is the bisector of $\angle BOD$:
$\angle BOQ = \angle QOD$ ...(3)

Now,
Sum of the angles around a point is 360°.

$\angle AOC + \angle BOD + \angle AOP + \angle COP + \angle BOQ + \angle QOD = 360^0$

$\angle BOQ + \angle QOD + \angle DOA + \angle AOP + \angle POC + \angle COB = 360^0$

$2\angle QOD + 2\angle DOA + 2\angle AOP = 360^0$ (Using (1), (2) and (3))

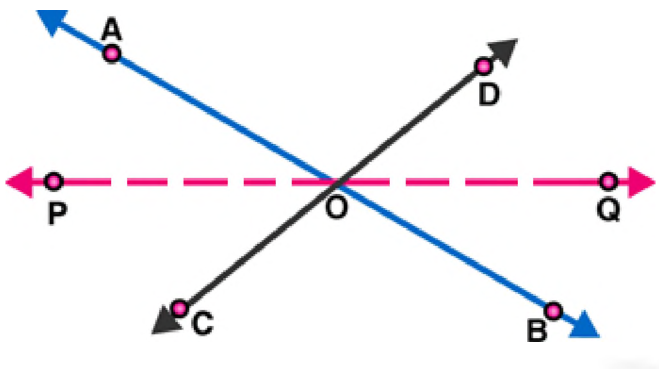
$\angle QOD + \angle DOA + \angle AOP = 180^0$
$POQ = 180^0$

Which shows that, the bisectors of pair of vertically opposite angles are on the same straight line.

Hence Proved.

Question 6 : If two straight lines intersect each other, prove that the ray opposite to the bisector of one of the angles thus formed bisects the vertically opposite angle.

Solution: Given AB and CD are straight lines which intersect at O.
OP is the bisector of ∠ AOC.
To Prove : OQ is the bisector of ∠BOD
Proof :



AB, CD and PQ are straight lines which intersect in O.

Vertically opposite angles: ∠ AOP = ∠ BOQ

Vertically opposite angles: ∠ COP = ∠ DOQ

OP is the bisector of ∠ AOC : ∠ AOP = ∠ COP

Therefore, ∠BOQ = ∠ DOQ
Hence, OQ is the bisector of ∠BOD.