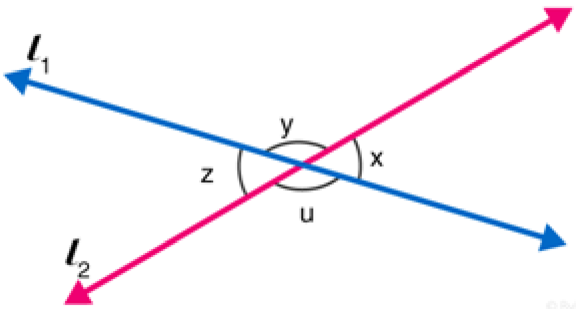
Exercise 8.3 Page No: 8.19

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.



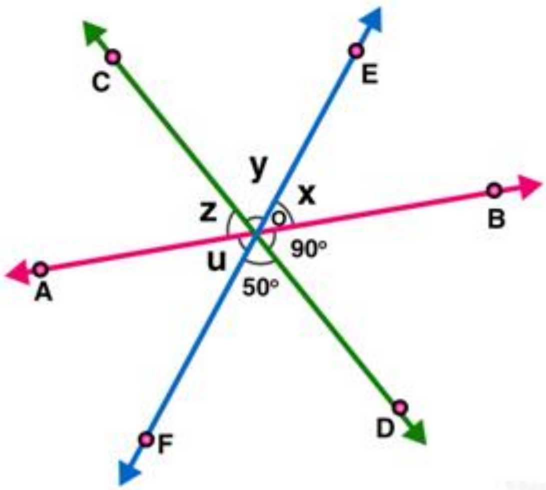
Solution:
Given: $x = 45^0$

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

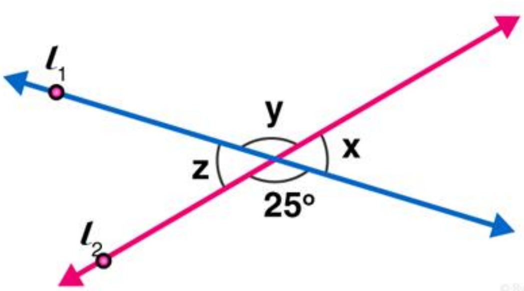
x + 50 + 90 = 180

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.



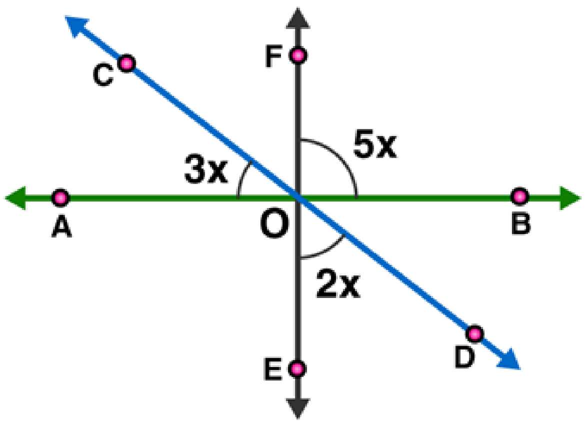
Solution:
From figure,

y = 25^0 [Vertically opposite angles are equal]
Now ∠x + ∠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:

∠AOE = ∠BOF = 5x [Vertically opposite angles]

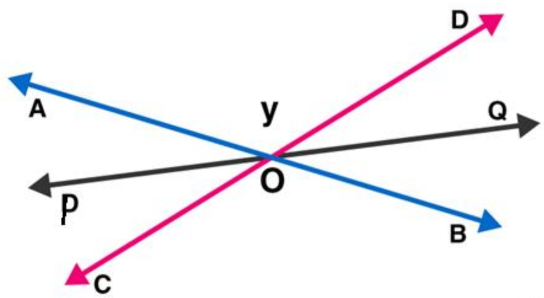
∠COA+∠AOE+∠EOD = 180^0 [Linear pair]

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

∠AOC = ∠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 ∠AOC:
∠AOP = ∠COP ...(2)
OQ is the bisector of ∠BOD:
∠BOQ = ∠QOD ...(3)

Now,
Sum of the angles around a point is 360^{o}.

∠AOC + ∠BOD + ∠AOP + ∠COP + ∠BOQ + ∠QOD = 360^{0}

∠BOQ + ∠QOD + ∠DOA + ∠AOP + ∠POC + ∠COB = 360^{0}

2∠QOD + 2∠DOA + 2∠AOP = 360^{0} (Using (1), (2) and (3))

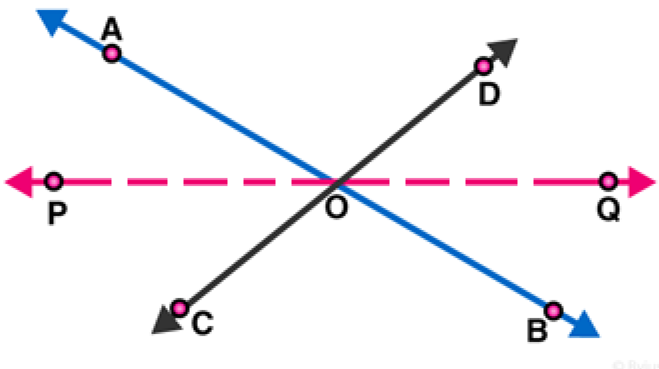
∠QOD + ∠DOA + ∠AOP = 180^{0}
POQ = 180^{0}

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.