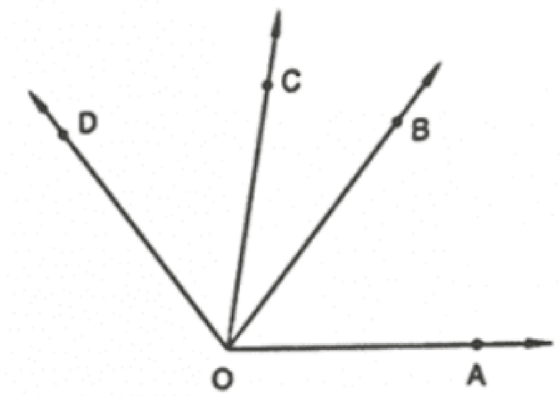
Chapter 14: Lines and Angles Exercise – 14.1

Question: 1

Write down each pair of adjacent angles shown in Figure



Solution:

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

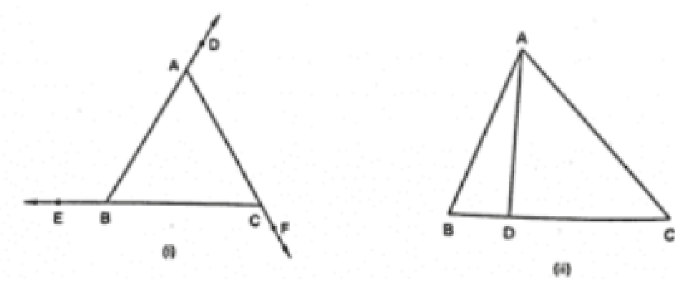
The adjacent angles are:

∠DOC and ∠BOC

∠COB and ∠BOA

Question: 2

In figure, name all the pairs of adjacent angles.



Solution:

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

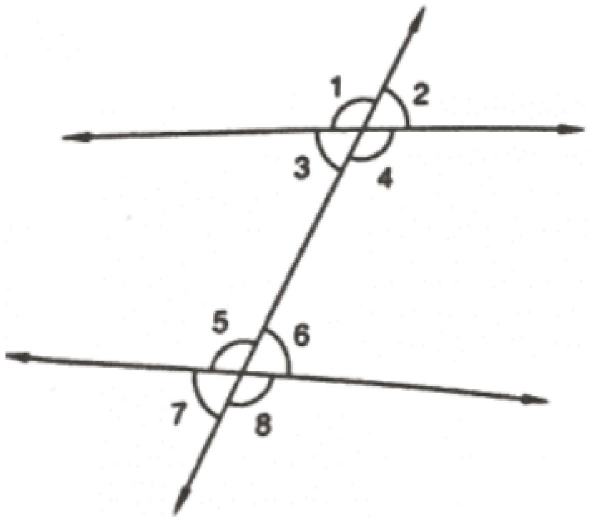
∠BDA and ∠CDA

Question: 3

In fig , write down

(i) each linear pair

(ii) each pair of vertically opposite angles.



Solution:

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

∠1 and ∠3

∠1 and ∠2

∠4 and ∠3

∠4 and ∠2

∠5 and ∠6

∠5 and ∠7

∠6 and ∠8

∠7 and ∠8

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

∠1 and ∠4

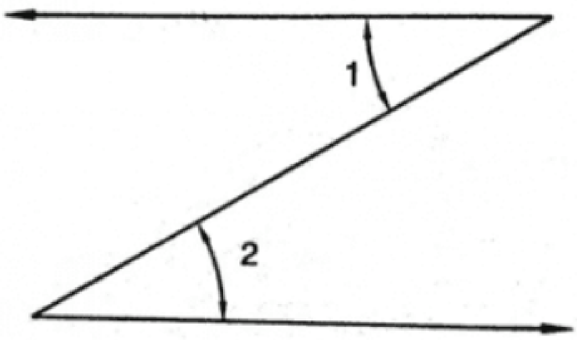
∠2 and ∠3

∠5 and ∠8

∠6 and ∠7

Question: 4

Are the angles 1 and 2 in figure adjacent angles?



Solution:

No, because they do not have common vertex.

Question: 5

Find the complement of each of the following angles:

(i) 35°

(ii) 72°

(iii) 45°

(iv) 85°

Solution:

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° – 35° = 55°

(ii) 90° – 72° = 18°

(iii) 90° – 45° = 45°

(iv) 90° – 85° = 5°

Question: 6

Find the supplement of each of the following angles:

(i) 70°

(ii) 120°

(iii) 135°

(iv) 90°

Solution:

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

(i) 180° – 70° = 110°

(ii) 180° – 120° = 60°

(iii) 180° – 135° = 45°

(iv) 180° – 90° = 90°

Question: 7

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

(i) 25°, 65°

(ii) 120°, 60°

(iii) 63°, 27°

(iv) 100°, 80°

Solution:

(i) 25° + 65° = 90° so, this is a complementary pair of angle.

(ii) 120° + 60° = 180° so, this is a supplementary pair of angle.

(iii) 63° + 27° = 90° so, this is a complementary pair of angle.

(iv) 100° + 80° = 180° 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.

Question: 8

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

(i) obtuse?

(ii) right?

(iii) acute?

Solution:

(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

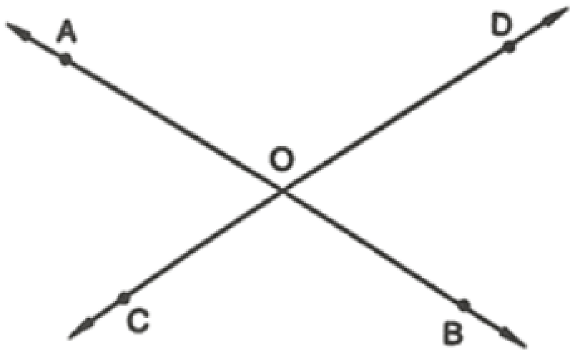
Because, 90° + 90° = 180°

(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.

Question: 9

Name the four pairs of supplementary angles shown in Fig.



Solution:

The supplementary angles are

∠AOC and ∠COB

∠BOC and ∠DOB

∠BOD and ∠DOA

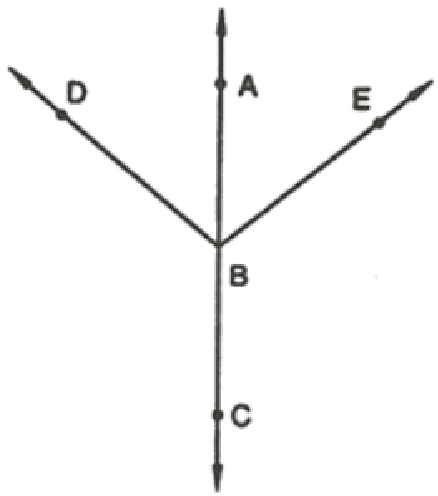
∠AOC and ∠DOA

Question: 10

In Figure, A, B, C are collinear points and ∠DBA = ∠EBA.

(i) Name two linear pairs.

(ii) Name two pairs of supplementary angles.



Solution:

(i) Linear pairs

∠ABD and ∠DBC

∠ABE and ∠EBC

Because every linear pair forms supplementary angles, these angles are

∠ABD and ∠DBC

∠ABE and ∠EBC

Question: 11

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

Solution:

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

∠p = ∠q

So,

∠p + ∠q = 180°

=> ∠p + ∠p = 180°

=> 2∠p = 180°

=> ∠p = 180°/2

=> ∠p = 90°

Therefore, ∠p = ∠q = 90°

Question: 12

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

Solution:

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

Therefore, ∠p + 28° = 90°

=> ∠p = 90° – 28°

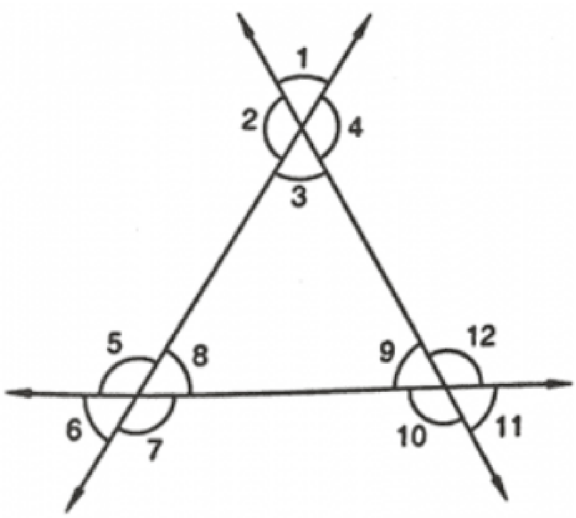
= 62°

So, the supplement of the angle = 180° – 62°

= 118°

Question: 13

In Figure, name each linear pair and each pair of vertically opposite angles.



Solution:

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

∠1 and ∠2

∠2 and ∠3

∠3 and ∠4

∠1 and ∠4

∠5 and ∠6

∠6 and ∠7

∠7 and ∠8

∠8 and ∠5

∠9 and ∠10

∠10 and ∠11

∠11 and ∠12

∠12 and ∠9

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

∠1 and ∠3

∠4 and ∠2

∠5 and ∠7

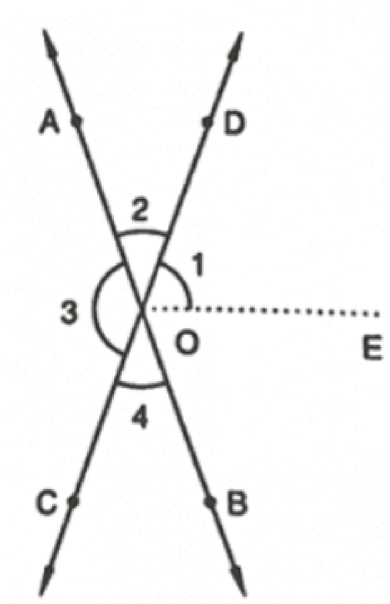
∠6 and ∠8

∠9 and ∠11

∠10 and ∠12

Question: 14

In Figure, OE is the bisector of ∠BOD. If ∠1 = 70°, Find the magnitude of ∠2, ∠3, ∠4



Solution:

Given,

∠1 = 70°

∠3 = 2(∠1)

= 2(70°)

= 140°

∠3 = ∠4

As, OE is the angle bisector,

∠DOB = 2(∠1)

= 2(70°)

= 140°

∠DOB + ∠AOC + ∠COB +∠DOB = 360°

=> 140° + 140° + 2(∠COB) = 360°

Since, ∠COB = ∠AOD

=> 2(∠COB) = 360° – 280°

=> 2(∠COB) = 80°

=> ∠COB = 80°/2

=> ∠COB = 40°

Therefore, ∠COB = ∠AOB = 40°

The angles are,

∠1 = 70°,

∠2 = 40°,

∠3 = 140°,

∠4 = 40°

Question: 15

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

Solution:

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

Therefore, the other angle is

=> 180° – 90° = 90°

Question: 16

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

Solution:

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

Question: 17

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

Solution:

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

Question: 18

Can two acute angles form a linear pair?

Solution:

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

Question: 19

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

Solution:

Let x be the required angle

So,

=> x + 65° = 180°

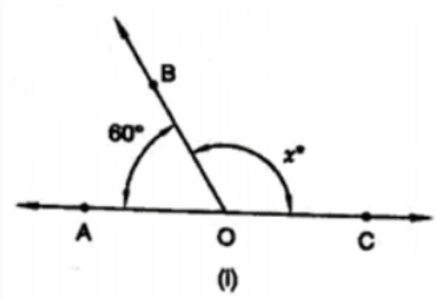
=> x = 180° – 65°

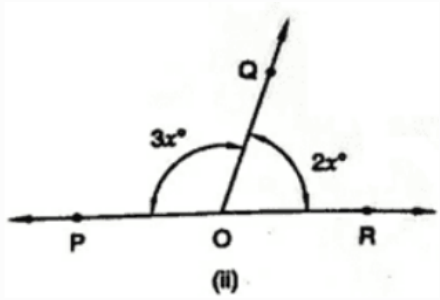
= 115°

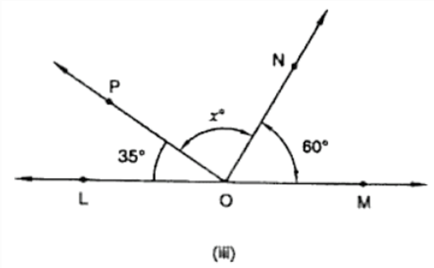
But the complement of the angle cannot be determined.

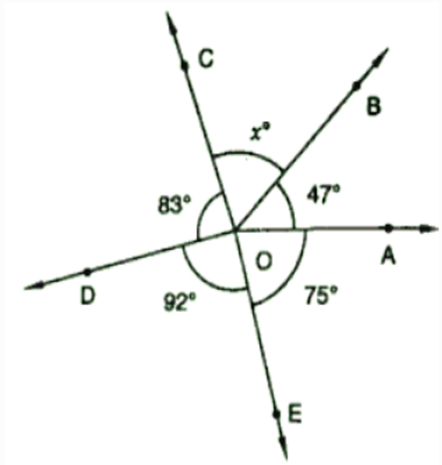
Question: 20

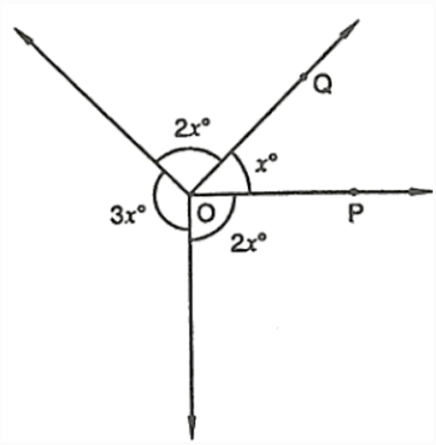
Find the value of x in each of the following figures

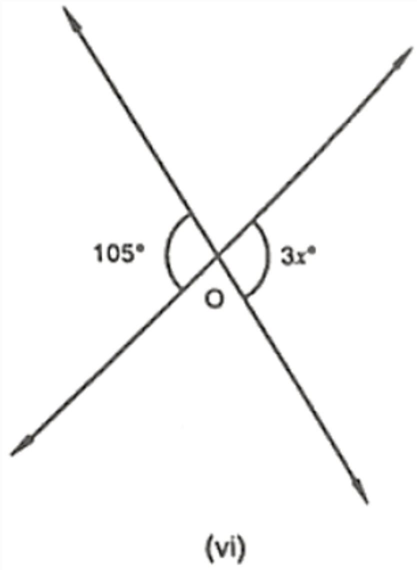












Solution:

(i) Since, ∠BOA + ∠BOC = 180°

Linear pair:

=> 60° + x° = 180°

=> x° = 180° – 60°

=> x° = 120°

(ii) Linear pair:

=> 3x° + 2x° = 180°

=> 5x° = 180°

=> x° = 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°

=> x° = 63°

(v) Linear pair,

3x° + 2x° + x° + 2x° = 360°

=> 8x° = 360°

=> x° = 360°/8

=> x∘ = 45°

(vi) Linear pair:

3x° = 105°

=> x° = 105°/3

=> x° = 45°

Question:

In Fig. 22, it being given that ∠1 = 65°, find all the other angles.

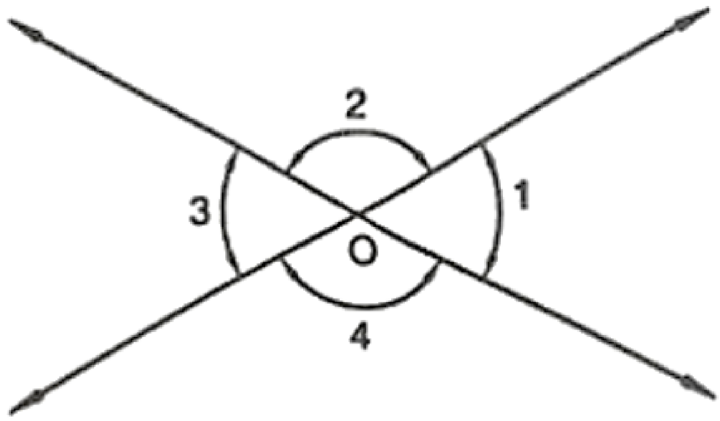


Fig. 22

Solution:

Given,

∠1 = ∠3 are the vertically opposite angles

Therefore, ∠3 = 65°

Here, ∠1 + ∠2 = 180° are the linear pair

Therefore, ∠2 = 180° – 65°

= 115°

∠2 = ∠4 are the vertically opposite angles

Therefore, ∠2 = ∠4 = 115°

And ∠3 = 65°

Question: 22

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?

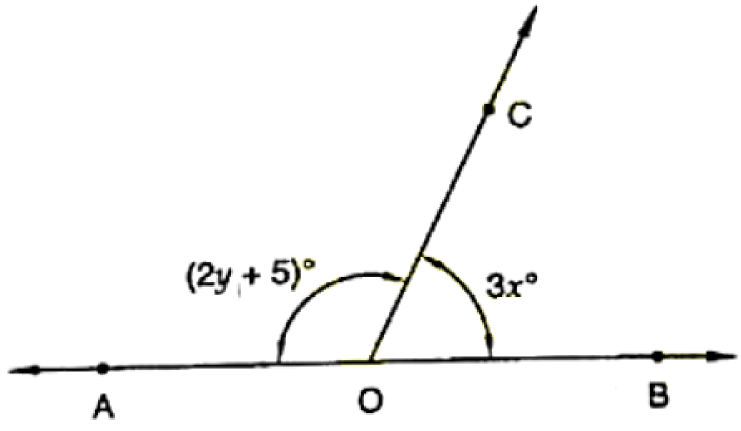


Fig. 23

Solution:

∠AOC + ∠BOC = 180° – Linear pair

=> 2y + 5 + 3x = 180°

=> 3x + 2y = 175°

(i) If x = 25°, then

=> 3(25°) + 2y = 175°

=> 75° + 2y = 175°

=> 2y = 175° – 75°

=> 2y = 100°

=> y = 100°/2

=> y = 50°

(ii) If y = 35°, then

3x + 2(35°) = 175°

=> 3x + 70° = 175°

=> 3x = 175° – 70°

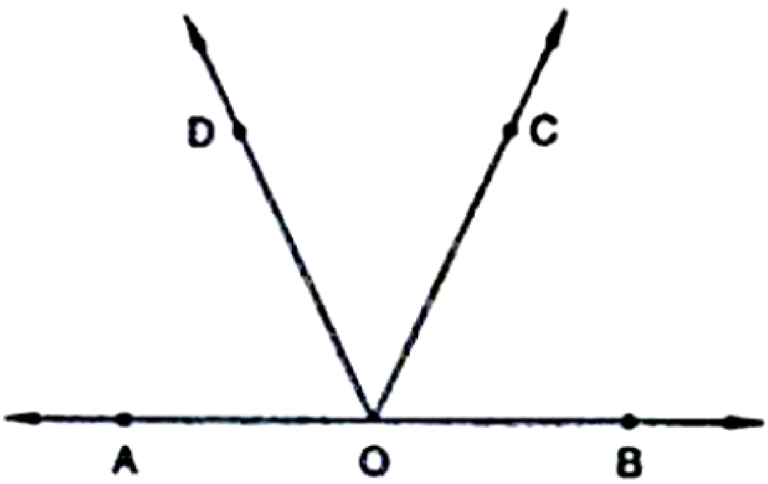
=> 3x = 105°

=> x = 105°/3

=> x = 35°

Question: 24

In Figure, write all pairs of adjacent angles and all the linear pairs.



Solution:

Pairs of adjacent angles are:

∠DOA and ∠DOC

∠BOC and ∠COD

∠AOD and ∠BOD

∠AOC and ∠BOC

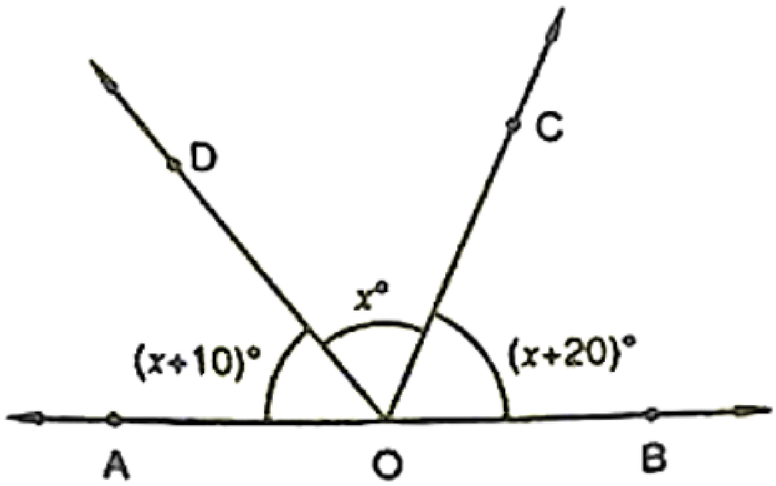
Linear pairs:

∠AOD and ∠BOD

∠AOC and ∠BOC

Question: 25

In Figure, find ∠x. Further find ∠BOC, ∠COD, ∠AOD



Solution:

(x + 10)° + x° + (x + 20) ° = 180°

=> 3x° + 30° = 180°

=> 3x° = 180° – 30°

=> 3x° = 150°

=> x° = 150°/3

=> x° = 50°

Here,

∠BOC = (x + 20)°

= (50 + 20)°

= 70°

∠COD = 50°

∠AOD = (x + 10)°

= (50 + 10)°

= 60°

Question: 25

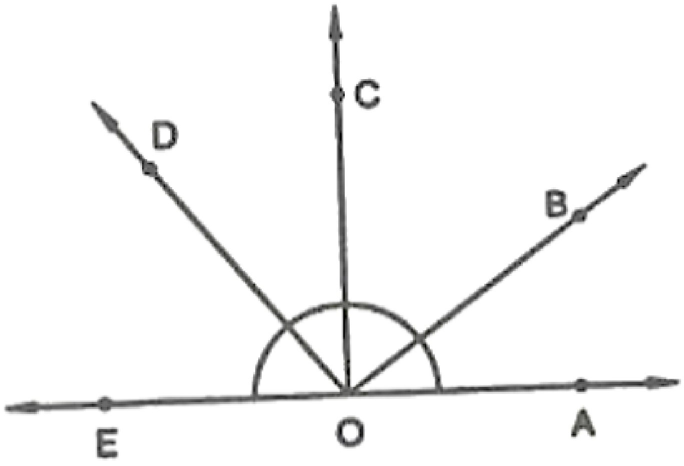
How many pairs of adjacent angles are formed when two lines intersect in a point?

Solution:

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

Question: 26

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



Solution:

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

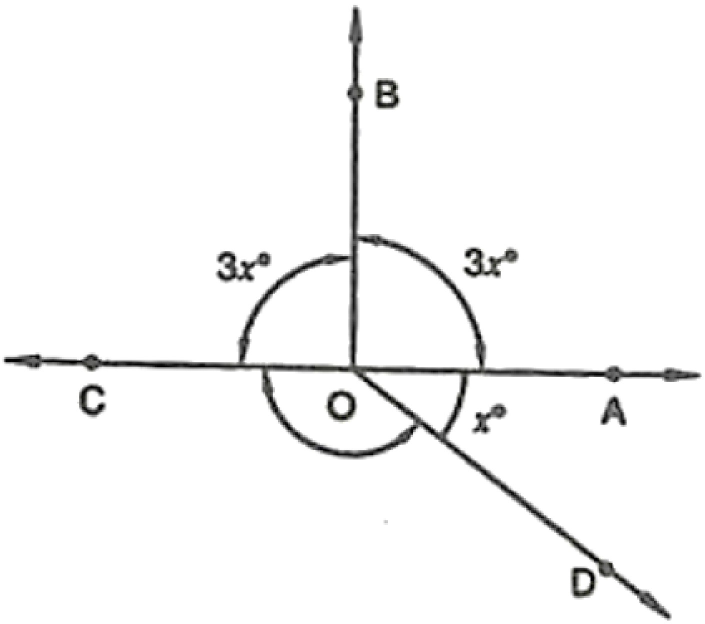
∠EOD and ∠DOA

∠EOC and ∠AOC

∠AOB and ∠BOE

Question: 27

In Figure, determine the value of x.



Solution:

Linear pair:

∠COB + ∠AOB = 180°

=> 3x° + 3x° = 180°

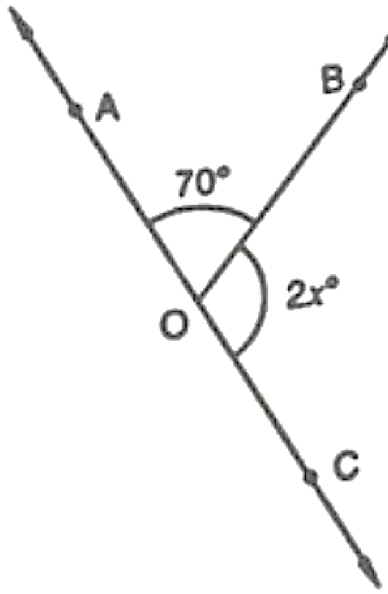
=> 6x° = 180°

=> x° = 180°/6

=> x° = 30°

Question: 28

In Figure, AOC is a line, find x.



Solution:

∠AOB + ∠BOC = 180°

Linear pair

=> 2x + 70° = 180°

=> 2x = 180° – 70°

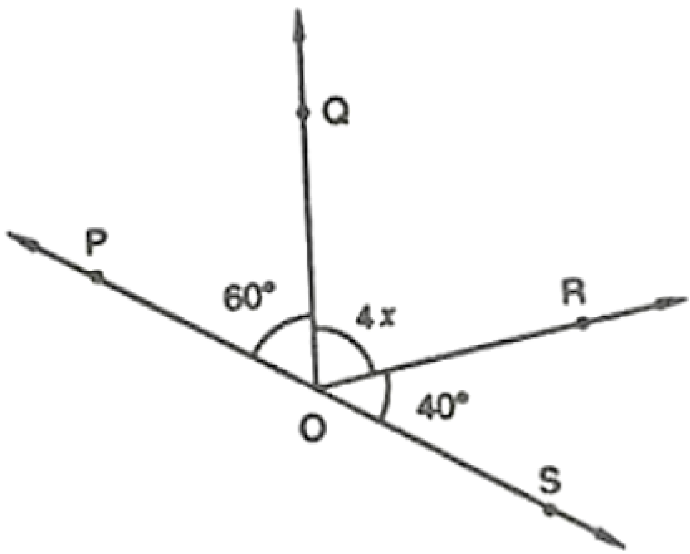
=> 2x = 110°

=> x = 110°/2

=> x = 55°

Question: 29

In Figure, POS is a line, find x.



Solution:

Angles of a straight line,

∠QOP + ∠QOR + ∠ROS = 108°

=> 60° + 4x + 40° = 180°

=> 100° + 4x = 180°

=> 4x = 180° – 100°

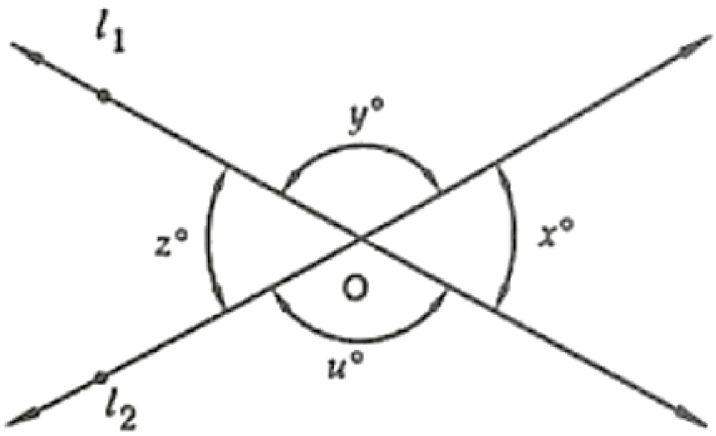
=> 4x = 80°

=> x = 80°/4

=> x = 20°

Question: 30

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 that,

∠x = 45°

∠x = ∠z = 45°

∠y = ∠u

∠x + ∠y + ∠z + ∠u = 360°

=> 45° + 45° + ∠y + ∠u = 360°

=> 90° + ∠y + ∠u = 360°

=> ∠y + ∠u = 360° – 90°

=> ∠y + ∠u = 270°

=> ∠y + ∠z = 270°

=> 2∠z = 270°

=> ∠z = 135°

Therefore, ∠y = ∠u = 135°

So, ∠x = 45°,

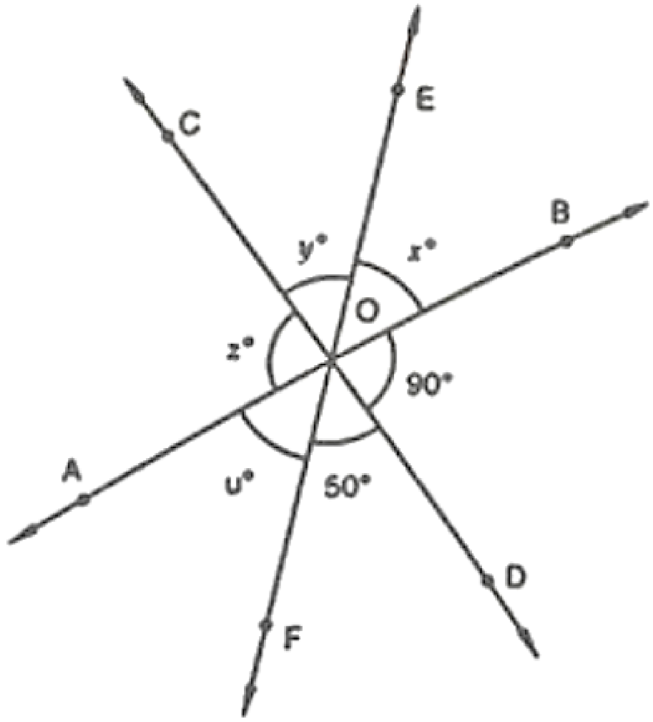
∠y = 135°,

∠z = 45°,

∠u = 135°

Question: 31

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:

Given that,

∠x + ∠y + ∠z + ∠u + 50° + 90° = 360°

Linear pair,

∠x + 50° + 90° = 180°

=> ∠x + 140° = 180°

=> ∠x = 180° – 140°

=> ∠x = 40°

∠x = ∠u = 40° are vertically opposite angles

=> ∠z = 90° is a vertically opposite angle

=> ∠y = 50° is a vertically opposite angle

Therefore, ∠x = 40°,

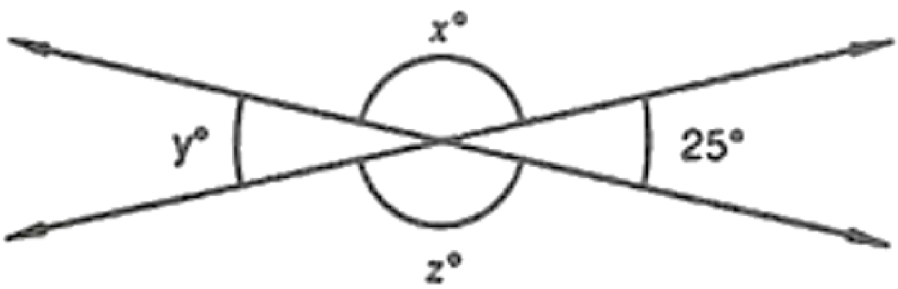
∠y = 50°,

∠z = 90°,

∠u = 40°

Question: 32

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



Solution:

∠y = 25° vertically opposite angle

∠x = ∠y are vertically opposite angles

∠x + ∠y + ∠z + 25° = 360°

=> ∠x + ∠z + 25° + 25° = 360°

=> ∠x + ∠z + 50° = 360°

=> $\angle x + \angle z = 360° – 50°$

=> $2\angle x = 310°$

=> $\angle x = 155°$

And, $\angle x = \angle z = 155°$

Therefore, $\angle x = 155°$,

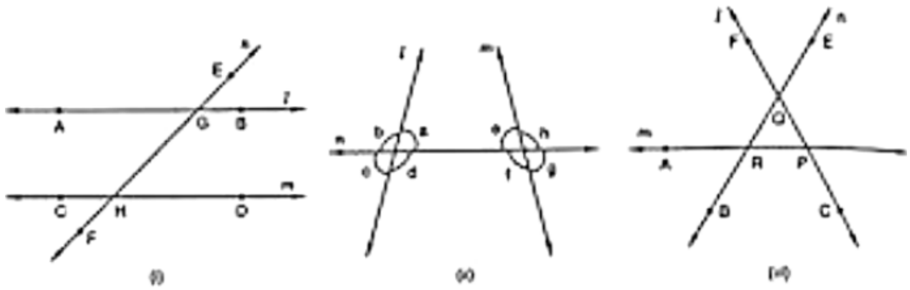
$\angle y = 25°$,

$\angle z = 155°$

Chapter 14: Lines and Angles Exercise – 14.2

Question: 1

In Figure, line n is a transversal to line l and m. Identify the following:



(i) Alternate and corresponding angles in Figure.(i)

(ii) Angles alternate to ∠d and ∠g and angles corresponding to ∠RQF and angle alternate to ∠PQE in Figure. (ii)

(iii) Angle alternate to ∠PQR, angle corresponding to ∠RQF and angle alternate to ∠PQE in Figure. (iii)

(iv) Pairs of interior and exterior angles on the same side of the transversal in Figure. (iii)

Solution:

(i) Figure (i)

Corresponding angles:

∠EGB and ∠GHD

∠HGB and ∠FHD

∠EGA and ∠GHC

∠AGH and ∠CHF

The alternate angles are:

∠EGB and ∠CHF

∠HGB and ∠CHG

∠EGA and ∠FHD

∠AGH and ∠GHD

(ii) Figure (ii)

The alternate angle to ∠d is ∠e.

The alternate angle to ∠g is ∠b.

The corresponding angle to ∠f is ∠c.

The corresponding angle to ∠h is ∠a.

(iii) Figure (iii)

Angle alternate to ∠PQR is ∠QRA.

Angle corresponding to ∠RQF is ∠ARB.

Angle alternate to ∠POE is ∠ARB.

(iv) Figure (ii)

Pair of interior angles are

∠a is ∠e.

∠d is ∠f.

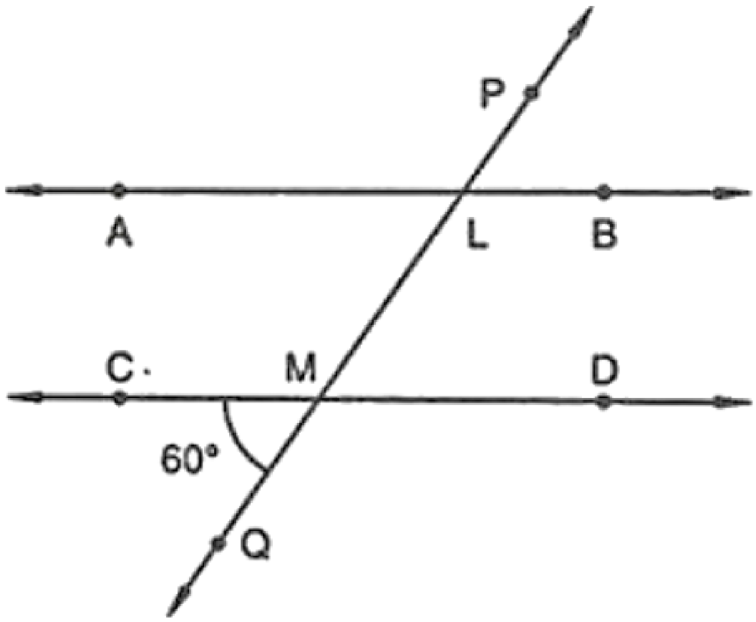
Pair of exterior angles are

∠b is ∠h.

∠c is ∠g.

Question: 2

In Figure, AB and CD are parallel lines intersected by a transversal PQ at L and M respectively, If ∠CMQ = 60°, find all other angles in the figure.



Solution:

Corresponding angles:

∠ALM = ∠CMQ = 60°

Vertically opposite angles:

∠LMD = ∠CMQ = 60°

Vertically opposite angles:

∠ALM = ∠PLB = 60°

Here,

∠CMQ + ∠QMD = 180° are the linear pair

= ∠QMD = 180° – 60°

= 120°

Corresponding angles:

∠QMD = ∠MLB = 120°

Vertically opposite angles

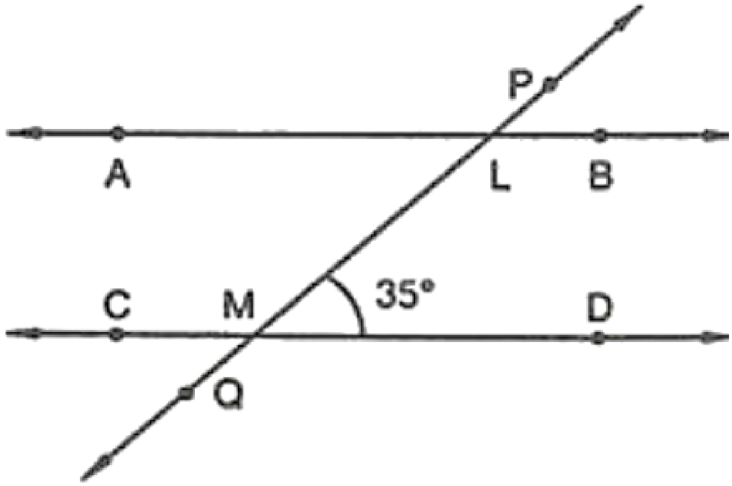
∠QMD = ∠CML = 120°

Vertically opposite angles

∠MLB = ∠ALP = 120°

Question: 3

In Figure, AB and CD are parallel lines intersected by a transversal by a transversal PQ at L and M respectively. If ∠LMD = 35° find ∠ALM and ∠PLA.



Solution:

Given that,

∠LMD = 35°

∠LMD and ∠LMC is a linear pair

∠LMD + ∠LMC = 180°

= ∠LMC = 180° – 35°

= 145°

So, ∠LMC = ∠PLA = 145°

And, ∠LMC = ∠MLB = 145°

∠MLB and ∠ALM is a linear pair

∠MLB + ∠ALM = 180°

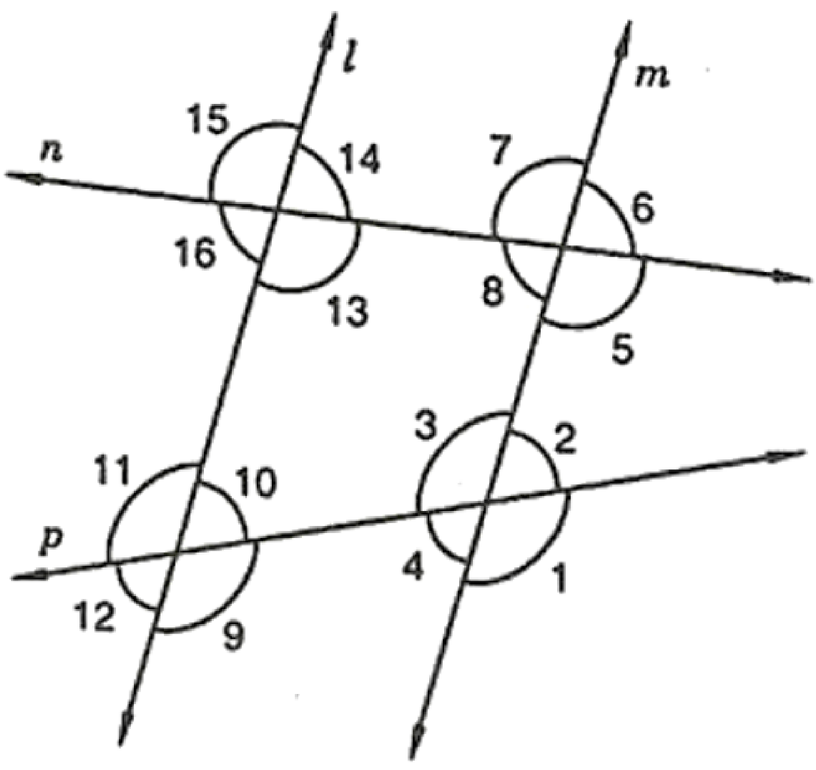
= ∠ALM = 180° – 145°

= ∠ALM = 35°

Therefore, ∠ALM = 35°, ∠PLA = 145°.

Question: 4

The line n is transversal to line l and m in Figure. Identify the angle alternate to ∠13, angle corresponding to ∠15, and angle alternate to ∠15.



Solution:

Given that, l ∥ m

So,

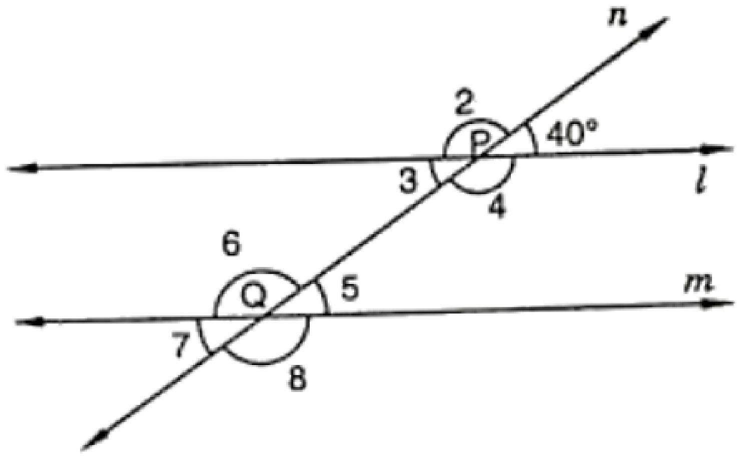
The angle alternate to ∠13 is ∠7

The angle corresponding to ∠15 is ∠7

The angle alternate to ∠15 is ∠5

Question: 5

In Figure, line l ∥ m and n is transversal. If ∠1 = 40°, find all the angles and check that all corresponding angles and alternate angles are equal.



Solution:

Given that,

∠1 = 40°

∠1 and ∠2 is a linear pair

= ∠1 + ∠2 = 180°

= ∠2 = 180° – 40°

= ∠2 = 140°

∠2 and ∠6 is a corresponding angle pair

So, ∠6 = 140°

∠6 and ∠5 is a linear pair

= ∠6 + ∠5 = 180°

= ∠5 = 180° – 140°

= ∠5 = 40°

∠3 and ∠5 are alternative interior angles

So, ∠5 = ∠3 = 40°

∠3 and ∠4 is a linear pair

= ∠3 + ∠4 = 180°

= ∠4 = 180° – 40°

= ∠4 = 140°

∠4 and ∠6 are a pair interior angles

So, ∠4 = ∠6 = 140°

∠3 and ∠7 are pair of corresponding angles

So, ∠3 = ∠7 = 40°

Therefore, ∠7 = 40°

∠4 and ∠8 are a pair corresponding angles

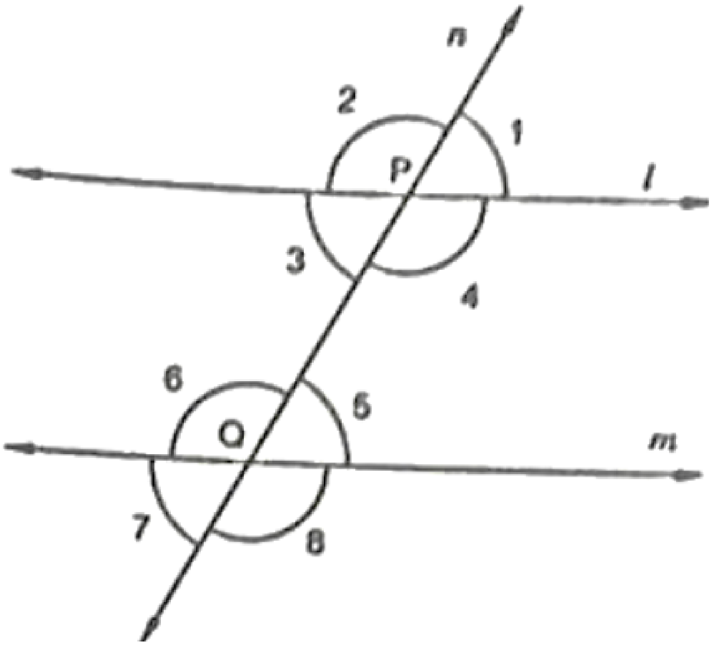
So, ∠4 = ∠8 = 140°

Therefore, ∠8 = 140°

So, $\angle 1 = 40°$, $\angle 2 = 140°$, $\angle 3 = 40°$, $\angle 4 = 140°$, $\angle 5 = 40°$, $\angle 6 = 140°$, $\angle 7 = 40°$, $\angle 8 = 140°$

Question: 6

In Figure, line l ∥ m and a transversal n cuts them P and Q respectively. If $\angle 1 = 75°$, find all other angles.



Solution:

Given that, l ∥ m and $\angle 1 = 75°$

We know that,

$\angle 1 + \angle 2 = 180°$ → (linear pair)

$= \angle 2 = 180° - 75°$

$= \angle 2 = 105°$

here, $\angle 1 = \angle 5 = 75°$ are corresponding angles

$\angle 5 = \angle 7 = 75°$ are vertically opposite angles.

$\angle 2 = \angle 6 = 105°$ are corresponding angles

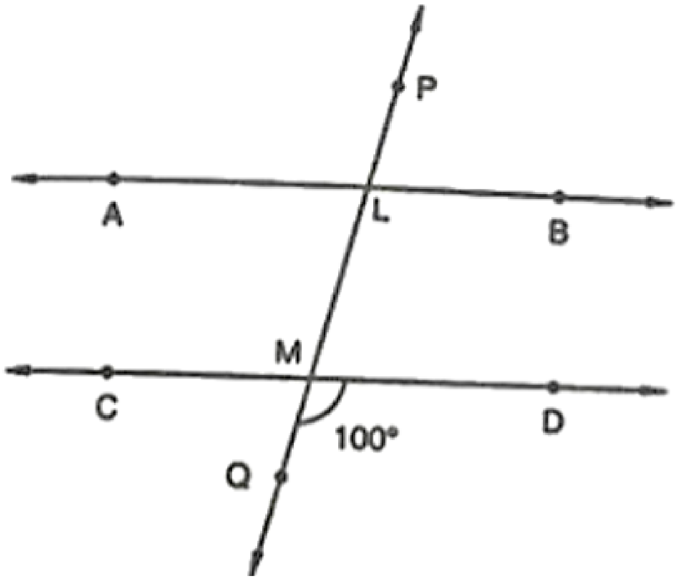
$\angle 6 = \angle 8 = 105°$ are vertically opposite angles

$\angle 2 = \angle 4 = 105°$ are vertically opposite angles

So, $\angle 1 = 75°$, $\angle 2 = 105°$, $\angle 3 = 75°$, $\angle 4 = 105°$, $\angle 5 = 75°$, $\angle 6 = 105°$, $\angle 7 = 75°$, $\angle 8 = 105°$

Question: 7

In Figure, AB ∥ CD and a transversal PQ cuts at L and M respectively. If $\angle QMD = 100°$, find all the other angles.



Solution:

Given that, AB ∥ CD and ∠QMD = 100°

We know that,

Linear pair,

∠QMD + ∠QMC = 180°

= ∠QMC = 180° – ∠QMD

= ∠QMC = 180° – 100°

= ∠QMC = 80°

Corresponding angles,

∠DMQ = ∠BLM = 100°

∠CMQ = ∠ALM = 80°

Vertically Opposite angles,

∠DMQ = ∠CML = 100°

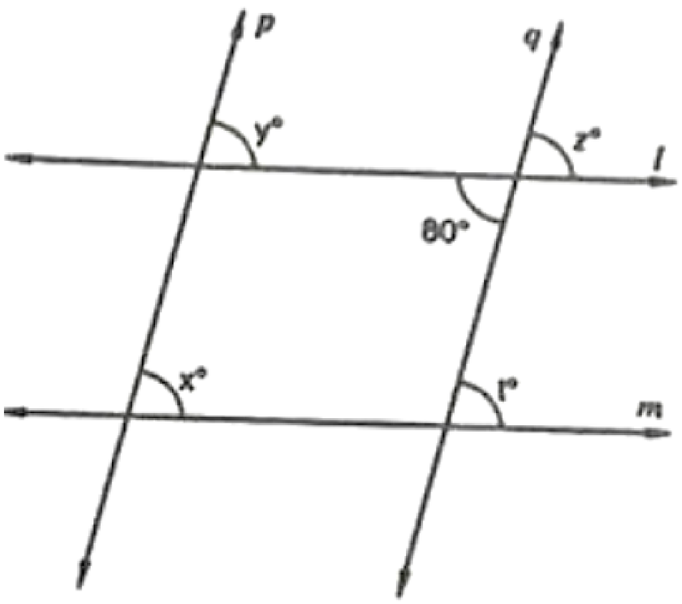
∠BLM = ∠PLA = 100°

∠CMQ = ∠DML = 80°

∠ALM = ∠PLB = 80°

Question: 8

In Figure, l ∥ m and p || q. Find the values of x, y, z, t.



Solution:

Give that, angle is 80°

∠z and 80° are vertically opposite angles

= ∠z = 80°

∠z and ∠t are corresponding angles

= ∠z = ∠t

Therefore, ∠t = 80°

∠z and ∠y are corresponding angles

= ∠z = ∠y

Therefore, ∠y = 80°

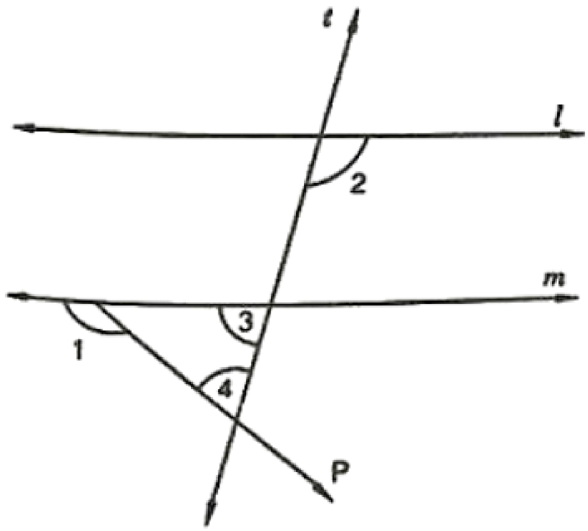
∠x and ∠y are corresponding angles

= ∠y = ∠x

Therefore, ∠x = 80°

Question: 9

In Figure, line l ∥ m, ∠1 = 120° and ∠2 = 100°, find out ∠3 and ∠4.



Solution:

Given that, ∠1 = 120° and ∠2 = 100°

∠1 and ∠5 a linear pair

= ∠1 + ∠5 = 180°

= ∠5 = 180° – 120°

= ∠5 = 60°

Therefore, ∠5 = 60°

∠2 and ∠6 are corresponding angles

= ∠2 = ∠6 = 100°

Therefore, ∠6 = 100°

∠6 and ∠3 a linear pair

= ∠6 + ∠3 = 180°

= ∠3 = 180° – 100°

= ∠3 = 80°

Therefore, ∠3 = 80°

By, angles of sum property

= ∠3 + ∠5 + ∠4 = 180°

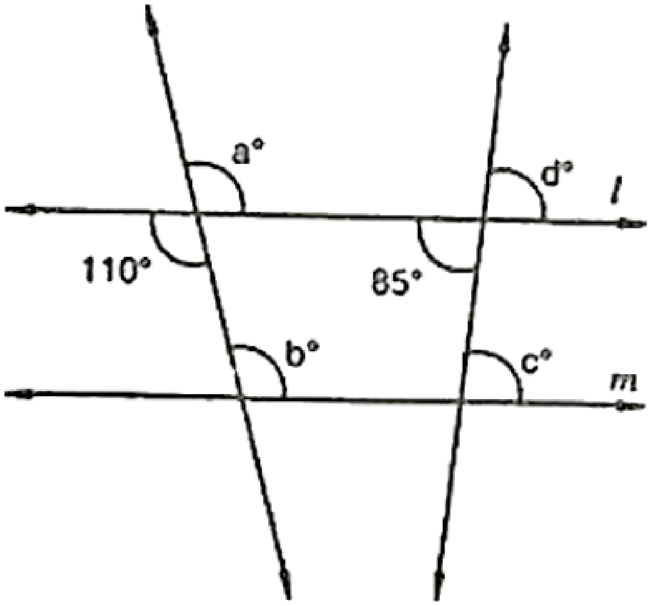
= ∠4 = 180° – 80° – 60°

= ∠4 = 40°

Therefore, ∠4 = 40°

Question: 10

In Figure, l ∥ m. Find the values of a, b, c, d. Give reasons.



Solution:

Given that, l ∥ m

Vertically opposite angles,

∠a = 110°

Corresponding angles,

∠a = ∠b

Therefore, ∠b = 110°

Vertically opposite angle,

∠d = 85°

Corresponding angles,

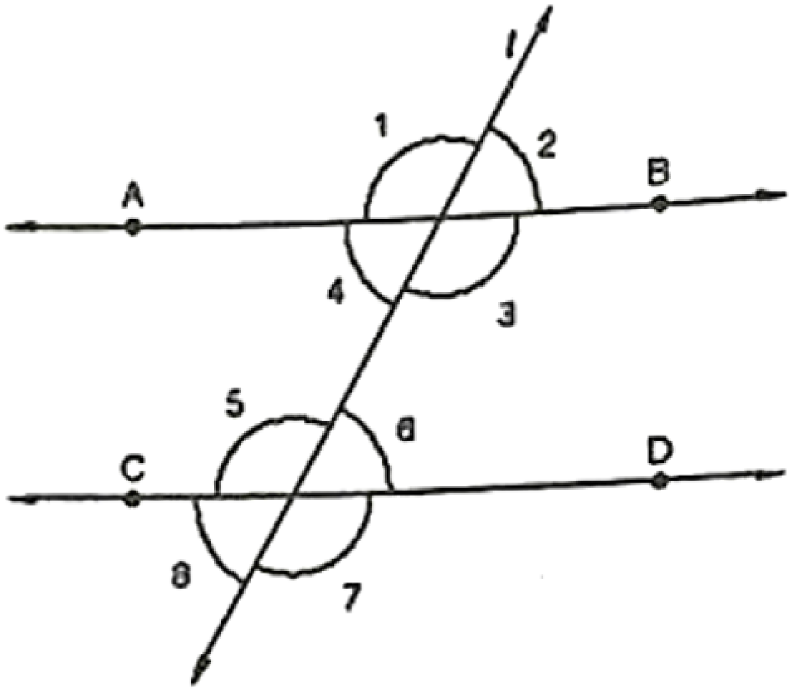
∠d = ∠c

Therefore, ∠c = 85°

Hence, ∠a = 110°, ∠b = 110°, ∠c = 85°, ∠d = 85°

Question: 11

In Figure, AB ∥ CD and ∠1 and ∠2 are in the ratio of 3: 2. Determine all angles from 1 to 8.



Solution:

Given that,

∠1 and ∠2 are 3: 2

Let us take the angles as 3x, 2x

∠1 and ∠2 are linear pair

= 3x + 2x = 180°

= 5x = 180°

= x = 180°/5

= x = 36°

Therefore, ∠1 = 3x = 3(36) = 108°

∠2 = 2x = 2(36) = 72°

∠1 and ∠5 are corresponding angles

= ∠1 = ∠5

Therefore, ∠5 = 108°

∠2 and ∠6 are corresponding angles

= ∠2 = ∠6

Therefore, ∠6 = 72°

∠4 and ∠6 are alternate pair of angles

= ∠4 = ∠6 = 72°

Therefore, ∠4 = 72°

∠3 and ∠5 are alternate pair of angles

= ∠3 = ∠5 = 108°

Therefore, ∠5 = 108°

∠2 and ∠8 are alternate exterior of angles

= ∠2 = ∠8 = 72°

Therefore, ∠8 = 72°

∠1 and ∠7 are alternate exterior of angles

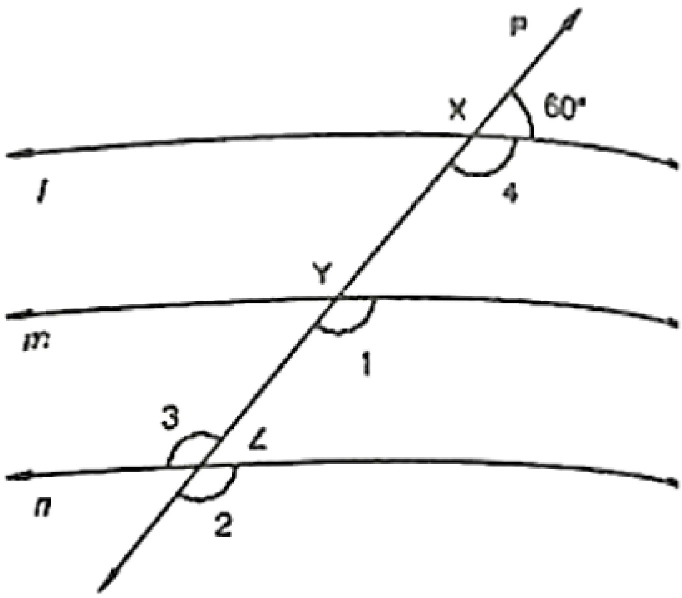
= ∠1 = ∠7 = 108°

Therefore, ∠7 = 108°

Hence, ∠1 = 108°, ∠2 = 72°, ∠3 = 108°, ∠4 = 72°, ∠5 = 108°, ∠6 = 72°, ∠7 = 108°, ∠8 = 72°

Question: 12

In Figure, l, m and n are parallel lines intersected by transversal p at X, Y and Z respectively. Find ∠1, ∠2 and ∠3.



Solution:

Linear pair,

= ∠4 + 60° = 180°

= ∠4 = 180° – 60°

= ∠4 = 120°

∠4 and ∠1 are corresponding angles

= ∠4 = ∠1

Therefore, ∠1 = 120°

∠1 and ∠2 are corresponding angles

= ∠2 = ∠1

Therefore, ∠2 = 120°

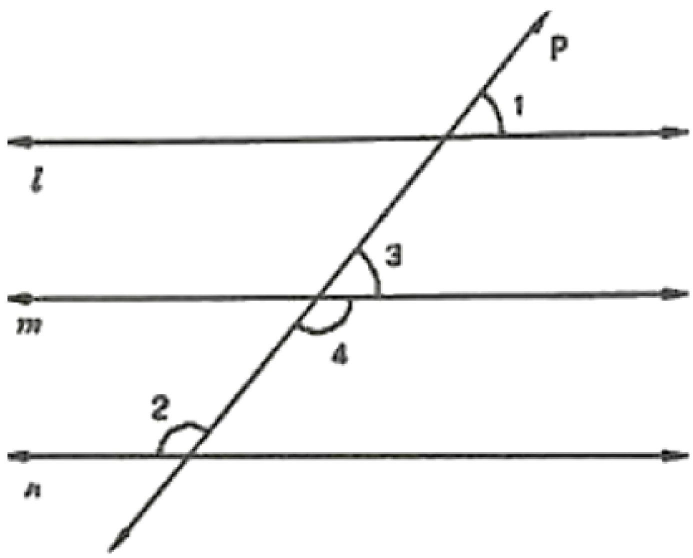
∠2 and ∠3 are vertically opposite angles

= ∠2 = ∠3

Therefore, ∠3 = 120°

Question: 13

In Figure, if l ∥ m ∥ n and ∠1 = 60°, find ∠2



Solution:

Given that,

Corresponding angles:

∠1 = ∠3

= ∠1 = 60°

Therefore, ∠3 = 60°

∠3 and ∠4 are linear pair

= ∠3 + ∠4 = 180°

= ∠4 = 180° – 60°

= ∠4 = 120°

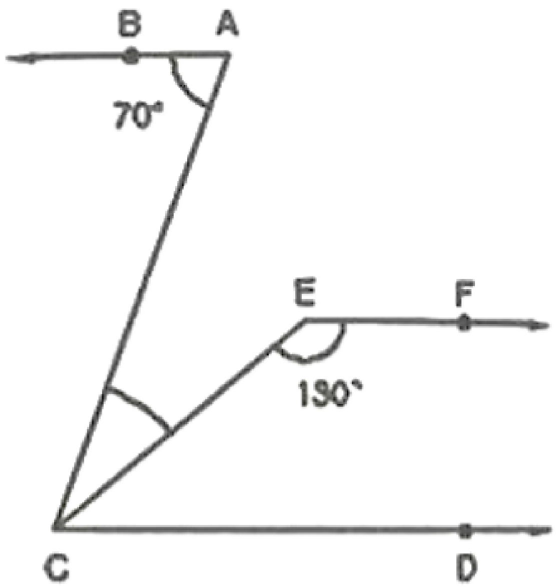
∠3 and ∠4 are alternative interior angles

= ∠4 = ∠2

Therefore, ∠2 = 120°

Question: 14

In Figure, if AB ∥ CD and CD ∥ EF, find ∠ACE



Solution:

Given that,

Sum of the interior angles,

= ∠CEF + ∠ECD = 180°

= 130° + ∠ECD = 180°

= ∠ECD = 180° – 130°

= ∠ECD = 50°

We know that alternate angles are equal

= ∠BAC = ∠ACD

= ∠BAC = ∠ECD + ∠ACE

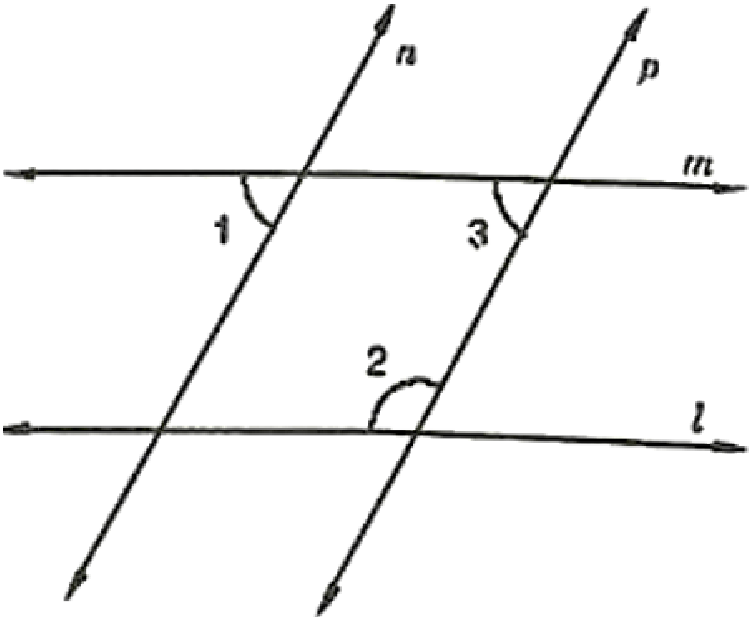
= ∠ACE = 70° – 50°

= ∠ACE = 20°

Therefore, ∠ACE = 20°

Question: 15

In Figure, if l ∥ m, n ∥ p and ∠1 = 85°, find ∠2.



Solution:

Given that, ∠1 = 85°

∠1 and ∠3 are corresponding angles

So, ∠1 = ∠3

= ∠3 = 85°

Sum of the interior angles

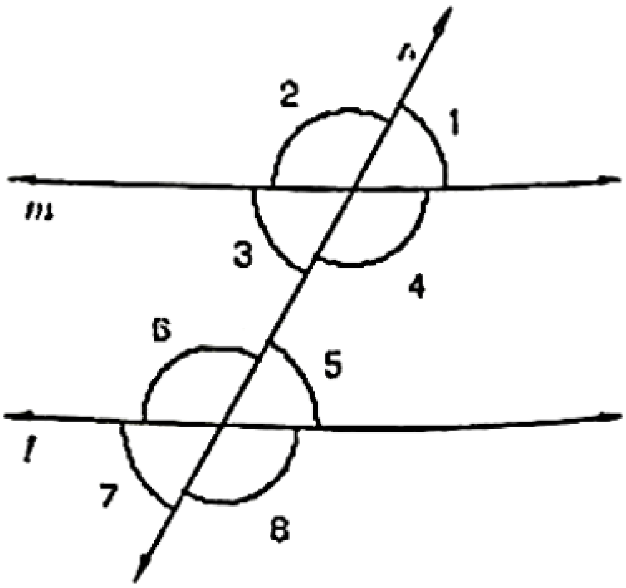
= ∠3 + ∠2 = 180°

= ∠2 = 180° – 85°

= ∠2 = 95°

Question: 16

In Figure, a transversal n cuts two lines l and m. If ∠1 = 70° and ∠7 = 80°, is l ∥ m?



Solution:

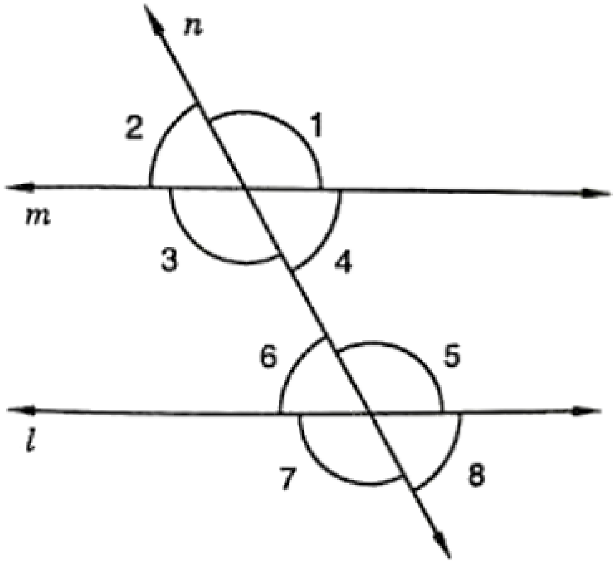
We know that if the alternate exterior angles of the two lines are equal, then the lines are parallel.

Here, ∠1 and ∠7 are alternate exterior angles, but they are not equal

= ∠1 ≠ ∠7 ≠ 80°

Question: 17

In Figure, a transversal n cuts two lines l and m such that ∠2 = 65° and ∠8 = 65°. Are the lines parallel?



Solution:

vertically opposite angels,

∠2 = ∠3 = 65°

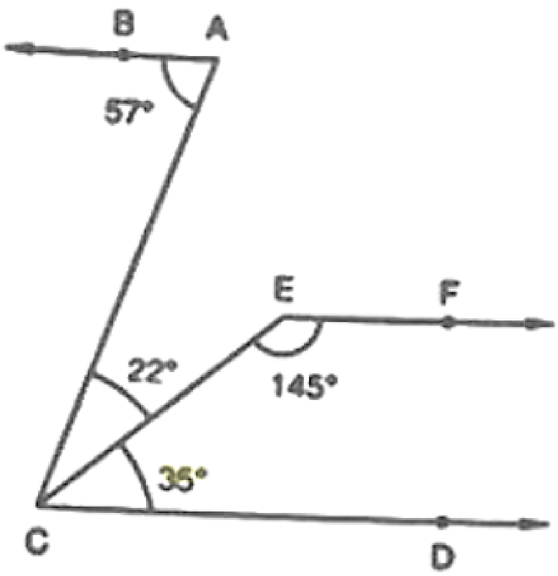
∠8 = ∠6 = 65°

Therefore, ∠3 = ∠6

Hence, l ∥ m

Question: 18

In Figure, Show that AB ∥ EF.



Solution:

We know that,

∠ACD = ∠ACE + ∠ECD

= ∠ACD = 35° + 22°

= ∠ACD = 57° = ∠BAC

Thus, lines BA and CD are intersected by the line AC such that, ∠ACD = ∠BAC

So, the alternate angles are equal

Therefore, AB ∥ CD — 1

Now,

∠ECD + ∠CEF = 35° + 45° = 180°

This, shows that sum of the angles of the interior angles on the same side of the transversal CE is 180 degrees

So, they are supplementary angles

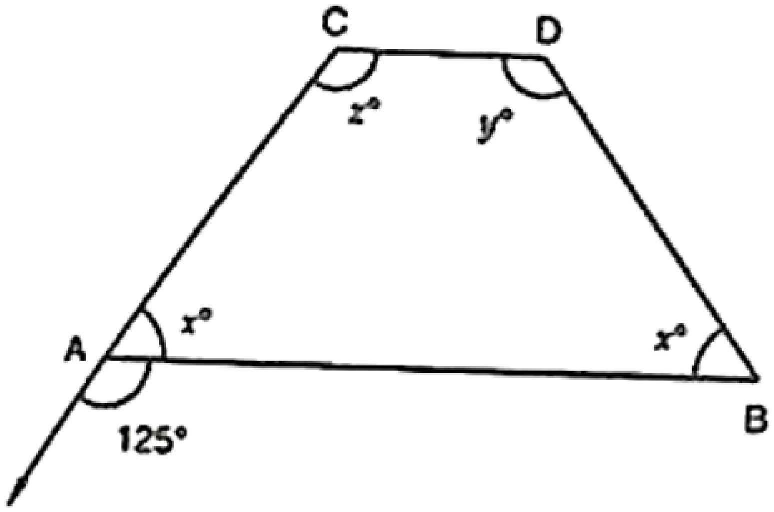
Therefore, EF ∥ CD ——- 2

From eq 1 and 2

We can say that, AB ∥ EF

Question: 19

In Figure, AB ∥ CD. Find the values of x, y, z.



Solution:

Linear pair,

= $\angle x + 125° = 180°$

= $\angle x = 180° – 125°$

= $\angle x = 55°$

Corresponding angles

= $\angle z = 125°$

Adjacent interior angles

= $\angle x + \angle z = 180°$

= $\angle x + 125° = 180°$

= $\angle x = 180° – 125°$

= $\angle x = 55°$

Adjacent interior angles

= $\angle x + \angle y = 180°$

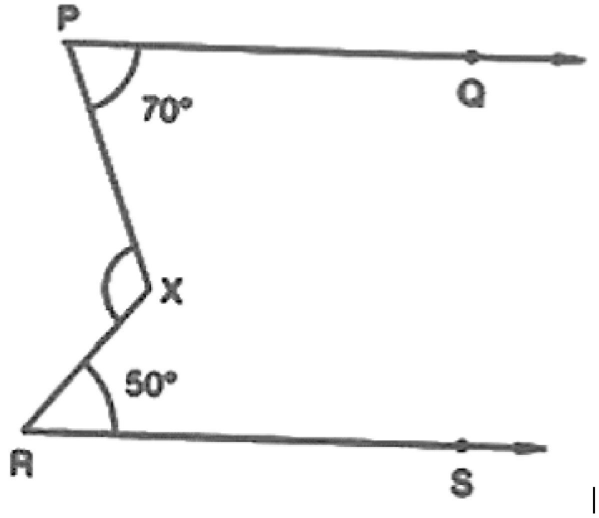
= $\angle y + 55° = 180°$

= $\angle y = 180° – 55°$

= $\angle y = 125°$

Question: 20

In Figure, find out ∠PXR, if PQ ∥ RS.



Solution:

We need to find ∠PXR

∠XRS = 50°

∠XPR = 70°

Given, that PQ ∥ RS

∠PXR = ∠XRS + ∠XPR

∠PXR = 50° + 70°

∠PXR = 120°

Therefore, ∠PXR = 120°

Question: 21

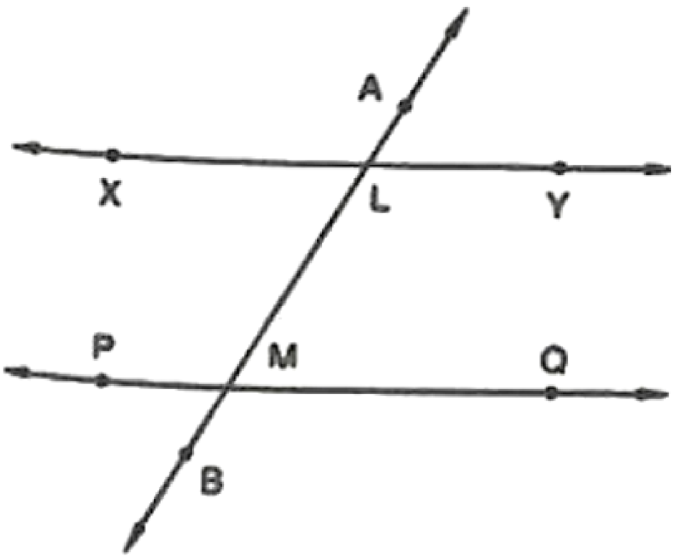
In Figure, we have

(i) ∠MLY = 2∠LMQ

(ii) ∠XLM = (2x - 10)° and ∠LMQ = (x + 30) °, find x.

(iii) ∠XLM = ∠PML, find ∠ALY

(iv) ∠ALY = (2x - 15) °, ∠LMQ = (x + 40) °, find x.



Solution:

(i) ∠MLY and ∠LMQ are interior angles

= ∠MLY + ∠LMQ = 180°

= 2∠LMQ + ∠LMQ = 180°

= 3∠LMQ = 180°

= ∠LMQ = 180°/3

= ∠LMQ = 60°

(ii) ∠XLM = (2x - 10)° and ∠LMQ = (x + 30) °, find x.

∠XLM = (2x - 10) ° and ∠LMQ = (x + 30) °

∠XLM and ∠LMQ are alternate interior angles

= ∠XLM = ∠LMQ

= (2x - 10) ° = (x + 30) °

= 2x – x = 30° + 10°

= x = 40°

Therefore, x = 40°

(iii) ∠XLM = ∠PML, find ∠ALY

∠XLM = ∠PML

Sum of interior angles is 180 degrees

= ∠XLM + ∠PML = 180°

= ∠XLM + ∠XLM = 180°

= 2∠XLM = 180°

= ∠XLM = 180°/2

= ∠XLM = 90°

∠XLM and ∠ALY are vertically opposite angles

Therefore, ∠ALY = 90°

(iv) ∠ALY = (2x - 15) °, ∠LMQ = (x + 40) °, find x.

∠ALY and ∠LMQ are corresponding angles

= ∠ALY = ∠LMQ

= (2x - 15) °= (x + 40) °

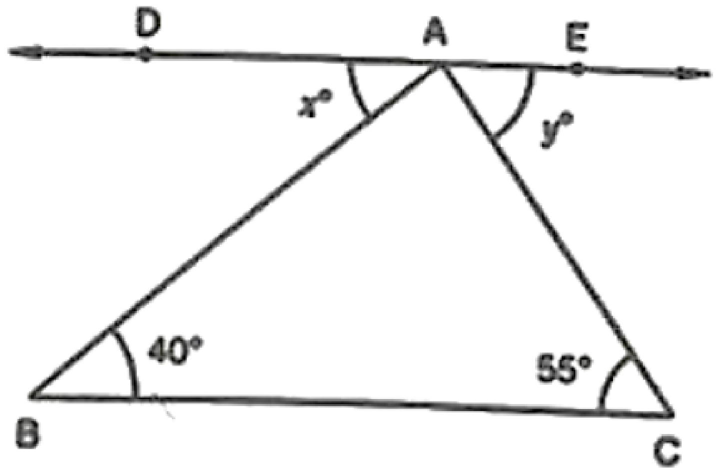
= 2x – x = 40° + 15°

=x = 55°

Therefore, x = 55°

Question: 22

In Figure, DE ∥ BC. Find the values of x and y.



Solution:

We know that,

ABC, DAB are alternate interior angles

∠ABC = ∠DAB

So, x = 40°

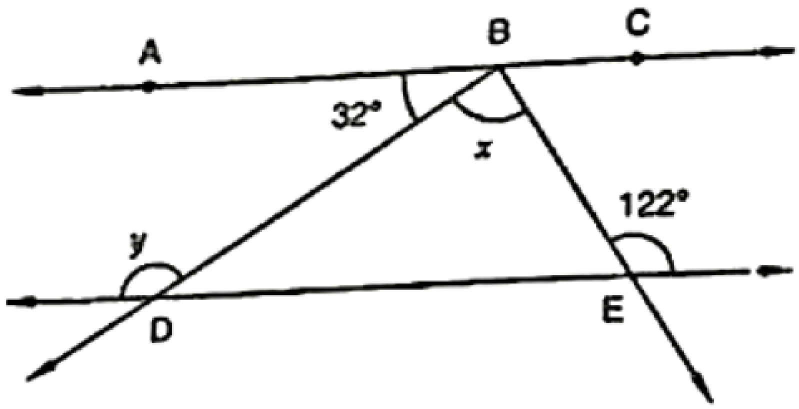
And ACB, EAC are alternate interior angles

∠ACB = ∠EAC

So, y = 40°

Question: 23

In Figure, line AC ∥ line DE and ∠ABD = 32°, Find out the angles x and y if ∠E = 122°.



Solution:

∠BDE = ∠ABD = 32° – Alternate interior angles

= ∠BDE + y = 180°– linear pair

= 32° + y = 180°

= y = 180° – 32°

= y = 148°

∠ABE = ∠E = 32° – Alternate interior angles

= ∠ABD + ∠DBE = 122°

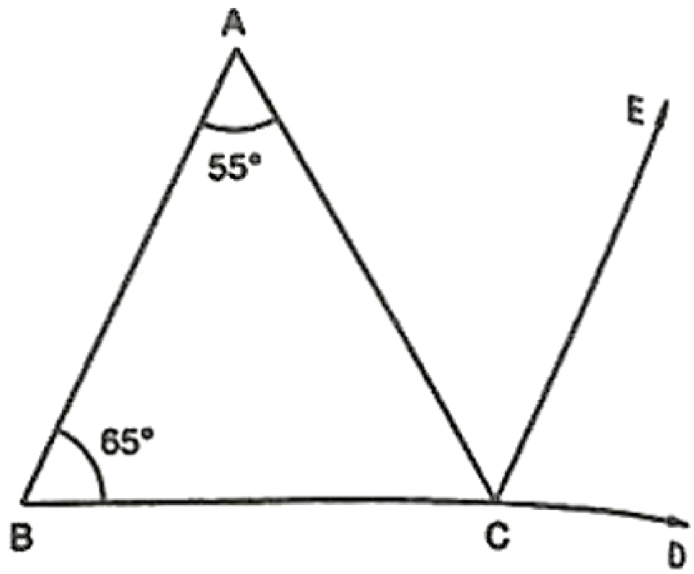
= 32° + x = 122°

= x = 122° – 32°

= x = 90°

Question: 24

In Figure, side BC of ΔABC has been produced to D and CE ∥ BA. If ∠ABC = 65°, ∠BAC = 55°, find ∠ACE, ∠ECD, ∠ACD.



Solution:

Corresponding angles,

∠ABC = ∠ECD = 55°

Alternate interior angles,

∠BAC = ∠ACE = 65°

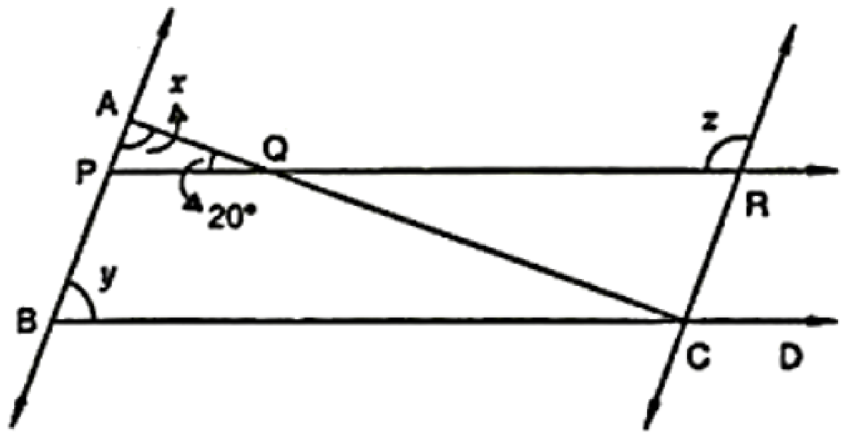
Now, ∠ACD = ∠ACE + ∠ECD

= ∠ACD = 55° + 65°

= 120°

Question: 25

In Figure, line CA ⊥ AB ∥ line CR and line PR ∥ line BD. Find ∠x, ∠y, ∠z.



Solution:

Given that, CA ⊥ AB

= ∠CAB = 90°

= ∠AQP = 20°

By, angle of sum property

In ΔAPD

= ∠CAB + ∠AQP + ∠APQ = 180◦

= ∠APQ = 180° – 90° – 20°

= ∠APQ = 70°

y and ∠APQ are corresponding angles

= y = ∠APQ = 70°

∠APQ and ∠z are interior angles

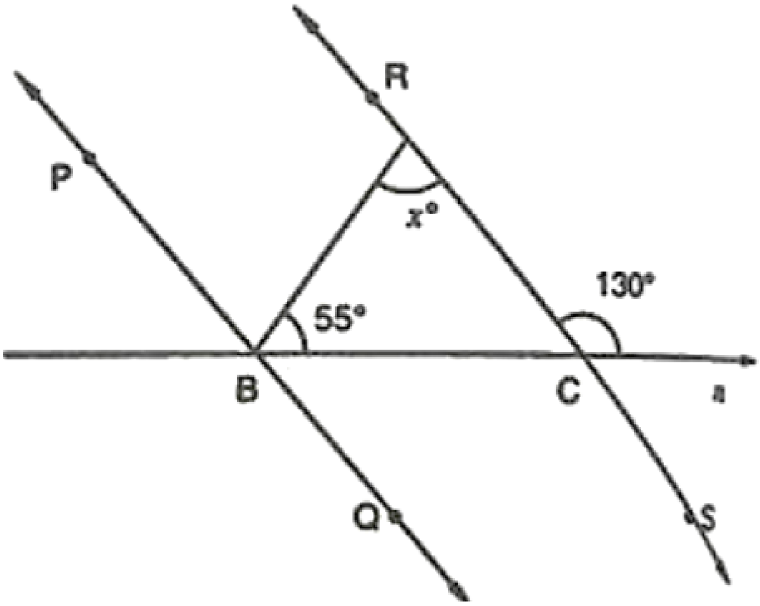
= ∠APQ + ∠z = 180°

= ∠z = 180° – 70°

= ∠z = 110°

Question: 26

In Figure, PQ ∥ RS. Find the value of x.



Solution:

Given,

Linear pair,

∠RCD + ∠RCB = 180°

= ∠RCB = 180° – 130°

= 50°

In ΔABC,

∠BAC + ∠ABC + ∠BCA = 180°

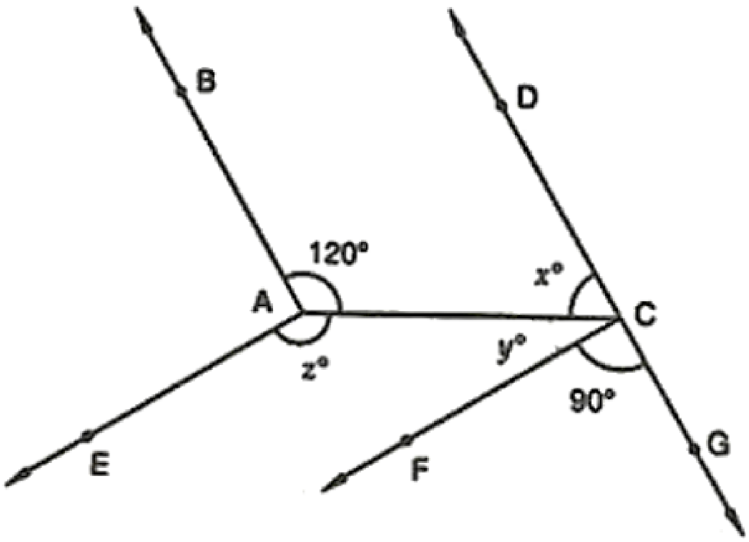
By, angle sum property

= ∠BAC = 180° – 55° – 50°

= ∠BAC = 75°

Question: 27

In Figure, AB ∥ CD and AE ∥ CF, ∠FCG = 90° and ∠BAC = 120°. Find the value of x, y and z.



Solution:

Alternate interior angle

∠BAC = ∠ACG = 120°

= ∠ACF + ∠FCG = 120°

So, ∠ACF = 120° – 90°

= 30°

Linear pair,

∠DCA + ∠ACG = 180°

= ∠x = 180° – 120°

= 60°

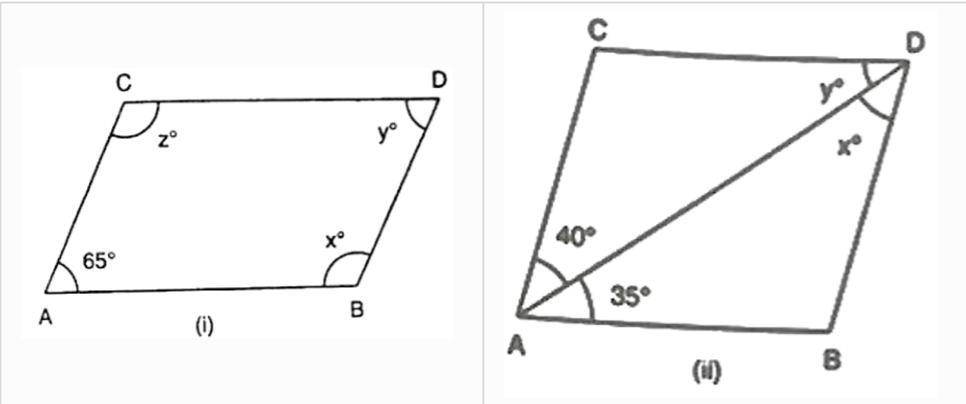
∠BAC + ∠BAE + ∠EAC = 360°

∠CAE = 360° – 120° – (60° + 30°)

= 150°

Question: 28

In Figure, AB ∥ CD and AC ∥ BD. Find the values of x, y, z.



Solution:

(i) Since, AC ∥ BD and CD ∥ AB, ABCD is a parallelogram

Adjacent angles of parallelogram,

∠CAD + ∠ACD = 180°

= ∠ACD = 180° – 65°

= 115°

Opposite angles of parallelogram,

= ∠CAD = ∠CDB = 65°

= ∠ACD = ∠DBA = 115°

(ii) Here,

AC ∥ BD and CD ∥ AB

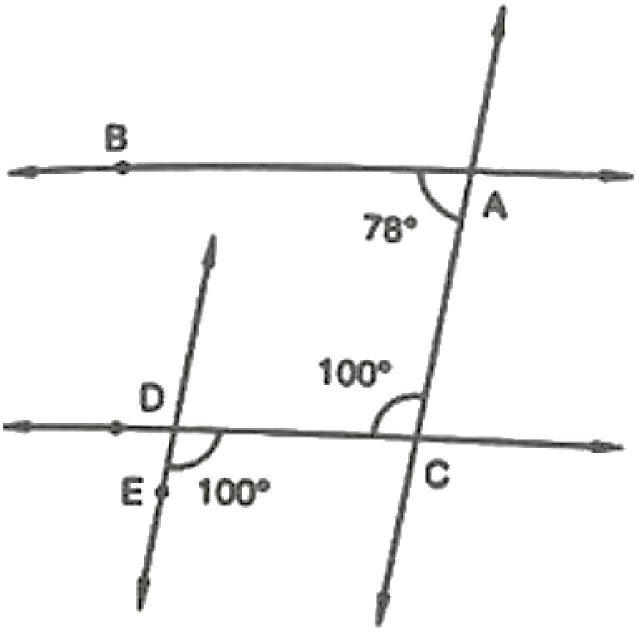
Alternate interior angles,

∠DCA = x = 40°

∠DAB = y = 35°

Question: 29

In Figure, state which lines are parallel and why?



Solution:

Let, F be the point of intersection of the line CD and the line passing through point E.

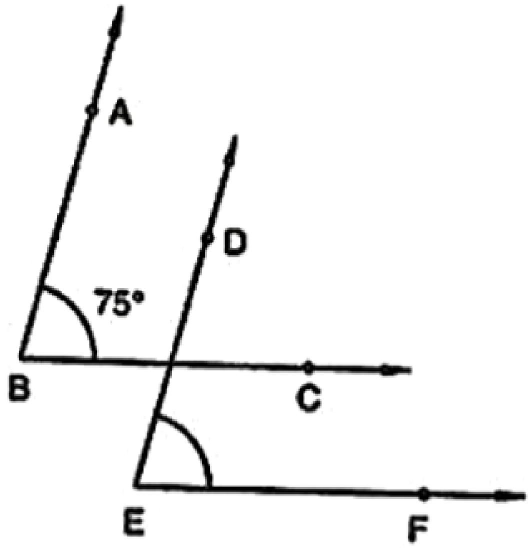
Here, ∠ACD and ∠CDE are alternate and equal angles.

So, ∠ACD = ∠CDE = 100°

Therefore, AC ∥ EF

Question: 30

In Figure, the corresponding arms of ∠ABC and ∠DEF are parallel. If ∠ABC = 75°, find ∠DEF.



Solution:

Let, G be the point of intersection of the lines BC and DE

Since, AB ∥ DE and BC ∥ EF

The corresponding angles,

= ∠ABC = ∠DGC = ∠DEF = 100°