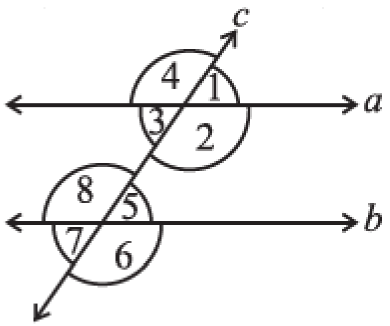
Section A

Q1. In the adjoining figure, identify



(i) The pairs of corresponding angles.

Answer: By observing the figure, the pairs of the corresponding angles are,

∠1 and ∠5, ∠4 and ∠8, ∠2 and ∠6, ∠3 and ∠7

(ii) The pairs of alternate interior angles.

Answer: By observing the figure, the pairs of alternate interior angles are,

∠2 and ∠8, ∠3 and ∠5

(iii) The pairs of interior angles on the same side of the transversal.

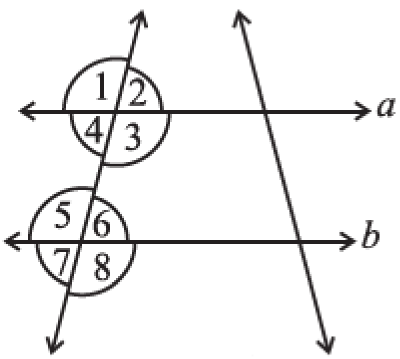
Answer: By observing the figure, the pairs of interior angles on the same side of the transversal are ∠2 and ∠5, ∠3 and ∠8

(iv) The vertically opposite angles.

Answer: By observing the figure, the vertically opposite angles are,

∠1 and ∠3, ∠5 and ∠7, ∠2 and ∠4, ∠6 and ∠8

Q2. **State the property that is used in each of the following statements.**



(i) If a ∥ b, then ∠1 = ∠5.

Answer: Corresponding angles property is used in the above statement.

(ii) If ∠4 = ∠6, then a ∥ b.

Answer: Alternate interior angles property is used in the above statement.

(iii) If ∠4 + ∠5 = 180º, then a ∥ b.

Answer: Interior angles on the same side of the transversal are supplementary.

Section B

Q3. Angles which are both supplementary and vertically opposite are

a. 95°, 85° b. 90°, 90° c. 100°, 80° d. 45°, 45°

Answer: We have to find the angles which are supplementary as well as vertically opposite.

Vertical angles theorem or vertically opposite angles theorem states that two opposite vertical angles formed when two lines intersect each other are always equal (congruent) to each other.

When the sum of the measures of two angles is 180°, the angles are called supplementary angles.

From the options,

1) considering 95°, 85°

Sum of angles = 95° + 85°

= 180°

The angles 95° and 85° are not equal

Therefore, 95° and 85° are supplementary but not vertically opposite.

2) considering 90°, 90°

Sum of angles = 90° + 80°

= 180°

The angles 90° and 90° are not equal

Therefore, 90° and 90° are supplementary as well as vertically opposite.

3) considering 100°, 80°

Sum of angles = 100° + 80°

= 180°

The angles 100° and 80° are not equal

Therefore, 100° and 80° are supplementary but not vertically opposite.

4) considering 45°, 45°

Sum of angles = 45° + 45°

= 90°

The angles 45° and 45° are equal

Therefore, 45° and 45° are complementary as well as vertically opposite.

Q4. The angle which makes a linear pair with an angle of 61° is of

(a) 29° **(b) 61°** **(c) 122°** **(d) 119°**

Answer: (d) 119°

A linear pair is a pair of adjacent angles whose non-common sides are opposite rays.

We know that the measure of the sum of adjacent angles is equal to 180°.

Let the measure of the other angle be x°.

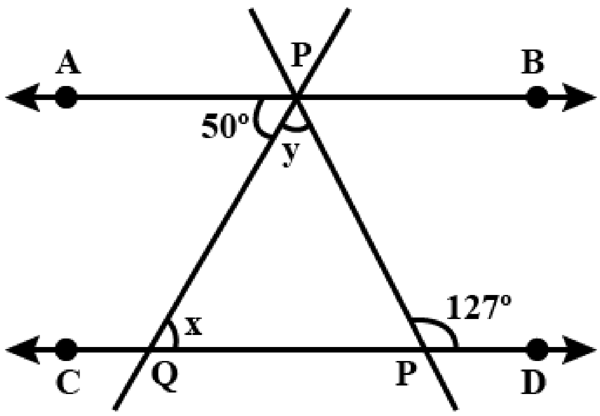
Then,

x + 61° = 180°

x = 180° – 61°

x = 119°

Q5. In Fig. 5.11, if AB || CD, ∠ APQ = 50° and ∠PRD = 130°, then ∠ QPR is



(a) 130° **(b) 50°** **(c) 80°** **(d) 30°**

Answer: (c) 80°

We know that, ∠APR = ∠PRD … [because interior alternate angles]

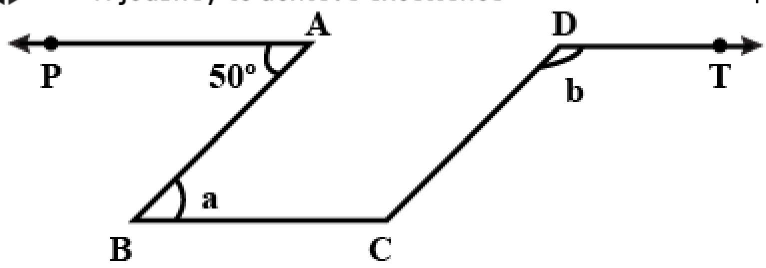
∠APQ + ∠QPR = 130°

50° + ∠QPR = 130°

∠QPR = 130° – 50°

∠QPR = 80°

Q6. In Fig. 5.16, PA || BC || DT and AB || DC. Then, the values of a and b are respectively.



(a) 60°, 120° (b) 50°,130° (c) 70°,110° (d) 80°,100°

Answer: (b) 50°,130°

We know that, ∠PAB = ∠ABC = 50° … [because interior alternate angles]

Given, AB || DC so consider it as parallelogram,

In a parallelogram, adjacent angles of the parallelogram are supplementary.

So, ∠ABC + ∠BCD = 180°

50° + ∠BCD = 180°

∠BCD = 180° – 50°

∠BCD = 130°

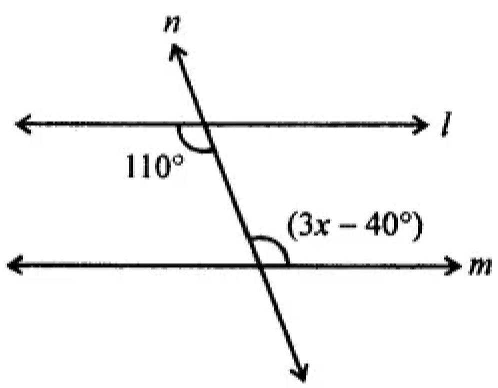
∠BCD = ∠CDT = 130° … [because interior alternate angles]

Therefore, a = 50° and b = 130°

Section C

Q7. In the given figure, if l || m then the value of x is

(a) x = 50 (b) x = 60 (c) x = 70 (d) x = 45



Answer:

In the given figure, l || m

110° = 3x − 40°

⇒ 3x = 110° + 40° = 150°

x = 50° (a)

Q8. In Fig.63, line l ∥ m and a transversal n cuts them P and Q respectively. If ∠1 = 75°, find all other angles.

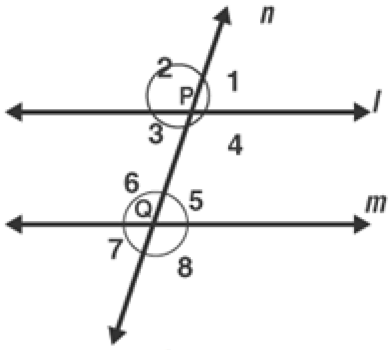


Fig. 63

Answer:

Given that, l ∥ m and ∠1 = 75°

∠1 = ∠3 are vertically opposite angles

We know that, from the figure

∠1 + ∠2 = 180° is a linear pair

∠2 = 180° – 75°

∠2 = 105°

Here, ∠1 = ∠5 = 75° are corresponding angles

∠5 = ∠7 = 75° are vertically opposite angles.

∠2 = ∠6 = 105° are corresponding angles

∠6 = ∠8 = 105° are vertically opposite angles

∠2 = ∠4 = 105° are vertically opposite angles

So, ∠1 = 75°, ∠2 = 105°, ∠3 = 75°, ∠4 = 105°, ∠5 = 75°, ∠6 = 105°, ∠7 = 75° and ∠8 = 105°

Q9. In Fig. 80, line AC ∥ line DE, and ∠ABD = 32°, Find out the angles x and y if ∠E = 122°.

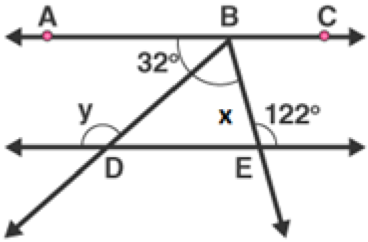


Fig. 80

Answer:

Given line AC ‖ line DE and ∠ABD = 32°

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

∠BDE + y = 180°– linear pair

32° + y = 180°

y = 180° – 32°

y = 148°

∠ABE = ∠E = 122° – Alternate interior angles

∠ABD + ∠DBE = 122°

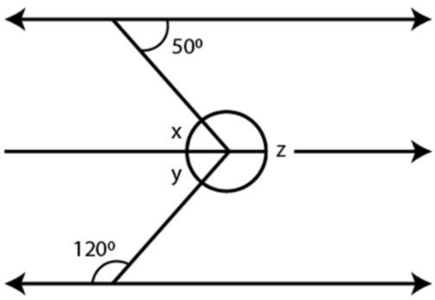
32° + x = 122°

x = 122° – 32°

x = 90°

Section D

Q10. In the given figure, the directed lines are parallel to each other. Find the unknown angles.



Answer: If the lines are parallel

$x = 50^0$ are alternate angles

$y + 120^0 = 180^0$ are co-interior angles

$y = 180 - 120 = 60^0$

We know that

$x + y + z = 360^0$ are angles at a point

Substituting the values

$50 + 60 + z = 360$

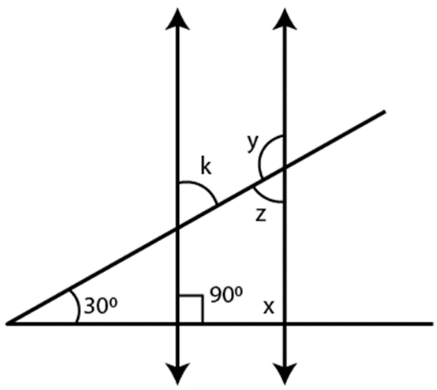
By further calculation

$110 + z = 360$

$z = 360 – 110 = 250^0$

Therefore, $x = 50^0$, $y = 60^0$ and $z = 250^0$.

Q11. In the given figure, the directed lines are parallel to each other. Find the unknown angles.



Answer: If the lines are parallel

$x + 90^0 = 180^0$ are co-interior angles

$x = 180^0 – 90^0 = 90^0$

$\angle 2 = x$

$\angle 2 = 90^0$

We know that the sum of angles of a triangle

$\angle 1 + \angle 2 + 30^0 = 180^0$

Substituting the values

$\angle 1 + 90^0 + 30^0 = 180^0$

By further calculation

$\angle 1 + 120^0 = 180^0$

$\angle 1 = 180 – 120 = 60^0$

Here $\angle 1 = k$ are vertically opposite angles

$k = 60^0$

Here $\angle 1 = z$ are corresponding angles

$z = 60^0$

Here k + y = 180^0 are co-interior angles

Substituting the values

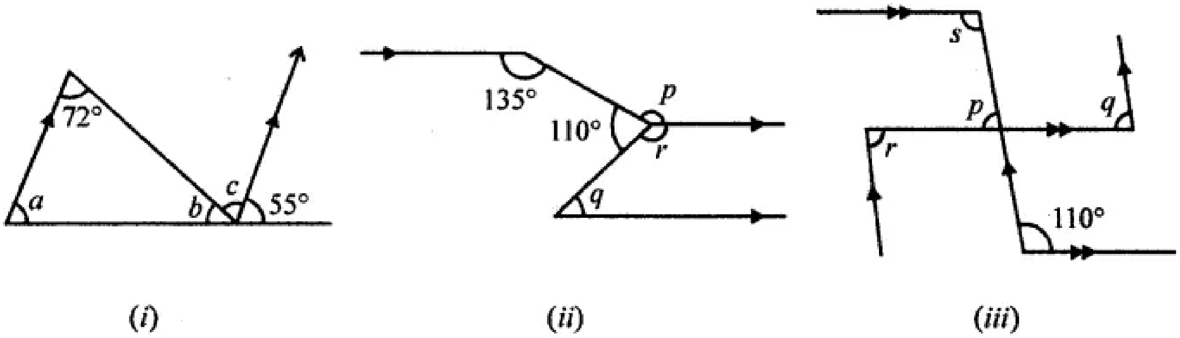
$60^0 + y = 180^0$

$y = 180 – 60 = 120^0$

Therefore, $x = 90^0$, $y = 120^0$, $z = 60^0$, $k = 60^0$.

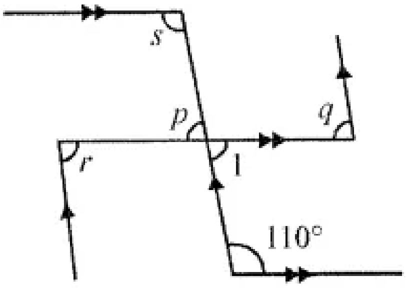
Higher Order Thinking Skills (HOTS)

Q14. Calculate the measure of each lettered angle in the following figures (parallel line segments / rays are denoted by thick matching arrows):



Answer:

(i) In the given figure,
Given ∠s are 72° and 55°
a = 55° (Corresponsing angles)
c = 72° (Alternate angles)
But b + c + 55° = 180°
(Angles on the one side of a straight line)
⇒ b + 72° + 55° = 180°
⇒ b + 127° = 180°
⇒ b = 180° − 127° = 53°
a = 55, b = 53°, c = 72°
(ii) In the given figure,



Give ∠s are 135° and 110°
p = 135° (Alternate angles)
p + r + 110° = 360° (Angles at a point)
⇒ 135° + 110° + r = 360°
⇒ 245° + r = 360°
⇒ r = 360° − 245° = 115°
But r + q = 180° (Co-interior angles)
⇒ 115° + q = 180°
⇒ q = 180° − 115° = 65°
p = 135°, q = 65°, r = 115°
(iii) In the given figure,
Given angle is 110°
p = ∠1 (Vertically opposite angles)
But ∠1 + 110° = 180° (Co-interior angles)
⇒ ∠1 = 180° − 110° = 70°
⇒ p = ∠1 = 70°
s = 110° (Alternate angles with 110°)
p = q (Corresponding angles)
q = 70°
r = q (Alternate angles)
r = 70°
Now, p = 70°, q = 70°, r = 70°, s = 110°

Extra Questions:

Q1. In Fig. 60, 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.

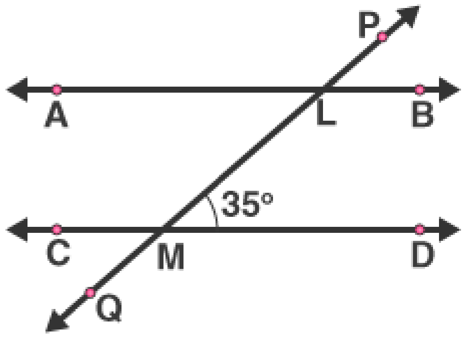


Fig. 60

Answer:

Given that, ∠LMD = 35°

From the figure we can write

∠LMD and ∠LMC is a linear pair

∠LMD + ∠LMC = 180° [sum of angles in linear pair = 180°]

On rearranging, we get

∠LMC = 180° – 35°

= 145°

So, ∠LMC = ∠PLA = 145°

And, ∠LMC = ∠MLB = 145°

∠MLB and ∠ALM is a linear pair

∠MLB + ∠ALM = 180° [sum of angles in linear pair = 180°]

∠ALM = 180° – 145°

∠ALM = 35^0

Therefore, ∠ALM = 35°, ∠PLA = 145°.

Q2. In Fig. 83, PQ || RS. Find the value of x.

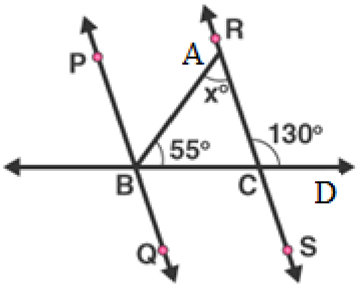


Fig. 83

Answer: 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°