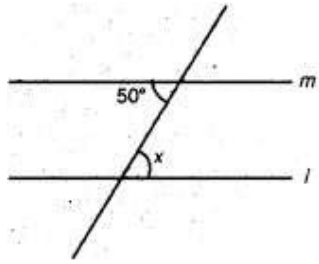# MATHEMATICS

Chapter 5: Lines and Angles

(c) A zero angle

(d) A right angle

Question 13. If in the given figure l ∥ m then :

(a) x = 50°
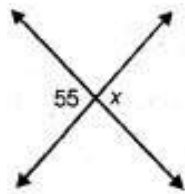
(b) x = 60°

(c) No relation

Question 14. What are the lines which lie on the same plane and do not intersect at any point called?

(a) Perpendicular lines

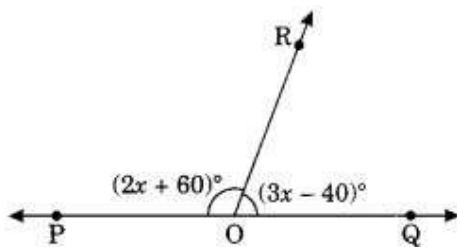(b) Intersecting lines

(c) Parallel lines

(d) Collinear lines
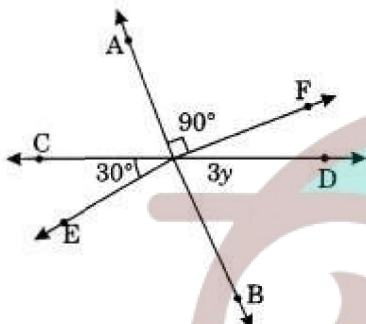
Question 15.In the given figure value of x is :

(b) 45°

(a) 55°

(b) 45°

(c) 65°

(d) None of these

Very Short Questions :

1. Find the angles which is $\frac{1}{5}$ of its complement.

2. Find the angles which is $\frac{2}{3}$ of its supplement.

3. Find the value of x in the given figure.
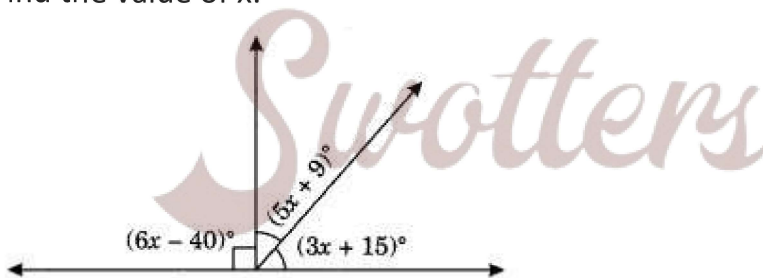
4. In the given figure, find the value of y.

5. Find the supplements of each of the following:
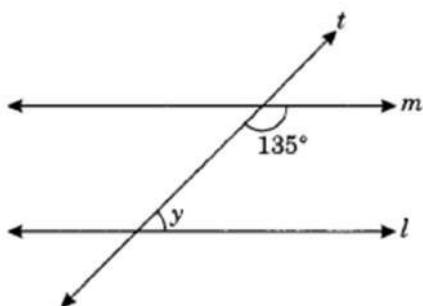
(i) 30°

(ii) 79°

(iii) 179°

(iv) x°

(v) $\frac{2}{5}$ of right angle

6. If the angles (4x + 4)° and (6x – 4)° are the supplementary angles, find the value of x.
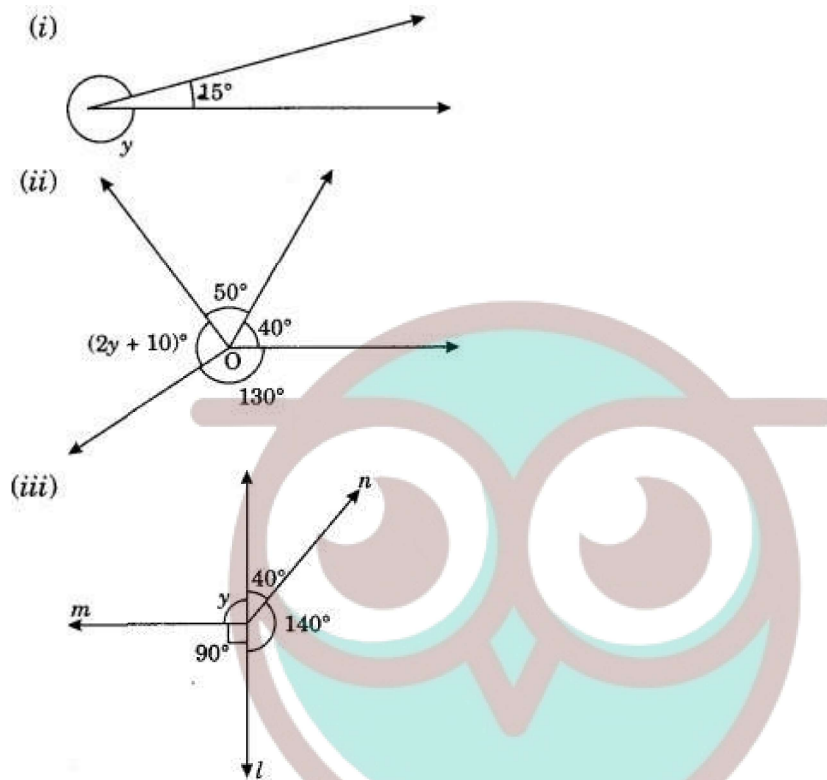
7. Find the value of x.

8. Find the value of y.

Short Questions :

1. Find the value of y in the following figures:

(i)

(ii)

(iii)

2. In the following figures, find the lettered angles.

(i)
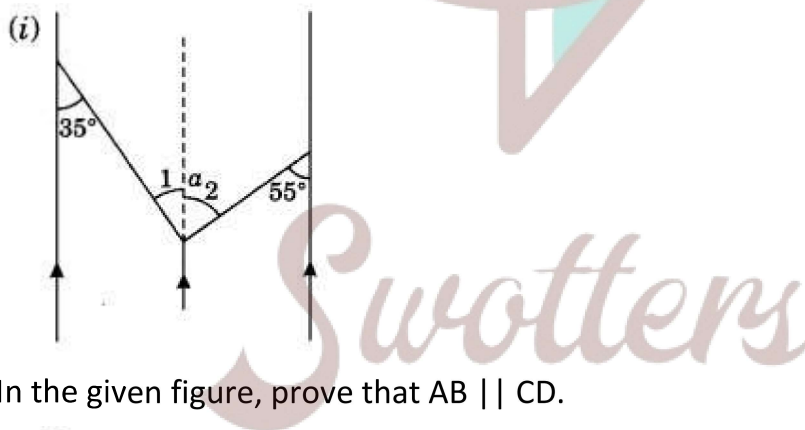
3. In the given figure, prove that AB || CD.
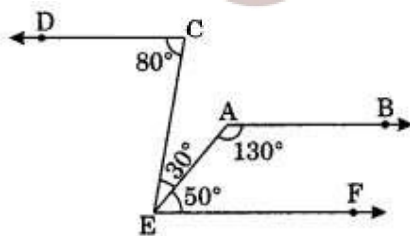
4. In the given figure l || m. Find the values of a, b and c.

(i)

(ii)
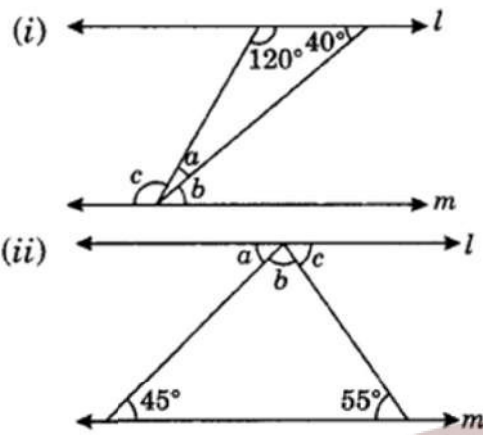
5. In the adjoining figure if x : y : z = 2 : 3 : 4, then find the value of z.
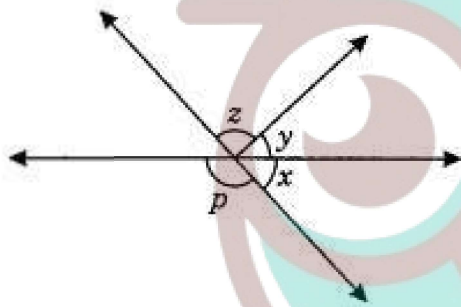
Long Questions :

1. In the following figure, find the value of ∠BOC, if points A, O and B are collinear.
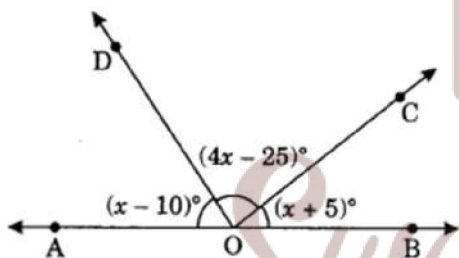
2. In given figure, PQ, RS and UT are parallel lines.

(i) If c = 57° and a = $\frac{c}{3}$, find the value of d.

(ii) If c = 75° and a = $\frac{2}{5}$ c , find

3. An angle is greater than 45˚. Is its complementary angle greater than 45˚

or equal to 45˚ or less than 45˚?

4. In the adjoining figure, p ∥ q. Find the unknown angles.

Assertion and Reason Questions:
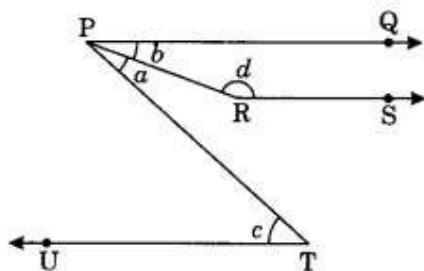
1.) Assertion: When the sum of the measures of two angles is 90°, the angles are called complementary angles.

Reason: Two acute angles can be complementary to each other.

a.) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion

b.) Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.

c.) assertion is true but the reason is false.

d.) both assertion and reason are false.

2.) Assertion: The sum of the measures of two complementary angles is 90°.

Reason: When the sum of the measures of two angles is 90°, the angles are called complementary angles.

a.) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion

b.) Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.

c.) assertion is true but the reason is false.

d.) both assertion and reason are false.

<u>ANSWER KEY -</u>

Multiple Choice questions :

1. (c) None of these
2. (a) 25°
3. (a) 90°
4. (c) 63°, 27°
5. (a) 20°
6. (c) Remains the same
7. (d) None of these
8. (b) 75°
9. (a) x = 60°
10. (c) 112°, 68°

11. (a) 180°

12. (c) A zero angle

13. (a) x = 50°

14. (c) Parallel lines

15. (a) 55°

Very Short Answer :

1.   Let the required angle be x°

     its complement = (90 − x)°

     As per condition, we get

     $$\frac{1}{5} \text{ of } (90 - x)° = x°$$

     $$\Rightarrow \qquad \frac{1}{5} \times (90 - x)° = x°$$

     $$\Rightarrow \qquad \frac{1}{5} \times 90° - \frac{1}{5} \times x° = x°$$

     $$\Rightarrow \qquad 18° - \frac{1}{5} x° = x°$$

     $$\Rightarrow \qquad x° + \frac{1}{5} x° = 18°$$

     $$\Rightarrow \qquad \frac{6}{5} x° = 18°$$

     $$\therefore \qquad x° = 18 \times \frac{5}{6}° = 15°$$

     Thus, the required angle be 15°.

2.   Let the required angle be x°.

     its supplement = (180 − x)°

     As per the condition, we get

     $\frac{2}{3}$ of (180 − x)° = x°

$$\Rightarrow \qquad \frac{2}{3} \times (180 - x)° = x°$$

$$\Rightarrow \qquad \frac{2}{3} \times 180° - \frac{2}{3} \times x° = x°$$

$$\Rightarrow \qquad \cdot 120° - \frac{2}{3}x° = x°$$

$$\Rightarrow \qquad x° + \frac{2}{3}x° = 120°$$

$$\Rightarrow \qquad \frac{5}{3}x° = 120°$$

$$\therefore \qquad x° = 120° \times \frac{3}{5} = 72°$$

Thus, the required angle be 72°.

3. ∠POR + ∠QOR = 180° (Angles of linear pair)

   ⇒ (2x + 60°) + (3x − 40)° = 180°

   ⇒ 2x + 60 + 3x − 40 = 180°

   ⇒ 5x + 20 = 180°

   ⇒ 5x = 180 − 20 = 160

   ⇒ x = 32

   Thus, the value of x = 32.

4. Let the angle opposite to 90° be z.

   z = 90° (Vertically opposite angle)

   3y + z + 30° = 180° (Sum of adjacent angles on a straight line)

   ⇒ 3y + 90° + 30° = 180°

   ⇒ 3y + 120° = 180°

   ⇒ 3y = 180° − 120° = 60°

   ⇒ y = 20°

5. Thus the value of y = 20°.

   (i) Supplement of 30° = 180° − 30° = 150°

   (ii) Supplement of 79° = 180° − 79° = 101°

   (iii) Supplement of 179° = 180° − 179° = 1°

   (iv) Supplement of x° = (180 − x)°

   (v) Supplement of $\frac{2}{5}$ of right angle

   $= 180° - \frac{2}{5} \times 90° = 180° - 36° = 144°$

6. (4x + 4)° + (6x − 4)° = 180° (∵ Sum of the supplementary angle is 180°)

⇒ 4x + 4 + 6x − 4 = 180°

⇒ 10x = 180°

⇒ x = 18°

Thus, x = 18°

7. (6x − 40)° + (5x + 9)° + (3x + 15) ° = 180° (∵ Sum of adjacent angles on straight line)

⇒ 6x − 40 + 5x + 9 + 3x + 15 = 180°

⇒ 14x − 16 = 180°

⇒ 14x = 180 + 16 = 196

⇒ x = 14

Thus, x = 14

8. l || m, and t is a transversal.

y + 135° = 180° (Sum of interior angles on the same side of transversal is 180°)

⇒ y = 180° − 135° = 45°

Thus, y = 45°

Short Answer :

1. (i) y + 15° = 360° (Sum of complete angles round at a point)

⇒ y = 360° − 15° = 345°

Thus, y = 345°

(ii) (2y + 10)° + 50° + 40° + 130° = 360° (Sum of angles round at a point)

⇒ 2y + 10 + 220 = 360

⇒ 2y + 230 = 360

⇒ 2y = 360 − 230

⇒ 2y = 130

⇒ y = 65

Thus, y = 65°

(iii) y + 90° = 180° (Angles of linear pair)

⇒ y = 180° − 90° = 90°

[40° + 140° = 180°, which shows that l is a straight line]

2. (i) Let a be represented by ∠1 and ∠2

∠a = ∠1 + ∠2

∠1 = 35° (Alternate interior angles)

∠2 = 55° (Alternate interior angles)

∠1 + ∠2 = 35° + 55°

∠a = 90°

Thus, ∠a = 90°

3.   ∠CEF = 30° + 50° = 80°

∠DCE = 80° (Given)

∠CEF = ∠DCE

But these are alternate interior angle.

CD || EF ……(i)

Now ∠EAB = 130° (Given)

∠AEF = 50° (Given)

∠EAB + ∠AEF = 130° + 50° = 180°

But these are co-interior angles.

AB || EF …(ii)

From eq. (i) and (ii), we get

AB || CD || EF

Hence, AB || CD

Co-interior angles/Allied angles: Sum of interior angles on the same side of transversal is 180°.

4.   (i) We have l || m

∠b = 40° (Alternate interior angles)

∠c = 120° (Alternate interior angles)

∠a + ∠b + ∠c = 180° (Sum of adjacent angles on straight angle)

⇒ ∠a + 40° + 120° = 180°

⇒ ∠a + 160° = 180°

⇒ ∠a = 180° − 160° = 20°

Thus, ∠a = 20°, ∠b = 40° and ∠c = 120°.

(ii) We have l || m

∠a = 45° (Alternate interior angles)

∠c = 55° (Alternate interior angles)

∠a + ∠b + ∠c = 180° (Sum of adjacent angles on straight line)

⇒ 45 + ∠b + 55 = 180°

⇒ ∠b + 100 = 180°

⇒ ∠b = 180° − 100°

⇒ ∠b = 80°

5.   Let x = 2s°

y = 3s°

and z = 4s°

∠x + ∠y + ∠z = 180° (Sum of adjacent angles on straight line)

2s° + 3s° + 4s° = 180°

⇒ 9s° = 180°

⇒ s° = 20°

Thus x = 2 × 20° = 40°, y = 3 × 20° = 60° and z = 4 × 20° = 80°

Long Answer :

1.   We have A, O and B are collinear.

∠AOD + ∠DOC + ∠COB = 180° (Sum of adjacent angles on straight line)

(x − 10)° + (4x − 25)° + (x + 5)° = 180°

⇒ x − 10 + 4x − 25 + x + 5 = 180°

⇒ 6x − 10 − 25 + 5 = 180°

⇒ 6x − 30 = 180°

⇒ 6x = 180 + 30 = 210

⇒ x = 35

So, ∠BOC = (x + 5)° = (35 + 5)° = 40°

2.   (i) We have ∠c = 57° and ∠a = $\frac{\angle c}{3}$

∠a = 573 = 19°

PQ || UT (given)

∠a + ∠b = ∠c (Alternate interior angles)

19° + ∠b = 57°

∠b = 57° − 19° = 38°

PQ || RS (given)

∠b + ∠d = 180° (Co-interior angles)

38° + ∠d = 180°

∠d = 180° − 38° = 142°

Thus, ∠d = 142°

(ii) We have ∠c = 75° and $\angle a = \frac{2}{5}\angle c$

$\angle a = \frac{2}{5} \times 75° = 30°$

PQ || UT (given)

∠a + ∠b = ∠c

30° + ∠b = 75°

∠b = 75° − 30° = 45°

Thus, ∠b = 45°

3. Let us assume the complementary angles be p and q,

We know that, sum of measures of complementary angle pair is 90°.

Then,

= p + q = 90°

It is given in the question that p > 45°

Adding q on both the sides,

= p + q > 45° + q

= 90o > 45° + q

= 90o − 45° > q

= q < 45°

Hence, its complementary angle is less than 45°.

4. By observing the figure,

∠d = ∠125° … [∵ corresponding angles]

We know that, Linear pair is the sum of adjacent angles is 180°

Then,

= ∠e + 125° = 180° … [Linear pair]

= ∠e = 180° − 125°

= ∠e = 55°

From the rule of vertically opposite angles,

∠f = ∠e = 55°

∠b = ∠d = 125°

By the property of corresponding angles,

∠c = ∠f = 55°

∠a = ∠e = 55°

Assertion and Reason Answers:

1) b.) Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.

2) a.) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.