## **Coordinate Geometry**

## Assertion & Reason Type Questions

In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:

a. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)

b. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A)

c. Assertion (A) is true and Reason (R) is false

d. Assertion (A) is false and Reason (R) is true

Q 1. Assertion (A): The distance between the points

 $(\cos e, \sin \theta)$  and  $(\sin \theta, -\cos \theta)$  is 2 units.

Reason (R): The distance between two points

 $A(x_1,y_1)$  and  $B(x_2, y_2)$  is given by

AB =  $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ .

**Answer :** (d) **Assertion (A):** Distance between points A( $\cos \theta$ ,  $\sin \theta$ ) and B( $\sin \theta$ , -  $\cos \theta$ ) is given by

$$AB = \sqrt{(\sin \theta - \cos \theta)^2 + (-\cos \theta - \sin \theta)^2}$$

 $= \sqrt{\frac{\sin^2 \theta + \cos^2 \theta - 2\sin\theta \cos \theta}{+\cos^2 \theta + \sin^2 \theta + 2\sin\theta \cos \theta}}$ 

$$=\sqrt{2}(\sin^2\theta + \cos^2\theta) = \sqrt{2}$$
 units

So, Assertion (A) is false.

Reason (R): It is a true statement.

Hence, Assertion (A) is false but Reason (R) is true.

**Q 2. Assertion (A):** The point P(-4, 6) divides the join of A(-6, 10) and B(3,-8) in the ratio 2: 7.

**Reason (R):** If the point C(x, y) divides the join of  $A(x_1, y_1)$  and  $B(x_2, y_2)$  in the ratio m: n,





then

$$x = \frac{mx_2 + nx_1}{m+n}$$
 and  $y = \frac{my_2 + ny_1}{m+n}$ .

Answer: (a) Assertion (A): Let P(-4, 6) divides A(-6, 10) and B(3.-8) in the ratio k: 1.

Then, 
$$\frac{k \times 3 + 1 \times (-6)}{k+1} = -4$$
 and  $\frac{k \times (-8) + 1 \times 10}{k+1} = 6$   
 $\Rightarrow \quad 3k - 6 = -4k - 4$  and  $-8k + 10 = 6k + 6$   
 $\Rightarrow \quad 7k = 2 \Rightarrow k = \frac{2}{7}$  and  $14k = 4 \Rightarrow k = \frac{2}{7}$ 

:- Required ratio is 2/7 ie., 2:7.

So, Assertion (A) is true.

Reason (R): It is also true.

Hence, both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Q 3. Assertion (A): The point (0, 4) lies on Y-axis.

Reason (R): The x-coordinate of the point on Y-axis is zero.

**Answer : Assertion (A):** X-coordinate of each point lies on Y-axis is zero. So, the point (0, 4) always lies on Y-axis.

Thus, Assertion (A) is true.

**Reason (R):** It is a true statement. Hence, both Assertion (A) and Reason (R) is true and Reason (R) is the correct explanation of Assertion (A).

**Q 4. Assertion (A):** The coordinates of the points which divide the line segment joining A(2, -8) and

B(-3, -7) into three equal parts are  $\left(\frac{1}{3}, -\frac{23}{3}\right)$  and

 $\left(-\frac{4}{3},-\frac{22}{3}\right)$ 

**Reason (R):** The points which divide AB in the ratio 1:3 and 3 : 1 are called points of trisection of AB.

**Answer : (c) Assertion (A):** Let P and Q be the points which divide A(2, -8) and B(-3, -7) into three equal parts.

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So, coordinates of P

$$= \left(\frac{1 \times (-3) + 2 \times 2}{1 + 2}, \frac{1 \times (-7) + 2 \times (-8)}{1 + 2}\right)$$
$$= \left(\frac{-3 + 4}{3}, \frac{-7 - 16}{3}\right) = \left(\frac{1}{3}, -\frac{23}{3}\right)$$

Also,

∴ Coordinates of Q

$$= \left(\frac{2 \times (-3) + 1 \times 2}{2 + 1}, \frac{2 \times (-7) + 1 \times (-8)}{2 + 1}\right)$$
$$= \left(\frac{-6 + 2}{3}, \frac{-14 - 8}{3}\right) = \left(-\frac{4}{3}, -\frac{22}{3}\right)$$

So, Assertion (A) is true.

Reason (R): It is false to say that in trisection point,

point divide AB in the ratios 3:1 and 1:3.

AQ : QB = 2 : 1

Hence, Assertion (A) is true but Reason (R) is false.

**Q 5. Assertion (A):** The coordinates of the centroid of a triangle whose vertices are (0, 6), (8,12) and (8,0),

are 
$$\left(\frac{17}{3}, 5\right)$$
.

**Reason (R):** Coordinates of the centroid of a triangle whose vertices are  $(x_1,y_1)$ ,  $(X_2, y_2)$  and  $(x_3, y_3)$ , are

 $\left(\frac{x_1+x_2+x_3}{3},\frac{y_1+y_2+y_3}{3}\right).$ 

**Answer : (d) Assertion (A):** The, coordinate of the centroid of a triangle with vertices (0.6). (8, 12) and (8,0) are

$$\left(\frac{0+8+8}{3},\frac{6+12+0}{3}\right) = \left(\frac{16}{3},6\right)$$

So, Assertion (A) is false.

**Reason (R):** It is a true statement.

Hence, Assertion (A) is false but Reason (R) is true.



**Q.6.** Assertion (A) : The point (-1, 6) divides the line segment joining the points (- 3, 10) and (6, -8) in the ratio 2 : 7 internally.

**Reason (R) :** Given three points, i.e. A, B, C form an equilateral triangle, then AB = BC = AC.

Answer : (b)

**Q.7. Assertion (A) :** The point (0, 4) lies on y-axis.

**Reason (R) :** The x-coordinate on the point on y-axis is zero.

Answer: (a)

**Q.8.** Assertion (A) : The value of y is 6, for which the distance between the points P(2, -3) and Q(10, y) is 10.

**Reason (R) :** Distance between two given points A  $(x_1, y_1)$  and B  $(x_2, y_2)$  is given by

AB = 
$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Answer: (d)

**Q.9.** Assertion (A) : Mid-point of a line segment divides line in the ratio 1 : 1.

**Reason (R) :** The ratio in which the point (-3, k) divides the line segment joining the points (-5, 4) and (-2, 3) is 1 : 2.

Answer: (c)

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