Solution

COORDINATE GEOMETRY WS 3

Class 10 - Mathematics

Section A

1. **(a)** 5 units

   Explanation: Let be point A(0, 5) and B(-3, 1)

   $x_1 = 0$, $y_1 = 5$, $x_2 = -3$, $y_2 = 1$

   Distance between the points

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

   AB = $\sqrt{(-3 - 0)^2 + (1 - 5)^2}$

   $= \sqrt{9 + 16}$

   $= \sqrt{25}$

   = 5 units

2. **(c)** A straight line

   Explanation: Distance from A to B = $\sqrt{40} = 2\sqrt{10}$ units

   Distance from B to C = $\sqrt{10}$ units

   Distance from C to A = $3\sqrt{10}$ units

   Since, AB + BC = AC

   ∴ Points lie on a straight line.

3. **(c)** None of these

   Explanation: Let the point be A(a, 0) be equidistant from the two given points P(-3, 4) and Q(2, 5) So applying distance formula, we get,

   $AP^2 = AQ^2$

   Therefore,

   $(a + 3)^2 + (-4)^2 = (a - 2)^5 + 5^2$

   10a = 4

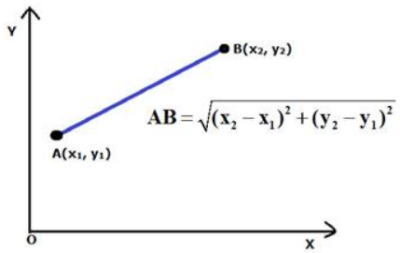
   $a = \frac{2}{5}$

   Hence the coordinates of A are $\left(\frac{2}{5}, 0\right)$

   So the answer is none of these.

4. **(a)** 8

   Explanation: By using the distance formula:

   $d^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$

   Lets calculate the distance between the points (x_1, y_1) and (x_2, y_2)

   We have;

   $x_1 = 0$, $x_2 = 0$

   $y_1 = 6$, $y_2 = -2$

   $d^2 = (0 - 0)^2 + (-2 - 6)^2$

   $d = \sqrt{(0)^2 + (-8)^2}$

   $d = \sqrt{64}$

d = 8 units

So, the distance between A (0, 6) and B (0, - 2) = 8

5.

(d) $\left(-6, \frac{5}{2}\right)$

Explanation: Distance between (0, 0) and $\left(-6, \frac{5}{2}\right)$

d = $\sqrt{(-6-0)^2 + \left(\frac{5}{2}-0\right)^2}$

= $\sqrt{36 + \frac{25}{4}}$

= $\sqrt{\frac{144+25}{4}}$

= $\sqrt{\frac{169}{4}} = \frac{13}{2}$ = 6.5

So, the point $\left(-6, \frac{5}{2}\right)$ does not lie in the circle.

6. **(a)** 12 units

Explanation: 12 units

7. **(a)** 7

Explanation: The distance of the point (4, 7) from x-axis = 7

8.

(c) x-axis

Explanation: Since the ordinates of given points are 0. Therefore, points lie on x-axis.

9.

(d) $2a\sqrt{2}$ units

Explanation: Let the points be A(a, a) and B$(-\sqrt{3}a, \sqrt{3}a)$

$\therefore$AB = $\sqrt{\left(-\sqrt{3}a - a\right)^2 + \left(\sqrt{3}a - a\right)^2}$

= $\sqrt{3a^2 + a^2 + 2\sqrt{3}aa + 3a^2 + a^2 - 2\sqrt{3}aa}$

= $\sqrt{6a^2 + 2a^2}$

= $\sqrt{8a^2}$

= $2a\sqrt{2}$ units

10. **(a)** $\sqrt{2}$ units

Explanation: Distance between $(\sin\theta, \cos\theta)$ and $(\cos\theta, -\sin\theta)$

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

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

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

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

$\left[\because \cos^2\theta + \sin^2\theta = 1\right]$

= $\sqrt{2}$ units

11.

(b) $2\sqrt{10}$ units

Explanation: $2\sqrt{10}$ units

12.

(b) None of these

Explanation: Let the points (0, 0), $(3, \sqrt{3})$ and $(3, \lambda)$ from an equilateral triangle AB = BC = CA

$\Rightarrow$ $AB^2 = BC^2 = CA^2$

Now, $AB^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$

$= (3-0)^2 + (\sqrt{3}-0)^2 = (3)^2 + (\sqrt{3})^2$

= 9 + 3 = 12

$BC^2 = (3-3)^2 + (\lambda - \sqrt{3})^2$

$= (0)^2 + (\lambda - \sqrt{3})^2 = (\lambda - 3)^2$

and $CA^2 = (0-3)^2 + (0-\lambda)^2 = (-3)^2 + (-\lambda)^2$

$= 9 + \lambda^2$

$AB^2 = CA^2 \Rightarrow 12 = 9 + \lambda^2$

$\Rightarrow \lambda^2 = 12 - 9 = 3$

$\therefore \lambda = \pm\sqrt{3}$

13. **(a)** 5

Explanation: Three vertices of a rectangle ABCD are B (4,0), C (4, 3) and D (0, 3) length of one of its diagonals

$\text{BD} = \sqrt{(4-0)^2 + (0-3)^2} = \sqrt{4^2 + 3^2}$

$= \sqrt{16+9} = \sqrt{25}$ = 5

14. **(c)** $\sqrt{34}$

Explanation: In rectangle AOBC, AB is a diagonal.

$\therefore$ AB = $\sqrt{(5-0)^2 + (0-3)^2}$

= $\sqrt{25+9}$ = $\sqrt{34}$ units

15. **(a)** $2 + \sqrt{2}$

Explanation: Let the vertices of $\triangle \text{ABC}$ be A(0, 0), B(1, 0) and C(0, 1)

Now length of AB $= \sqrt{(1-0)^2 + (0-0)^2}$

$= \sqrt{(1)^2 + 0^2} = \sqrt{1^2} = 1$

Length of AC $= \sqrt{(0-0)^2 + (1-0)^2} = \sqrt{0^2 + (1)^2}$

$= \sqrt{1^2} = 1$

and length of BC $= \sqrt{(0-1)^2 + (1-0)^2}$

$= \sqrt{(1)^2 + (1)^2} = \sqrt{1+1} = \sqrt{2}$

Perimeter of $\triangle \text{ABC}$ = Sum of sides

$= 1 + 1 + \sqrt{2} = 2 + \sqrt{2}$

16. **(d)** origin

Explanation: The point of intersection of the x-axis and y-axis is called an origin.

The coordinates of the origin are (0, 0).

17. **(d)** 2

Explanation: 2

18. **(d)** ± 4

Explanation: Distance between (4, p) and (1, 0) = 5

$\Rightarrow \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = 5$

$\Rightarrow \sqrt{(1-4)^2 + (0-p)^2} = 5$

$\sqrt{(-3)^2 + (-p)^2} = 5$

Squaring, both sides

$(-3)^2 + (-p)^2 = (5)^2 \Rightarrow 9 + p^2 = 25$

$\Rightarrow p^2 = 25 - 9 = 16$

$\therefore p = \pm\sqrt{16} = \pm 4$

19. **(c)** Coordinate Geometry

Explanation: Coordinate Geometry is an algebraic tool for studying geometry.

20. **(c)** c$\sqrt{2}$ units

Explanation: c$\sqrt{2}$ units

21. **(a)** $5\sqrt{10}$ units

Explanation: Since P is equidistant from A, B and C.

Therefore, P is centre of circumcircle of triangle ABC.

Hence, AP = Radius of circumcircle = $5\sqrt{10}$ units

22.

(c) x + 3y - 7 = 0

Explanation: Given: $(x_1, y_1) = (x, y)$, $(x_2, y_2) = (1, 2)$ and $(x_3, y_3) = (7, 0)$ and these are collinear

$\therefore \frac{1}{2}|x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)| = 0$

$\Rightarrow \frac{1}{2}|x(2 - 0) + 1(0 - y) + 7(y - 2)| = 0$

$\Rightarrow \frac{1}{2}|2x - y + 7y - 14| = 0$

$\Rightarrow 2x + 6y - 14 = 0$

$\Rightarrow x + 3y - 7 = 0$

23.

(c) x

Explanation: Since coordinates of any point on the x-axis is (x, 0)

Therefore, abscissa is x.

Section B

24. Q(x, y) is mid-point of B(-2, 4) and C(6, 4)

$\therefore$ (x, y) = $\left(\frac{-2+6}{2}, \frac{4+4}{2}\right) = \left(\frac{4}{2}, \frac{8}{2}\right)$ = (2, 4)

25. Since PQRS is a rhombus, therefore, PQ = QR = RS = PS.

$\therefore$ PQ = $\sqrt{(-2-2)^2 + (1-4)^2}$ = $\sqrt{16+9} = \sqrt{25}$ = 5 units

Thus, length of each side of PQRS is 5 units.

26. Length of route PQRS = 4 PQ

= 4×5 = 20 units

27. Length of CD = 4 + 2 = 6 units and length of AD = 6 + 2 = 8 units

$\therefore$ Length of route ABCD - 2(6 + 8) = 28 units

28. Position of Neena = (3, 6)

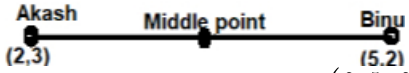
Position of Karan = (6, 5)

Distance between Neena and Karan = $\sqrt{(6-3)^2 + (5-6)^2}$

= $\sqrt{9 + (-1)^2}$

= $\sqrt{10}$

29. Co-ordinate of seat of Akash = 2, 3

30. 

Co-ordinate of middle point = $\left(\frac{2+5}{2}, \frac{3+2}{2}\right)$

= 3.5, 2.5

31. Binu = (5, 5); Karan = (6, 5)

Distance = $\sqrt{(6-5)^2 + (5-2)^2}$

= $\sqrt{1+9}$

= $\sqrt{10}$

32. The coordinates of point A are (9, 27), therefore its distance from x-axis = 27 units.

33. Coordinates of B and C are (4, 19) and (14, 19)

$\therefore$ Required distance = $\sqrt{(14-4)^2 + (19-19)^2}$

= $\sqrt{10^2}$ = 10 units

34. Coordinates of F and G are (2, 6) and (16, 6) respectively.

$\therefore$ Required distance = $\sqrt{(16-2)^2 + (6-6)^2}$

= $\sqrt{14^2}$ = 14 units

35. Coordinates of L and N are (6, 4) and (7, 1) respectively.

Length of LN = $\sqrt{(7-6)^2 + (1-4)^2}$

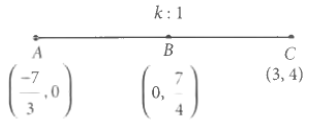
= $\sqrt{1+9} = \sqrt{10}$ units

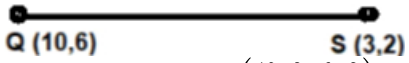
$\Rightarrow$ Length of MP = $\sqrt{10}$ units

Now, perimeter of LMPN = LN + LM + MP + NP

= $\sqrt{10} + 6 + \sqrt{10} + 4 = (2\sqrt{10} + 10)$ units [$\because$ LM = 12 - 6 = 6 units and NP = 11 - 7 = 4 units]

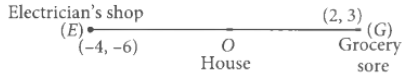
36. Here, CD = $\sqrt{(7-3)^2+(7-4)^2}$
    = $\sqrt{4^2+3^2}$ = 5 units
    Also, it is given that CE = 10 units
    Thus, DE = CE - CD = 10 - 5 = 5 units (∵ A, B, C, E are a line)
37. Since, CD = DE = 5 units
    ∴ D is the midpoint of CE.
    ∴ $\frac{x+3}{2}$ = 7 and $\frac{y+4}{2}$ = 7
    ⇒ x = 11 and y = 10 ⇒ x + y = 21
38. The points C, D and E are collinear.
39. Let B divides AC in the ratio k : 1, then



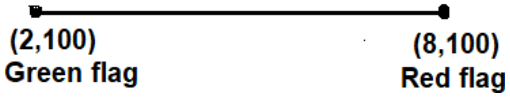
    $\frac{7}{4} = \frac{4k+0}{k+1}$
    ⇒ 7k + 7 = 16 k
    ⇒ 7 = 9k
    ⇒ k = $\frac{7}{9}$
    Thus, the required ratio is 7 : 9.
40. (4, 8) and (-3, 7)
41. 8 units
42. 1280 cubic feet
43. 7 or -1
44. Distance travelled by second bus = 7.2 km
    ∴ Total fare = 7.2 × 15 = ₹108
45. Required distance = $\sqrt{(2+2)^2+(3+3)^2}$
    = $\sqrt{4^2+6^2} = \sqrt{16+36} = 2\sqrt{13}$ km ≈ 7.2 km
46. Required distance = $\sqrt{(3+2)^2+(2+3)^2}$
    = $\sqrt{5^2+5^2} = 5\sqrt{2}$ km
47. Distance between B and C
    = $\sqrt{(3-2)^2+(2-3)^2}$ = $\sqrt{1+1} = \sqrt{2}$ km
    Thus, distance travelled by first bus to reach to B
    = AC + CB = $5\sqrt{2}+\sqrt{2} = 6\sqrt{2}$ km ≈ 8.48 km
    and distance travelled by second bus to reach to B
    = AB = $2\sqrt{13}$ km = 7.2 km
    ∴ Distance of first bus is greater than distance of the cond bus, therefore second bus should be chosen.
48. 

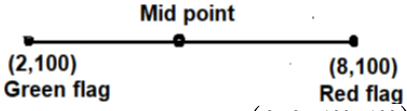
    Middle point of QS = $\left(\frac{10+3}{2}, \frac{6+2}{2}\right)$
    = (6.5, 4)
49. Length = RS = $\sqrt{(10-3)^2+(2-2)^2}$
    RS = $\sqrt{7^2+0}$
    RS = 7 m
    Breadth = RQ = $\sqrt{(10-10)^2+(2-6)^2}$
    = $\sqrt{0+16}$
    = 4 m
50. Area of rectangle = l × b
    = 7 × 4
    = 28 m^2
51. Diagonal = $\sqrt{l^2+b^2}$
    = $\sqrt{7^2+4^2}$
    = $\sqrt{49+16}$
    = $\sqrt{65}$

52. Consider the house is at origin (0, 0), then coordinates of grocery store, electrician's shop, food cart and bus stand are respectively (2, 3), (-4, -6), (6, - 8) and (-6, 8).
Since, grocery store is at (2, 3) and food cart is at (6, -8)
∴ Required distance = $\sqrt{(6-2)^2+(-8-3)^2}$
= $\sqrt{4^2+11^2} = \sqrt{16+121}$ = $\sqrt{137}$ cm
53. Consider the house is at origin (0, 0), then coordinates of the grocery store, electrician's shop, food cart and bus stand are respectively (2, 3), (-4, -6), (6, - 8) and (-6, 8).
Required distance
= $\sqrt{(-6)^2+8^2} = \sqrt{36+64}$ = $\sqrt{1}00$ = 10 cm
54. Consider the house is at origin (0, 0), then coordinates of grocery store, electrician's shop, food cart and bus stand are respectively (2, 3), (-4, -6), (6, - 8) and (-6, 8).
Let O divides EG in the ratio k: 1, then



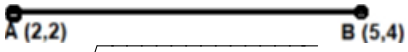
0 = $\frac{2k-4}{k+1}$
⇒ 2k = 4
⇒ k = 2
Thus, O divides EG in the ratio 2 : 1
Hence, required ratio = OG : OE i.e., 1 : 2.
55. Consider the house is at origin (0, 0), then coordinates of grocery store, electrician's shop, food cart and bus stand are respectively (2, 3), (-4, -6), (6, - 8) and (-6, 8).
Since, (0, 0) is the mid-point of (-6, 8) and (6, -8), therefore both bus stand and food cart are at equal distances from the house.
Hence, required ratio is 1 : 1.
56. Distance of Charu from y-axis = 8
57. 

Distance between Anishka and Bhawna = $\sqrt{(6-3)^2+(4-1)^2}$
= $\sqrt{3^2+3^2}$
= $3\sqrt{2}$
58. AB = $3\sqrt{2}$
BC = $\sqrt{(8-6)^2+(6-4)^2}$
= $\sqrt{2^2+2^2}$
= $2\sqrt{2}$
AC = $\sqrt{(8-3)^2+(6-1)^2}$
= $\sqrt{25+25}$
= $5\sqrt{2}$
AC = $5\sqrt{2}$
AB + BC = AC
59. Yes, because AB + BC = AC
60. Co-ordinate of green flag = (2,100)
61. 

distance between Red flag and Green flag
d = $\sqrt{(8-2)^2+(100-100)^2}$
= $\sqrt{6^2+0^2}$
d = 6
∴ distance between Green and Red flag is 6 m.
62. 

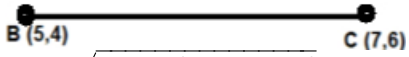
Position of blue flag = $\left(\frac{2+8}{2}, \frac{100+100}{2}\right)$
= (5,100)

63. Distance = $\sqrt{(5-2)^2+(100-100)^2}$
$= \sqrt{9+0}$
= 3 m

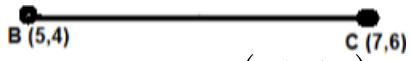
64. 

AB = $\sqrt{(5-2)^2+(4-2)^2}$
$= \sqrt{9+4}$
$= \sqrt{13}$

65. Middle point AB = $\left(\frac{2+5}{2}, \frac{2+4}{2}\right)$
= (3.5, 3)

66. 

BC = $\sqrt{(7-5)^2+(6-4)^2}$
$= \sqrt{4+4}$
$= 2\sqrt{2}$

67. 

Middle point of BC = $\left(\frac{5+7}{2}, \frac{4+6}{2}\right)$
= (6, 5)

68. Coordinates of Q are (9, 5).
∴ Distance of point Q from y-axis = 9 units

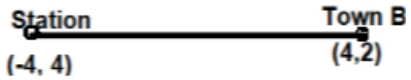
69. Coordinates of point U are (8, 2).

70. We have, P(2, 5) and Q (9, 5)
∴ PQ = $\sqrt{(2-9)^2+(5-5)^2} = \sqrt{49+0}$ = 7 units

71. Length of TU = 5 units and of TL = 2 units
∴ Perimeter of image of a rectangular face = 2(5 + 2) = 14 units

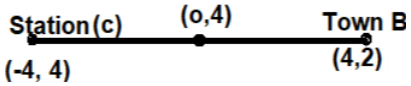
72. 

Distance travelled by veena = $\sqrt{1-(-4)^2+(7-4)^2}$
$= \sqrt{5^2+3^2}$
$= \sqrt{25+9}$
$= \sqrt{34}$

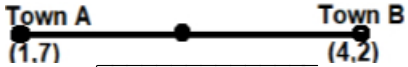


Distance travelled by Arun = $\sqrt{(4-(-4))^2+(2-4)^2}$
$= \sqrt{64+4}$
$= \sqrt{68}$
∴ Arun will travel more distance to reach his home.

73. Location of station = (-4, 4)

74. 

Let y-axis divides station (c) and Town B in K : 1
0 = $\frac{4k-4}{k+1}$
4k = 4
k = 1
∴ y-axis divides in 1 : 1

75. 

AB = $\sqrt{(4-1)^2+(2-7)^2}$
$= \sqrt{9+25}$
$= \sqrt{34}$