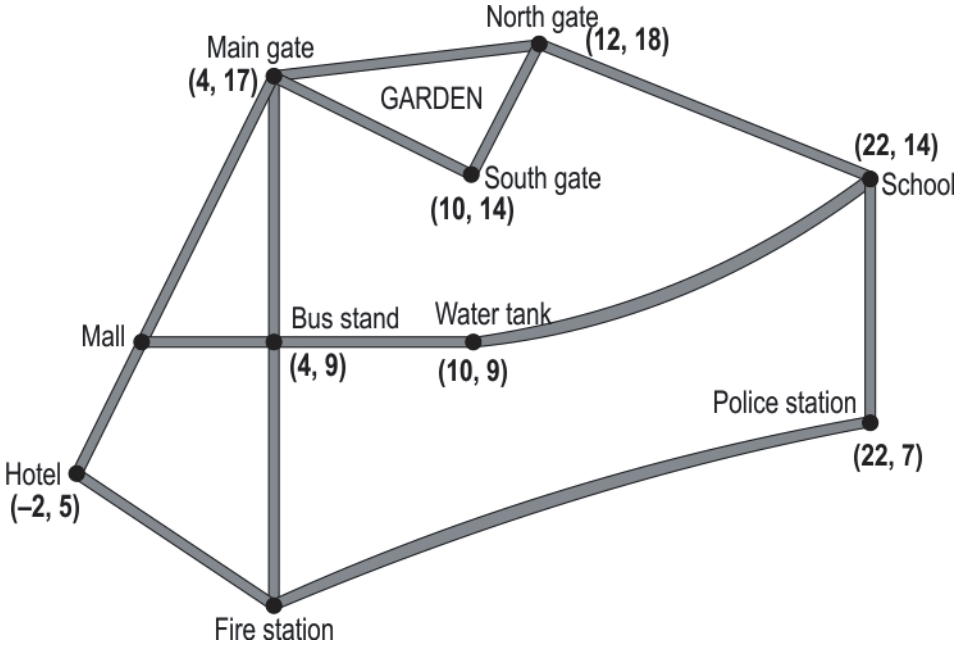
Chapter - 7
Coordinate Geometry

Answer the questions based on the information given.

Shown below is a map of Giri's neighbourhood.



Giri did a survey of his neighbourhood and collected the following information.
* The hotel, mall and the main gate of the garden lie in a straight line.
* The distance between the hotel and the mall is half the distance between the mall and the main gate of the garden.
* The bus stand is exactly midway between the main gate of the garden and the fire station.
* The mall, bus stand and the water tank lie in a straight line.

Q: 1 **What is the *x* -coordinate of the mall's location?**

1 -8 **2** 0 **3** 1 **4** 2

Q: 2 **Giri proposed a plan to make a triangular pathway by joining the midpoints of the sides of the triangular garden.**

What will be the area, in square units, enclosed by the triangular pathway?

1 3.75 **2** 7.5 **3** 15 **4** 30

Q: 3 **What are the coordinates of the fire station?**

1 (0, 8) **2** (4, -17) **3** (4, 1) **4** (4, 13)

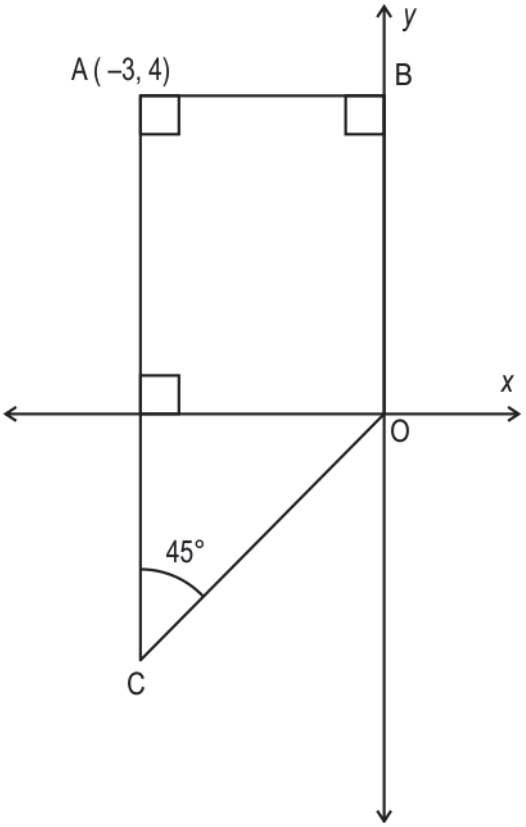
Q: 4 **What is the shortest distance between the water tank and the school?**

1 √13 units **2** √65 units **3** 13 units **4** 169 units

Q: 5 **How much more is the shortest distance of the school from the water tank than the distance of the school from the police station?**

1 6 units **2** 7 units **3** 13 units **4** 20 units

Q: 6 **A quadrilateral ABOC is drawn on a coordinate grid as shown below. O is the origin and the coordinates of A are (-3, 4). ∠OCA = 45°.**



(Note: The figure is not to scale.)

What is the perimeter of ABOC?

1 14 + 3√2 units
2 17 + 3√2 units
3 14 + 4√2 units
4 (cannot be found using the given information)

Q: 7 **ΔABC is a triangle such that AB:BC = 1:2. Point A lies on the *y* -axis and the coordinates of B and C are known.**

Which of the following formula can DEFINITELY be used to find the coordinates of A?

i) Section formula
ii) Distance formula

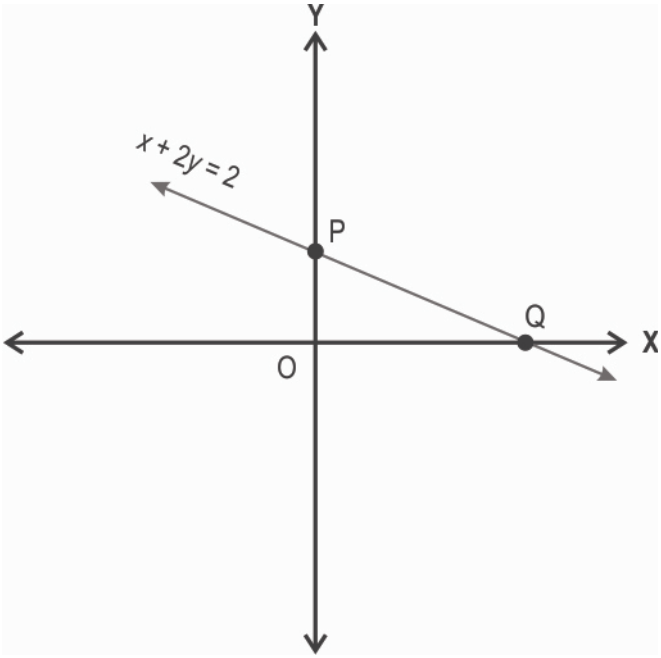
1 only i) **2** only ii) **3** both i) and ii) **4** neither i) or ii)

Q: 8 **A(5, 1), B(1, 4) and C(8, 5) are the coordinates of the vertices of a triangle.**

Which of the following types of triangle will ΔABC be?

1 Equilateral triangle
2 Scalene right-angled triangle
3 Isosceles right-angled triangle
4 Isosceles acute-angled triangle

Q: 9 **The line $x + 2y = 2$ forms a triangle OPQ, with the coordinate axes.** **[2]**



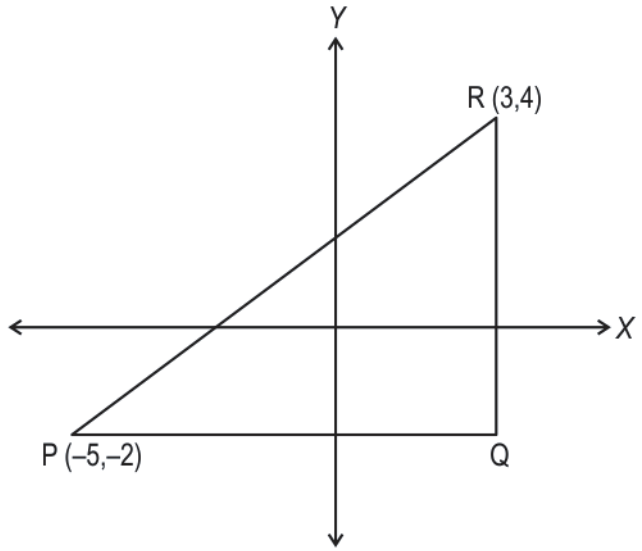
(i) What are the coordinates of points P and Q?

(ii) What is the area of the triangle formed? Show your steps.

Q: 10 **The radius of a circle with centre at the origin is $\frac{1}{2}$ units.** **[2]**

Find all the points on the circle which are of the form $(-y, y)$. Show your steps.

Q: 11 **Shown below is a right triangle PQR.** **[2]**



Find the value of cos P. Show your work.

Q: 12 **The three vertices of a rhombus PQRS are P(2, -3), Q(6, 5) and R(-2, 1).** **[3]**

a) Find the coordinates of the point where both the diagonals PR and QS intersect.
b) Find the coordinates of the fourth vertex S.

Show your steps and give valid reasons.

Q: 13 **Preeti and Arun are both driving to their respective offices from the same home. Preeti drives towards the east at an average speed of 30 km per hour for 12 minutes and then towards the south at an average speed of 60 km per hour for 3 minutes. Arun drives towards the west at an average speed of 30 km per hour for 4 minutes and then towards the north at an average speed of 45 km per hour for 4 minutes.** **[5]**

What is the straight-line distance between Preeti's office and Arun's office? Show your steps and represent the given scenario on the coordinate plane.

Q: 14 **On a playground, Parth, Qasim and Ragini are standing at the points P(2, 4), Q(8, 6) and R(8, 9) respectively. Sameer is standing exactly halfway between Parth and Qasim on the line joining Parth and Qasim.** **[2]**

What is the shortest distance, in units, between Sameer and Ragini? Show your steps.

Q: 15 For a triangle, the coordinates of the orthocentre and the circumcentre are (-4, 8) and ($\frac{1}{2}$, 1) respectively. [2]

Find the coordinates of the centroid of the triangle if the centroid divides the distance from the orthocentre to the circumcentre in the ratio 2:1. Show your steps.

Q: 16 Raaji and Gagan are finding a treasure that is exactly on the straight line joining them. Raaji's location is at (-6, -5) and Gagan's location is at (10, 11). The distance from the treasure to Raaji's location is three times that of the distance to Gagan's location. [2]

Find the coordinates of the location of the treasure. Show your steps.

Q: 17 The area of ΔPQR is 4 square units. The coordinates of P and Q are (-2, 2) and (-3, 1) respectively. The point R lies on the line $y + 3x = 4$. [3]

Find the coordinates of R. Show your steps.

Q: 18 Three players are standing on the circle at points A(-5, 0), B(1, 0) and C(3, 4). A ball is placed at a point that is equidistant from all 3 players. [5]

i) What are the coordinates of the ball?
ii) The fourth player is standing at the point D(-5, 4). Is he/she standing on the circle?

Show your steps and give valid reasons.

Q: 19 On a golf course, three holes A(-6, -1), B and C(9, -4) lie on a straight line in that order. The distance between B and C is two times that between B and A. [3]

Rahul strikes the ball, which is at point P(2, 3), such that it goes in the hole B.
i) Find the coordinates of hole B.
ii) Find the shortest distance covered by the ball.

Show your steps.

Q: 20 PQ is a line segment such that the y-coordinate of P is -1 and Q lies on the y-axis. The mid-point of PQ is O(-3, -6). [1]

Find the coordinates of Q. Show your work.

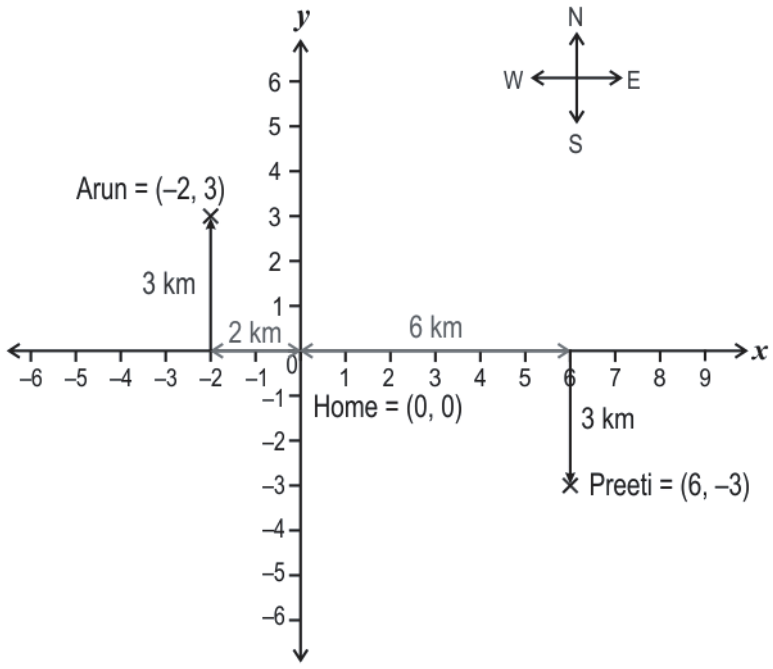
Q: 21 A circle with centre O(2, -5) has a chord with end-points A(1, 2) and B. M(5, -2) is the point where the perpendicular to the chord from the centre touches AB. [1]

Find the coordinates of point B. Show your steps with valid reasons.

The table below gives the correct answer for each multiple-choice question in this test.

Q.No	Correct Answers
1	2
2	1
3	3
4	3
5	1
6	1
7	2
8	3

Q.No	Teacher should award marks if students have done the following:	Marks
9	(i) Finds the coordinates correctly as P (0, 1) and Q(2, 0).	1
	(ii) Uses any suitable method to find the area of the triangle as 1 sq unit.	1
10	Identifies the distance between the origin and the point $(-y, y)$ as $\frac{1}{2}$ units and uses the distance formula to write the equation as: $(-y)^2 + y^2 = (\frac{1}{2})^2$	0.5
	Simplifies the above equation as $2y^2 = \frac{1}{4}$.	0.5
	Solves the above equation to get y as $\frac{1}{\sqrt{8}}$ and $\frac{-1}{\sqrt{8}}$.	0.5
	Finds the points as $(\frac{1}{\sqrt{8}}, \frac{-1}{\sqrt{8}})$ and $(\frac{-1}{\sqrt{8}}, \frac{1}{\sqrt{8}})$.	0.5
11	Finds the coordinates of Q as (3, -2).	0.5
	Uses the distance formula and finds PR as $\sqrt{(8^2 + 6^2)} = 10$ units and PQ as $\sqrt{8^2} = 8$ units.	1
	Mentions that cos P = $\frac{PQ}{PR}$ and finds its value as $\frac{8}{10} = \frac{4}{5}$.	0.5
12	a) Writes that the diagonals of a rhombus bisect each other.	0.5
	Finds the point of intersection of both the diagonals by finding the mid-point of P(2, -3) and R(-2, 1) as (0, -1) .	0.5
	b) Finds the mid-point of Q(6, 5) and S(x, y) as $(\frac{6+x}{2}, \frac{5+y}{2})$, where x and y are the coordinates of the fourth vertex S.	0.5
	Uses the above steps and equates the respective coordinates of the mid-points to get the following relationships: i) $0 = \frac{6+x}{2}$ ii) $-1 = \frac{5+y}{2}$	0.5

Q.No	Teacher should award marks if students have done the following:	Marks
	Solves the above two equations to find the values of *x* and *y* as -6 and -7 respectively. **Concludes that the coordinates of the fourth vertex S are (-6, -7).**	**1**
13	**Finds the distance travelled by Preeti towards the east as $\frac{30\times12}{60}$ = 6 km.**	**0.5**
	Finds the distance travelled by Preeti towards the south as $\frac{60\times3}{60}$ = 3 km.	**0.5**
	Finds the distance travelled by Arun towards the west as $\frac{30\times4}{60}$ = 2 km.	**0.5**
	Finds the distance travelled by Arun towards the north as $\frac{45\times4}{60}$ = 3 km.	**0.5**
	Represents the above scenario on a coordinate plane. The figure may look as follows:  **Locates the coordinates of Preeti's office as (6, -3) and the coordinates of Arun's office as (-2, 3).**	**2**

Q.No	Teacher should award marks if students have done the following:	Marks
	Finds the distance between the two offices as $\sqrt{\{(6 + 2)^2 + (-3 - 3)^2\}} = 10$ km. (Award 0.5 marks if the distance formula is correctly written.)	1
14	Uses the mid-point formula and finds the coordinates of Sameer's location as: $(\frac{2+8}{2}, \frac{4+6}{2}) = (5, 5)$. (Award 0.5 marks if only the mid-point formula is written.)	1
	Uses the distance formula and finds the shortest distance between Sameer and Ragini as $\sqrt{\{(8 - 5)^2 + (9 - 5)^2\}} = 5$ units. (Award 0.5 marks if only the distance formula is written.)	1
15	Uses the section formula to find the coordinates of the centroid as follows: $\left(\frac{2\left(\frac{1}{2}\right) + (-4)}{2 + 1}, \frac{2(1) + 1(8)}{2 + 1}\right)$ (Award 0.5 marks if only the section formula is written correctly.)	1
	Simplifies the above expressions and finds the coordinates of the centroid as $(-1, \frac{10}{3})$.	1
16	Writes that (x, y) are the coordinates of the location of the treasure that divide (-6, -5) and (10, 11) in the ratio $m : n = 3:1$.	0.5
	Uses the section formula to find (x, y) as follows: $(\frac{3(10)+1(-6)}{3+1}, \frac{3(11)+1(-5)}{3+1})$ $= (6, 7)$ (Award 0.5 marks if only the section formula is correctly written.)	1.5

Q.No	Teacher should award marks if students have done the following:	Marks
17	Applies the formula of area of the triangle and writes the relation as follows: $4 = \frac{1}{2} \times [(-2)(1 - y) + (-3)(y - 2) + x(2 - 1)]$ where, (x, y) are the coordinates of the third vertex, R. (Award 0.5 marks if only the formula to find the area of a triangle is correctly written.)	1
	Simplifies the above equation as: $x - y = 4$	1
	Solves $y + 3x = 4$ and $x - y = 4$ to find the values of x and y as 2 and -2 respectively. Concludes that (2, -2) are the coordinates of R.	1
18	i) Considers the coordinates of the ball as O(x, y) and considering OA = OB = OC, applies distance formula and writes the equations: $OA = OB \Rightarrow (x + 5)^2 + (y)^2 = (x - 1)^2 + (y)^2$ and $OB = OC \Rightarrow (x - 1)^2 + (y)^2 = (x - 3)^2 + (y - 4)^2$	1
	Simplifies the above equations to find the coordinates of the ball as O(-2, 4). (Award 1 mark if only one of the coordinates is correctly written.)	2
	ii) Considers O as the centre and finds the radius of the circle by finding either OA or OB or OC. $OA = \sqrt{\{(-2+5)^2 + (4 - 0)\}^2} = \sqrt{25} = 5$ units	1
	Finds the distance between O and D as 3 units and explains that the fourth player is not standing on the circle as the distance between the player and the centre of the circle is not equal to the radius of the circle.	1
19	i) Writes that point B internally divides the line joining A and C in the ratio 1:2.	0.5

Q.No	Teacher should award marks if students have done the following:	Marks
	Uses the section formula to find the coordinates of hole B as: $\left(\frac{2(-6)+1(9)}{1+2}, \frac{2(-1)+1(-4)}{1+2}\right)$ (Award 0.5 marks if only the section formula is correctly written.)	1
	Evaluates the above expressions to find the coordinates of hole B as (-1, -2).	0.5
	ii) Finds the shortest distance covered by the ball as $\sqrt{[(2 - (-1))^2 + (3 - (-2))^2]} = \sqrt{34}$ units.	1
20	Writes that the coordinates of Q is of the form (0, *y*) and uses the mid-point formula to find the value of *y* as $\left(\frac{-1+y}{2}\right) = -6$.	0.5
	Solves the above equation to find the value of *y* as -11 and writes the coordinates of Q as (0, -11).	0.5
21	Writes that the point M, where the perpendicular to the chord from the centre touches AB, is the mid-point of AB and writes the expressions to find the coordinates of point B as $\left(\frac{1+x}{2}, \frac{2+y}{2}\right) = (5, -2)$.	0.5
	Solves the above expressions to find the coordinates of point B as (9, -6).	0.5