Unit 8 · Coordinate Geometry

HARDER WORKSHEET

Full marks 24

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 24

1 Multiple choice [3]

Choose the correct option for each of the following questions.

i. For which value of k are the lines $kx + 2y = 5$ and $3x - y = 1$ perpendicular? [1]

a. $k = -6$ **b.** $k = 6$

c. $k = \frac{2}{3}$ **d.** $k = -\frac{2}{3}$

ii. Which circle touches both axes? [1]

a. $x^2 + y^2 - 6x - 6y + 9 = 0$ **b.** $x^2 + y^2 - 6x - 6y = 0$

c. $x^2 + y^2 - 6x - 4y + 9 = 0$ **d.** $x^2 + y^2 - 6x - 6y + 3 = 0$

iii. A plane cuts a double cone, makes an angle of 20° with the axis, and the curve it makes has two separate branches. What can you say about the cone's semi-vertical angle α? [1]

a. $\alpha < 20^\circ$ **b.** $\alpha = 20^\circ$

c. $\alpha > 20^\circ$ **d.** $\alpha = 70^\circ$ exactly

2 Short answers [7]

Write short answers to the following questions. Show your working.

a. The point $(k, 1)$ lies on the circle $x^2 + y^2 - 4x - 2y - 4 = 0$. Find the possible values of k. [2]

b. A **tangent** to a circle touches it at one point, at right angles to the radius there. Find the tangent to $x^2 + y^2 = 25$ at the point $(3, 4)$. [2]

c. Show that the circles $x^2 + y^2 = 25$ and $x^2 + y^2 - 24x - 18y + 125 = 0$ touch each other, and find the point where they touch. [3]

3 Long answers [12]

Solve the following problems. Show your working.

a. Two circles are $x^2 + y^2 = 10$ and $x^2 + y^2 - 4x - 2y = 0$. **[4]**

i. Subtract one equation from the other to find the line through the two points where the circles cross.

ii. Find the two points.

iii. Find the length of the chord joining them.

Answer: _____

b. $A(0, 0)$, $B(6, 0)$ and $C(2, 4)$ are the vertices of $\triangle ABC$. An **altitude** is the line from a vertex perpendicular to the opposite side. **[4]**

i. Find the altitude from C and the altitude from A.

ii. Find the point H where they meet.

iii. Show that the altitude from B passes through H too.

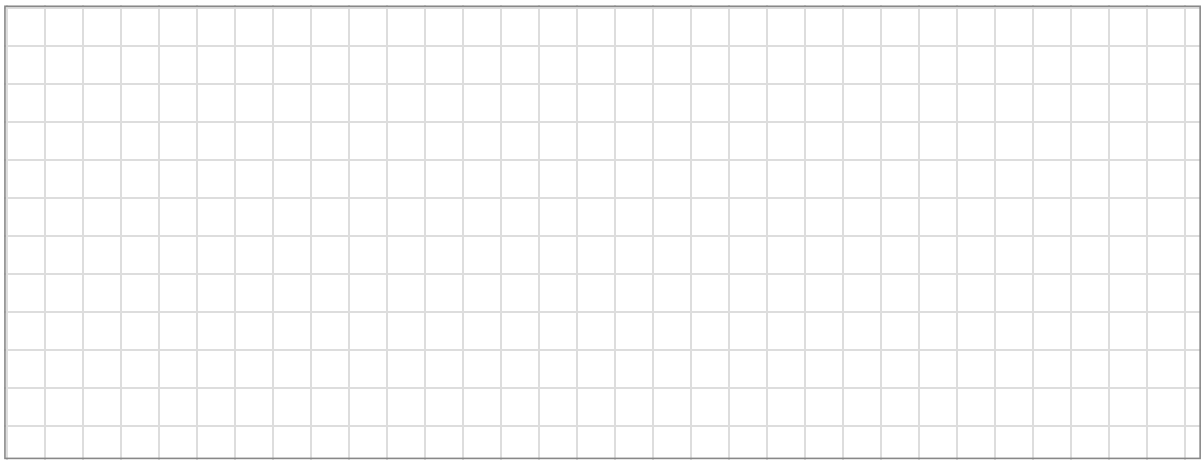
Answer: _____

c. Two straight roads start from a junction at $O(0, 0)$: one passes through $P(4, 2)$, the other through $Q(1, 3)$ (1 unit = 100 m). **[4]**

i. Find the angle between the roads.

ii. A path is to be made from P to the second road, as short as possible, so at right angles to it. Find the path's equation.

iii. Where does the path meet the second road, and how long is it?



Answer: _____

4 Think **[2]**

Think, then answer.

Sita says $x^2 + y^2 + 4x - 6y + 20 = 0$ is a circle, since x^2 and y^2 have the same coefficient and there is no xy term. Is she right? Explain.