

Coordinate Geometry Mastery

Practice Worksheet (Compact Layout)

I DO

C is a circle with centre $(0,0)$.

L is a straight line.

The circle C and line L intersect at the points P and Q .

The coordinates of P are $(8, 6)$.

The point Q has x -coordinate -6 and lies in the third quadrant.

Line L crosses the y -axis at the point $(0, k)$.

Find the value of k .

WE DO

C is a circle with centre $(0,0)$.

L is a straight line.

The circle C and line L intersect at the points P and Q .

The coordinates of P are $(-3, 4)$.

The point Q has x -coordinate -4 and lies in the third quadrant.

Line L crosses the y -axis at the point $(0, k)$.

Find the value of k .

YOU DO 1

C is a circle with centre $(0,0)$.

L is a straight line.

The circle C and line L intersect at the points P and Q .

The coordinates of P are $(15, 8)$.

The point Q has x -coordinate -8 and lies in the third quadrant.

Line L crosses the y -axis at the point $(0, k)$.

Find the value of k .

YOU DO 2

C is a circle with centre $(0,0)$.

L is a straight line.

The circle C and line L intersect at the points P and Q .

The coordinates of P are $(-8, 15)$.

The point Q has x -coordinate 15 and lies in the fourth quadrant.

Line L crosses the y -axis at the point $(0, k)$.

Find the value of k .

CHALLENGE

C is a circle with centre $(0,0)$.

L is a straight line.

The circle C and line L intersect at the points P and Q .

The coordinates of P are $(4, 3)$.

The point Q has y -coordinate -4 and lies in the fourth quadrant.

Line L crosses the y -axis at the point $(0, k)$.

Find the value of k .

ANSWERS & WORKED SOLUTIONS**I Do**

Step 1: Find the radius squared of circle C : $r^2 = 8^2 + 6^2 = 100$. Equation is $x^2 + y^2 = 100$.

Step 2: Find Q 's coordinates. Substitute $x = -6$ into circle equation: $(-6)^2 + y^2 = 100 \rightarrow y^2 = 64 \rightarrow y = \pm 8$.

Step 3: Q is in the 3rd quadrant (both x and y are negative), so $Q = (-6, -8)$.

Step 4: Find the gradient of line L through $P(8, 6)$ and $Q(-6, -8)$: $m = (6 - -8) / (8 - -6) = 14 / 14 = 1$.

Step 5: Use $y - y_{\text{sub1}} = m(x - x_{\text{sub1}})$ to find the equation: $y - 6 = 1(x - 8) \rightarrow y = x - 2$.

Step 6: The y -intercept is -2 . **Answer: $k = -2$**

We Do

Step 1: $r^2 = (-3)^2 + 4^2 = 25$. Equation: $x^2 + y^2 = 25$.

Step 2: Substitute $x = -4$ into circle equation: $(-4)^2 + y^2 = 25 \rightarrow y^2 = 9 \rightarrow y = \pm 3$.

Step 3: Q is in the 3rd quadrant, so $Q = (-4, -3)$.

Step 4: Gradient $m = (4 - -3) / (-3 - -4) = 7 / 1 = 7$.

Step 5: Equation: $y - 4 = 7(x - -3) \rightarrow y = 7x + 21 + 4 \rightarrow y = 7x + 25$. **Answer: $k = 25$**

You Do 1

Step 1: $r^2 = 15^2 + 8^2 = 289$. Equation: $x^2 + y^2 = 289$.

Step 2: At $x = -8$: $(-8)^2 + y^2 = 289 \rightarrow y^2 = 225 \rightarrow y = \pm 15$.

Step 3: 3rd quadrant means $Q = (-8, -15)$.

Step 4: Gradient $m = (8 - -15) / (15 - -8) = 23 / 23 = 1$.

Step 5: Equation: $y - 8 = 1(x - 15) \rightarrow y = x - 7$. **Answer: $k = -7$**

ANSWERS & WORKED SOLUTIONS (CONTINUED)

You Do 2

Step 1: $r^2 = (-8)^2 + 15^2 = 289$. Equation: $x^2 + y^2 = 289$.

Step 2: At $x = 15$: $15^2 + y^2 = 289 \rightarrow y^2 = 64 \rightarrow y = \pm 8$.

Step 3: 4th quadrant (positive x , negative y) means $Q = (15, -8)$.

Step 4: Gradient $m = (15 - -8) / (-8 - 15) = 23 / -23 = -1$.

Step 5: Equation: $y - 15 = -1(x - -8) \rightarrow y = -x - 8 + 15 \rightarrow y = -x + 7$. **Answer: $k = 7$**

Challenge

Step 1: $r^2 = 4^2 + 3^2 = 25$. Equation: $x^2 + y^2 = 25$.

Step 2: *Notice we are given the y -coordinate this time.* Substitute $y = -4$ into circle equation: $x^2 + (-4)^2 = 25 \rightarrow x^2 = 9 \rightarrow x = \pm 3$.

Step 3: 4th quadrant means x is positive, so $Q = (3, -4)$.

Step 4: Gradient $m = (3 - -4) / (4 - 3) = 7 / 1 = 7$.

Step 5: Equation: $y - 3 = 7(x - 4) \rightarrow y = 7x - 28 + 3 \rightarrow y = 7x - 25$. **Answer: $k = -25$**