

OCR Core 1

Coordinate Geometry

Section 2: Circles

Multiple Choice Test

Do not use a calculator in this test.

1) A circle has the equation $x^2 + y^2 = 16$.
The radius of this circle is

- (a) 256 (b) 8
(c) 16 (d) 4
(e) I don't know

2) A circle has the equation $(x + 3)^2 + (y - 1)^2 = 4$.
Which of the following statements is false?

- (a) The y coordinate of the centre is -1 (b) The radius of the circle is 2
(c) The x coordinate of the centre is -3 (d) The point $(-3, -1)$ lies on the circle
(e) I don't know

3) The equation of a circle with centre $(2, 1)$ and radius 6 is

- (a) $(x + 2)^2 + (y + 1)^2 = 36$ (b) $(x + 2)^2 + (y + 1)^2 = 6$
(c) $(x - 2)^2 + (y - 1)^2 = 6$ (d) $(x - 2)^2 + (y - 1)^2 = 36$
(e) I don't know

4) The equation of a circle with radius 5 and centre $(3, -2)$ can be written as

- (a) $x^2 + y^2 - 6x + 4y = 12$ (b) $x^2 + y^2 + 3x - 2y = 25$
(c) $x^2 + y^2 - 3x + 2y = 25$ (d) $x^2 + y^2 + 6x - 4y = 12$
(e) I don't know

Questions 5 and 6 are about the circle $x^2 + y^2 - 2x + 6y = 10$.

5) The centre of the circle is

- (a) $(-2, 6)$ (b) $(-1, 3)$
(c) $(2, -6)$ (d) $(1, -3)$
(e) I don't know

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6) The radius of the circle is

- (a) 20
(b) $\sqrt{10}$
(c) $\sqrt{20}$
(d) 10
(e) I don't know

7) O is the centre of a circle. P is a point on the circumference. The gradient of OP is 2.

The gradient of the tangent at P is

- (a) 2
(b) 0.5
(c) -2
(d) -0.5
(e) I don't know

8) The equation of a line is $y = x$. The equation of a circle is $x^2 + y^2 = 8$.

Which one of the following statements is true?

- (a) The line is a tangent to the circle
(b) The line does not meet the circle
(c) The line cuts the circle at one point
(d) The line cuts the circle at two points
(e) I don't know

9) AB is the diameter of a circle centre O. P is a point on the circumference.

Which one of the following statements is true?

- (a) $AP^2 + PB^2 = AB^2$
(b) Triangle APB is acute angled
(c) When P is equidistant from A and B then OP is parallel to AB
(d) Angle APB varies as the position of P varies
(e) I don't know

10) The line $y = 2x + 3$ is a tangent to a circle with centre (2, -3).

The radius of the circle is

- (a) $\sqrt{40}$
(b) $\sqrt{20}$
(c) 20
(d) 40
(e) I don't know

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Solutions to Multiple Choice Test

1) The correct answer is (d)

$$x^2 + y^2 = 16$$

Comparing with the standard equation $x^2 + y^2 = r^2$ for a circle with centre O and radius r , gives $r^2 = 16 \Rightarrow r = 4$.

The radius of the circle is 4.

2) The correct answer is (a)

The equation $(x + 3)^2 + (y - 1)^2 = 4$ represents a circle with centre $(-3, 1)$ and radius 2.

So the incorrect statement is that the y coordinate of the centre is -1 .

3) The correct answer is (d)

The equation of a circle with centre (a, b) and radius r is

$$(x - a)^2 + (y - b)^2 = r^2$$

so the equation of a circle with centre $(2, 1)$ and radius 6 is

$$(x - 2)^2 + (y - 1)^2 = 6^2$$

$$(x - 2)^2 + (y - 1)^2 = 36$$

4) The correct answer is (a)

The equation of a circle with centre $(3, -2)$ and radius 5 is

$$(x - 3)^2 + (y + 2)^2 = 5^2$$

$$x^2 - 6x + 9 + y^2 + 4y + 4 = 25$$

$$x^2 + y^2 - 6x + 4y = 12$$

5) The correct answer is (d)

$$x^2 + y^2 - 2x + 6y = 10$$

$$x^2 - 2x + y^2 + 6y = 10$$

$$(x - 1)^2 - 1 + (y + 3)^2 - 9 = 10$$

$$(x - 1)^2 + (y + 3)^2 = 20$$

The centre of the circle is $(1, -3)$.

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6) The correct answer is (c)

The equation of the circle is $(x-1)^2 + (y+3)^2 = 20$

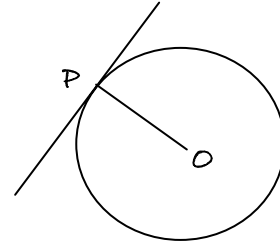
The radius is $\sqrt{20}$.

7) The correct answer is (d)

The tangent at P is perpendicular to the radius OP.

The gradient of OP is 2

so the gradient of the tangent is $-\frac{1}{2}$.



8) The correct answer is (d)

Substituting $y = x$ into $x^2 + y^2 = 8$

gives $x^2 + x^2 = 8$

$$2x^2 = 8$$

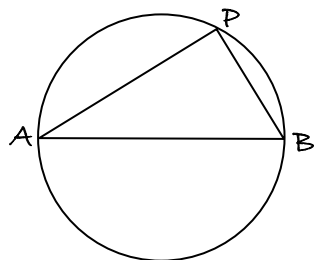
$$x^2 = 4$$

$$x = \pm 2$$

There are two distinct solutions, so the line cuts the circle at two points.

9) The correct answer is (a)

Since AB is a diameter, the angle APB is the angle in a semicircle and so angle APB is 90° .



Since triangle APB is right-angled, Pythagoras' theorem applies, and therefore

$$AP^2 + PB^2 = AB^2$$

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10) The correct answer is (b)

Equation of circle is $(x-2)^2 + (y+3)^2 = r^2$

Substituting in $y = 2x + 3$ gives

$$(x-2)^2 + (2x+3+3)^2 = r^2$$

$$(x-2)^2 + (2x+6)^2 = r^2$$

$$x^2 - 4x + 4 + 4x^2 + 24x + 36 = r^2$$

$$5x^2 + 20x + 40 - r^2 = 0$$

Since the line is a tangent, it touches the circle, so the quadratic equation has a repeated root and therefore the discriminant must be zero.

For the quadratic equation, $a = 5$, $b = 20$, $c = 40 - r^2$.

$$\text{Discriminant} = b^2 - 4ac = 0$$

$$20^2 - 4 \times 5(40 - r^2) = 0$$

$$400 = 20(40 - r^2)$$

$$20 = 40 - r^2$$

$$r^2 = 20$$

$$r = \sqrt{20}$$