

Circles Objective Questions

1. The point $(2, -3)$ lies on the circle with equation $x^2 + y^2 + 6x - 2y + c = 0$.

What is the value of c ?

- A. -31
- B. -13
- C. -1
- D. 9

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	2.4	C	0.62	0.57	CN	G10, A6	HSN 065

Let $(x, y) = (2, -3)$:

$$2^2 + (-3)^2 + 6(2) - 2(-3) + c = 0$$

$$4 + 9 + 12 + 6 + c = 0$$

$$c = -31. \quad \text{Option } \boxed{A}$$

2. A circle has centre $(2, 4)$ and passes through $(-1, 1)$.

What is the equation of the circle?

- A. $(x - 2)^2 + (y - 4)^2 = \sqrt{18}$
- B. $(x - 2)^2 + (y - 4)^2 = 18$
- C. $(x + 2)^2 + (y + 4)^2 = 18$
- D. $(x + 2)^2 + (y + 4)^2 = 26$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	2.4	C	0.51	0.17	NC	G10, G9	HSN 063

$$r^2 = (2 - (-1))^2 + (4 - 1)^2 = 3^2 + 3^2 = 18.$$

The equation is: $(x - 2)^2 + (y - 4)^2 = 18.$ Option \boxed{B}

3. The point $P(-2, 4)$ lies on the circle with equation $x^2 + y^2 - 2x + 2y - 32 = 0$.

What is the gradient of the tangent to the circle at P ?

- A. $\frac{1}{3}$
 B. $\frac{3}{5}$
 C. 1
 D. 3

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	2.4	C	0.7	0.06	NC	G11	HSN 056

Centre: $(1, -1)$.

$$m_{\text{radius}} = \frac{4 - (-1)}{-2 - 1} = -\frac{5}{3}.$$

$m_{\text{tangent}} = \frac{3}{5}$ since the radius and tangent are perpendicular.

Option B

4. A circle has equation $(x + 1)^2 + (y - 2)^2 = 29$.

What is the gradient of the tangent to the circle at the point $(1, -3)$?

- A. $\frac{2}{5}$
 B. 0
 C. $-\frac{5}{2}$
 D. $-\frac{1}{2}$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	2.4	C	0.49	0.48	NC	G11	HSN 014

The centre is $(-1, 2)$.

$$m_{\text{radius}} = \frac{2 - (-3)}{-1 - 1} = -\frac{5}{2}.$$

$m_{\text{tangent}} = \frac{2}{5}$ since $m_{\text{radius}} \times m_{\text{tangent}} = -1$.

Option A

5. A circle has equation $x^2 + y^2 - 2x - 4y + 1 = 0$.

Here are two statements about the circle:

I. The circle has centre $(-2, -4)$.

II. The circle has radius 1.

Which of the following is true?

A. neither statement is correct

B. only statement I is correct

C. only statement II is correct

D. both statements are correct

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	2.4	C	0.77	0.57	CN	G9	HSN 072

Comparing to $x^2 + y^2 + 2gx + 2fy + c = 0$, we have
 $g = -1$, $f = -2$ and $c = 1$.

The centre is $(1, 2)$ and the radius is

$$\sqrt{g^2 + f^2 - c} = \sqrt{1 + 4 - 1} = 2.$$

Option A

6. A circle has equation $x^2 + y^2 - 4x + 6y + 4 = 0$.

Here are two statements about the circle:

- I. The circle has centre $(-2, 3)$.
- II. The circle has radius 3 units.

Which of the following is true?

- A. neither statement is correct
- B. only statement I is correct
- C. only statement II is correct
- D. both statements are correct

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
C	2.4	C	0.47	0.64	NC	G9	HSN 076

The centre is $(2, -3)$

The radius is $\sqrt{g^2 + f^2 - c}$

$$= \sqrt{4 + 9 - 4}$$

$$= \sqrt{9}$$

$$= 3 \text{ units.}$$

$g = -2$
 $f = 3$
 $c = 4$

Option C

7. A circle has equation $x^2 + y^2 - ax + 2by + c = 0$. The centre of the circle is $(-1, 4)$.

What are the values of a and b ?

	a	b
A.	2	-4
B.	-1	-2
C.	-2	-4
D.	2	4

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
C	2.4	C	0.33	0.23	NC	G9	HSN 19

The centre is $(\frac{a}{2}, -b)$.

So $\frac{a}{2} = -1$ i.e. $a = -2$,
and $-b = 4$ i.e. $b = -4$

Comparing to
 $x^2 + y^2 + 2gx + 2fy + c = 0$
 which has centre $(-g, -f)$.

Option C

8. A circle has centre $(2, -1)$, and has the y -axis as a tangent.

What is the equation of the circle?

- A. $(x + 2)^2 + (y - 1)^2 = 4$
- B. $(x - 2)^2 + (y + 1)^2 = 4$
- C. $(x + 2)^2 + (y - 1)^2 = 1$
- D. $(x - 2)^2 + (y + 1)^2 = 1$

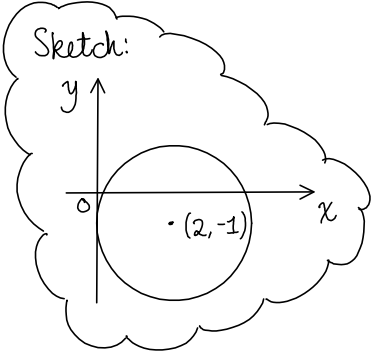
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Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	2.4	C	0.55	0.41	NC	G9, G10	HSN 087

The radius is 2 units.

$$(x - 2)^2 + (y + 1)^2 = 4.$$

Sketch:



Option B

9. What is the largest range of values of k for which the equation $x^2 + y^2 - 6x + 4y + k = 0$ represents a circle?
- A. $k < 52$
- B. $k < 13$
- C. $k > -13$
- D. All real k

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	2.4	C	0.49	0.3	NC	G9, G15	HSN 16

A circle when $g^2 + f^2 - c > 0$ where $g = -3$
 $f = 2$
 $c = k$

$9 + 4 - k > 0$
 $k < 13$

The radius is $\sqrt{g^2 + f^2 - c}$

Option B

[END OF QUESTIONS]