Multiple choice questions - Polar coordinates

Year: Further Maths · 10

Question 1 The Cartesian coordinates of $\left(2, \frac{\pi}{2}\right)$ are:

- ◯ **A.** $(0, 2)$
- ◯ **B.** $(2, 0)$
- ◯ **C.** $(0, -2)$
- ◯ **D.** $(2, 2)$

Question 2 $r = 4$ is:

- ◯ **A.** a line
- ◯ **B.** a circle centre O radius 4
- ◯ **C.** a spiral
- ◯ **D.** a cardioid

Question 3 $r = a(1 + \cos\theta)$ is a:

- ◯ **A.** circle
- ◯ **B.** cardioid
- ◯ **C.** rose
- ◯ **D.** lemniscate

Question 4 The area enclosed by $r = f(\theta)$ between α and β is:

- ◯ **A.** $\int r\,d\theta$
- ◯ **B.** $\frac{1}{2}\int r^2 d\theta$
- ◯ **C.** $\int r^2 d\theta$
- ◯ **D.** $\frac{1}{2}\int r\,d\theta$

Question 5 $r = \cos 3\theta$ has how many petals?

- ◯ **A.** 3
- ◯ **B.** 6
- ◯ **C.** 2
- ◯ **D.** 1

Question 6 $r = \cos 2\theta$ has how many petals?

- ◯ **A.** 2
- ◯ **B.** 4
- ◯ **C.** 8

- ◯ **D.** 1

Question 7 $\theta = \frac{\pi}{4}$ in Cartesian form is:

- ◯ **A.** $y = x$ (for $x > 0$)
- ◯ **B.** $y = -x$
- ◯ **C.** $x = 1$
- ◯ **D.** $y = 1$

Question 8 The curve $r = 2\cos\theta$ is:

- ◯ **A.** circle centre $(1, 0)$ radius 1
- ◯ **B.** circle centre $(2, 0)$ radius 2
- ◯ **C.** circle centre $(0, 1)$
- ◯ **D.** a line

Question 9 A tangent is parallel to the initial line where:

- ◯ **A.** $\frac{d}{d\theta}(r\cos\theta) = 0$
- ◯ **B.** $\frac{d}{d\theta}(r\sin\theta) = 0$
- ◯ **C.** $\frac{dr}{d\theta} = 0$
- ◯ **D.** $r = 0$

Question 10 The area of the circle $r = 2$ is (using $\frac{1}{2}\int r^2 d\theta$):

- ◯ **A.** 2π
- ◯ **B.** 4π
- ◯ **C.** π
- ◯ **D.** 8π

Answer grid - Polar coordinates

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Question	Answer	Explanation
1	**A**	$x = 2\cos\frac{\pi}{2} = 0$, $y = 2$.
2	**B**	Constant r.
3	**B**	Heart-shaped curve.
4	**B**	Sector areas $\frac{1}{2}r^2\delta\theta$.
5	**A**	Odd n: n petals.
6	**B**	Even n: $2n$ petals.
7	**A**	$\tan\frac{\pi}{4} = 1$.
8	**A**	$x^2 + y^2 = 2x \Rightarrow (x-1)^2 + y^2 = 1$.
9	**B**	Horizontal tangent means $dy/d\theta = 0$.
10	**B**	$\frac{1}{2} \cdot 4 \cdot 2\pi = 4\pi$.