Multiple choice questions - Complex numbers

Year: Further Maths · 11

Question 1 $(2+3i)(2-3i) =$

- **A.** -5
- **B.** 13
- **C.** $4-9i$
- **D.** $4+9i$

Question 2 $\frac{1}{i} =$

- **A.** i
- **B.** $-i$
- **C.** 1
- **D.** -1

Question 3 The modulus of $-5+12i$ is:

- **A.** 7
- **B.** 17
- **C.** 13
- **D.** $\sqrt{119}$

Question 4 The principal argument of $-1-i$ is:

- **A.** $-\frac{3\pi}{4}$
- **B.** $\frac{3\pi}{4}$
- **C.** $-\frac{\pi}{4}$
- **D.** $\frac{5\pi}{4}$

Question 5 If $2-3i$ is a root of a real polynomial, another root is:

- **A.** $-2+3i$
- **B.** $-2-3i$
- **C.** $2+3i$
- **D.** $3-2i$

Question 6 $|z-2i| = 3$ is a circle with centre:

- **A.** $(2,0)$
- **B.** $(0,-2)$

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

Question 7 $\arg(z_1 z_2)$ equals:

- ◯ **A.** $\arg z_1 \times \arg z_2$
- ◯ **B.** $\arg z_1 + \arg z_2$ (mod 2π)
- ◯ **C.** $\arg z_1 - \arg z_2$
- ◯ **D.** $\arg z_1 / \arg z_2$

Question 8 $|z - 1| = |z - 3|$ represents:

- ◯ **A.** the line $x = 2$
- ◯ **B.** the line $y = 2$
- ◯ **C.** a circle centre 2
- ◯ **D.** the line $x = 1$

Question 9 $(1 + i)^8 =$

- ◯ **A.** 16
- ◯ **B.** -16
- ◯ **C.** $16i$
- ◯ **D.** 8

Question 10 The greatest value of $|z|$ when $|z - 6| = 2$ is:

- ◯ **A.** 4
- ◯ **B.** 6
- ◯ **C.** 8
- ◯ **D.** 12

Question 11 $z = 3\left(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}\right)$ is equal to:

- ◯ **A.** 3
- ◯ **B.** $3i$
- ◯ **C.** $-3i$
- ◯ **D.** -3

Answer grid - Complex numbers

Year: Further Maths

Question	Answer	Explanation
1	**B**	$zz^* = \|z\|^2 = 4 + 9 = 13$.
2	**B**	$\frac{1}{i} = \frac{-i}{-i \cdot i} = \frac{-i}{1} = -i$.
3	**C**	$\sqrt{25 + 144} = 13$.
4	**A**	Third quadrant: $-\pi + \pi/4 = -3\pi/4$; $5\pi/4$ is outside $(-\pi, \pi]$.
5	**C**	Conjugate root theorem.
6	**C**	$z - 2i = z - (0 + 2i)$, centre $(0, 2)$.
7	**B**	Arguments add on multiplication.
8	**A**	Perpendicular bisector of 1 and 3: $x = 2$.
9	**A**	$(1 + i)^2 = 2i$, $(2i)^4 = 16$.
10	**C**	$6 + 2 = 8$.
11	**B**	$\cos \frac{\pi}{2} = 0$, $\sin \frac{\pi}{2} = 1$.