Name

Complex Numbers - Powers and Roots

1 Using De Moivre's theorem, what is z^{2} in polar form?

$$z = 2\left(\cos 30° + i \sin 30°\right)$$

A	$4\left(\cos 60° + i \sin 60°\right)$
B	$4\left(\cos 32° + i \sin 32°\right)$
C	$4\left(\cos 30° + i \sin 30°\right)$

2 What is z^{2} in rectangular form?

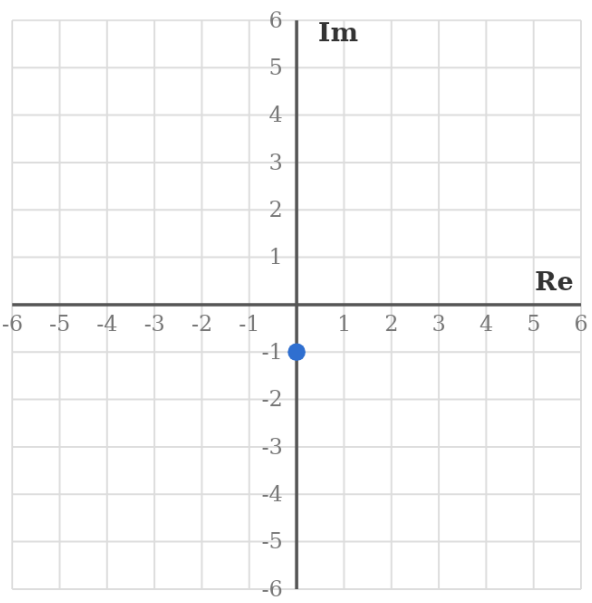
$$z = 2\left(\cos 90° + i \sin 90°\right)$$

A	B
-4	$-4i$

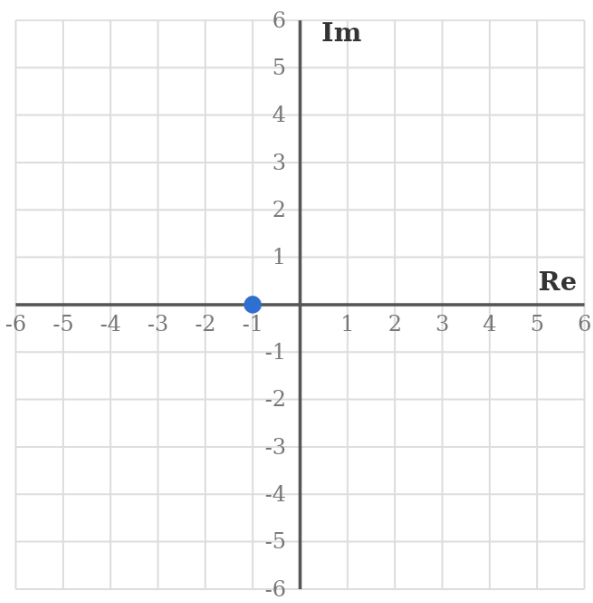
3 Which graph plots z^{3}?

$$z = 1\left(\cos 60° + i \sin 60°\right)$$

A



B



4 What is the modulus of each of the 3rd roots of z?

$$z = 8\left(\cos 60° + i \sin 60°\right)$$

A	B
4	3
C	D
8	2

5 What is the full set of arguments of the 3rd roots of z?

$$z = 27\left(\cos 180° + i \sin 180°\right)$$

A	$180°,\ 300°,\ 60°$
B	$60°$
C	$60°,\ 180°,\ 300°$
D	$60°,\ 120°,\ 180°$

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6 What is the root of z for k = 1 (of the 3rd roots)?

$$z = 8\left(\cos 0° + i \sin 0°\right)$$

A	$2\left(\cos 120° + i \sin 120°\right)$
B	$2\left(\cos 240° + i \sin 240°\right)$
C	$2\left(\cos 165° + i \sin 165°\right)$
D	$8\left(\cos 120° + i \sin 120°\right)$

7 What are all 4 of the 4th roots of z, in polar form?

$$z = 81\left(\cos 180° + i \sin 180°\right)$$

8 Rewrite the root as a complex number and simplify all radicals

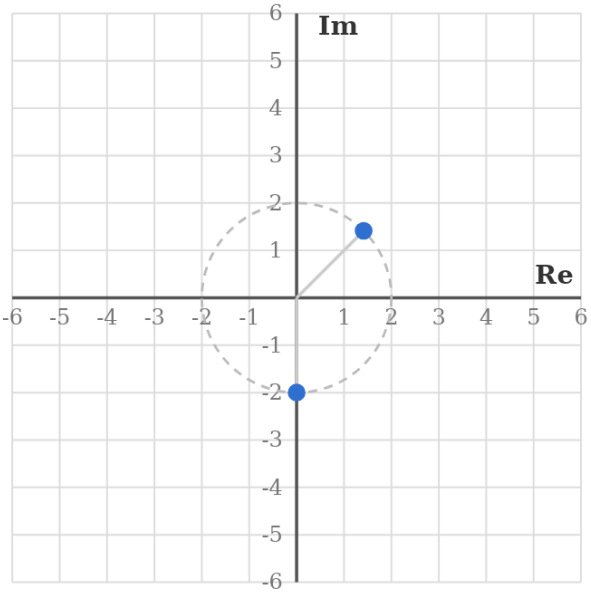
$$\sqrt{-4}$$

A	$4i$	B	$2i\sqrt{3}$
C	$i\sqrt{4}$	D	$2i$
E	$3i$	F	i

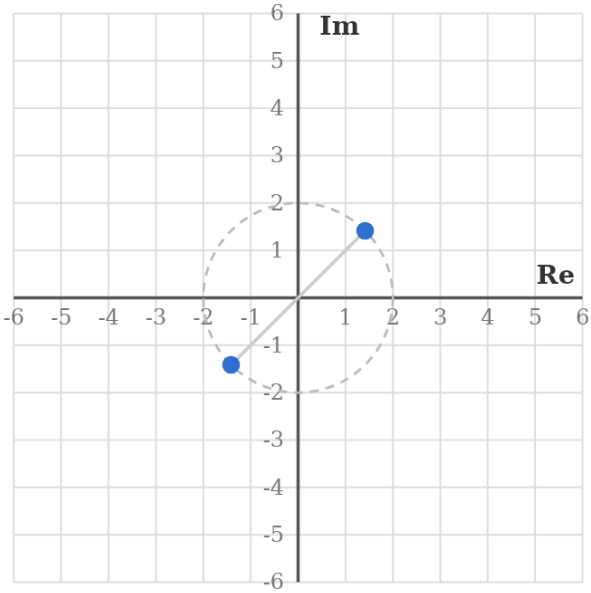
9 Which graph shows all 2 of the 2nd roots of z?

$$z = 4\left(\cos 90° + i \sin 90°\right)$$

A



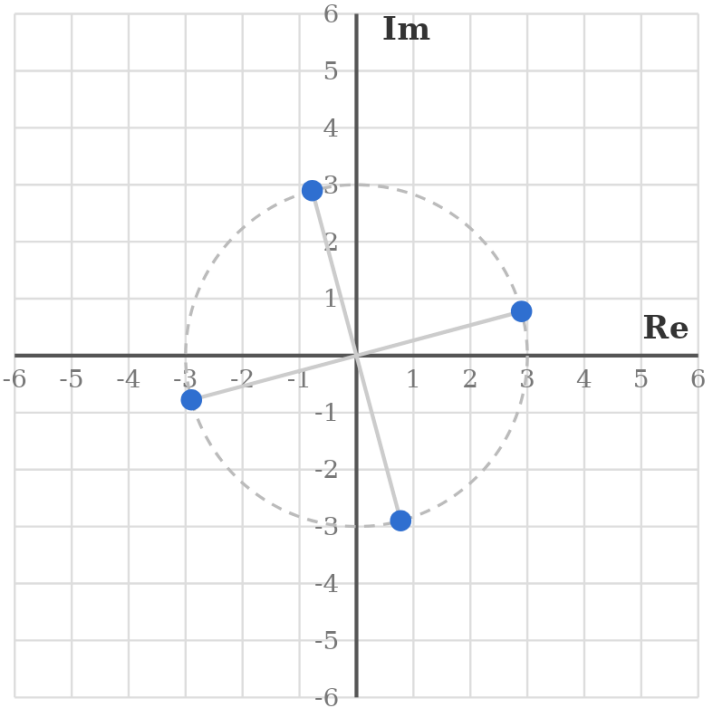
B



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10 How many distinct nth roots are shown on the graph?



A: 4

B: 6

C: 2

D: 5

11 Rewrite the root as a complex number and simplify all radicals

$$\sqrt{-48}$$

A $2i\sqrt{2}$	B $i\sqrt{6}$
C i	D $3i$
E $5i$	F $4i\sqrt{3}$

12 Multiply these complex numbers and simplify

$$(2i) \cdot (5i)$$

A $-10-2i$	B -12
C -10	D $-10+2i$
E $-10+1i$	F -8

13 Add or subtract these complex numbers and simplify

$$(-4-4i)+(-3+2i)$$

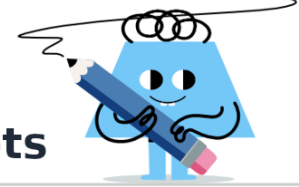
A $-7-4i$	B $-7-1i$
C $-7-2i$	D $7+2i$
E $-9-2i$	F $-5-2i$

14 Rewrite the root as a complex number and simplify all radicals

$$\sqrt{-20p^4}$$

A $3p^2i\sqrt{3}$	B $2p^2i\sqrt{7}$
C $3p^4i\sqrt{3}$	D $p^2i\sqrt{3}$
E $2pi\sqrt{5}$	F $2p^2i\sqrt{5}$

Name



Complex Numbers - Powers and Roots

15 Multiply these complex numbers and simplify

$$(4-6i)\cdot(5+3i)$$

A $38-17i$	B $38-18i$
C $38-20i$	D $37-18i$
E $38+18i$	F $39-18i$

16 Rewrite the root as a complex number and simplify all radicals

$$\sqrt{-20n^4x^3}$$

A $4n^4xi\sqrt{4x}$	B $nxi\sqrt{4x^3}$
C $3n^4x^2i\sqrt{8x}$	D $n^4xi\sqrt{5x}$
E $2nxi\sqrt{4x}$	F $2n^2xi\sqrt{5x}$

17 Find the complex conjugate of this complex number

$$3+4i$$

A $3+4i$	B $2-4i$
C $5-4i$	D $3-4i$
E $-3+4i$	F $-3-4i$

18 Find the exponential form in radians of this complex number

$$-5-4i$$

A $25.2e^{0.8\pi i}$	B $6.4e^{1.2\pi i}$
C $12e^{1.2\pi i}$	D $9.2e^{0.2\pi i}$
E $9.2e^{1.2\pi i}$	F $12e^{1.8\pi i}$

19 Divide these complex numbers and simplify

$$\frac{3i}{-4i}$$

A $\frac{-3}{3}$	B $\frac{-3}{5}$	C $\frac{-3}{4}$
D $\frac{-3}{6}$	E $\frac{-3}{4+2i}$	F $\frac{-3+1i}{4}$

20 Divide these complex numbers and simplify

$$\frac{-4-5i}{3+4i}$$

A $\frac{-32+1i}{-25}$	B $\frac{32+1i}{25}$	C $\frac{-32+1i}{27}$
D $\frac{-32+1i}{25}$	E $\frac{-32+2i}{25}$	F $\frac{-34+1i}{25}$

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21 Find the exponential form in radians of this complex number

$5.4(cos(0.1\pi\ rad) + i \cdot sin(0.1\pi\ rad))$

A $7.6e^{0.9\pi i}$	B $10.4e^{0.9\pi i}$
C $12.6e^{0.9\pi i}$	D $9.4e^{0.8\pi i}$
E $5.4e^{0.1\pi i}$	F $9.1e^{2\pi i}$

22 Find the rectangular form of this complex number that is in exponential form

$6.4e^{1.8\pi i}$

A $6-5i$	B $7+8i$
C $6+7i$	D $5-4i$
E $8+9i$	F $8-10i$

23 Find the polar form in radians of this complex number that is in exponential form

$4.2e^{1.8\pi i}$

A $7.4(cos(1.9\pi\ rad) + i \cdot sin(1.9\pi\ rad))$	B $5.1(cos(1.9\pi\ rad) + i \cdot sin(1.9\pi\ rad))$
C $5.4(cos(1.7\pi\ rad) + i \cdot sin(1.7\pi\ rad))$	D $7.6(cos(1.9\pi\ rad) + i \cdot sin(1.9\pi\ rad))$
E $3.4(cos(1.7\pi\ rad) + i \cdot sin(1.7\pi\ rad))$	F $4.2(cos(1.8\pi\ rad) + i \cdot sin(1.8\pi\ rad))$