

Precalculus · Complex Numbers in Polar Form · Test

Common Core N-CN.B.4, N-CN.B.5, N-CN.B.6, N-CN.A.3 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

This precalculus complex polar test checks complex numbers in polar form in 45 minutes, with 9 questions for a total of 20 points.

This 45-minute test covers complex numbers in polar form: modulus, conjugates, division, polar and rectangular form, products, quotients, De Moivre's theorem, and distance and midpoint. It has 9 questions worth 20 points. Calculators are allowed; show your work.

Test information

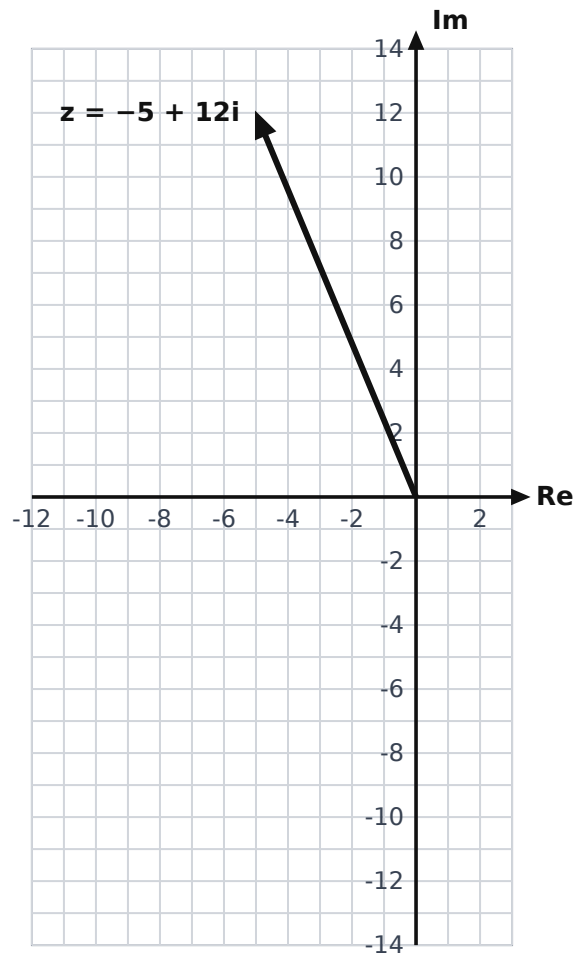
- **Grade:** Precalculus
- **Chapter:** Complex Numbers in Polar Form
- **Common Core:** N-CN.B.4, N-CN.B.5, N-CN.B.6, N-CN.A.3
- **Time:** 45 minutes
- **Total:** 20 points (Question 1: 2 pts; Question 2: 2 pts; Question 3: 3 pts; Question 4: 2 pts; Question 5: 2 pts; Question 6: 3 pts; Question 7: 2 pts; Question 8: 2 pts; Question 9: 2 pts)

Precalculus Complex Polar Test: questions 1-5

Question 1: Modulus and conjugate (2 points)

The complex number z is shown.

- Find $|z|$. (1 point)
- Write the conjugate $\bar{z}$. (1 point)



The complex number z .

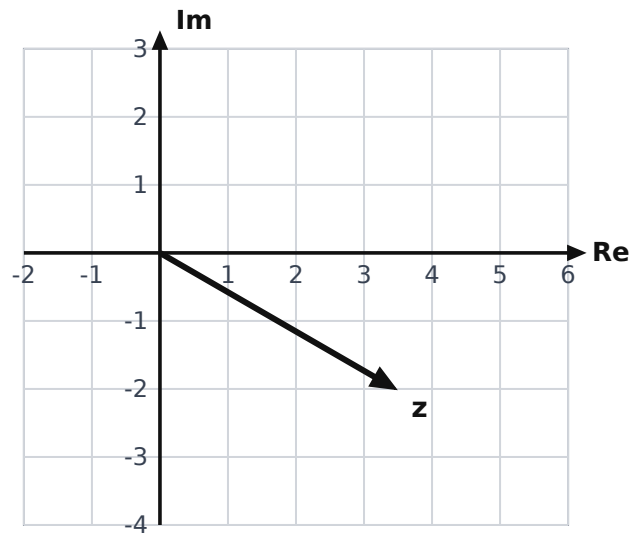
Question 2: Complex quotient (2 points)

Write $\frac{10+5i}{2-i}$ in the form $a+bi$.

Question 3: Polar form of a complex number (3 points)

Let $z = 2\sqrt{3} - 2i$ (see figure).

- Find the modulus of z . (1 point)
- Find the argument of z between 0° and 360° . (1 point)
- Write z in polar form. (1 point)



The point z .

Question 4: Polar to rectangular (2 points)

Write each number in the form $a+bi$.

- $8(\cos 150^\circ + i\sin 150^\circ)$ (1 point)
- $6(\cos \frac{3\pi}{2} + i\sin \frac{3\pi}{2})$ (1 point)

Question 5: Products and quotients in polar form (2 points)

Let $z_1 = 4(\cos 70^\circ + i\sin 70^\circ)$ and $z_2 = 2(\cos 20^\circ + i\sin 20^\circ)$. Find $z_1 z_2$ and $\frac{z_1}{z_2}$ in polar form. Then write $z_1 z_2$ in the form $a+bi$.

Precalculus Complex Polar Test: questions 6-9

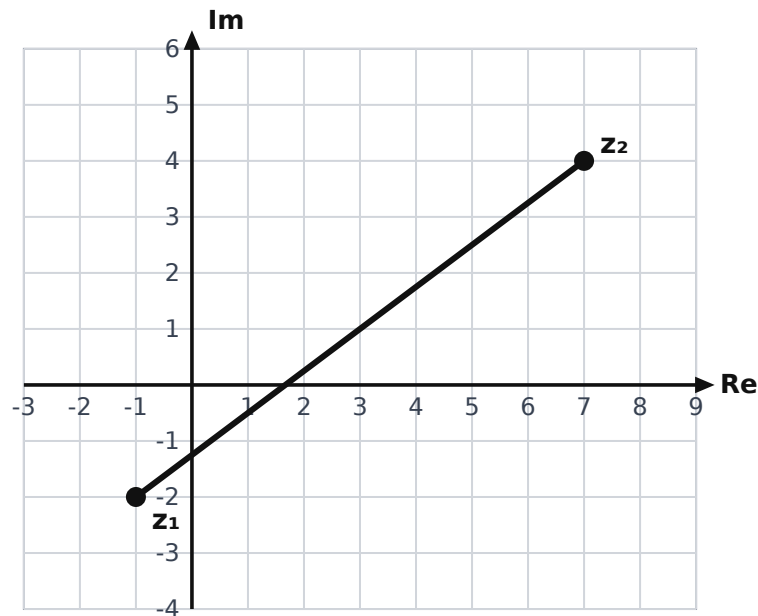
Question 6: De Moivre's theorem (3 points)

Complete each part.

- Evaluate $(1+i)^{10}$. (2 points)
- Find the smallest positive integer n for which $(\cos 24^\circ + i\sin 24^\circ)^n = 1$. (1 point)

Question 7: Distance and midpoint (2 points)

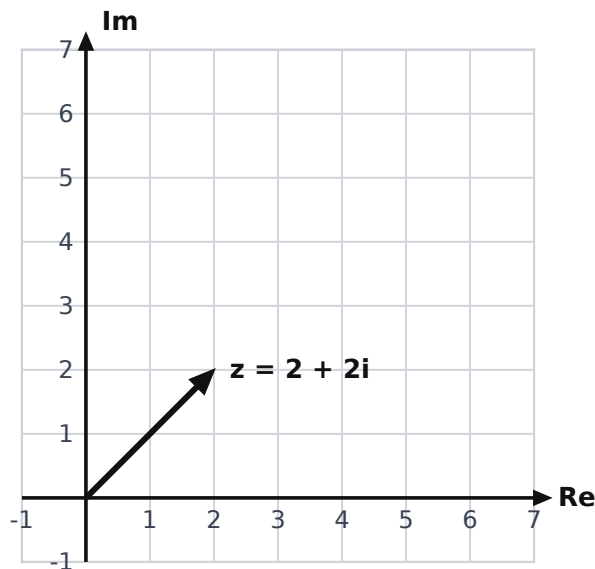
The complex numbers $z_1 = -1-2i$ and $z_2 = 7+4i$ are shown. Find the distance between them and their midpoint.



Two complex numbers.

Question 8: Rotation and scaling (2 points)

The complex number $z = 2 + 2i$ is shown. It is multiplied by $w = 2(\cos 45^\circ + i \sin 45^\circ)$. Write zw in polar form and in the form $a + bi$.



The point z .

Question 9: Circuit current (2 points)

An impedance $Z = 6 + 8i$ ohms has a voltage $V = 50$ volts. Find $|Z|$ and the current $I = \frac{V}{Z}$ in the form $a + bi$.

How to use this precalculus complex polar test

Take this precalculus complex polar test without notes, then grade it with the test answer key out of 20 points.

