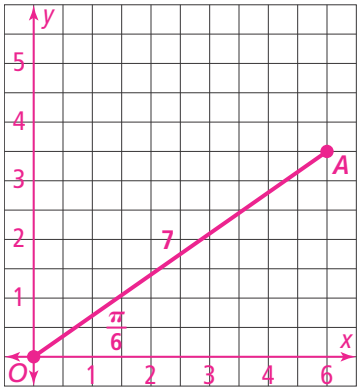
8-5 Additional Practice

Polar Form of Complex Number

1. Graph the complex number 7 cis$\left(\frac{\pi}{6}\right)$.



2. Express $\sqrt{3}$ cis $\left(\frac{5\pi}{6}\right)$ in rectangular form. $-\frac{3}{2}+\frac{\sqrt{3}}{2}i$

3. Express $-\frac{1}{2}+\frac{\sqrt{3}}{2}i$ in polar form. $\text{cis}\ \frac{2\pi}{3}$

4. Find the product of $z_1 = \sqrt{5}$ cis 120° and $z_2 = 7$ cis 80° in polar form.
$-7\sqrt{5}\ \text{cis}\ 200$

5. What is the product of $z_1 = 3 + 4i$ and $z_2 = \sqrt{3} - i$? $10\ \text{cis}\ 23$

6. Use polar form to find z^5, if $z = -2 + 2i$. $128\sqrt{2}\ \text{cis}\ \frac{7\pi}{4}$

7. What is z^5 in rectangular form, if $z = -2 + 2i$? $128 - 128i$

8. A student made some mistakes when he was writing $z = 1 + \sqrt{3}i$ in polar form. Correct the mistake next to the row, where the mistake occurred.

$r = \sqrt{x^2 + y^2} = \sqrt{1^2 + (\sqrt{3})^2} = 2$

$\tan\theta = \sqrt{3}$, $\theta = \frac{\pi}{6}$ for $0 \le \theta \le 2\pi$ $\theta = \frac{\pi}{3}$

Therefore, $1 + \sqrt{3}i = 2\ \text{cis}\ \frac{\pi}{6}$ $2\ \text{cis}\ \frac{\pi}{3}$

9. The current in an electric circuit is defined by $\sqrt{2}\text{cis}\ \frac{\pi}{4}$ and the impedance is 2 cis $\frac{11\pi}{6}$ ohm. Determine the voltage in the circuit. *Hint:* Use $E = I \cdot Z$, where E is voltage, I is electric current, and Z is impedance. $2\sqrt{2}\text{cis}\ \frac{25\pi}{12}$

10. Explain why the coordinates $\left(-3, \frac{19\pi}{20}\right)$ and $\left(-3, \frac{\pi}{20}\right)$ represent the same point in the coordinate plane.
The endpoints of the terminal side of both angles coincide.