

POLAR FORMS

Complex Numbers

Complete each problem. Show all work on a separate sheet of paper. When you are finished, color the picture using your selected answers.

Write in polar form:
 $-\sqrt{2} - i\sqrt{2}$

Write as a complex number:
 $-2\sqrt{3} \left(\cos \frac{11\pi}{6} + i \sin \frac{11\pi}{6} \right)$

3 Find the product:
 $4 \left(\cos \frac{4\pi}{3} + i \sin \frac{4\pi}{3} \right) \cdot 5 \left(\cos \frac{3\pi}{2} + i \sin \frac{3\pi}{2} \right)$

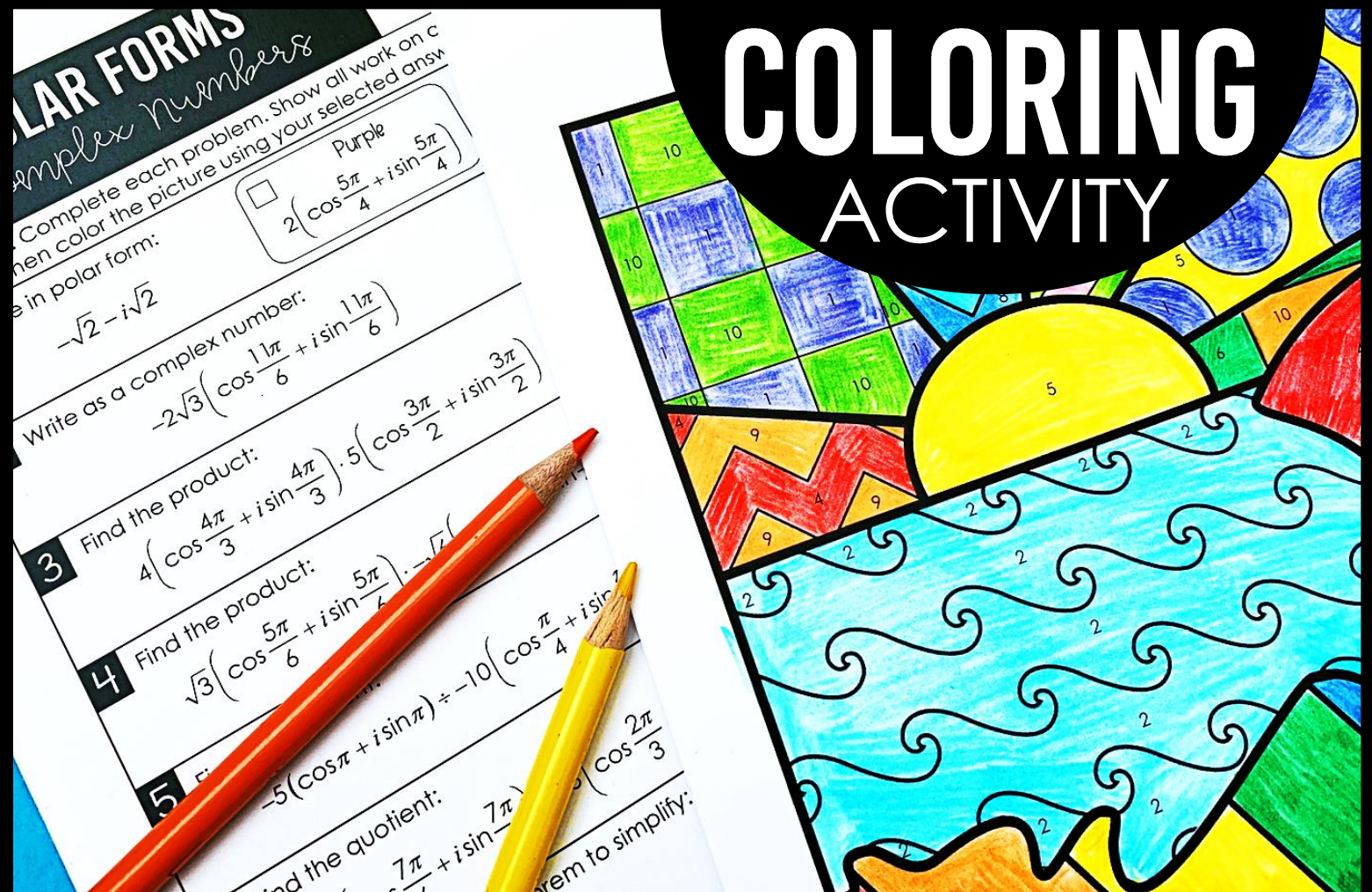
4 Find the product:
 $\sqrt{3} \left(\cos \frac{5\pi}{6} + i \sin \frac{5\pi}{6} \right) \cdot \sqrt{2} \left(\cos \frac{\pi}{4} + i \sin \frac{\pi}{4} \right)$

5 Find the quotient:
 $-5(\cos \pi + i \sin \pi) \div -10 \left(\cos \frac{\pi}{4} + i \sin \frac{\pi}{4} \right)$

6 Simplify:
 $\frac{7\pi}{4} + i \sin \frac{7\pi}{4}$

7 Simplify:
 $\left(\cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3} \right)^2$

COLORING ACTIVITY



POLAR FORMS of Complex Numbers

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POLAR FORMS OF COMPLEX NUMBERS

Coloring Activity

Objective: To practice writing complex numbers from rectangular form to polar form, write complex numbers from polar form to rectangular form, multiply complex numbers in polar form, divide complex numbers in polar form, find powers of complex numbers using De Moivre's Theorem, and find the n^{th} roots of a complex number using its polar form.

Directions:

- 1) Copy the polar forms of complex numbers sheet and coloring picture for each student. I typically copy the coloring sheet on the back to save paper.
- 2) Students solve each problem. I have my students show all work on a separate sheet of notebook paper. There are three answer choices given for each problem. They check the both that matches their solution.
- 3) After solving all the problems, students color the picture. The question number and selected answer reveals how to color the picture. For example, if "orange" is checked for question #1, then all 1's on the picture are orange.

I have them staple their work to the paper and turn in for a classwork grade.

POLAR FORMS
of Complex Numbers

Name: _____
Date: _____

Directions: Complete each problem. Show all work on a separate sheet of paper. Check your answer, then color the picture using your selected answers.

1 Write in polar form: Purple $2\left(\cos\frac{5\pi}{4} + i\sin\frac{5\pi}{4}\right)$ Yellow $\sqrt{2}\left(\cos\frac{4\pi}{3} + i\sin\frac{4\pi}{3}\right)$ 2

2 Write as a complex number: Orange $-2\sqrt{3}\left(\cos\frac{11\pi}{6} + i\sin\frac{11\pi}{6}\right)$ Dark Blue $-3\sqrt{3} + i\sqrt{3}$ $-\sqrt{3} - 3i$

3 Find the product: Black $4\left(\cos\frac{4\pi}{3} + i\sin\frac{4\pi}{3}\right) \cdot 5\left(\cos\frac{3\pi}{2} + i\sin\frac{3\pi}{2}\right)$ Brown $-10\sqrt{3} - 10i$ $-20\sqrt{2} + 20i$

4 Find the product: Purple $\sqrt{3}\left(\cos\frac{5\pi}{6} + i\sin\frac{5\pi}{6}\right) \cdot \sqrt{6}\left(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}\right)$ Red $\frac{3\sqrt{2}}{2} - \frac{3\sqrt{2}}{2}i$ $\frac{3\sqrt{6}}{2} - \frac{3\sqrt{2}}{2}i$

5 Find the quotient: Dark Blue $-5(\cos\pi + i\sin\pi) \div -10\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$ Light Green $\frac{-\sqrt{2}}{4} - \frac{\sqrt{2}}{4}i$ $-5\sqrt{2} - 5\sqrt{2}i$

6 Find the quotient: Dark Green $-2\sqrt{15}\left(\cos\frac{7\pi}{6} + i\sin\frac{7\pi}{6}\right) \div \sqrt{6}\left(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}\right)$ Pink $-i\sqrt{10}$ $\frac{-5\sqrt{3}}{6}$

7 Use De Moivre's Theorem to simplify: Yellow $(3\sqrt{2} - i\sqrt{6})^4$ Orange $-576 + 576i\sqrt{3}$ $-288\sqrt{3} - 288i$

8 Use De Moivre's Theorem to simplify: Purple $(-1+i)^9$ Dark Blue $-16 - 16i$ $-16 + 16i$

9 Which is an n^{th} root of the expression below? Brown $\sqrt{3} + i\sqrt{3}; n = 2$ Orange $-1.45 + 0.6i$ $-1.45 - 0.6i$

10 Which is an n^{th} root of the expression below? Light Green $1 - i\sqrt{3}; n = 4$ Gray $1.15 - 0.3i$ $-1.15 + 0.85i$

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