NAME ______________________________ DATE _______________ PERIOD _________

9-8

Practice

Powers and Roots of Complex Numbers

Find each power. Express the result in rectangular form.

1. $(-2 - 2\sqrt{3}\boldsymbol{i})^3$
64

2. $(1 - \boldsymbol{i})^5$
$-4 + 4i$

3. $(-1 + \sqrt{3}\boldsymbol{i})^{12}$
4096

4. $\left[1\left(\cos \frac{\pi}{4} + \boldsymbol{i} \sin \frac{\pi}{4}\right)\right]^{-3}$
$-\frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2}i$

5. $(2 + 3\boldsymbol{i})^6$
$2035 - 828i$

6. $(1 + \boldsymbol{i})^8$
16

Find each principal root. Express the result in the form a + bi with a and b rounded to the nearest hundredth.

7. $(-27\boldsymbol{i})^{\frac{1}{3}}$
$2.60 - 1.5i$

8. $(8 - 8\boldsymbol{i})^{\frac{1}{3}}$
$2.17 - 0.58i$

9. $\sqrt[5]{-243\boldsymbol{i}}$
$2.85 - 0.93i$

10. $(-\boldsymbol{i})^{\frac{1}{3}}$
$0.87 + 0.5i$

11. $\sqrt[8]{-8\boldsymbol{i}}$
$1.27 - 0.25i$

12. $\sqrt[4]{-2 - 2\sqrt{3}\boldsymbol{i}}$
$1.22 - 0.71i$

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Algebraic Nu

A complex number i
polynomial with inte
are integers with no
of $qx - p$. This show
irrational numbers c

Example **Show t**

Let x =
x
$(x$ -
$x^2 - 2$
$x^2 - 2x$

Thus, 1
algebra

If a complex number
The best-known tran
these numbers are n
until 1873 that the I
able to show that e i
C. L. F. Lindemann

Show that each con polynomial with inte number is a zero.

1. $\sqrt{2}$
$x^2 - 2$

3. $2 - \boldsymbol{i}$
$x^2 - 4x + 5$

5. $4 - \sqrt[4]{2}\boldsymbol{i}$
$x^4 - 16x^3 + 9$

7. $\sqrt{1 + \sqrt[3]{5}}$
$x^6 - 3x^4 + 3x$