Graph each of the following.

1. $\left(-2, \frac{\pi}{4}\right)$
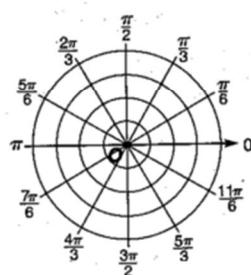
2. $\left(2, -\frac{2\pi}{3}\right)$
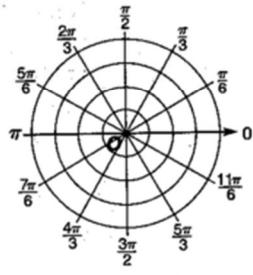
3. $r = 3$
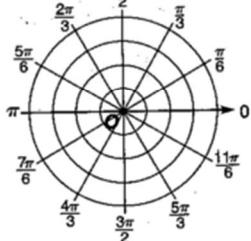
4. $\theta = \frac{-5\pi}{6}$
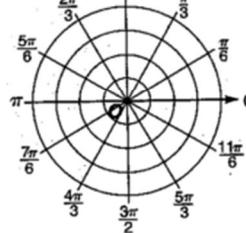
Find each product, quotient, or power and express the result *in polar form AND in rectangular form*. Let $z_1 = 4\left(\cos \frac{2\pi}{3} + i\sin \frac{2\pi}{3}\right)$ **and** $z_2 = 0.5\left(\cos \frac{\pi}{6} + i\sin \frac{\pi}{6}\right)$

#5-7
Identify the modulus and the argument

5. $z_1 z_2$

6. $\frac{z_1}{z_2}$

7. z_1^2

Find each power or root. Express the result in *rectangular* form. Use DeMoivre's Theorem.

8. $\left(\sqrt{2} + \sqrt{2}i\right)^4$

9. $\sqrt[3]{64i}$ Hint: rewrite in the form (a+bi) and use a fractional exponent.

10. Find the polar coordinates of the point with rectangular coordinates $(4, -4\sqrt{3})$. Use $0 \le \theta < 2\pi$ and $r \ge 0$.

11. Find the rectangular coordinates of the point with polar coordinates $(6, \frac{7\pi}{4})$.

12. Write the polar equation $r = 5$ in rectangular form.

Simplify.

13. $2(3 + i) - (4 - i)$

14. $(2 - 4i)(3 + 5i)$

15. $\frac{4 - 3i}{5 + 2i}$

CHECK ANSWERS:

$-4\sqrt{2} + 4\sqrt{2}i$

$2\sqrt{3} + 2i$ $\frac{14}{29} - \frac{23}{29}i$

$-8 - 8\sqrt{3}i$ $-\sqrt{3} + i$

$26 - 2i$ $2 + 3i$

$(3\sqrt{2}, -3\sqrt{2})$ $8i$

-16   2   8   16

$x^2 + y^2 = 25$ $\left(8, \frac{5\pi}{3}\right)$

$\frac{\pi}{2}$ $\frac{4\pi}{3}$ $\frac{5\pi}{6}$

$2\left(\cos\frac{5\pi}{6} + i\sin\frac{5\pi}{6}\right)$

$4\left(\cos\frac{11\pi}{6} + i\sin\frac{11\pi}{6}\right)$

$8\left(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}\right)$

$16\left(\cos\frac{4\pi}{3} + i\sin\frac{4\pi}{3}\right)$

16. Express $2\sqrt{3} - 2i$ in polar form.

17. Express $8\left(\cos\frac{3\pi}{4} + i\sin\frac{3\pi}{4}\right)$ in rectangular form.