Polar Review

Find all pairs of polar coordinates that describe the same point as the provided polar coordinates.

5) $(4, 90°)$

6) $\left(2, \dfrac{11\pi}{12}\right)$

Convert each pair of polar coordinates to rectangular coordinates.

7) $\left(2, \dfrac{3\pi}{2}\right)$

8) $\left(1, \dfrac{5\pi}{6}\right)$

Convert each pair of rectangular coordinates to polar coordinates where $r > 0$ and $0 \le \theta < 2\pi$.

9) $\left(\dfrac{3\sqrt{3}}{2}, \dfrac{3}{2}\right)$

10) $\left(-\sqrt{2}, \sqrt{2}\right)$

Two points are specified using polar coordinates. Find the distance between the points.

11) $\left(2, \dfrac{\pi}{3}\right), \left(2, \dfrac{11\pi}{6}\right)$

12) $\left(4, \dfrac{7\pi}{12}\right), \left(2, \dfrac{\pi}{12}\right)$

Critical thinking question:

13) An air traffic controller's radar display uses polar coordinates. A passing plane is detected at 285° counter-clockwise from north at a distance of 3 miles from the radar. Thirty seconds later the plane is detected at 225° and 2 miles. Estimate the plane's speed in miles per hour.

Name_____

Polar and Rectangular Forms of Equations

Date_____ Period_____

Convert each equation from polar to rectangular form.

1) $\tan \theta = 2$

2) $r = 4\cos \theta - 4\sin \theta$

3) $r = -2\cos \theta$

4) $r = 2\cos \theta + 2\sin \theta$

Convert each equation from rectangular to polar form.

5) $(x - 1)^2 + (y + 1)^2 = 2$

6) $x = y^2$

7) $x = y^2$

8) $y = \dfrac{x^2}{5}$

Convert each equation from polar to rectangular form.

9) $r = 4\csc\left(\theta + \dfrac{\pi}{6}\right)$

10) $r = 2\sin\left(\theta + \dfrac{\pi}{4}\right)$

11) $r^2 = 5\sec(2\theta)$

12) $r^2 = 4\sec(2\theta)$

Name_____

Complex Numbers and Polar Form

Date_____ Period_____
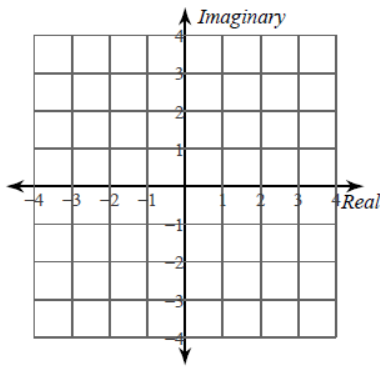
Find the absolute value.

1) $4 + 3i$

2) $-\sqrt{15} + i\sqrt{15}$

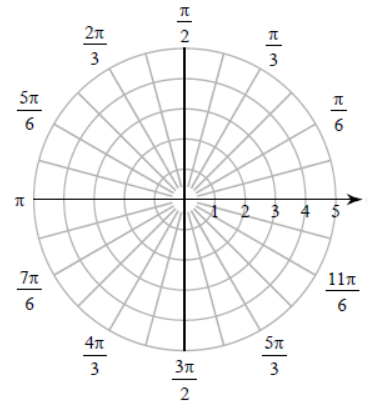3) $3\left(\cos\dfrac{3\pi}{2} + i\sin\dfrac{3\pi}{2}\right)$

4) $\sqrt{21}\left(\cos\dfrac{\pi}{2} + i\sin\dfrac{\pi}{2}\right)$

Plot each point in the complex plane. Use rectangular coordinates when the number is given in rectangular form and polar coordinates when polar form is used.

5) $1 + 3i$

6) $3\left(\cos\dfrac{7\pi}{6} + i\sin\dfrac{7\pi}{6}\right)$

Convert numbers in rectangular form to polar form and polar form to rectangular form.

7) $-2\sqrt{3} - 2i$

8) $\sqrt{21} + i\sqrt{7}$

9) $-\dfrac{5\sqrt{2}}{2} - \dfrac{5\sqrt{2}}{2}i$

10) $2i$

11) $\sqrt{6}\left(\cos\dfrac{\pi}{2} + i\sin\dfrac{\pi}{2}\right)$

12) $2\left(\cos\dfrac{4\pi}{3} + i\sin\dfrac{4\pi}{3}\right)$

13) $\sqrt{3}\left(\cos\dfrac{\pi}{6} + i\sin\dfrac{\pi}{6}\right)$

14) $\sqrt{30}(\cos\pi + i\sin\pi)$

Simplify. Write your answer in rectangular form when rectangular form is given and in polar form when polar form is given.

15) $(4 + 4i)(5 - 3i)$

16) $4\sqrt{2}\left(\cos\dfrac{7\pi}{4} + i\sin\dfrac{7\pi}{4}\right) \cdot 2\left(\cos\dfrac{\pi}{6} + i\sin\dfrac{\pi}{6}\right)$

17) $\dfrac{6 - 2i}{2 + 4i}$

18) $\dfrac{2\sqrt{6}\left(\cos\dfrac{7\pi}{6} + i\sin\dfrac{7\pi}{6}\right)}{6\left(\cos\dfrac{11\pi}{6} + i\sin\dfrac{11\pi}{6}\right)}$

19) $(-1 - 6i)^3$

20) $\left(2\left(\cos\dfrac{7\pi}{6} + i\sin\dfrac{7\pi}{6}\right)\right)^3$

Find all nth roots. Write your answers in rectangular form when rectangular form is given and in polar form when polar form is given.

21) $2i,\ n = 3$

22) $6\left(\cos\dfrac{3\pi}{4} + i\sin\dfrac{3\pi}{4}\right),\ n = 4$

Critical thinking questions:

23) Show that $-i\sqrt[23]{n}$ is a 23rd root of ni.

24) Solve for x : $(2 + i)x = 1 + 2i$
    Hint: x is a complex number.