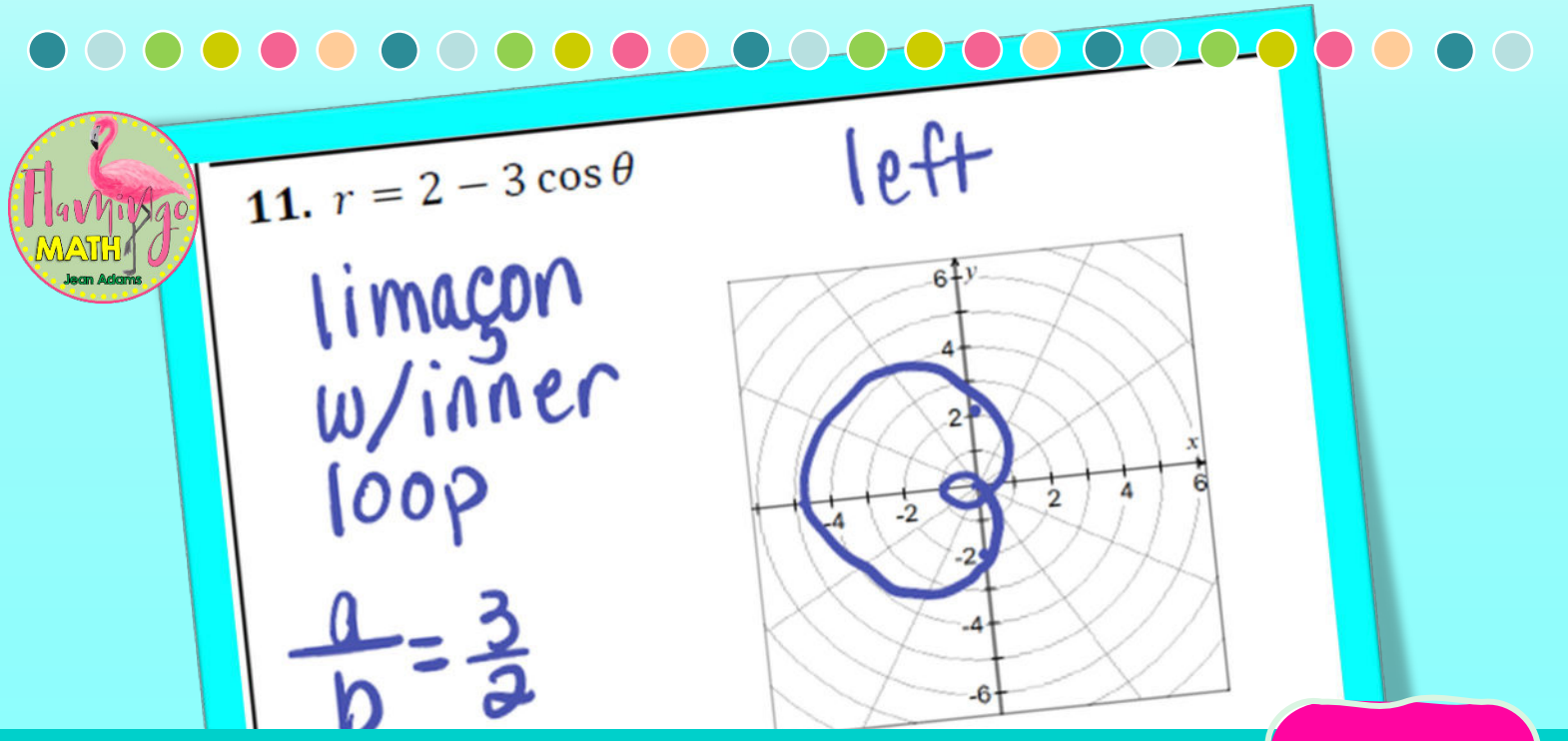
Precalculus Honors

Polar Coordinates and Vectors



Homework 6

Completely Editable

PRECALCULUS CURRICULUM

Scope and Sequence

Unit 6: Polar Coordinates & Vectors

Lesson	Skills & Learning Objectives
[6.1] Polar Coordinates	❑ Convert points and equations from polar to rectangular form and vice versa
[6.2] Polar Graphs and Equations	❑ Graph Polar Equations ❑ Convert polar equations to rectangular form and vice versa ❑ Identify types of polar graphs from equations
[6.3] More About Polar Graphs	❑ Use auxiliary graphs to sketch polar curves ❑ Find negative *r*-values that create inner loops ❑ Find points of intersection in two polar graphs
[6.4] The Complex Plane; De Moivre's Theorem	❑ Represent complex numbers in the complex plane ❑ Write complex numbers in trigonometric form ❑ Find the conjugate of a complex number and moduli ❑ Find product and quotients of complex numbers ❑ Apply De Moivre's Theorem to find nth root of complex numbers
[6.5] Vectors in the Plane	❑ Apply the arithmetic of vectors ❑ Find component form, magnitude, and solve real-world problems ❑ Use vectors to solve real-world problems ❑ Find projection of vectors, angles between vectors
[6.6] The Dot Product	❑ Calculate dot products ❑ Find the angle between two vectors ❑ Finding vector components ❑ Find work done by a constant force

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6.1 Polar Coordinates Homework

Name _____

Date _____ Period _____

Problems 1 – 4, the polar coordinates of a point are given. Find its rectangular coordinates.

1. $\left(3, -\frac{\pi}{3}\right)$

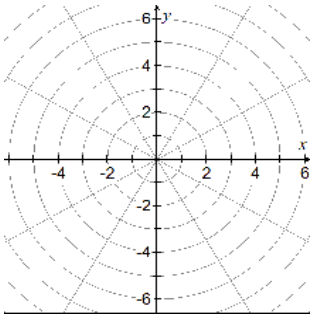
2. $\left(-2, \frac{7\pi}{6}\right)$

3. $\left(-5, -\frac{2\pi}{3}\right)$

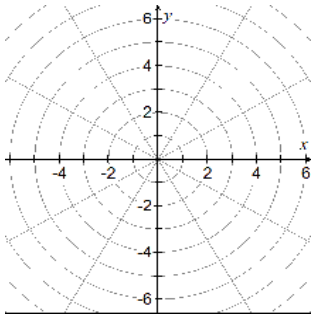
4. $\left(-4, -\frac{11\pi}{6}\right)$

Problems 5-10, plot each point given in polar coordinates.

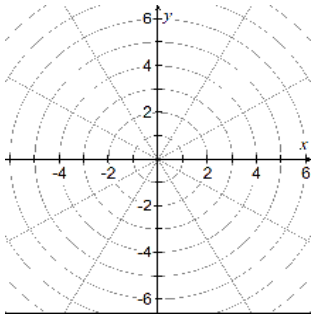
5. $\left(4, \frac{4\pi}{3}\right)$



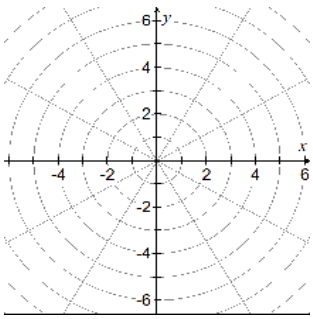
6. $\left(-2, \frac{5\pi}{6}\right)$



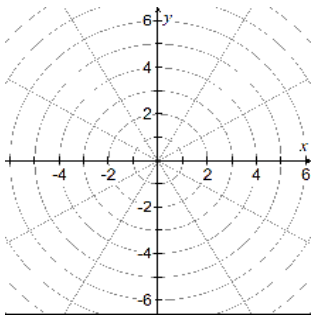
7. $\left(3, -\frac{3\pi}{4}\right)$



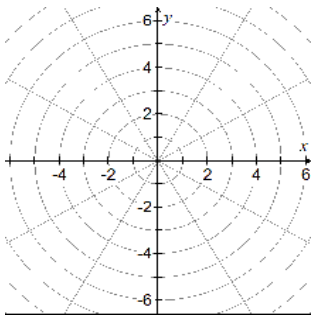
8. $\left(-5, -\frac{5\pi}{3}\right)$



9. $\left(6, \frac{3\pi}{2}\right)$



10. $(-4, -\pi)$



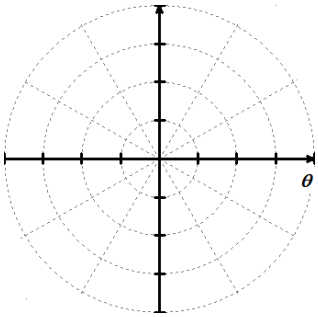
6.3 More About Polar Graphs Homework

Name _____

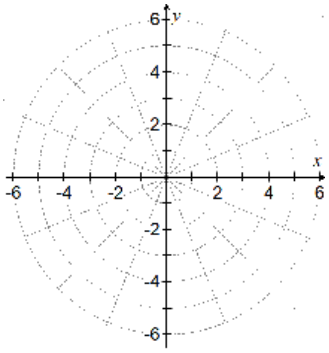
Date _____ Period _____

Problems 1 – 6, plot each polar curve to find the first range of positive θ-values for which r is negative. Confirm your answer by plotting the graph on the grid provided.

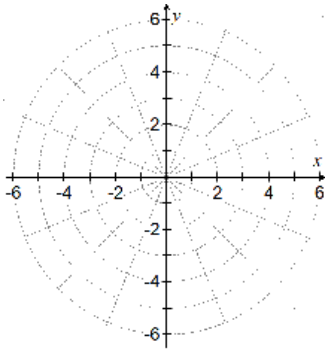
1. $r = 1 - 2\cos\theta$



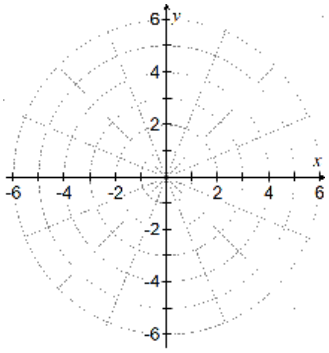
2. $r = 2 - 4\sin\theta$



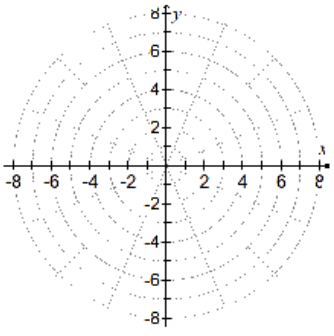
3. $r = 5\sin(3\theta)$



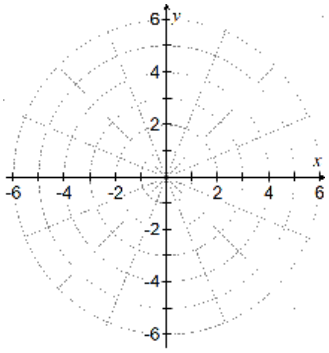
4. $r = 4\cos(2\theta)$



5. Calculator: $r = 2 - 5\cos\theta$



6. Calculator: $r = 1 - 5\sin\theta$



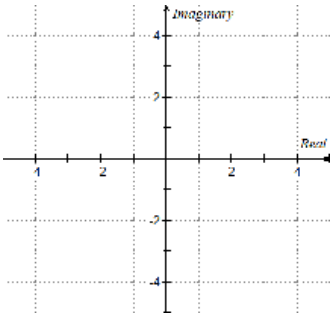
6.4 DeMoivre's Theorem Homework

Name _____

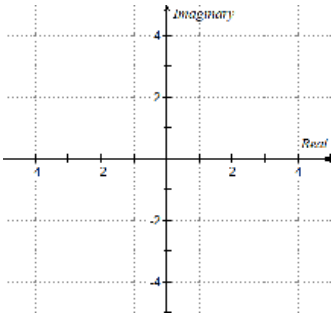
Date _____ Period _____

Problems 1 – 4, plot each complex number in the complex plane and write it in polar form. Express the argument in degrees.

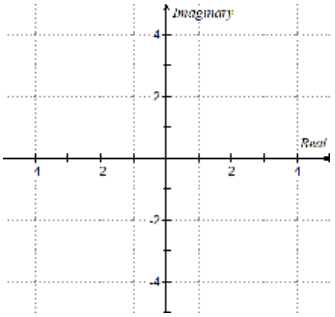
1. $2 + \sqrt{3}i$



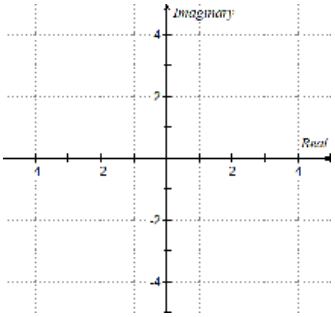
2. $3 - 4i$



3. $\sqrt{3} + i$



4. $-4i$



Problems 5 - 8, write each complex number in rectangular form.

5. $5(\cos 120\,° + i \sin 120\,°)$

6. $2(\cos 225\,° + i \sin 225°)$

7. $3\left(\cos\frac{\pi}{5} + i \sin\frac{\pi}{5}\right)$

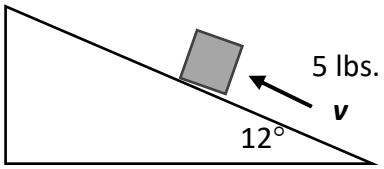
8. $0.4\left(\cos\frac{\pi}{3} + i \sin\frac{\pi}{3}\right)$

Problems 32 – 42, solve.

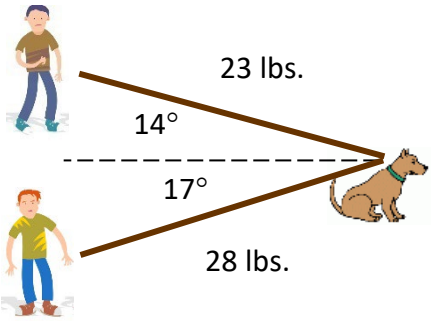
32. A helicopter is flying on a bearing of 260° at 105 mph. Find the component form of the velocity of the helicopter.

33. A ship is heading due north at 10 mph. The current is flowing southwest at 3 mph. Find the actual bearing and speed of the ship.

34. In a warehouse, a box is being pushed up a 12° inclined plane with a force of 5 lbs., shown in the figure. Find the component form of the force.



35. Hayden, age 10 and Matt, age 11 are walking Roscoe, their Staffordshire terrier puppy. He hasn't been leash trained and is reluctant to walk with the boys. They have a plan to use two leases in order to get Roscoe to cooperate. If Hayden and Matt pull with the forces and angles shown in the figure, determine how hard Roscoe is pulling if the puppy holds the boys at a standstill.



6.6 Dot Product of Vectors Homework

Name _____

Date _____ Period _____

Problems 1 – 6, find the dot product of **u** and **v**.

1. $\mathbf{u} = \langle 4,3 \rangle; \mathbf{v} = \langle 8,5 \rangle$

2. $\mathbf{u} = \langle -6,1 \rangle; \mathbf{v} = \langle 14,-3 \rangle$

3. $\mathbf{u} = \langle -2,7 \rangle; \mathbf{v} = \langle -6,-9 \rangle$

4. $\boldsymbol{u} = -5\mathbf{i} + 7\mathbf{j}\ ; \mathbf{v} = -2\mathbf{i} - 3\mathbf{j}$

5. $\mathbf{u} = 12\mathbf{i} - 5\mathbf{j}\ ; \mathbf{v} = -8\mathbf{i} - 9\mathbf{j}$

6. $\mathbf{u} = -2\mathbf{i} - 9\mathbf{j}\ ; \mathbf{v} = 14\mathbf{i} - 4\mathbf{j}$

Problems 7-10, find the angle between **v** and **w**. State whether the vectors are parallel, orthogonal, or neither.

7. $\mathbf{v} = 4\mathbf{i} + 4\mathbf{j},\ \mathbf{w} = -2\mathbf{i}$

8. $\mathbf{v} = 4\mathbf{i} + 3\mathbf{j},\ \mathbf{w} = 3\mathbf{i} - 2\mathbf{j}$

9. $\mathbf{v} = \langle 1, \sqrt{3} \rangle;\ \mathbf{w} = \langle 1,-1 \rangle$

10. $\mathbf{v} = \langle 8,4 \rangle\ ;\ \mathbf{w} = \langle -2,-1 \rangle$