

Do all work on a separate sheet of a paper.

Polar Coordinates & Equations

- Graph $(4, 210^\circ)$ and then give 3 additional representations of this point with $-360^\circ \leq \theta \leq 360^\circ$.
- Convert from rectangular form to polar form.



a. $y = \sqrt{3}x$ $\theta = 60^\circ = \pi/3$

$\frac{y}{x} = \frac{\sqrt{3}x}{x} = \sqrt{3}$
 $\tan^{-1} \frac{y}{x} = \tan^{-1} \sqrt{3}$
 $\theta = 60^\circ$

b. $(x-4)^2 + y^2 = 16$ $r = 8 \cos \theta$

- Convert from polar form to rectangular form. Then, identify the resulting figure.

a. $r = 10$ $x^2 + y^2 = 100$

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b. $\theta = -\frac{\pi}{3}$ $y = -\sqrt{3}x$

b. $\tan \theta = \tan(-\pi/3)$

c. $r = 2 \cos \theta$ $x^2 + y^2 - 2x = 0$

$\frac{y}{x} = -\sqrt{3}$

d. $r = \frac{1}{\cos \theta + \sin \theta}$ $y = -x + 1$

$y = -\sqrt{3}x$

c. $r^2 = 2r \cos \theta$

$x^2 + y^2 = 2x$

$x^2 + y^2 - 2x = 0$

d. $r \cos \theta + r \sin \theta = 1$

$x + y = 1$

$y = -x + 1$

Polar Graphs

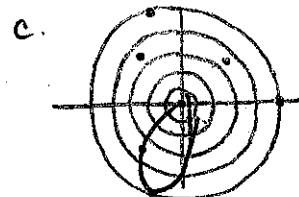
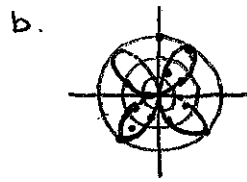
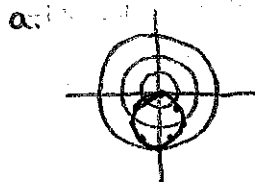
θ	30	45	60	90	120	135	150	180	210	225	240	270
a.	1.5	2.1	2.6	3	2.6	2.1	1.5	0	1.5	2.1	2.6	3
b.	-1.5	-3	-1.5	3	-1.5	-3	-1.5	3	-1.5	-3	-1.5	3
c.	0	3.5	5	0	5	3.5	0	5	0	3.5	5	0

- Graph each.

a. $r = -3 \sin \theta$

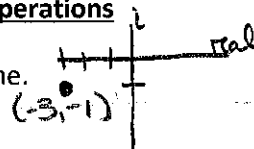
b. $r = 3 \cos 4\theta$

~~c. $r = 5 \cos 3\theta$~~
OMIT



Represent complex numbers (polar form) & Complex Number Operations

- Explain how you would represent $-3 - i$ on the complex plane.



- Find the conjugate of $-4 + 2i$. $-4 - 2i$

- Divide: $\frac{6-i}{-4+2i}$. Write your answer in rectangular and polar form. $-\frac{13}{10} - \frac{2}{5}i$

$r = 1.36$
 $\theta = \tan^{-1} \left(\frac{-2/5}{-13/10} \right) = 180.3$

- Find $(-1 + 4i) - (2 + 7i)$ $-3 - 3i$

$-1.3 - .4i$

$1.36 (\cos 180.3 + i \sin 180.3)$

- Find $(2 - i)(3 + 4i)$ $10 + 5i$

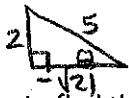
Cumulative Review

10. Know how to solve a linear system – such as: $x - 2y = 7$ $x = 2.4$
 $4x + 5y = -2$ $y = -2.3$
11. Know how to complete the square to get a conic in standard form – such as: $2x^2 - 4y^2 - 6x + 8y - 10 = 2$
 OMIT

12. Know how to find a coordinate from a following trig. expression – such as: $\sin\left(\frac{4\pi}{3}\right) - \frac{\sqrt{3}}{2}$

13. Know how to find an angle with inverse trig. – such as: $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right) 150^\circ = \frac{5\pi}{6}$

14. Know how to find the exact value of a trig. function – such as: Quadrant II, $\sin\theta = \frac{2}{5}$ - find $\sec\theta = ?$



$$\cos = \frac{-\sqrt{21}}{5}$$

$$\sec\theta = -\frac{5}{\sqrt{21}} = -\frac{5\sqrt{21}}{21}$$

15. Know how to find the determinant of a 2x2 matrix – such as: $\begin{vmatrix} -5 & 1 \\ -2 & -2 \end{vmatrix} 10 - (-2) = 10 + 2 = 12$

16. Know how to find the asymptotes of a tangent graph – such as: $y = \tan(2x - 60^\circ)$ left asympt: $x = -15^\circ$
 right asympt: $x = 75^\circ$

$$LA: 2x - 60 = -90$$

$$2x = -30$$

$$RA: 2x - 60 = 90$$

$$2x = 150$$

17. Know how to solve a trigonometric equation – such as: $4\sin^2 x - 3 = 0$

$$\sin^2 x = \frac{3}{4}$$

$$\sin x = \pm \frac{\sqrt{3}}{2}$$

$$60^\circ, -60^\circ \text{ or } 300^\circ$$

18. Know how to solve for a missing angle when given three sides – such as: $r = 6, b = 2, e = 5$ - find $\angle E = ?$

$$LOC: 5^2 = 6^2 + 2^2 - 2(6)(2)\cos E$$

$$-15 = -24\cos E$$

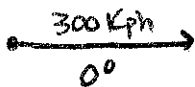
$$51.3^\circ$$

19. Know how to find the component form – such as $\|v\| = 5, \theta = 48^\circ$

$$\langle 5\cos 48^\circ, 5\sin 48^\circ \rangle = \langle 3.3, 3.7 \rangle$$

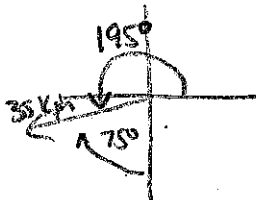
20. Know how to find the resultant speed of a vectors application – such as: An airplane is traveling 300 kilometers per hour due east. A wind is blowing 35 kilometers per hour 75° southwest. What is the resulting speed of the airplane?

S 75° W



$$\langle 300 \cos 0^\circ, 300 \sin 0^\circ \rangle$$

$$\langle 266.2, -9.1 \rangle$$



$$\langle 35 \cos 195^\circ, 35 \sin 195^\circ \rangle$$

$$\sqrt{266.2^2 + (-9.1)^2}$$

$$266.4 \text{ Kph}$$

266.4 Kph