LESSON PLANS

DATE: Mar 30, 2015

SUBJECT: PreCalc

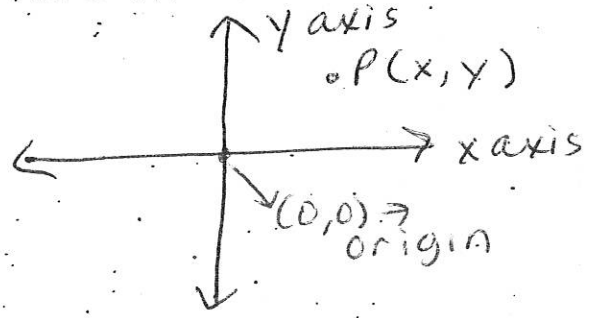
TOPIC: Sec 8.1 POLAR ~~Mar 31~~ COORDINATES

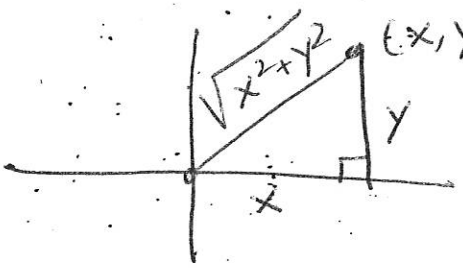
OBJECTIVES:

Students are able to plot points using polar coordinates and convert between rectangular and polar coordinates.

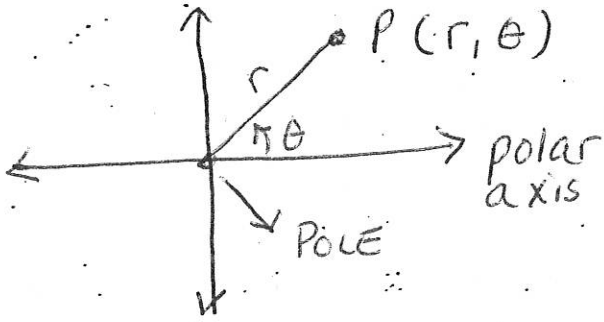
PROCEDURE:

RECTANGULAR COORDINATES





POLAR COORDINATES



$|r|$ → distance from the Pole to the Point.

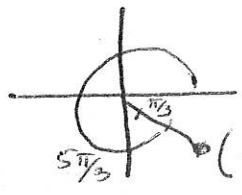
IF $r > 0$ (POSITIVE) → FORWARD
IF $r < 0$ (NEGATIVE) → BACKWARD

θ → POSITIVE → Counterclockwise
θ → negative → Clockwise

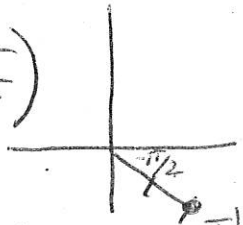
TO PLOT a POINT USING POLAR COORDINATES:

1) draw θ in standard position.
2) go forward r units if r is positive or (go backward r units if r is negative) from the pole to the terminal side of the angle.

ex) a) Plot $(3, \frac{5\pi}{3})$

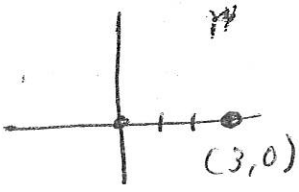


b) $(2, -\frac{\pi}{4})$

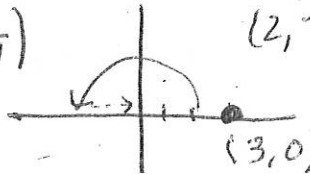


ASSIGNMENT:

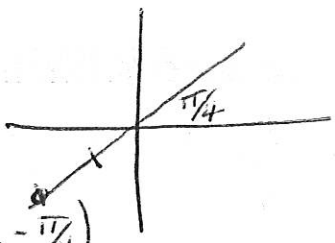
c) (3,0)



d) $(-3, \pi)$

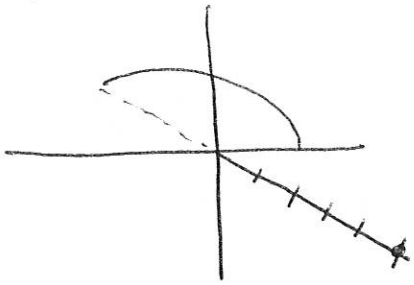


e) $(-2, \frac{\pi}{4})$



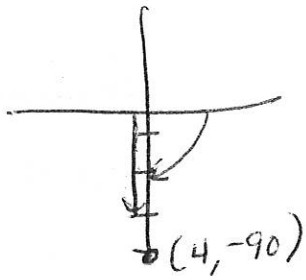
$(2, -\frac{\pi}{4})$

f) $(-5, 120°)$



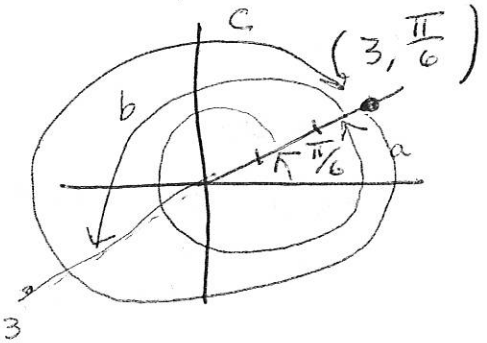
$(-5, 120)$

g) $(4, -90)$



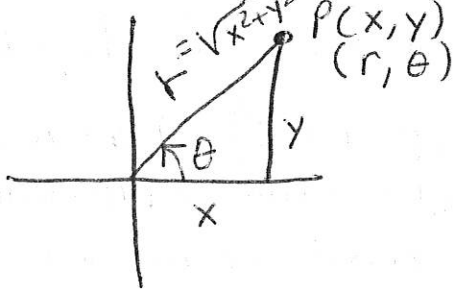
$(4, -90)$

ex 2) PLOT $(3, \frac{\pi}{6})$. FIND other points (r, θ) such that: (a) $r > 0$, $2\pi \leq \theta < 4\pi$
(b) $r < 0$, $0 \leq \theta < 2\pi$
(c) $r > 0$, $-2\pi < \theta \leq 0$



a) $(3, \frac{13\pi}{6})$ b) $(-3, \frac{7\pi}{6})$ c) $(3, -\frac{11}{6}\pi)$

ex 3) CONVERTING FROM RECTANGULAR COORDINATES TO POLAR COORDINATES $(x, y) \rightarrow (r, \theta)$

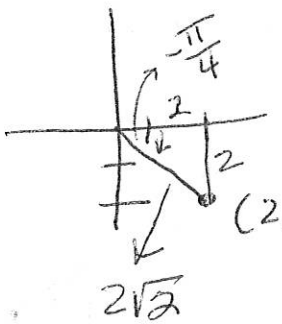


$\cos\theta = \frac{x}{r}$ so $x = r\cos\theta$ $\tan\theta = \frac{y}{x}$

$\sin\theta = \frac{y}{r}$ so $y = r\sin\theta$

$r = \sqrt{x^2+y^2}$ so $r^2 = x^2 + y^2$

a) Convert $(2, -2)$ to polar COORDINATES

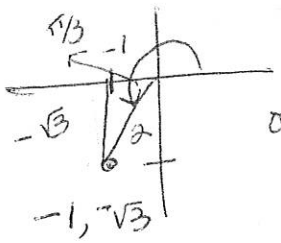


$(2, -2)$

$(\text{leg} \times \sqrt{2} = \text{hyp})$

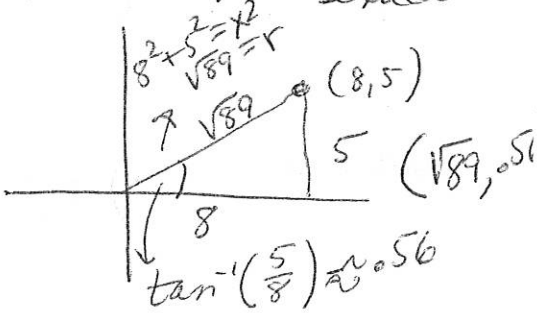
MULTIPLE answers: $(2\sqrt{2}, \frac{\pi}{4})$ or $(2\sqrt{2}, \frac{7\pi}{4})$ or $(-2\sqrt{2}, \frac{3\pi}{4})$ .....

b) $(-1, -\sqrt{3})$



$(2, \frac{4\pi}{3})$ or $(-2, \frac{\pi}{3})$ ....

c) $(8, 5)$ → IF not exact



LESSON PLANS DATE: _____

SUBJECT: _____ TOPIC: _____

OBJECTIVES:

PROCEDURE:

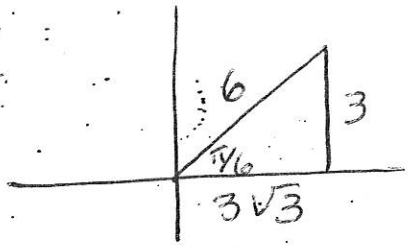
ex 4) To convert polar COORDINATES TO RECTANGULAR COORDINATES USE $x = r\cos\theta$ AND $y = r\sin\theta$ or DRAW the △

a) convert $(6, \frac{\pi}{6})$ to polar COORDINATES

$x = 6\cos\frac{\pi}{6} = 6 \cdot \frac{\sqrt{3}}{2} = 3\sqrt{3}$ answer $(3\sqrt{3}, 3)$

$y = 6\sin\frac{\pi}{6} = 6 \cdot 1/2 = 3$

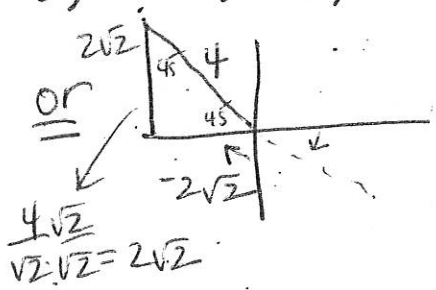
OR



Hyp to short ÷2
short to long × √3
write point $(3\sqrt{3}, 3)$

b) $(-4, -\frac{\pi}{4})$ $x = -4\cos(-\frac{\pi}{4}) = -4 \cdot \frac{\sqrt{2}}{2} = -2\sqrt{2}$ $(-2\sqrt{2}, 2\sqrt{2})$

$y = -4\sin(-\pi/4) = -4 \cdot -\frac{\sqrt{2}}{2} = 2\sqrt{2}$



OR

Hyp to leg ÷ √2

$(-2\sqrt{2}, 2\sqrt{2})$

c) $(-3.1, 182^\circ)$ MODE degree

$x = -3.1\cos(182^\circ) = 3.10$ $(3.10, .11)$

$y = -3.1\sin(182^\circ) = .11$

ASSIGNMENT:

→ OVER

TO TRANSFORM an EQUATION from POLAR TO RECTANGULAR:

ex) $r = 4\sin\theta$

FIRST MULTIPLY BOTH SIDES by r

$r^2 = 4r\underbrace{\sin\theta}_{y}$

$r^2 = x^2+y^2$
$y = r\sin\theta$
} SUBSTITUTE

$x^2+y^2 = 4y$

↓

TO SEE WHAT THIS EQUATION graphs, complete the square

$x^2+y^2-4y = 0$

$x^2 + y^2-4y+\frac{4}{} = 0+\frac{4}{}$

$x^2+(y-2)^2 = 4$

CIRCLE
$((x-h)^2+(y-k)^2 = r^2)$
center (h, k)
r = radius

IT IS A CIRCLE WITH center (0, 2) and radius 2