

Pre-Calculus Worksheet

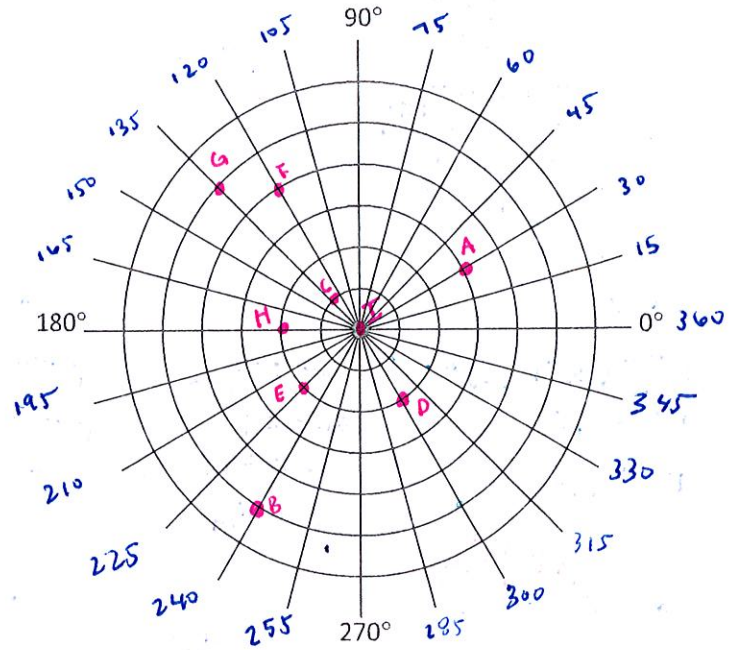
Name: _____

Section 10.7 - Polar Coordinates

Period: _____

I. Graph and label each point.

1. $A(3, 30^\circ)$ ✓
2. $B(5, 240^\circ)$ ✓
3. $C(1, 135^\circ)$ ✓
4. $D(2, -60^\circ)$ ✓
5. $E(-2, 45^\circ)$ ✓
6. $F(-4, 300^\circ)$ ✓
7. $G(-5, -45^\circ)$ ✓
8. $H(-2, 0^\circ)$ ✓
9. $I(0, -270^\circ)$ ✓



II. State three other pairs of polar coordinates for each point where $-360^\circ < \theta < 360^\circ$. Show work.

<p>10. $(-2, 150^\circ)$</p> <p>$(2, 330^\circ) = (2, 11\pi/6)$</p> <p>$(2, -30^\circ) = (2, -\pi/6)$</p> <p>$(-2, 150^\circ) = (-2, 5\pi/6)$</p>	<p>11. $(5, -60^\circ) = (5, 5\pi/3)$</p> <p>$= (5, -\pi/3)$</p> <p>$= (-5, 120^\circ)$</p>
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III. State three other pairs of polar coordinates for each point where $-2\pi < \theta < 2\pi$. Show work.

<p>12. $(4, \frac{\pi}{5})$</p>	<p>13. $(-3, \frac{2\pi}{3}) = (3, 5\pi/3)$</p> <p>$(3, -\pi/3)$</p> <p>$(-?)$</p>
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IV. A point in polar coordinates is given. Convert the point to rectangular coordinates. Show work.

<p>14. $(3, \frac{\pi}{2})$</p> <p>$x = r \cos \theta$</p> <p>$= 3 \cos \pi/2$</p> <p>$= 0$</p> <p>$y = r \sin \theta$</p> <p>$= 3 \sin \pi/2$</p> <p>$= 3$</p> <p>$(0, 3)$</p>	<p>15. $(-1, \frac{5\pi}{4})$</p> <p>$x = r \cos \theta$</p> <p>$= -1 \cos \frac{5\pi}{4}$</p> <p>$= -1 \cdot \frac{\sqrt{2}}{2}$</p> <p>$= \frac{\sqrt{2}}{2}$</p> <p>$y = r \sin \theta$</p> <p>$= -1 \sin \frac{5\pi}{4}$</p> <p>$= -1 \cdot -\frac{\sqrt{2}}{2}$</p> <p>$= \frac{\sqrt{2}}{2}$</p> <p>$(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$</p>
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<p>16. $\left(2, \frac{7\pi}{6}\right)$</p> $x = r \cos \theta$ $= 2 \cos \frac{7\pi}{6}$ $= 2 \cdot -\frac{\sqrt{3}}{2}$ $= -\sqrt{3}$ $y = r \sin \theta$ $= 2 \sin \frac{7\pi}{6}$ $= 2 \cdot -\frac{1}{2}$ $= -1$ <p>$(-\sqrt{3}, -1)$</p>	<p>17. $(-2.5, 1.1)$</p> <p>Use a calculator.</p> $x = r \cos \theta$ $= -2.5 \cos 1.1$ $= -1.133$ $y = r \sin \theta$ $= -2.5 \sin 1.1$ $= -2.228$ <p>$(-1.133, -2.228)$</p>
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V. A point in rectangular coordinates is given. Convert the point to polar coordinates. Show work.

<p>18. $(-3, -3)$</p> $r^2 = (-3)^2 + (-3)^2$ $r^2 = 18$ $r = \sqrt{18}$ $\tan \theta = \frac{-3}{-3}$ $\tan \theta = 1$ $\theta = \tan^{-1}(1)$ $\theta = \pi/4$ <p>$(\sqrt{18}, \pi/4)$</p>	<p>19. $(-6, 0)$</p> $r^2 = (-6)^2 + (0)^2$ $r^2 = 36$ $r = 6$ $\tan \theta = 0/-6$ $\tan \theta = 0$ $\theta = \arctan 0$ $\theta = 0$ <p>$(6, 0)$</p>
<p>20. $(4, -4\sqrt{3})$</p> $r^2 = 4^2 + (-4\sqrt{3})^2$ $r^2 = 16 + 16 \cdot 3$ $r^2 = 64$ $r = 8$ $\tan \theta = \frac{-4\sqrt{3}}{4}$ $\tan \theta = -\sqrt{3}$ $\theta = \tan^{-1}(-\sqrt{3})$ $\theta = -\pi/3$ <p>$(8, -\pi/3)$</p>	<p>21. $(-3, 4)$</p> $r^2 = (-3)^2 + (4)^2$ $r^2 = 9 + 16$ $r^2 = 25$ $r = 5$ $\tan \theta = 4/-3$ $\theta = \tan^{-1}(-4/3)$ <p>$(5, \swarrow)$</p>

VI. Convert the rectangular equation to polar form.

<p>22. $x^2 + y^2 = 9$</p> $r^2 = 9$ $r = 3$ $r = -3$ <p>all the same</p>	<p>23. $y = 4$</p> $r \sin \theta = 4$ $r = \frac{4}{\sin \theta}$ <p>$r = 4 \csc \theta$</p>	<p>24. $y = x$</p> $r \sin \theta = r \cos \theta$ $\sin \theta = \cos \theta$ <p>$\tan \theta = 1$</p>
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VII. Convert each polar equation to rectangular form.

<p>25. $r = -5 \sec \theta$ [divide by $\sec \theta$]</p> $\frac{r}{\sec \theta} = -5$ $r \cos \theta = -5$ <p>$x = -5$</p>	<p>26. $r = 4 \sin \theta$ [mult. by r!]</p> $r^2 = 4r \sin \theta$ $x^2 + y^2 = 4y$ $x^2 + y^2 - 4y = 0$ $x^2 + y^2 - 4y + 4 = 4$ <p>$x^2 + (y-2)^2 = 4$</p>	<p>26. $r = 4$ [square!]</p> $r^2 = 4^2$ <p>$x^2 + y^2 = 16$</p>
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vertical line.

circle centered at $(0, 2)$
w/ radius $\sqrt{4} = 2$

circle centered at $(0, 0)$
w/ radius $\sqrt{16} = 4$