Name: ____ Period: __________ Date: _______________

Polar Coordinates Assignment

Find a different pair of polar coordinates for each given point such that $0 \le \theta \le 180°$ or $0 \le \theta \le \pi$.

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

2. $(1.5, -920°)$

3. $(-5, -1460°)$

4. $\left(-3, -\frac{21\pi}{8}\right)$

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Polar Coordinates Assignment

Use distance formula to find the distance between each pair of points.

1. $\left(3, \frac{\pi}{2}\right)$ **and** $\left(8, \frac{4\pi}{3}\right)$

2. $(4, -315°)$ **and** $(1, 60°)$

3. $(-5, 135°)$ **and** $(-1, 240°)$

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Polar Coordinates Assignment

Answers

Find a different pair of polar coordinates for each given point such that $0 \le \theta \le 180°$ or $0 \le \theta \le \pi$.

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

Let $P(r,\theta) = P\left(-2, \frac{5\pi}{2}\right)$. We subtract multiples of π to make the angle between 0 and π.

$$\frac{5\pi}{2} - (2)\pi = \frac{5\pi - 4\pi}{2} = \frac{\pi}{2}$$

Now, $\frac{\pi}{2}$ is between 0 and π, also since $k = 2$ is even, so $r = 5$ is kept as such.

$$\rightarrow P\left(-2, \frac{5\pi}{2}\right) = P\left(-2, \frac{\pi}{2}\right)$$

2. $(1.5, -920°)$

Let $P(r,\theta) = P(1.5, -920°)$. We add multiples of $180°$ to make the angle between 0 and $180°$.

$$-920° + (6)180° = -920° + 1080° = 160°$$

Now, $160°$ is between 0 and $180°$, also since $k = 6$ is even, so $r = 1.5$ is kept as such.

$$\rightarrow P(1.5, -920°) = P(1.5, 160°)$$

3. $(-5, -1460°)$

Let $P(r,\theta) = P(-5, -1460°)$. We add multiples of $180°$ to make the angle between 0 and $180°$.

$$-1460° + (9)180° = -1460° + 1620° = 160°$$

Now, $160°$ is between 0 and $180°$, also since $k = 9$ is odd, so $r = -5$ becomes $r = 5$

$$\rightarrow P(-5, -1460°) = P(5, 160°)$$

4. $\left(-3, -\frac{21\pi}{8}\right)$

Let $P(r,\theta) = P\left(-3, -\frac{21\pi}{8}\right)$. We subtract multiples of π to make the angle between 0 and π.

$$-\frac{21\pi}{8} + (3)\pi = \frac{-21\pi + 24\pi}{8} = \frac{3\pi}{8}$$

Now, $\frac{3\pi}{8}$ is between 0 and π, also since $k = 3$ is odd, so $r = -3$ becomes $r = 3$.

$$\rightarrow P\left(-3, -\frac{21\pi}{8}\right) = P\left(3, \frac{3\pi}{8}\right)$$

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Polar Coordinates Assignment

Use distance formula to find the distance between each pair of points.

1. $\left(3, \frac{\pi}{2}\right)$ **and** $\left(8, \frac{4\pi}{3}\right)$

Let $P_1(r_1, \theta_1) = P_1\left(3, \frac{\pi}{2}\right)$ **and** $P_2\left(8, \frac{4\pi}{3}\right)$**, then:**

$$P_1P_2 = \sqrt{3^2 + 8^2 - 2(3)(8)\cos\left(\frac{4\pi}{3} - \frac{\pi}{2}\right)}$$

$$P_1P_2 = \sqrt{9 + 64 - 48\cos\left(\frac{5\pi}{6}\right)}$$

$\rightarrow$ $P_1P_2 = 10.70$

2. $(4, -315°)$ **and** $(1, 60°)$

Let $P_1(r_1, \theta_1) = P_1(4, -315°)$ **and** $P_2(1, 60°)$**, then:**

$$P_1P_2 = \sqrt{4^2 + 1^2 - 2(4)(1)\cos\big(60° - (-315°)\big)}$$

$$P_1P_2 = \sqrt{16 + 1 - 8\cos(375°)}$$

$\rightarrow$ $P_1P_2 = 3.1$

3. $(-5, 135°)$ **and** $(-1, 240°)$

Let $P_1(r_1, \theta_1) = P_1(-5, 135°)$ **and** $P_2(-1, 240°)$**, then:**

$$P_1P_2 = \sqrt{(-5)^2 + (-1)^2 - 2(-5)(-1)\cos(240° - 135°)}$$

$$P_1P_2 = \sqrt{25 + 1 - 10\cos(105°)}$$

$\rightarrow$ $P_1P_2 = 5.35$