Activity 4.2 - Answer Key

Problem 1

Find the six trigonometric values of $\dfrac{\pi}{2}$.

$\sin\left(\frac{\pi}{2}\right) = 1$

$\cos\left(\frac{\pi}{2}\right) = 0$

$\tan\left(\frac{\pi}{2}\right) = \frac{1}{0} = \text{undefined}$

$\csc\left(\frac{\pi}{2}\right) = \frac{1}{1} = 1$

$\sec\left(\frac{\pi}{2}\right) = \frac{1}{0} = \text{undefined}$

$\cot\left(\frac{\pi}{2}\right) = \frac{0}{1} = 0$

Problem 2

Find the six trigonometric values of $\dfrac{5\pi}{3}$.

$\sin\left(\frac{5\pi}{3}\right) = -\frac{\sqrt{3}}{2}$

$\cos\left(\frac{5\pi}{3}\right) = \frac{1}{2}$

$\tan\left(\frac{5\pi}{3}\right) \frac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = -\sqrt{3}$

$\csc\left(\frac{5\pi}{3}\right) = \frac{1}{\sin\left(\frac{5\pi}{3}\right)} = \frac{1}{-\frac{\sqrt{3}}{2}} = -\frac{2\sqrt{3}}{3}$

$\sec\left(\frac{5\pi}{3}\right) = \frac{1}{\cos\left(\frac{5\pi}{3}\right)} = \frac{1}{\frac{1}{2}} = 2$

$\cot\left(\frac{5\pi}{3}\right) = \frac{1}{\tan\left(\frac{5\pi}{3}\right)} = \frac{1}{-\sqrt{3}} = -\frac{\sqrt{3}}{3}$

Problem 3

Given the point on the unit circle $\left(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$, find $\cos(x)$.

$\cos(x) = \frac{-\sqrt{2}}{2}$

Problem 4

Given the point on the unit circle $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$, find $\sec(x)$.

$\sec(x) = \frac{1}{\cos(x)} = \frac{1}{\frac{\sqrt{3}}{2}} = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

Problem 5

Is the point $\left(\frac{3}{2}, \frac{1}{4}\right)$ on the unit circle?

In order to be on the unit circle, the point must satisfy the equation $x^2 + y^2 = 1$:

$$\left(\frac{3}{2}\right)^2 + \left(\frac{1}{4}\right)^2 = 1$$
$$\frac{9}{4} + \frac{1}{16} = 1$$
$$\frac{36}{16} + \frac{1}{16} = 1$$
$$\frac{37}{16} \neq 1$$

Because $\frac{37}{16} \neq 1$, the point $\left(\frac{3}{2}, \frac{1}{4}\right)$ is not on the unit circle.

Problem 6

Find all the values of u, so the given point is on the unit circle: $(u, \frac{-2}{5})$.

To find all values of u such that the point $(u, \frac{-2}{5})$ is on the unit circle, we need to ensure that the coordinates satisfy the equation of the unit circle. The equation of the unit circle is:

$$x^2 + y^2 = 1$$

Here, $x = u$ and $y = \frac{-2}{5}$. Substituting these values into the equation, we get:

$$u^2 + \left(\frac{-2}{5}\right)^2 = 1$$

Now, let's solve for u:

$$u^2 + \left(\frac{-2}{5}\right)^2 = 1$$

$$u^2 + \frac{4}{25} = 1$$
$$u^2 + \frac{4}{25} = \frac{25}{25}$$
$$u^2 = \frac{25}{25} - \frac{4}{25}$$
$$u^2 = \frac{25-4}{25}$$
$$u^2 = \frac{21}{25}$$

Taking the square root of both sides, we find:

$$u = \pm\sqrt{\frac{21}{25}}$$
$$u = \pm\frac{\sqrt{21}}{\sqrt{25}}$$
$$u = \pm\frac{\sqrt{21}}{5}$$

Therefore, the values of u such that the point $(u, \frac{-2}{5})$ is on the unit circle are:

$$u = \frac{\sqrt{21}}{5} \quad \text{and} \quad u = -\frac{\sqrt{21}}{5}$$

Problem 7

Find $\tan(4\pi)$

To find $\tan(4\pi)$, we can use the periodicity property of the tangent function. The tangent function has a period of π, which means that:

$$\tan(\theta + n\pi) = \tan(\theta)$$

for any integer n.

In this case, we can use this property to simplify $\tan(4\pi)$:

$$4\pi = 4\pi + 0\pi$$

Since the tangent function is periodic with period π, we can write:

$$\tan(4\pi) = \tan(0)$$

We know that:

$$\tan(0) = 0$$

Therefore:

$$\tan(4\pi) = 0$$

So, the value of $\tan(4\pi)$ is:

$$\tan(4\pi) = 0$$

Problem 8

Find the exact value of: $\sin(180°) - \cos(0°)$

To find the exact value of $\sin(180°) - \cos(0°)$, we start by evaluating each trigonometric function individually.

First, we evaluate $\sin(180°)$:

$$\sin(180°) = 0$$

Next, we evaluate $\cos(0°)$:

$$\cos(0°) = 1$$

Now we can subtract these values:

$$\sin(180^\circ) - \cos(0^\circ) = 0 - 1 = -1$$

Therefore, the exact value of $\sin(180^\circ) - \cos(0^\circ)$ is:

$$\sin(180^\circ) - \cos(0^\circ) = -1$$