

Hello! I can certainly help you solve these trigonometry problems.

The goal is to find all values of θ in the interval $0^\circ \leq \theta \leq 360^\circ$ for each given trigonometric ratio, rounding the final answer to the nearest degree.

For each problem, we'll use the following steps:

1. **Find the reference angle (α):** Use the inverse trigonometric function of the *absolute value* of the given ratio.
2. **Determine the quadrants:** Use the sign of the trigonometric ratio (positive or negative) to determine which quadrants θ lies in. (Remember the **CAST Rule** or **All Students Take Calculus** to identify where each function is positive: **C**os is positive in IV, **A**ll are positive in I, **S**in is positive in II, **T**an is positive in III).
3. **Calculate the angles (θ):** Use the reference angle to find the actual angles in the appropriate quadrants:
 - **Quadrant I:** $\theta = \alpha$
 - **Quadrant II:** $\theta = 180^\circ - \alpha$
 - **Quadrant III:** $\theta = 180^\circ + \alpha$
 - **Quadrant IV:** $\theta = 360^\circ - \alpha$

Solutions

a) $\sin \theta = 0.4815$

1. Reference Angle (α):

$$\alpha = \arcsin(0.4815) \approx 28.786^\circ$$

2. **Quadrants:** Sine is **positive**, so θ is in **Quadrant I** and **Quadrant II**.

3. **Angles (θ):**

- **QI:** $\theta_1 = \alpha \approx 28.786^\circ$

- **QII:** $\theta_2 = 180^\circ - \alpha \approx 180^\circ - 28.786^\circ = 151.214^\circ$

4. Nearest Degree:

$$\theta \approx ** 29^\circ ** \text{ and } ** 151^\circ **$$

b) $\tan \theta = -0.1623$

1. Reference Angle (α):

$$\alpha = \arctan(|-0.1623|) = \arctan(0.1623) \approx 9.224^\circ$$

2. **Quadrants:** Tangent is **negative**, so θ is in **Quadrant II** and **Quadrant IV**.

3. **Angles (θ):**

- **QII:** $\theta_1 = 180^\circ - \alpha \approx 180^\circ - 9.224^\circ = 170.776^\circ$

- **QIV:** $\theta_2 = 360^\circ - \alpha \approx 360^\circ - 9.224^\circ = 350.776^\circ$

4. Nearest Degree:

$$\theta \approx ** 171^\circ ** \text{ and } ** 351^\circ **$$

c) $\cos \theta = -0.8722$

1. Reference Angle (α):

$$\alpha = \arccos(|-0.8722|) = \arccos(0.8722) \approx 29.317^\circ$$

2. **Quadrants:** Cosine is **negative**, so θ is in **Quadrant II** and **Quadrant III**.

3. **Angles (θ):**

- **QII:** $\theta_1 = 180^\circ - \alpha \approx 180^\circ - 29.317^\circ = 150.683^\circ$

- **QIII:** $\theta_2 = 180^\circ + \alpha \approx 180^\circ + 29.317^\circ = 209.317^\circ$

4. Nearest Degree:

$$\theta \approx **151^\circ** \text{ and } **209^\circ**$$

d) $\cot \theta = 8.1516$

First, convert to the tangent function, since $\tan \theta = \frac{1}{\cot \theta}$:

$$\tan \theta = \frac{1}{8.1516} \approx 0.12267$$

1. Reference Angle (α):

$$\alpha = \arctan(0.12267) \approx 6.992^\circ$$

2. **Quadrants:** Cotangent (and Tangent) is **positive**, so θ is in **Quadrant I** and **Quadrant III**.

3. **Angles (θ):**

- **QI:** $\theta_1 = \alpha \approx 6.992^\circ$

- **QIII:** $\theta_2 = 180^\circ + \alpha \approx 180^\circ + 6.992^\circ = 186.992^\circ$

4. Nearest Degree:

$$\theta \approx **7^\circ** \text{ and } **187^\circ**$$

e) $\csc \theta = -2.3424$

First, convert to the sine function, since $\sin \theta = \frac{1}{\csc \theta}$:

$$\sin \theta = \frac{1}{-2.3424} \approx -0.42699$$

1. Reference Angle (α):

$$\alpha = \arcsin(|-0.42699|) = \arcsin(0.42699) \approx 25.268^\circ$$

2. **Quadrants:** Cosecant (and Sine) is **negative**, so θ is in **Quadrant III** and **Quadrant IV**.

3. **Angles (θ):**

$$\circ \text{ QIII: } \theta_1 = 180^\circ + \alpha \approx 180^\circ + 25.268^\circ = 205.268^\circ$$

$$\circ \text{ QIV: } \theta_2 = 360^\circ - \alpha \approx 360^\circ - 25.268^\circ = 334.732^\circ$$

4. Nearest Degree:

$$\theta \approx **205^\circ** \text{ and } **335^\circ**$$

f) $\sec \theta = 0$

First, convert to the cosine function, since $\cos \theta = \frac{1}{\sec \theta}$:

$$\cos \theta = \frac{1}{0}$$

This expression is **undefined** (division by zero).

The secant function, $\sec \theta = \frac{1}{\cos \theta}$, is only defined when $\cos \theta \neq 0$.

Since the range of the cosine function is $-1 \leq \cos \theta \leq 1$, and $\sec \theta$ is the reciprocal of $\cos \theta$:

- If $0 < \cos \theta \leq 1$, then $\sec \theta \geq 1$.
- If $-1 \leq \cos \theta < 0$, then $\sec \theta \leq -1$.

The values of $\sec \theta$ are always $|\sec \theta| \geq 1$ or $\sec \theta$ is undefined.

Therefore, $\sec \theta$ **can never equal 0**.

Solution: No solution for $0^\circ \leq \theta \leq 360^\circ$.

Would you like to practice another problem using a different trigonometric function?