

Ch 5 Quiz

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(No Calculators permitted on Page 1)

2. Evaluate using exact values and show the angle and appropriate special triangle on the Cartesian plane.

(a) $\sin 135^\circ$

Solution:

1. **Quadrant:** 135° is in Quadrant II, where sine is positive.

2. **Related Acute Angle:** $\beta = 180^\circ - 135^\circ = 45^\circ$.

3. **Exact Value:** $\sin 45^\circ = \frac{1}{\sqrt{2}}$.

$$\sin 135^\circ = \sin 45^\circ = \frac{1}{\sqrt{2}}$$

(b) $\cot 210^\circ$

Solution:

1. **Quadrant:** 210° is in Quadrant III, where cotangent is positive.

2. **Related Acute Angle:** $\beta = 210^\circ - 180^\circ = 30^\circ$.

3. **Exact Value:** $\cot 30^\circ = \sqrt{3}$.

$$\cot 210^\circ = \cot 30^\circ = \sqrt{3}$$

3. Determine all possible angles for $0^\circ \leq x < 360^\circ$. Show this on the Cartesian plane and use the appropriate special triangles.

(a) $\sin x = -\frac{1}{\sqrt{2}}$

Solution:

1. **RAA:** Since $\sin \beta = \frac{1}{\sqrt{2}}$, the related acute angle is $\beta = 45^\circ$.

2. **Quadrants:** Sine is negative in Quadrants III and IV.

- **QIII:** $x = 180^\circ + 45^\circ = 225^\circ$

- **QIV:** $x = 360^\circ - 45^\circ = 315^\circ$

$$x = \{225^\circ, 315^\circ\}$$

(b) $\cot x = 1$

Solution:

1. **RAA:** Since $\cot \beta = 1$ (so $\tan \beta = 1$), the related acute angle is $\beta = 45^\circ$.

2. **Quadrants:** Cotangent is positive in Quadrants I and III.

- **QI:** $x = 45^\circ$

- **QIII:** $x = 180^\circ + 45^\circ = 225^\circ$

$$x = \{45^\circ, 225^\circ\}$$

4. For $\sin A = -\frac{1}{3}$, determine all possible exact values of $\cos A$, and all angles of A to 1 decimal place. Show angles and related acute angle on the Cartesian plane.

Solution:**Part 1: Exact values of $\cos A$**

Given $\sin A = \frac{y}{r} = -\frac{1}{3}$, we have $y = -1$ and $r = 3$.

Find x :

$$x^2 + y^2 = r^2$$

$$x^2 + (-1)^2 = 3^2$$

$$x^2 + 1 = 9$$

$$x^2 = 8$$

$$x = \pm\sqrt{8} = \pm 2\sqrt{2}$$

Since $\sin A$ is negative, angle A is in Quadrant III or IV.

- In **QIII**, x is negative: $\cos A = \frac{x}{r} = -\frac{2\sqrt{2}}{3}$
- In **QIV**, x is positive: $\cos A = \frac{x}{r} = \frac{2\sqrt{2}}{3}$

$$\cos A = \pm \frac{2\sqrt{2}}{3}$$

Part 2: Angles of A

Find Related Acute Angle β :

$$\sin \beta = \frac{1}{3} \implies \beta = \sin^{-1}\left(\frac{1}{3}\right) \approx 19.5^\circ$$

Possible angles:

- **QIII**: $A = 180^\circ + 19.5^\circ = 199.5^\circ$
- **QIV**: $A = 360^\circ - 19.5^\circ = 340.5^\circ$

$$A \approx \{199.5^\circ, 340.5^\circ\}$$

6. Find all possible angles for $0^\circ \leq x < 360^\circ$ where $\tan x = -1.3748$ (1 dp). Show angles and related acute angle on the Cartesian plane.

Solution:

1. **RAA:** Find acute angle β such that $\tan \beta = 1.3748$.

$$\beta = \tan^{-1}(1.3748) \approx 54.0^\circ$$

2. **Quadrants:** Tangent is negative in Quadrants II and IV.

- **QII:** $x = 180^\circ - 54.0^\circ = 126.0^\circ$
- **QIV:** $x = 360^\circ - 54.0^\circ = 306.0^\circ$

$$x \approx \{126.0^\circ, 306.0^\circ\}$$