

Warmup

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Use the cofunction identities to find the measure of the acute angle θ .

5. $\sin \theta = \cos 25^\circ$ $\sin 65^\circ$

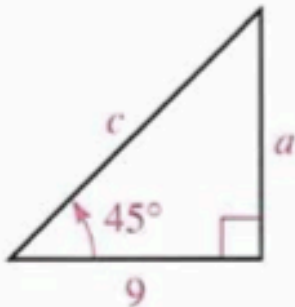
6. $\tan \theta = \cot 70^\circ$ $\tan 20^\circ$

7. $\sec \theta = \csc 15^\circ$ $\csc 75^\circ$

8. $\cos \theta = \sin 45^\circ$ $\cos 45^\circ$

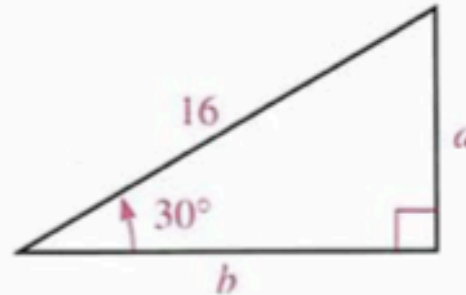
The length of one side of a right triangle is given. Give the lengths of the other two sides.

9.



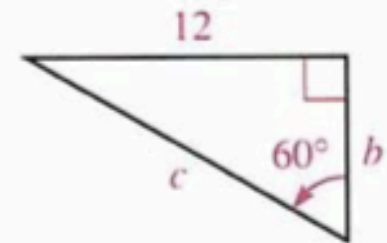
$$a = 9; c = 9\sqrt{2}$$

10.



$$a = 8; b = 8\sqrt{3}$$

11.

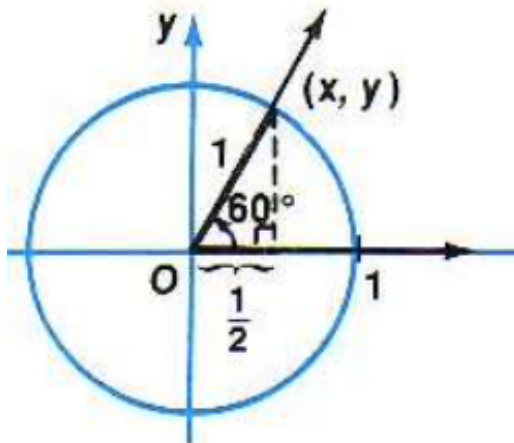


$$b = 4\sqrt{3}; c = 8\sqrt{3}$$

Other Trig Functions

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Find the sin, cos, tan of 60°

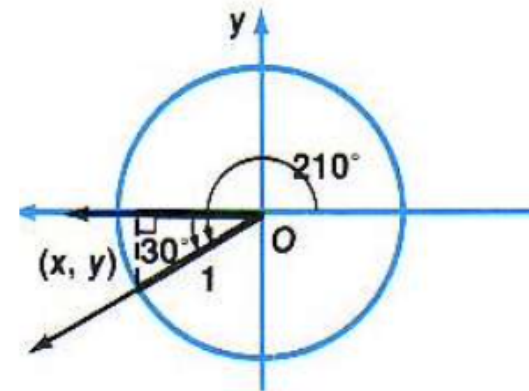


$$\sin 60^\circ = \frac{\sqrt{3}}{2}$$

$$\cos 60^\circ = \frac{1}{2}$$

$$\tan 60^\circ = \sqrt{3}$$

Find the sin, cos, tan of 210°

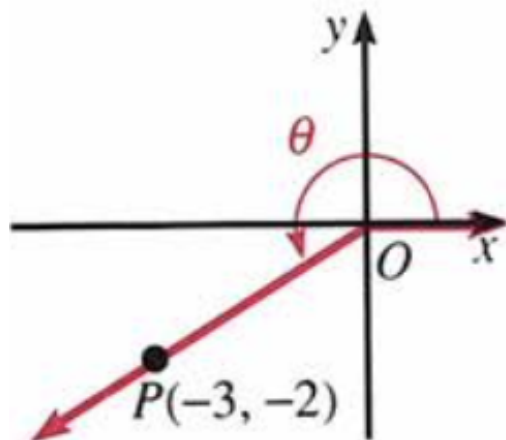


$$\sin 210^\circ = -\frac{1}{2}$$

$$\cos 210^\circ = -\frac{\sqrt{3}}{2}$$

$$\tan 210^\circ = \frac{\sqrt{3}}{3}$$

Practice - Give the six trigonometric ratios of θ



$$\cos \theta = -\frac{3\sqrt{13}}{13}$$

$$\sec \theta = -\frac{\sqrt{13}}{3}$$

$$\sin \theta = -\frac{2\sqrt{13}}{13}$$

$$\csc \theta = -\frac{\sqrt{13}}{2}$$

$$\tan \theta = \frac{2}{3}$$

$$\cot \theta = \frac{3}{2}$$

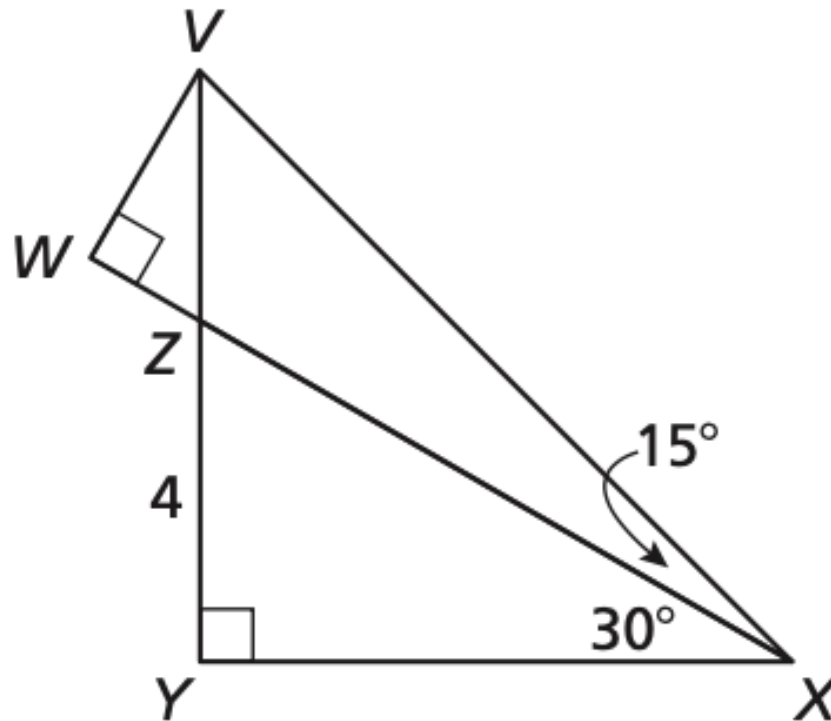


Ch 1.3 Right Triangle Ratios

1.3 - Right Triangle Ratios

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Practice: Find the dimensions of $\triangle VWX$ using special right triangles.



$$VX = 4\sqrt{6} \approx 9.80$$

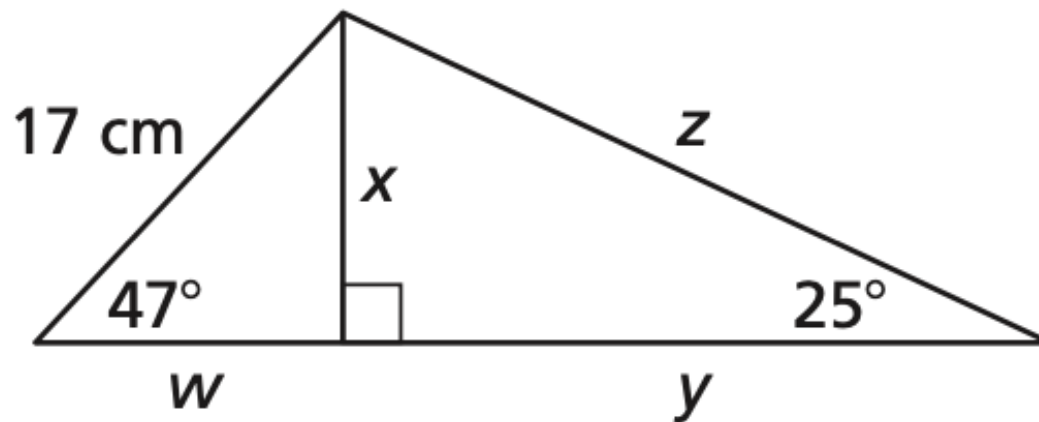
$$WX = 6 + 2\sqrt{3} \approx 9.46$$

$$VW = 6 - 2\sqrt{3} \approx 2.54$$

1.3 - Right Triangle Ratios

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Practice: Find the unknown values using trigonometric ratios.



$$x \approx 12.433 \text{ cm}$$

$$w \approx 11.594$$

$$y \approx 26.663$$

$$z \approx 29.419$$



1.4 - Evaluating Trigonometric Functions

1.4 - Evaluating Trigonometric Functions

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Degrees/Minutes/Seconds (DMS)

- one degree is equivalent to 60 minutes
 - or $1^\circ = 60'$
- one minute is equivalent to 60 seconds
 - or $1' = 60''$

For example:

49 degrees, 21 minutes, 17 seconds = $49^\circ 21' 17''$

1.4 - Evaluating Trigonometric Functions

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Degrees/Minutes/Seconds (DMS)

$$122.5^\circ = 122^\circ 30'$$

$$98.25^\circ = 98^\circ 15'$$

$$77.34^\circ = 77^\circ 20.4' = 77^\circ 20' 24''$$

Practice - convert to degrees, minutes, seconds

1. 95.3°

$$95^\circ 18'$$

2. 115.23°

$$115^\circ 13' 48''$$

3. 1.3 radians

$$74.48^\circ = 74^\circ 29' 4.2''$$

1.4 - Evaluating Trigonometric Functions

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Degrees/Minutes/Seconds (DMS)

$$122.5^\circ = 122^\circ 30'$$

$$98.25^\circ = 98^\circ 15'$$

$$77.34^\circ = 77^\circ 20.4' = 77^\circ 20' 24''$$

Practice - convert to degrees

1. $34^\circ 12' 24''$

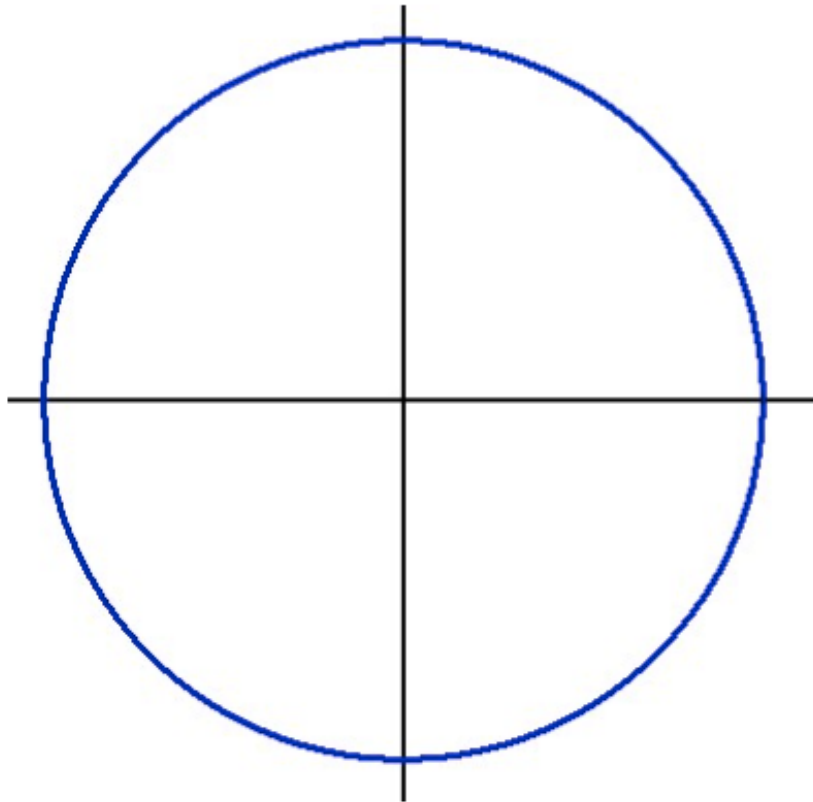
34.21°

1.4 - Evaluating Trigonometric Functions

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Reference Angle

The **acute positive angle** formed by the terminal ray of an angle and the x-axis.



Express in terms of its reference angle

$$\sin 100^\circ = \sin 80^\circ$$

$$\cos 200^\circ = -\cos 20^\circ$$

$$\cot 300^\circ = -\cot 60^\circ$$

Practice - Find the reference angle

1. $\cot(285^\circ) = -\cot(75^\circ)$

2. $\sec(-105^\circ) = -\sec(75^\circ)$

3. $\sin(3) = \sin(\pi - 3) = \sin(0.14159)$

1.4 - Evaluating Trigonometric Functions

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$$0 \leq x < 360^\circ$$

When is $\sin(x)$ positive?

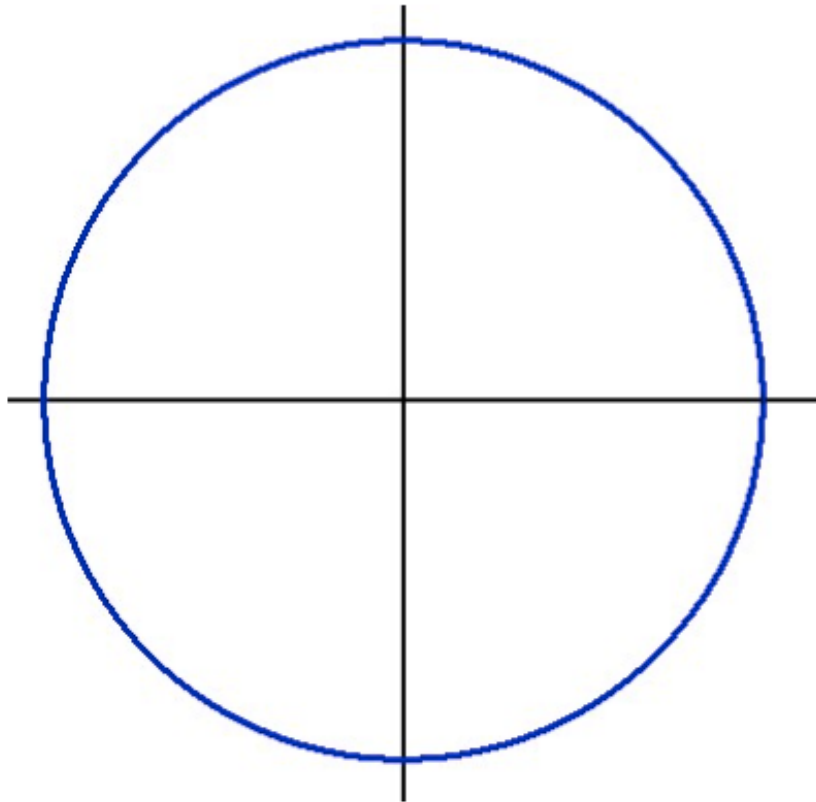
When is $\cos(x)$ positive?

When is $\tan(x)$ positive?

$$\cos(x) = \frac{\sqrt{2}}{2} \quad x = 45^\circ, 315^\circ$$

$$\sin(x) = -\frac{1}{2} \quad x = 210^\circ, 330^\circ$$

$$\tan(x) = -0.778 \quad x = 142.1^\circ, 322.1^\circ$$



1.4 - Evaluating Trigonometric Functions

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$$\sin(x) = 0.6 \quad x = 36.9^\circ = 0.64 \text{ rads}$$

$$0 \leq x < 2\pi \quad x = 143.1^\circ = 2.50 \text{ rads}$$

Practice - Leave answers in degrees $0 \leq x < 360^\circ$

1. $\sin x = -0.2$

2. $\cos x = 0.7$

3. $\sec x = 2.2$

$x = 191.5^\circ, 348.5^\circ$

$x = 45.6^\circ, 314.4^\circ$

$x = 63.0^\circ, 297.0^\circ$

1.4 - Evaluating Trigonometric Functions

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$$\cos(x) = \frac{\sqrt{2}}{2} \quad x = 45^\circ, 315^\circ$$

$$\sin(x) = -\frac{1}{2} \quad x = 210^\circ, 330^\circ$$

$$\tan(x) = -0.778 \quad x = 142.1^\circ, 322.1^\circ$$

Practice - Leave answers in degrees $0 \leq x < 360^\circ$

1. $\sin^2 x = \frac{1}{8}$

$x = 20.7^\circ, 159.3^\circ,$
 $200.7^\circ, 339.3^\circ$

2. $\cos x = -1$

$x = 180^\circ$

3. $\cos^2 x + \cos x = 0$

$x = 90^\circ, 270^\circ, 180^\circ$

1.4 - Evaluating Trigonometric Functions

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Practice - Leave answers in degrees $0 \leq x < 360^\circ$

1. $\cos^2 x - \cos x \cdot \sin x = 0$

$x = 90^\circ, 270^\circ, 45^\circ, 225^\circ$

2. $2 \cos^2 x - \cos x - 3 = 0$

$x = 180^\circ$

3. $3 \sin^2 x - 2 \cos^2 x = 0$

$x = 39.23^\circ, 140.77^\circ, 219.23^\circ, 320.77^\circ$

