Solving Right Triangles

To find the **SIDE** measures of a right triangle, you would use the trigonometric functions (sin, cos, tan).
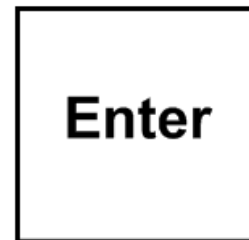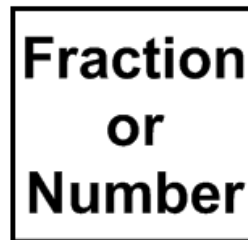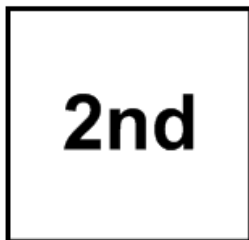
To find the **ANGLE** measures of a right triangle, you would use the *inverse* functions on your calculator.

Inverse Functions (Angles)

$$sin^{-1} \qquad cos^{-1} \qquad tan^{-1}$$

2nd	SIN COS TAN	Fraction or Number	Enter

Use the inverse functions on your calculator to find the angle measures. If necessary, round your answer to the nearest 4th decimal place.

1. $\tan A = 3.5$
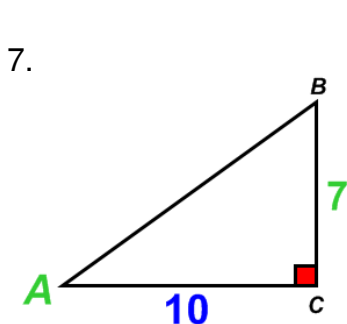
    $74.0546°$

2. $\sin B = 0.55$

    $33.3670°$

3. $\cos C = 0.48$

    $61.3146°$

4. $\cos X = 0.28$

    $73.7398°$

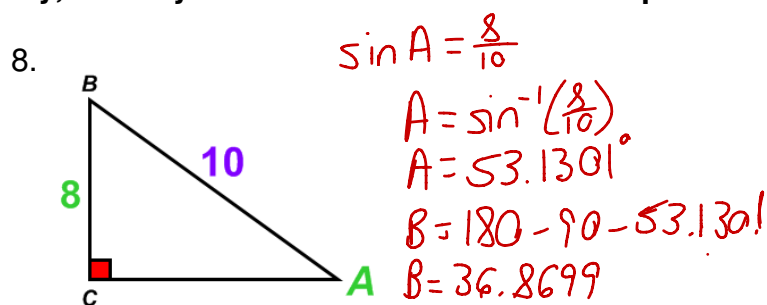5. $\sin \vartheta = \dfrac{3}{8}$

    $22.0243°$

6. $\tan \vartheta = \dfrac{4}{9}$

    $23.9625°$

Find the measure of the missing angles. If necessary, round your answer to the 4th decimal place.

7.

$\tan A = \frac{7}{10}$

$A = \tan^{-1}\left(\frac{7}{10}\right)$
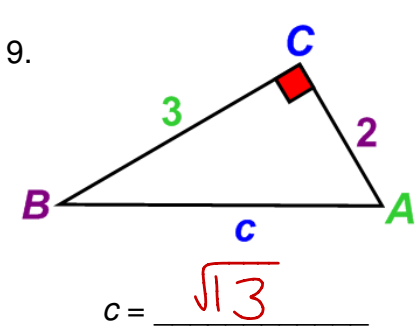
$A = 34.9920°$

$B = 180 - 90 - 34.9920°$

$B = 55.0080$

8.

$\sin A = \frac{8}{10}$

$A = \sin^{-1}\left(\frac{8}{10}\right)$

$A = 53.1301°$

$B = 180 - 90 - 53.1301$

$B = 36.8699$

$\angle A = \underline{34.9920°} \quad \angle B = \underline{55.0080°}$

$\angle A = \underline{53.1301°} \quad \angle B = \underline{36.8699°}$

Solving Right Triangles

To solve a right triangle means to find the measures of all angles and the measures of all three sides.

Solve the right triangle. If necessary, round decimals to the nearest 4th decimal place.

9.

$c = \underline{\sqrt{13}}$

$\angle A = \underline{56.3099°}$

$\angle B = \underline{33.6901°}$

$2^2 + 3^2 = c^2 \qquad \tan A = \frac{3}{2}$

$13 = c^2 \qquad A = \tan^{-1}\left(\frac{3}{2}\right)$

$\sqrt{13} = c \qquad A = 56.3099$

$B = 180 - 90 - 56.3099$

$B = 33.6901$
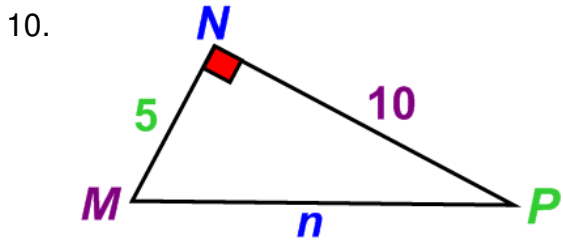
10.

$n = \underline{5\sqrt{5}}$

$\angle M = \underline{63.4349°}$

$\angle P = \underline{26.5651°}$

$5^2 + 10^2 = n^2 \qquad \tan M = \frac{10}{5}$

$\sqrt{125} = n^2 \qquad M = \tan^{-1}\left(\frac{10}{5}\right)$
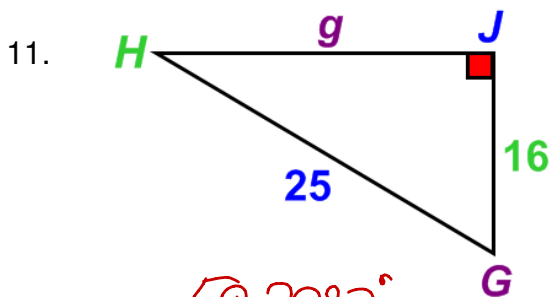
$5\sqrt{5} = n \qquad M = 63.4349$

$P = 180 - 90 - 63.434$

$P = 26.5651$

11.

$\angle G = \underline{50.2082°}$

$\angle H = \underline{39.7918°}$

$g = \underline{3\sqrt{41}}$

$16^2 + g^2 = 25^2 \qquad \cos G = \frac{16}{25}$

$g^2 = 369 \qquad G = \cos^{-1}\left(\frac{16}{25}\right)$

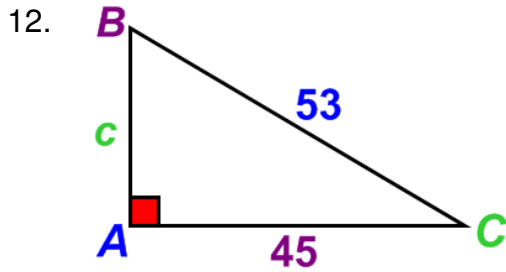$g = \sqrt{369} \qquad G = 50.2082°$

$g = 3\sqrt{41} \qquad H = 180 - 90 - 50.2082$

$H = 39.7918$

Solve the right triangle. If necessary, round decimals to the nearest 4th decimal place.

12.

B

53

C

A   45   C

$45^2 + c^2 = 53^2$

$c^2 = \sqrt{784}$

$c = 28$

$\sin B = \frac{45}{53}$

$B = \sin^{-1}\left(\frac{45}{53}\right)$
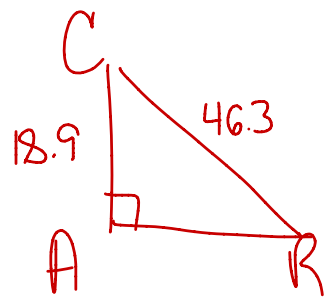
$B = 58.1092$

$\angle B = \underline{58.1092^\circ}$

$C = 180 - 90 - 58.1092$

$C = 31.8908$

$\angle C = \underline{31.8908^\circ}$

$C = 180 - 90 - 58.1092$

$C = 31.8908$

$c = \underline{28}$

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13.   Given $\triangle CAR$, where $\angle A$ is a right angle, $a = 46.3$ and $r = 18.9$. Find the remaining angle and sides. If necessary, round your answers to the nearest 4th decimal place.

C

18.9   46.3

A   R

$18.9^2 + c^2 = 46.3^2$

$c^2 = 1786.48$

$c = 42.2668$

$\sin R = \frac{18.9}{46.3}$
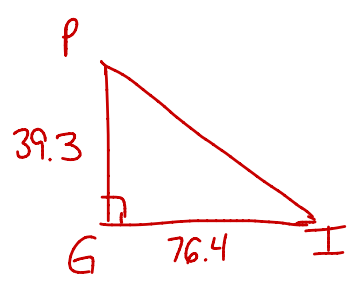
$R = \sin^{-1}\left(\frac{18.9}{46.3}\right)$

$R = 24.0923^\circ$

$C = 180 - 90 - 24.093$

$C = 65.9077^\circ$

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14.   Given $\triangle PIG$, where $\angle G$ is a right angle, $p = 76.4$ and $i = 39.3$. Find the remaining angle and sides. If necessary, round your answers to the nearest 4th decimal place.

P

39.3

G   76.4   I

$\tan I = \frac{39.3}{76.4}$

$I = \tan^{-1}\left(\frac{39.3}{76.4}\right)$
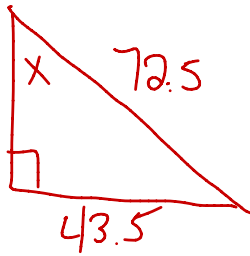
$I = 27.2212^\circ$

$P = 180 - 90 - 27.2212$

$P = 62.7788^\circ$

$39.3^2 + 76.4^2 = c^2$

$7381.45 = c^2$

$85.9154 = c$

15. A 72.5 foot rope from the top of a circus pole is anchored to the ground 43.5 feet from the bottom of the pole. Assuming the pole is perpendicular to the ground, what angle does the rope make with the pole? If necessary, round your answers to the nearest 4th decimal place.
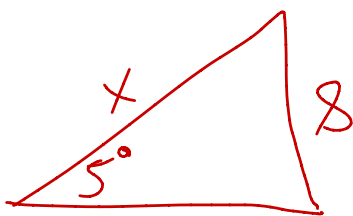
$$\sin x = \frac{43.5}{72.5}$$

$$x = \sin^{-1}\left(\frac{43.5}{72.5}\right)$$

$$x = 36.8699°$$

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16. You are building a ramp so that people in wheelchairs can access a building. If the ramp must have a height of 8 feet, and the angle of the ramp must be 5°, how long must the ramp be? If necessary, round your answers to the nearest 4th decimal place.
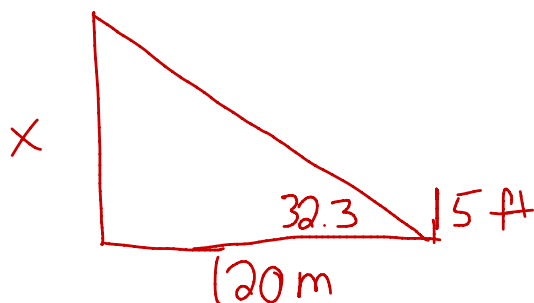
$$\sin 5 = \frac{8}{x}$$

$$x \sin 5 = 8$$

$$x = \frac{8}{\sin 5} \rightarrow \boxed{91.7897 \text{ ft.}}$$

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17. Your friend, who is exactly 5 feet tall is standing 120 meters from the base of a tree. The angle from the ground to the top of the tree is 32.3°. If necessary, round your answers to the nearest 4th decimal place.

(A)   Find the height of the tree.

$$\tan 32.3 = \frac{x}{120}$$

$$120 \tan 32.3 = x$$

$$\boxed{76.5680 \text{ m}} = x$$

(B)   Find the distance from that your friend is standing to the top of the tree.