The Right Triangle

Trigonometric Functions

When working with right triangles, we use Trigonometric Functions to solve for the sides (and angles) of the triangle.

Can’t figure out which side is opposite or adjacent?

Imagine you are the angle $\theta$ standing in a room shaped like the triangle below. (And you are looking down at yourself from above.) Which side is opposite or across the room from you? Which side is adjacent (or beside) you, the angle?

$$\sin \theta = \frac{\text{side opposite}}{\text{hypotenuse}} = \frac{o}{h}$$
$$\cos \theta = \frac{\text{side adjacent}}{\text{hypotenuse}} = \frac{a}{h}$$
$$\tan \theta = \frac{\text{side opposite}}{\text{side adjacent}} = \frac{o}{a}$$

Trigonometric functions for the triangle below:

$$\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{l}{m}$$
$$\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{l}{n}$$
$$\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{n}{m}$$
Solve for all parts of the right triangle. Round to appropriate significant figures.

1. $\theta = 21.4^\circ; \ c = 0.0793$

2. $b = 15; \ c = 34$

3. $\alpha = 49^\circ; \ c = 78$

4. $\theta = 62.31^\circ; \ n = 76.45$

5. $\alpha = 33^\circ; \ m = 56$

6. $\theta = 42.7^\circ; \ b = 12.5$

Answers:

1. $a = 0.0289; \ b = 0.0738; \ a = 68.6^\circ$
2. $\Theta = 64^\circ; \ a = 31; \ a = 26^\circ$
3. $\Theta = 41^\circ; \ b = 59; \ a = 51$
4. $l = 67.69; \ m = 35.53; \ a = 27.69^\circ$
5. $\Theta = 57^\circ; \ l = 86; \ n = 103$
6. $\alpha = 47.3^\circ; \ c = 18.4; \ a = 13.5$