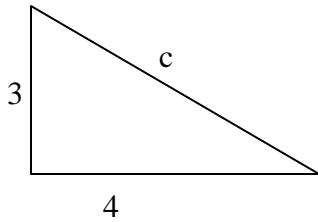


Right Triangle Reference Sheet:

The Pythagorean Theorem:

For all right triangles: $a^2 + b^2 = c^2$ (where c is the hypotenuse)



$$a=3 \quad b=4 \quad c=?$$

$$3^2 + 4^2 = c^2$$

$$9 + 16 = c^2$$

$$25 = c^2$$

$$\sqrt{25} = \sqrt{c^2}$$

$$5 = c$$

Pythagorean Triples

3,4,5

5,12,13

7,24,25

8,15,17

9, 40, 41

Rules for Special Right Triangles:

There are two special types of right triangles that we will be studying, the 45-45-90, and the 30-60-90.

45 – 45 – 90

30 – 60 – 90

This type of triangle is also isosceles.

Rules for the 45-45-90 Right Triangle:

- 1) If given one of the legs, multiply one leg by $\sqrt{2}$ to find the hypotenuse.
- 2) If given the length of the hypotenuse, divide by $\sqrt{2}$ to find the value the legs.

Rules for the 30-60-90 Right Triangle:

- 1) If given the leg opposite the 30 degree angle, multiply by $\sqrt{3}$ to find the other leg, and multiply by 2 to find the hypotenuse.
- 2) If given the hypotenuse, divide by 2 to find the leg opposite the 30 degree angle, and take the leg opposite the 30 degree angle and multiply by $\sqrt{3}$ to find the other leg.
- 3) If given the leg opposite the 60 degree angle, divide by $\sqrt{3}$ to find the leg opposite the 30 degree angle, and multiply this result by 2 to find the hypotenuse.

*** Now complete worksheets and workbook page 290 to work with these special right triangles!

Trigonometric Ratios

The ratio of the lengths of any two sides of a right triangle is called a trigonometric ratio. These ratios refer to right triangles only. The three most common ratios are **sine**, **cosine**, and **tangent**. Their abbreviations are sin, cos, and tan. The ratios are as follows:

$$\text{Sin} = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\text{Cos} = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\text{Tan} = \frac{\text{opposite}}{\text{adjacent}}$$

If you take the first letter of each of the ratios, you will have an easy way to remember them:

SOHCAHTOA

*** When you are using your calculator to find trigonometric functions, first be sure that the calculator is in degree mode. The **MODE** key will allow you to go back and forth from radian mode to degree mode. (If you are not in degree mode you will get the wrong answer!!!)

*** Now complete worksheets and workbook pages 292 – 293 to work with the trigonometric ratios!!!

Indirect Measure:

Often, we will need to find the measurement of a distance or of an angle in a situation where it is impossible to use a ruler or another measuring tool. These measurements can be obtained by imaging a right triangle in a situation and applying the principles of trigonometry.

With trigonometry, if you know the length of one side of a right triangle and either one more side or one angle, then you can find all the lengths and angle measures of the triangle.

Here is the process:

- 1) Make a sketch of the triangle that contains the given information and label clearly what is given and what needs to be found.
- 2) Decide which ratio connects the given information with the side or angle that needs to be found.
- 3) Substitute the known information in this ratio.
- 4) Solve for the unknown value.

In many triangle problems the measured angle is referred to as the angle of elevation or angle of depression. An **angle of elevation** is formed by a horizontal line and the upward line of sight to an object. An **angle of depression** is the angle formed by a horizontal

line and the downward line of sight to an object. The measure of the angle of elevation equals the measure of the angle of depression since they are alternate interior angles.

Example:

*** Now complete worksheets and workbook pages 296 – 297.

Mean Proportions:

If an altitude is drawn to the hypotenuse of a right triangle, the following are always true:

- 1) The two interior triangles are similar to each other and to the original triangle.
- 2) The altitude is the mean proportional between the measures of the segments of the hypotenuse.
- 3) The measure of each leg of the original triangle is the mean proportional between the hypotenuse and the segment of the hypotenuse that is adjacent to that leg.

The following proportions are true and should be used when trying to solve the problems:

$$\frac{\text{segment 1}}{\text{altitude}} = \frac{\text{altitude}}{\text{segment 2}} \quad \text{Example:}$$

$$\frac{\text{adjacent segment}}{\text{leg}} = \frac{\text{leg}}{\text{hypotenuse}} \quad \text{Example:}$$

*** Now complete worksheets and workbook pages 284 – 285.