### Math 10 C: Trigonometry

## C1 & C2 Basic Skills and Working with Trig Ratios

#### Vocabulary & Key Concepts

## Pythagorean Theorem

In a right triangle the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the other two sides in a *right* triangle.



 $(hypotenuse)^2 = (one side)^2 + (other side)^2$ 

## **Trig Ratios**

The ratios in right triangles have a special name depending on what two sides are divided (forming the fraction/ratio). The trigonometric ratios are as follows:

 $\sin \theta = \frac{opposite}{hypotenuse}$   $\cos \theta = \frac{adjacent}{hypotenuse}$   $\tan \theta = \frac{opposite}{adjacent}$  **SOH CAH TOA** 

### <u>Skills</u>

### Pythagorean Theorem

### Example #1

**Determine** the value of x for each of the following triangles. Round to the nearest tenth.



# Working with Trig Ratios

# Example #2

Determine the sine, cosine, and tangent ratios for the reference angle in each triangle.



# Example #3

Determine the unknown side for each of the following triangles.



# Example #4

**Determine** the unknown angle for each of the following.



# C3 & C4: Problem Solving Using Trigonometry

## Vocabulary and Key Concepts

Angle of Elevation: when looking up, the angle that your line of sight makes with the horizontal.

For example: A person looks up to the top of the flagpole. The angle to the top of the flagpole would be referred to as an angle of elevation.



Angle of Depression: when looking down, the angle that your line of site makes with the horizontal.

For example: A person looks down from the top of a building to his car below. The angle at which the person looks down, from the horizon is referred to as an angle of depression.



Skills

### Solving a Triangle

### Example #1

Solve triangle DEF, shown below.



### Given:

$\angle D = 70.5^{\circ}$	d =	Solve for $\angle F \rightarrow \angle D + \angle E + \angle F = 180^{\circ}$
$\angle E = 90^{\circ}$	<i>e</i> = 58.3	$\angle F = 180^{\circ} - 70.5 - 90$
$\angle F =$	f =	$\angle F = 19.5^{\circ}$

Solve for side 
$$d \rightarrow \sin 70.5^\circ = \frac{d}{58.3}$$
  
 $d = 55.0$ 

Steps:

1. Make a list of all sides and angles.

angles. (Note: whenever possible,

pythagoreas theorem and other trig

use the information provided in

Fill in the ones you know.
Solve for all missing sides and

4. Check your answers using

the question)

ratios.

Solve for side 
$$f \rightarrow \cos 70.5^\circ = \frac{f}{58.3}$$
  
 $f = 19.5$ 

## Angle of Elevation and Depression

## Example #2

Katrina is flying a kite and lets out 150 m of string. The string is taut and makes an angle of  $62^{\circ}$  with the horizontal. If Katrina's hand is 1.69 m above the ground, **determine** the height of the kite.



The kite's is 134.1 m above the ground.

# Solving Problems Using More Than One Right Triangle

# Example #3

(a) Two trees are 200 m apart. From a point midway between the two trees, the angles of elevation to the top of each tree are 12° and 9°, respectively. **Determine** how much taller one tree is than the other?

y = 15.84



Tree 1 - Tree 2 = 21.26 - 15.84 = 5.4 m

x = 21.26