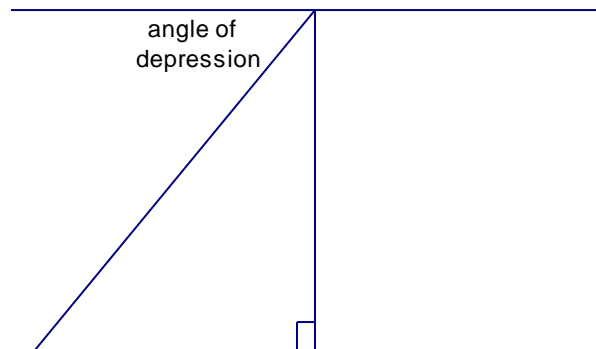
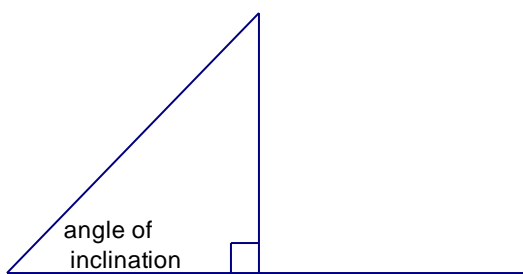


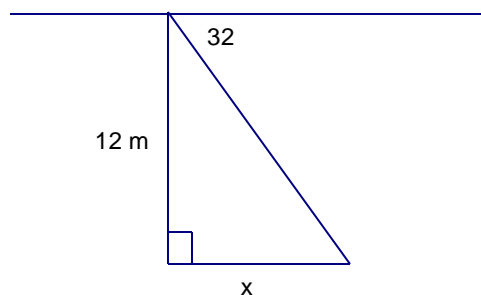
Course: MFM2P Gr. 10 AppliedLesson: 2 - 6Unit: Right Triangle TrigonometryTopic: Solving Problems using Right Triangles✚ *homework check:* Lesson 2 - 5✚ *note:* Solving Problems using Right Triangles

In order to solve word problems, we need to know that angles of depressions are measured down from the horizontal. Angles of inclination are measured up from the horizontal. For example,



- a) A tree is 12 m high. When the sun is at an angle of depression of 32 degrees, how long is the shadow?

Step 1: draw a picture



Step 2: identify sides and ratio

Step 3: find missing angle

Step 4: solve for unknown side

$$\tan x = \frac{\text{opp}}{\text{adj}}$$

$$\tan 58 = \frac{12}{x}$$

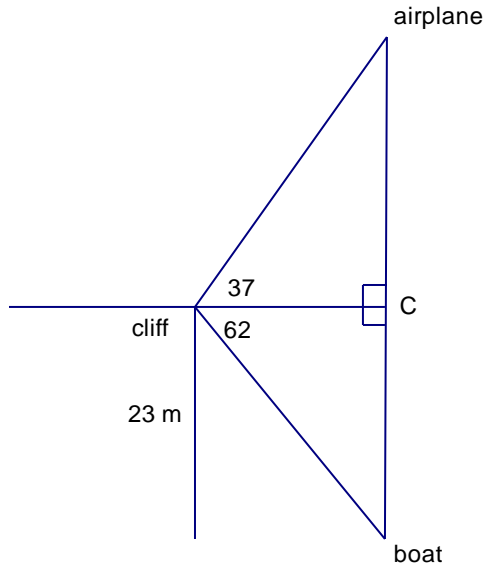
$$x \tan 58 = 12$$

$$x = \frac{12}{\tan 58}$$

$$x = 7.5\text{m}$$

- b) A man on a cliff can see an airplane in the air at an angle of inclination of 37 degrees. The same man can also see a boat in the water at an angle of depression of 62 degrees. If the cliff is 23 m high, how high is the plane above the boat?

Step 1: draw a picture



Step 2: identify sides and ratios

Step 3: make a plan

Step 4: solve for unknowns

Because the distance between the boat and point C is the same as the height of the cliff, we can use the tangent ratio to find the distance between the cliff and point C.

$$\tan x = \frac{\text{opp}}{\text{adj}}$$

$$\tan 62 = \frac{23}{x}$$

$$x \tan 62 = 23$$

$$x = \frac{23}{\tan 62}$$

$$x = 12.2\text{m}$$

Now that we know the distance between the cliff and point C, we can move into the airplane triangle. With the distance between the point C and the cliff's edge, we can use the tangent ratio again to find the distance between point C and the airplane.

$$\tan x = \frac{\text{opp}}{\text{adj}}$$

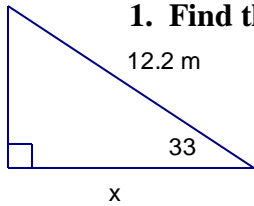
$$\tan 37 = \frac{x}{12.2}$$

$$12.2 \tan 37 = x$$

$$x = 9.2\text{m}$$

Therefore the total distance between the boat and the plane is $9.2 + 23 = 32.2$ m.

✚ homework assignment: Lesson 2 - 6

Lesson 2 – 6: Solving Trig Problems**** diagrams will be part of your solution **round all answers to the nearest tenth****1. Find the length of BC.****2. From a point 4.5 m from the base of a wind turbine, the angle of elevation to the top of the turbine is 87 degrees. Find the height of the wind turbine.****3. From a point 9.3 m from the base of a billboard, the angle of elevation to the top of the billboard is 28 degrees. Find the height of the billboard.****4. From the top of a 38.5 m high cliff, the angle of depression to a boat is 38 degrees. How far is the boat from the base of the cliff?****5. A 4 m long ladder is leaning up against the side of a garage. It reaches 3.8 m up the side of the garage wall. Find the angle the ladder makes with the ground.**

- 6. A lighthouse sits on the top of a cliff. The top of the lighthouse is 41 m above the water. The angle of depression to a small sailboat is 22 degrees. How far is the sailboat from the base of the cliff?**
- 7. Tonya is standing 17 m from the base of a tower. She measures the angle of elevation to the top of the tower to be 33 degrees. What is the height of the tower?**
- 8. A flagpole casts a shadow 22 m long when the sun shines down at an angle of depression of 30 degrees. How tall is the flagpole?**
- 9. Marlene is making a pen for her rabbits. She makes the pen in the shape of a right triangle. Two sides of the pen each measure 3 m. What is the length of the third side?**
- 10. A tall and a short building are 15 m apart. From the top of the shorter building, the angle of elevation to the top of the tall building is 48 degrees. The angle of depression to the bottom of the tall building is 34 degrees. Find the height of the tall building.**