LESSON
12.2

Problem Solving with Right Triangles

12.2 Problem Solving with Right Triangles Day 2

a. I can solve application problems using trigonometry ratios.
b. I can use **angle of elevation and angle of depression** to solve right triangle application problems.

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Problem Solving with Right Triangles
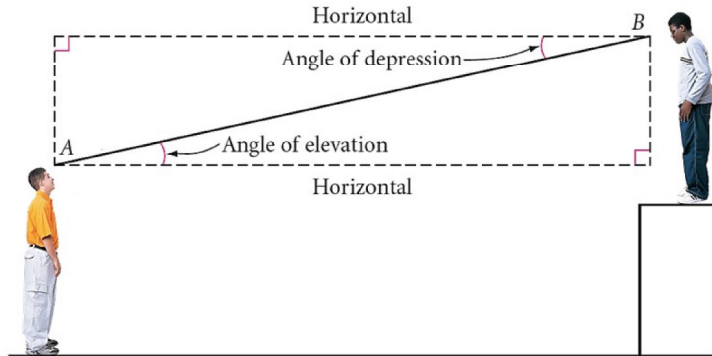
Vocabulary

angle of elevation

angle of depression

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Problem Solving with Right Triangles

Right triangle trigonometry is often used indirectly to find the height of a tall object. To solve a problem of this type, measure the angle from the horizontal to your line of sight when you look at the top or bottom of the object.

If you look up, you measure the **angle of elevation**. If you look down, you measure the **angle of depression**.

Horizontal

Angle of depression

Angle of elevation

Horizontal

B

A

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Lesson 12.2 Problem Solving with Right Triangles

Angle of Elevation and Depression

a.) On the diagram below use *x* to label the angle of elevation from point A to point B and use *y* to label the angle of depression from point B to A.
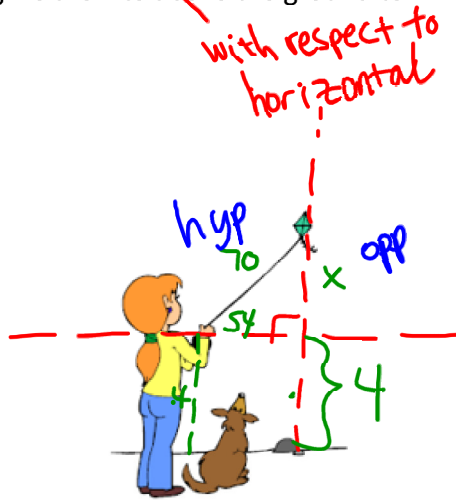
b) What is true about these angles?

they are ≅
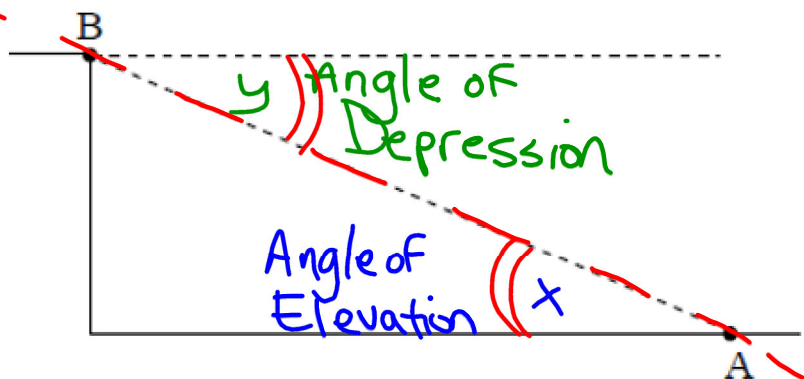
B

y)) Angle of
Depression

Angle of
Elevation ((x

A

1. Maria is flying a kite on the beach. She holds the end of the string 4 feet above ground level and determines that the angle of elevation of the kite to be 54°. If the string is 70 feet long, how high is the kite above the ground to the nearest tenth of a foot?

$$S\frac{O}{H}C\frac{A}{H}T\frac{O}{A}$$

with respect to horizontal

$$\sin 54 = \frac{x}{70}$$
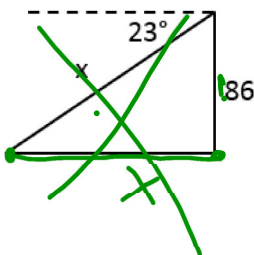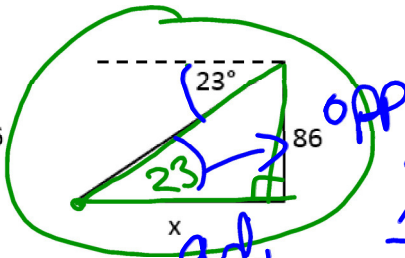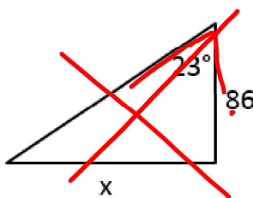
hyp 70   opp x

sy

4

$$x = 70 \cdot \sin 54$$

$$x = 56.6 \text{ ft}$$

$$56.6 + 4 = \boxed{60.6 \text{ ft}}$$

2. From the top of an 86 foot lighthouse, the angle of depression to the ship in the ocean is 23°. How far is the ship from the base of the lighthouse? Round to the nearest hundredth of a foot.

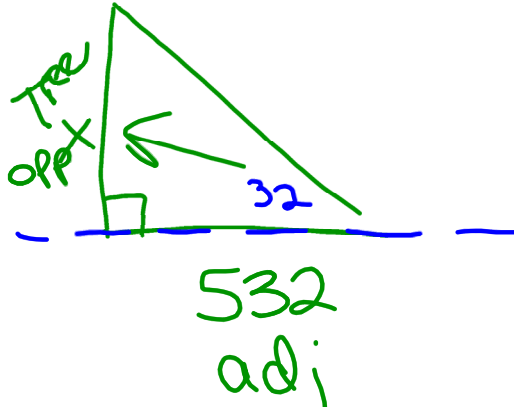**Which of the following diagrams would you use to solve?**

$$\tan 23 = \frac{86}{x}$$

23°   86   x

23°   86   opp

23   x   adj

23°   86   x

23°   86   x

$$x \cdot \tan 23 = 86$$

$$\frac{x \cdot \tan 23}{\tan 23} = \frac{86}{\tan 23}$$

$$\boxed{x = 202.60 \text{ ft}}$$

3. A giant redwood tree cast a shadow that is 532 feet long. Find the height of the tree if the angle of elevation of the sun is 32°. Round to the nearest hundredth of a foot.
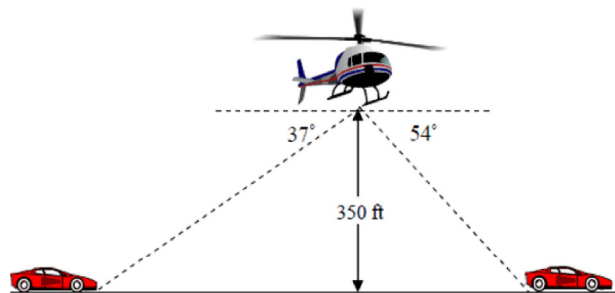
$$\tan 32 = \frac{x}{532}$$

$$x = 532 \cdot \tan 32$$

SOH CAH TOA

$$332.43 \text{ ft}$$

4. A helicopter is flying at an elevation of 350 feet, directly above a roadway. Two motorist are driving cars on the highway. The angle of depression to one car is 37° and the angle of depression to the other car is 54°. How far apart are the cars to the nearest hundredth of a foot?
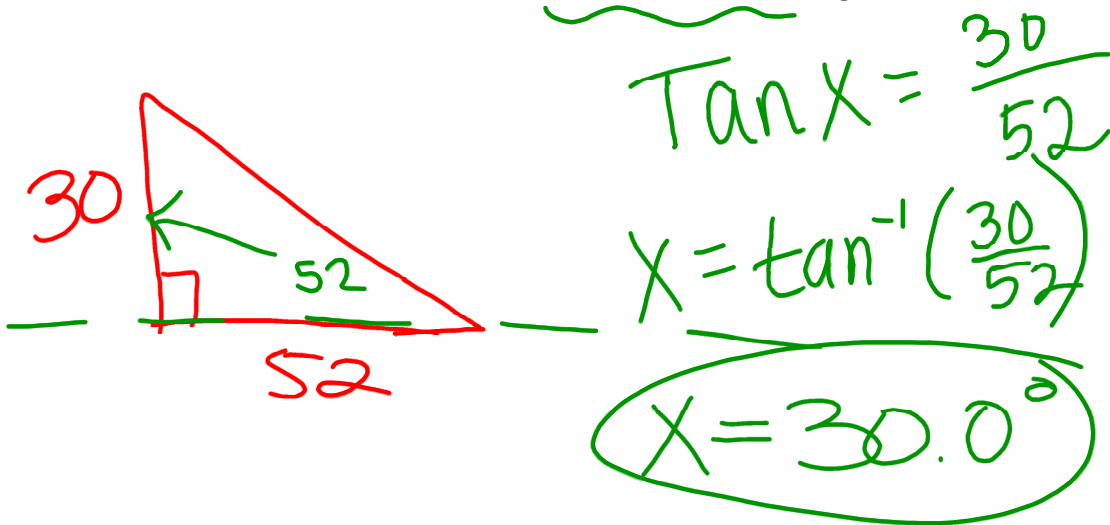
5. A person standing 60 inches tall casts a shadow 87 inches long. What is the angle of elevation of the sun to the nearest tenth of a degree?

$$\text{Tan } X = \frac{60}{87}$$

opp
60

x

87
adj

$$X = \tan^{-1}\left(\frac{60}{87}\right)$$

$$X = 34.6°$$
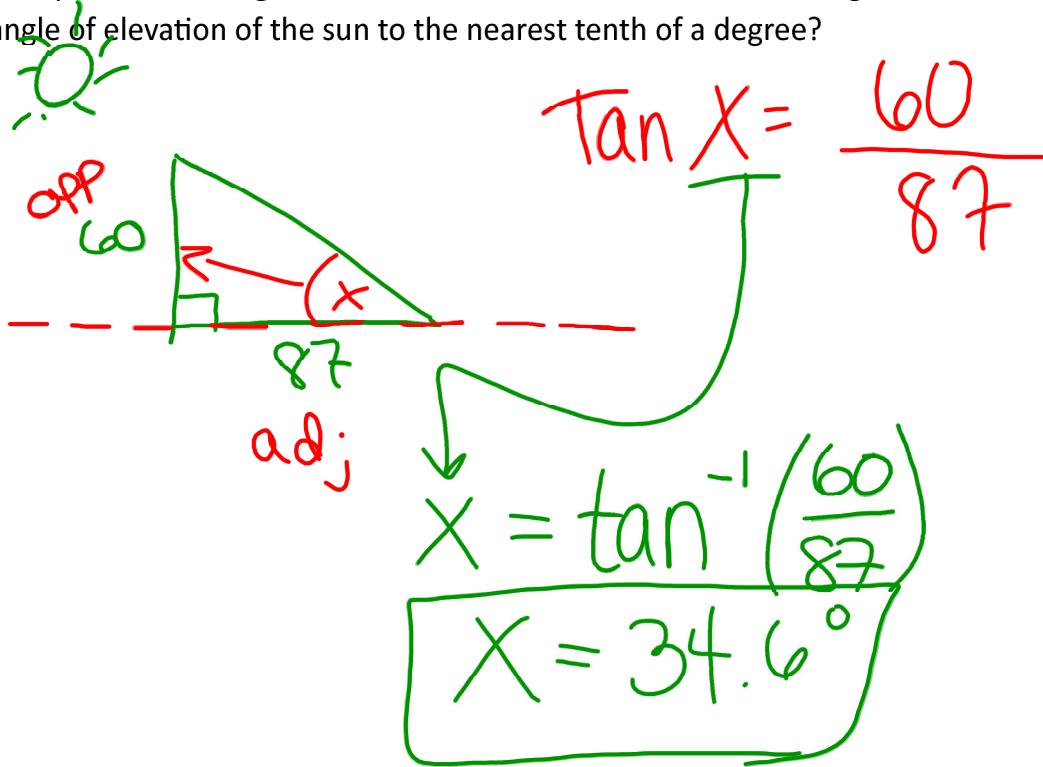
6. A flagpole 30 feet tall cast a shadow 52 feet long. What is the angle of elevation of the sun measured to the nearest tenth of a degree?

30

52

52

$$\text{Tan } X = \frac{30}{52}$$

$$X = \tan^{-1}\left(\frac{30}{52}\right)$$

$$X = 30.0°$$

Homework:

12.2 Problem Solving with Right Triangles Practice - Day 2