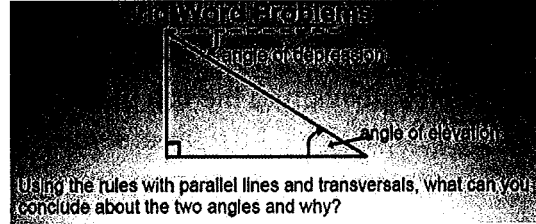


Steps to solving trig word problems

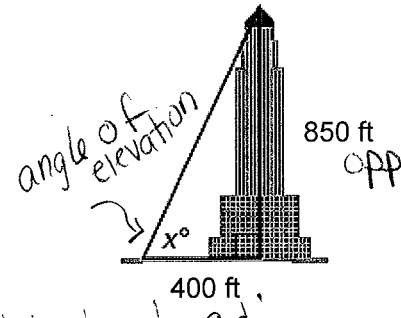
1. Draw a picture. (Right triangle)
2. Label the given parts.
3. Set up the trig ratios and solve.



Ex1) Find the angle of elevation if you are standing 400 ft. away and the building is 850 ft. tall?

$\tan x = \frac{850}{400}$

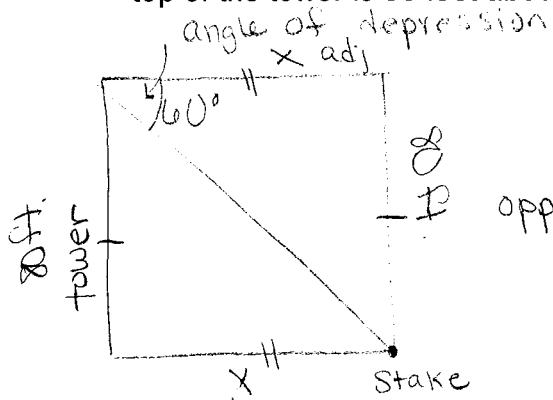
 angle missing use tan-1
 when putting in calc.



$x = 64.79887635^\circ$

← Don't Round unless told to do so!

Ex2) From the top of a tower, the angle of depression to a stake on the ground is 60°. The top of the tower is 80 feet above ground. How far is the stake from the foot of the tower?

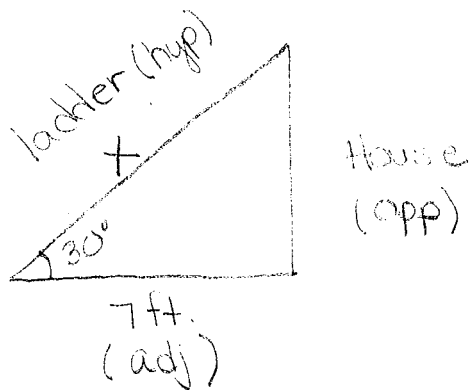


$\tan 60 = \frac{80}{x}$

$80 = (x)(\tan 60)$

$46.18802154 = x$

Ex3) A ladder leaning against a house makes an angle of 30° with the ground. The foot of the ladder is 7 feet from the foot of the house. How long is the ladder?



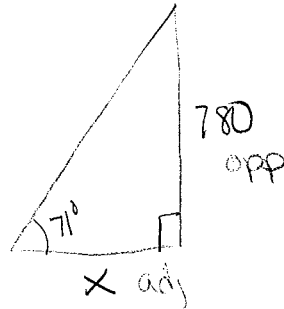
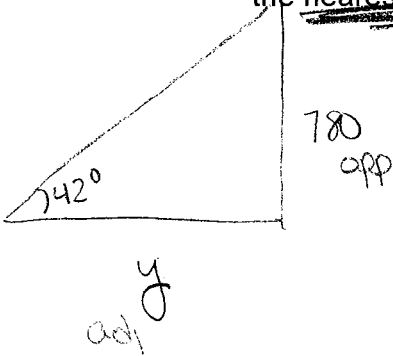
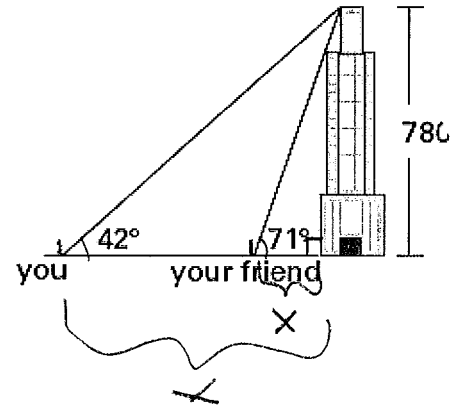
$\cos 30 = \frac{7}{x}$

$7 = (x)(\cos 30)$

$6.082903769 = x$

$6.082903769 = x$

Ex4) You are a block away from a skyscraper that is 780 feet tall. Your friend is between the skyscraper and yourself. The angle of elevation from your position to the top of the skyscraper is 42° . The angle of elevation from your friend's position to the top of the skyscraper is 71° . To the nearest foot, how far are you from your friend?



$$866.2777616$$

$$- 268.5755384$$

$$597.7022232$$

598 feet from friend

$$\tan 42 = \frac{780}{y}$$

$$\tan 71 = \frac{780}{x}$$

$$780 = (x)(\tan 71)$$

$$x = 268.5755384$$

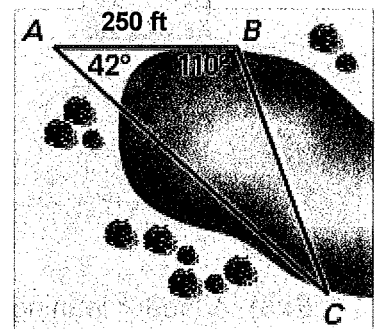
$$780 = (y)(\tan 42)$$

$$y = 866.2777616$$

Sometimes you need to add lines to your drawing to create right triangles.

Find the distance of BC.

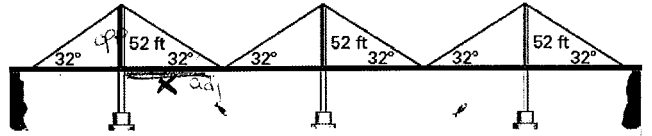
Hint: add the altitude from vertex B.



Don't
Do!

Exercises

1) Use the diagram below to find the distance across the suspension bridge.



$$\frac{\tan 32}{1} = \frac{52}{x}$$

$$\frac{52}{\tan 32} = x$$

$$83.21739551 = x$$

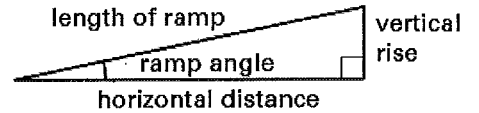
6 sections

$$6(83.21739551)$$

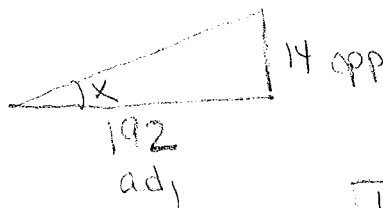
$$499.3043731 \text{ ft}$$

In Exercises 2 and 3, use the following information

Ramps The Uniform Federal Accessibility Standards specify that the ramp angle used for a wheelchair ramp must be less than or equal to 4.78° .



2) The length of one ramp is 16 feet. The vertical rise is 14 inches. Estimate the ramp's horizontal distance and its ramp angle. Does this ramp meet the Uniform Federal Accessibility Standards?



192 inches (16x12)

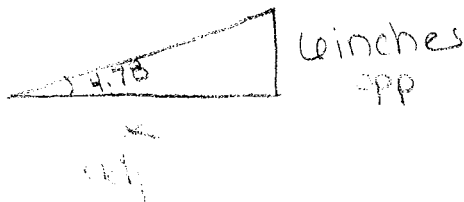
$$\tan x = \frac{14}{192}$$

} use \tan^{-1} in calc b/c the x is unknown

$$x = 4.170436525$$

Yes this Ramp meets uniform federal Accessibility Standards

3) You want to build a ramp with a vertical rise of 6 inches. You want to minimize the horizontal distance taken up by the ramp but still meet the Uniform Federal Accessibility Standards. Draw a sketch showing the approximate dimensions of your ramp.



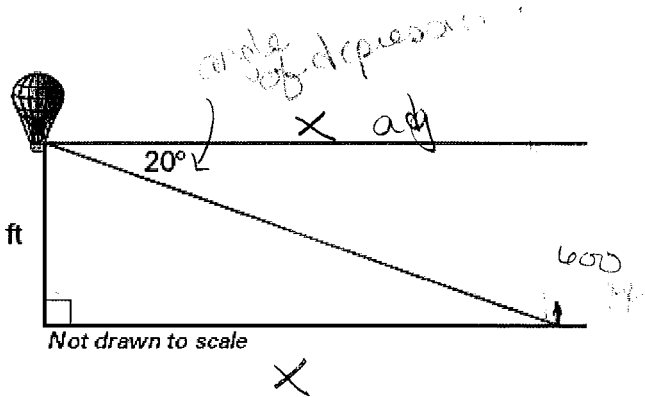
$$\frac{\tan 4.78}{1} = \frac{6}{x}$$

$$6 = (x)(\tan 4.78)$$

$$\frac{6}{\tan 4.78} = x$$

$$71.75345706 \text{ inches} = x$$

- 4) You are in a hot air balloon that is 600 feet above the ground where you can see your friend. If the angle from your line of sight to your friend is 20° , how far is he from the point on the ground below the hot air balloon?



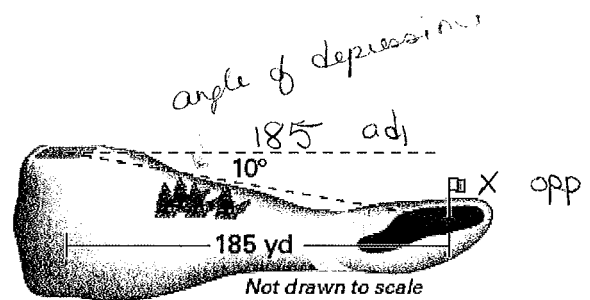
$$\tan 20 = \frac{600}{x}$$

$$600 = (x)(\tan 20)$$

$$\tan 20 \quad \tan 20$$

$$1648.486422 \text{ ft} = x$$

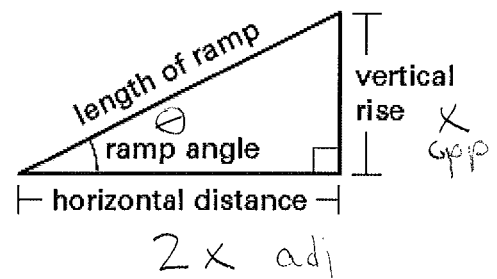
- 5) The angle from the tee box to the green is 10° on a par 3, 185 yard hole as shown. How much higher is the tee box than the green? Round to the nearest yard.



$$\tan 10 = \frac{x}{185}$$

$$x = 33 \text{ yds}$$

- 6) You are designing a ramp where the horizontal distance is twice the vertical rise. What will be the ramp angle to the nearest tenth of a degree?

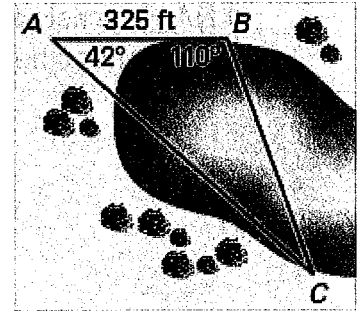


$$\tan \theta = \frac{x}{2x}$$

$$\tan \theta = \frac{1}{2} \leftarrow \text{missing angle use } \tan^{-1} \text{ in calc.}$$

$$\theta = 26.56505118^\circ$$

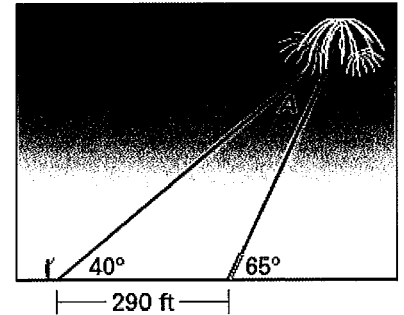
- 7) A surveyor needs to find the distance BC across a lake as part of a project to build a bridge. The distance from point A to point B is 325 feet. The measurement of angle A is 42° and the measurement of angle B is 110° . What is the distance BC across the lake to the nearest foot?



Don't Do!

Use the following information to answer questions 8 through 10

You are watching a fireworks display where you are standing 290 feet behind the launch pad. The launch tubes are aimed directly away from you at an angle of 65° with the ground. The angle for you to see the fireworks is 40° .



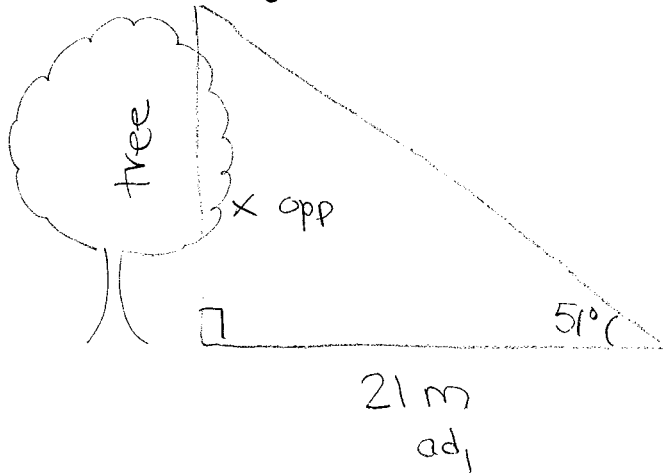
- 8) To the nearest foot, what is the horizontal distance from the launch pad to the point where the fireworks explode?

Don't Do!

- 9) To the nearest foot, what is the height of the fireworks when they explode?

- 10) What is the measure of angle A?

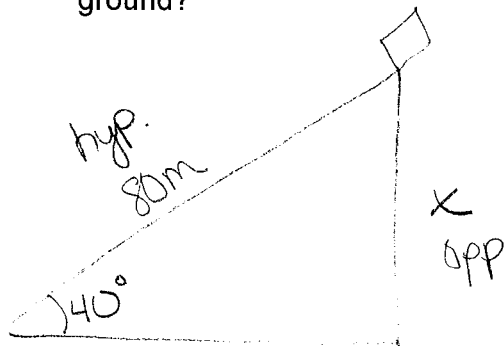
- 11) A tree casts a shadow 21 m long. The angle of elevation of the sun is 51° . What is the height of the tree?



$$\frac{\tan 51}{1} = \frac{x}{21}$$

$$x = 25.93284029 \text{ m}$$

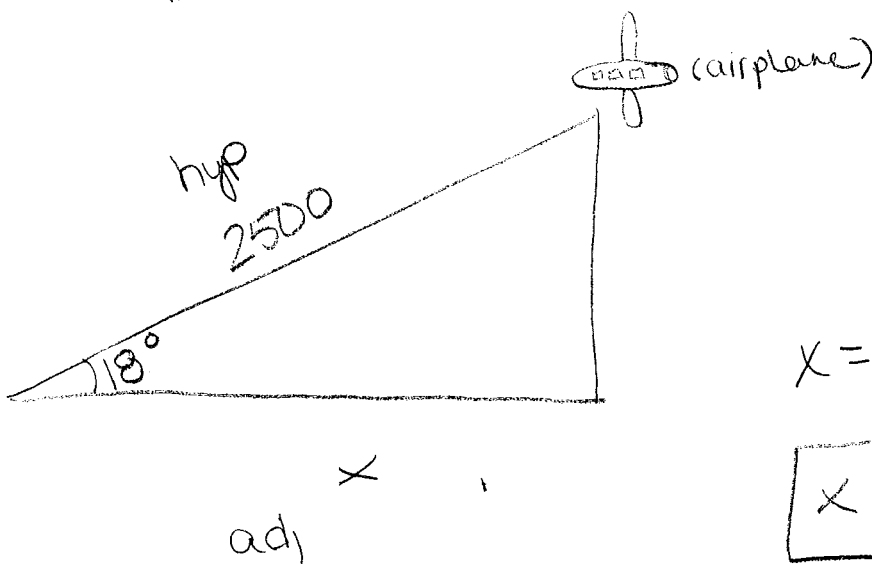
- 12) You are flying a kite and have let out 80 m of string. The kite's angle of elevation with the ground is 40° . If the string is stretched straight, how high is the kite above the ground?



$$\frac{\sin 40}{1} = \frac{x}{80}$$

$$x = 51.42300877 \text{ m}$$

- 13) An airplane climbs at an angle of 18° with the ground. Find the ground distance the plane travels as it moves 2500 m through the air. Give your answer to the nearest 100 m.



$$\cos 18 = \frac{x}{2500}$$

$$x = 2377.641291$$

$$x = 2400 \text{ m}$$