Curriculum Outcome

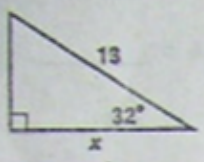
A1 Solve problems that require the manipulation and application of formulas related to: perimeter, area, volume, capacity, the Pythagorean theorem, primary trigonometric ratios, income. currency exchange, interest and finance charges.

G2 Demonstrate an understanding of the Pythagorean theorem by: identifying situations that involve right triangles, verifying the formula, applying the formula, solving problems.

G3 Demonstrate an understanding of primary trigonometric ratios (sine, cosine, tangent) by: applying similarity to right triangles, generalizing patterns from similar right triangles, applying the primary trigonometric ratios, and solving problems.

Student Friendly:

1.

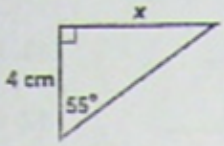


$\cos 32 = \frac{x}{13}$

$13\cos 32 = x$

$11.0 = x$

2.

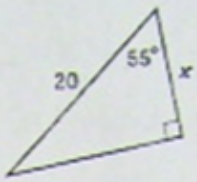


$\tan 55 = \frac{x}{4}$

$4\tan 55 = x$

$5.7 = x$

3.

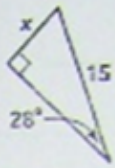


$\cos 55 = \frac{x}{20}$

$20\cos 55 = x$

$11.5 = x$

4.

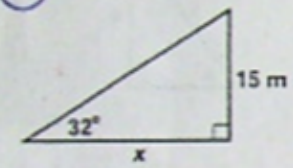


$\sin 28 = \frac{x}{15}$

$15\sin 28 = x$

$7.0 = x$

5.

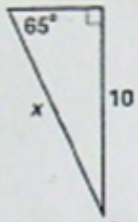


$\tan 32 = \frac{15}{x}$

$x = \frac{15}{\tan 32}$

$x = 24.8$

6.

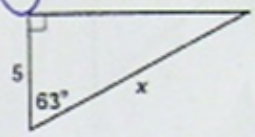


$\sin 65 = \frac{10}{x}$

$x = \frac{10}{\sin 65}$

$x = 11.0$

7.

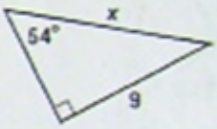


$\cos 63 = \frac{5}{x}$

$x = \frac{5}{\cos 63}$

$x = 11.0$

8.

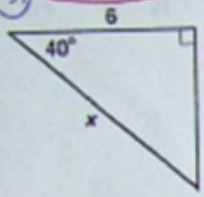


$\sin 54 = \frac{9}{x}$

$x = \frac{9}{\sin 54}$

$x = 11.1$

9.

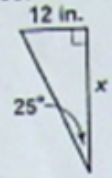


$\cos 40 = \frac{6}{x}$

$x = \frac{6}{\cos 40}$

$x = 7.8$

10.

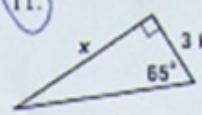


$\tan 25 = \frac{12}{x}$

$x = \frac{12}{\tan 25}$

$x = 25.7$

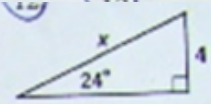
11.



$\tan 65 = \frac{x}{3}$

$3\tan 65 = x$

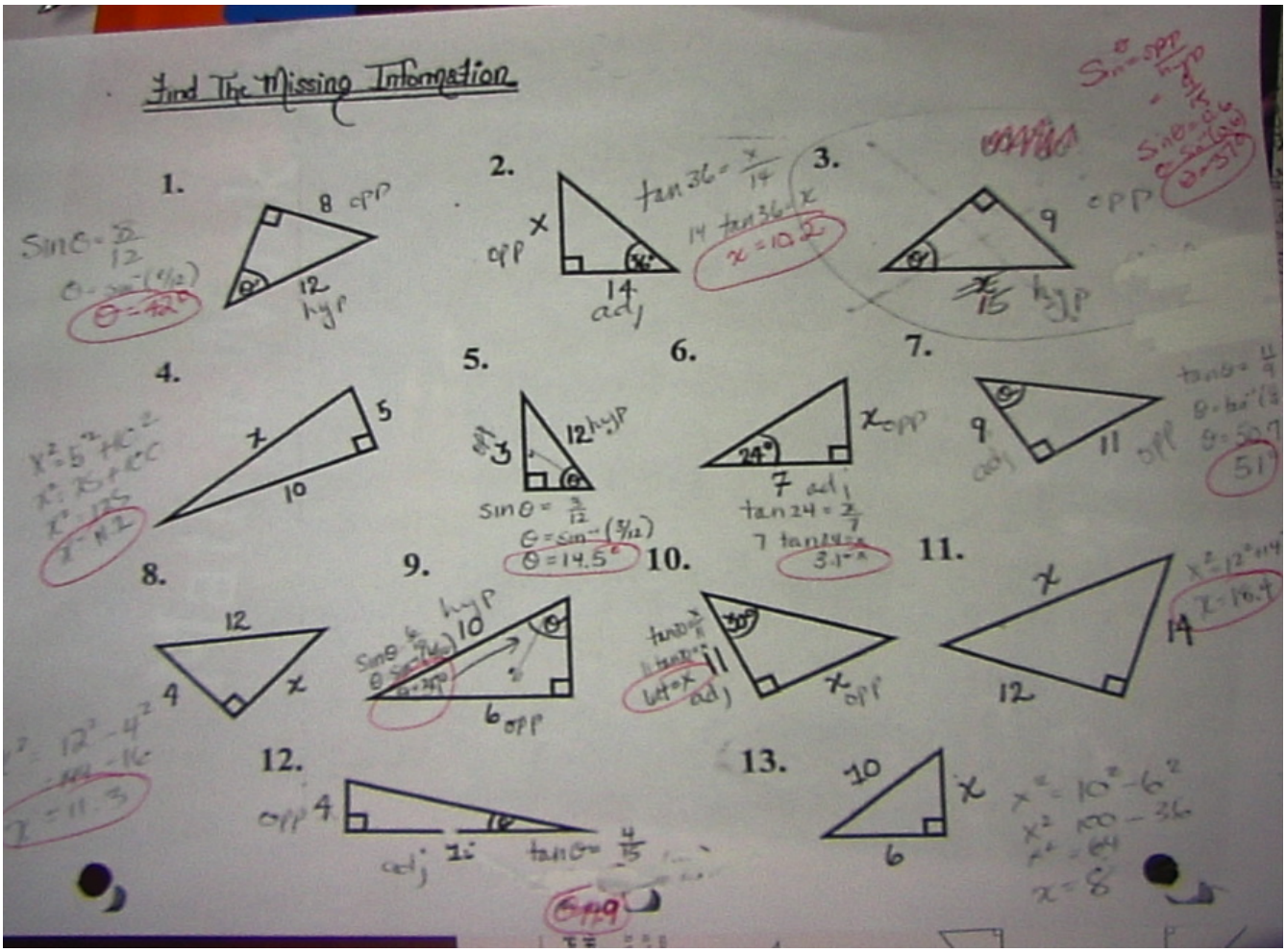
$6.4 = x$



$\sin 24 = \frac{4}{x}$

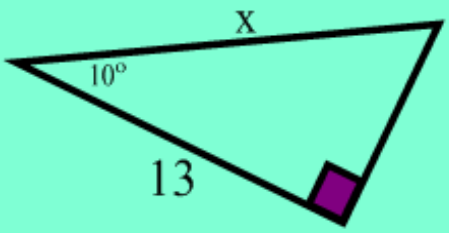
$x = \frac{4}{\sin 24}$

$x = 9.8$

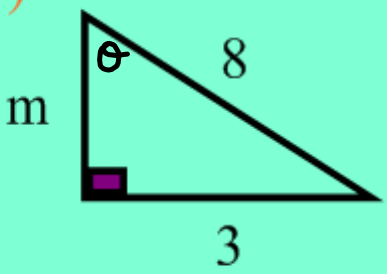

Find The Missing Information
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.

Warm Up

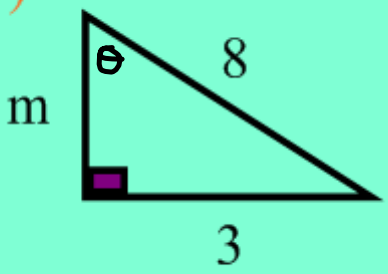
ii)



iii)



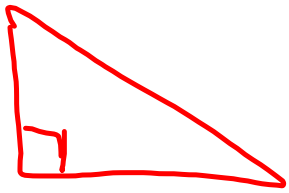
iii)



Word Problems

A tree casts a shadow that is 4.35 m . The rays of the sun strike the ground at an angle of 36°. Calculate the height of the tree.

You have to draw a picture (a triangle) and put the given info in it. How do you think it will look? Draw it in your notebook. See next slide to see how you did.



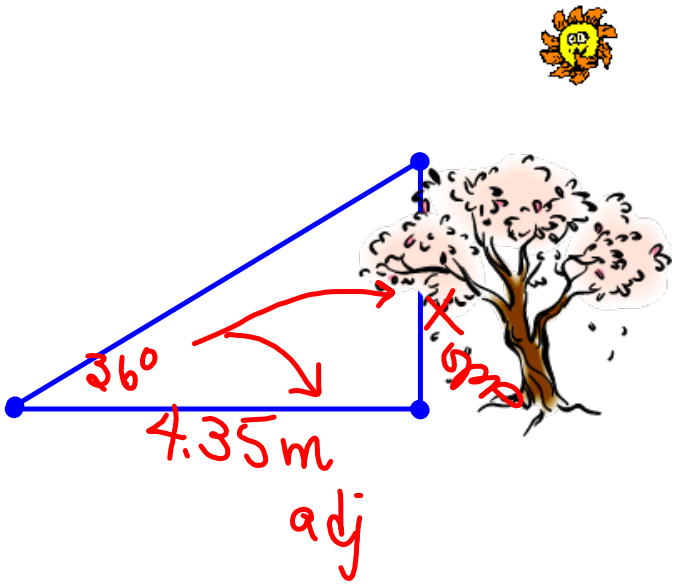
A tree casts a shadow that is 4.35 m . The rays of the sun strike the ground at an angle of 36º. Calculate the height of the tree.

$\tan\theta = \frac{opp}{adj}$

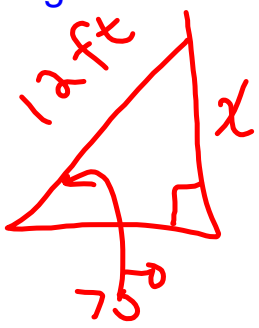
$\tan 36^\circ = \frac{x}{4.35}$

$x = (\tan 36)(4.35)$

$x = 3.2\text{ m}$



A ladder, 12 ft long, leans against a wall so that it makes an angle of 75° with the ground. How high will the ladder reach on the wall if given this information?



$\sin\theta = \frac{opp}{hyp}$

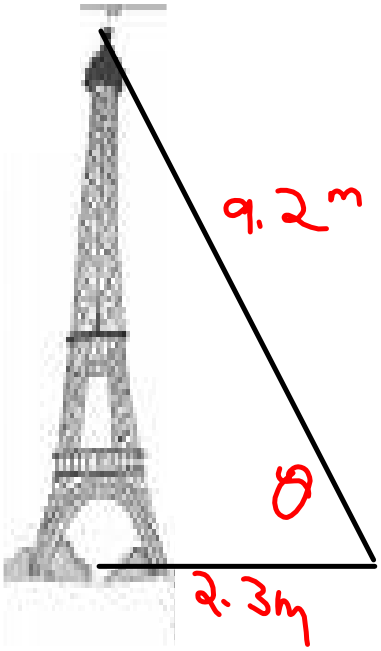
$\sin 75^\circ = \frac{x}{12}$

$x = (\sin 75^\circ) \times 12$

$x = 11.6 \text{ ft}$

$x = 11.6\text{m}$

A guy wire, 9.2 m long, one end is attached to the top of a t.v. tower. The other end of the guy wire is attached to a stake 2.3 m from the bottom of the tower. Find the measure of the angle that the wire makes with the ground, to the nearest degree.



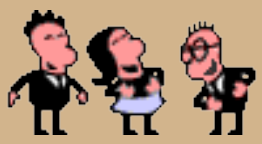
$\cos\theta = \frac{adj}{hyp}$

$\cos\theta = \frac{2.3}{9.2}$

$\cos\theta = 0.25$

$\theta = 76$

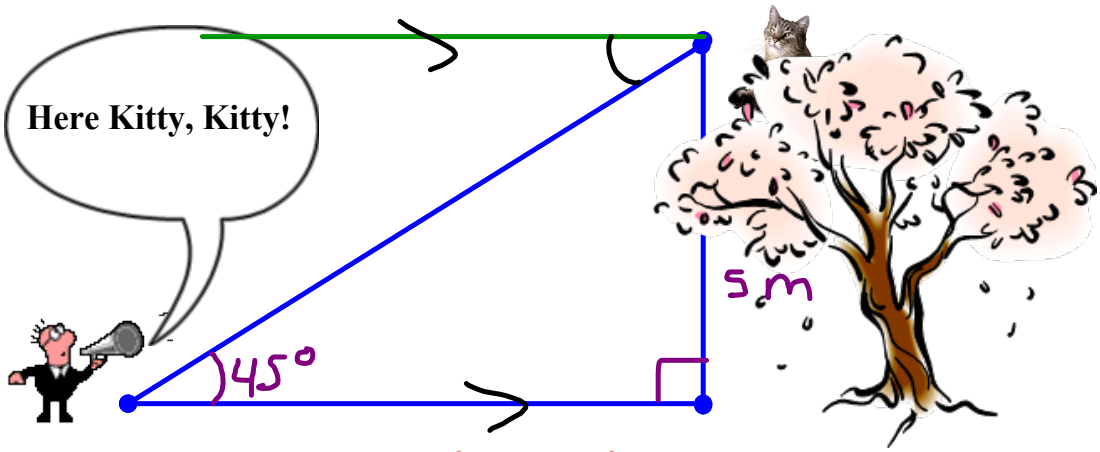
Angles of... Elevation



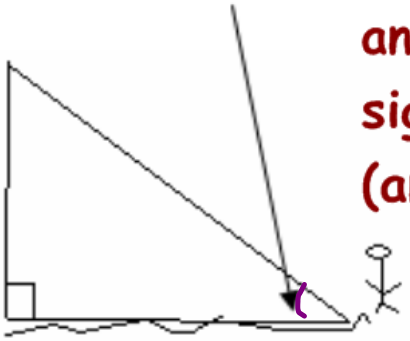
and

Depression!

Angle of elevation:

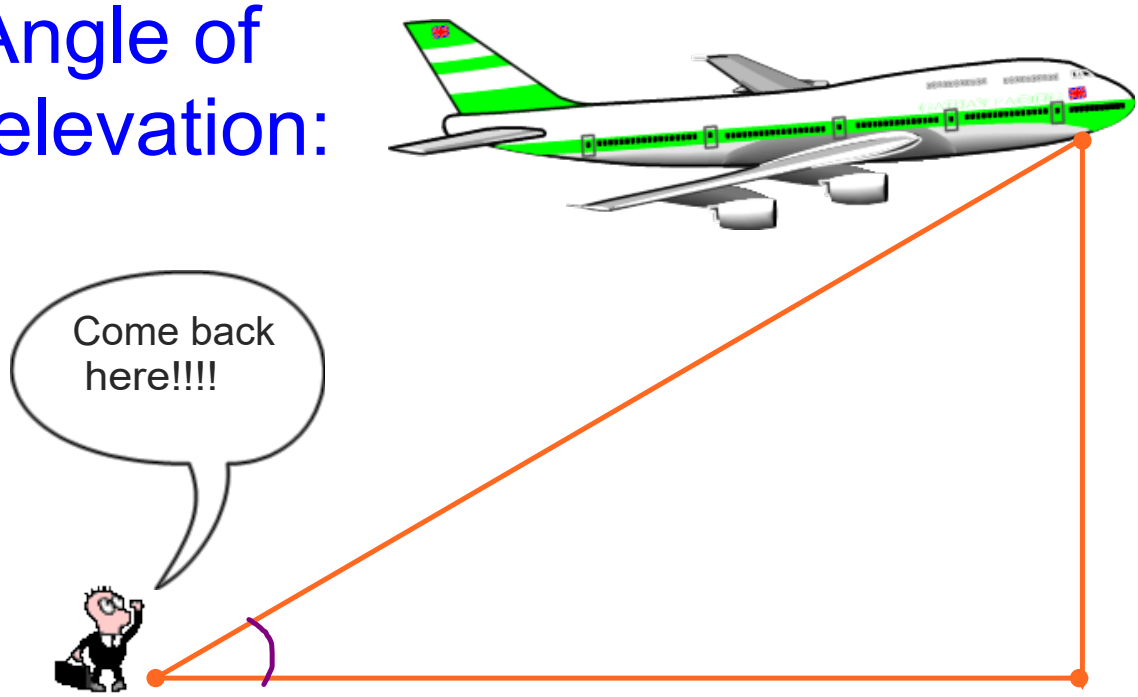


Angle of elevation - is the angle between the ground and the line of sight. (angle of inclination)

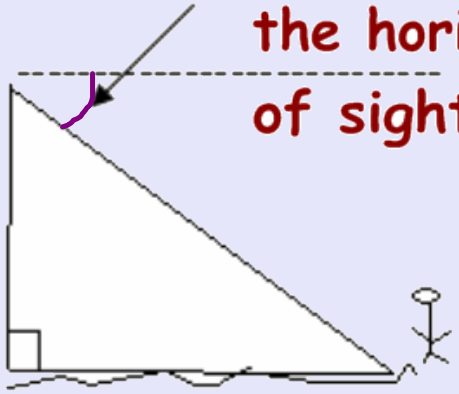


Always from the GROUND up

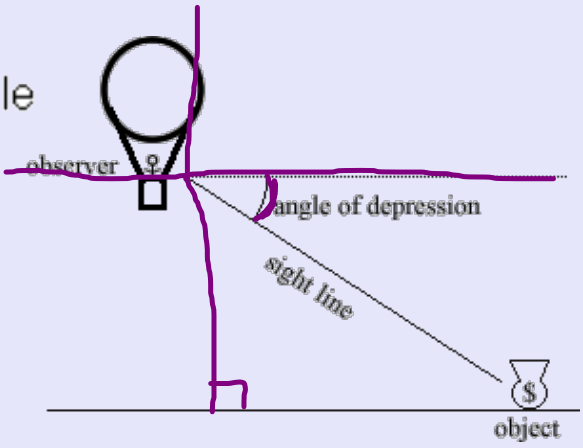
Angle of elevation:

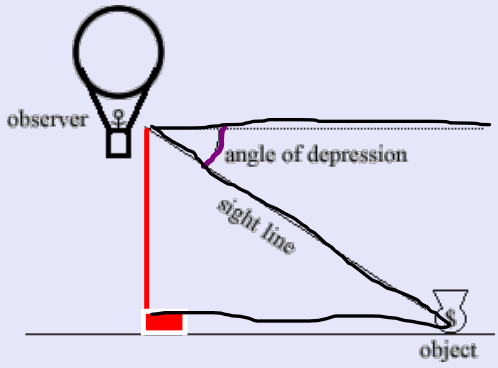


Angle of Depression - is the angle between the horizon and the line of sight.

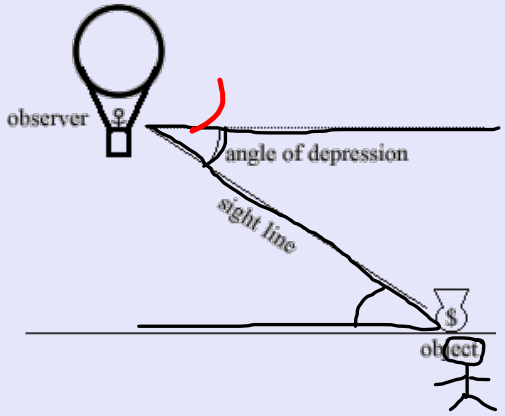


Always outside the triangle

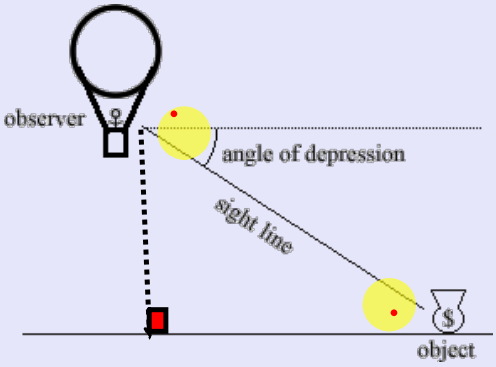




How does angle of depression help if it isn't in the triangle?



How does angle of depression help if it isn't even in the triangle?



Alternate angles are equal!

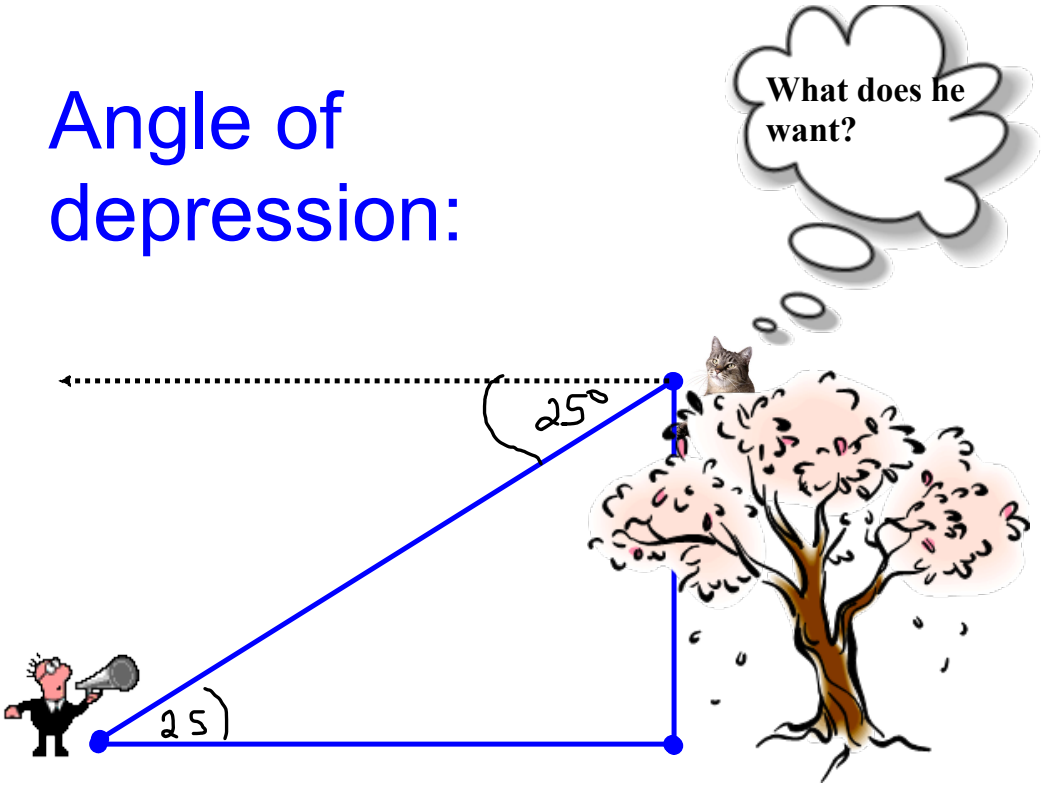
"Z" Rule

Angle of Depression

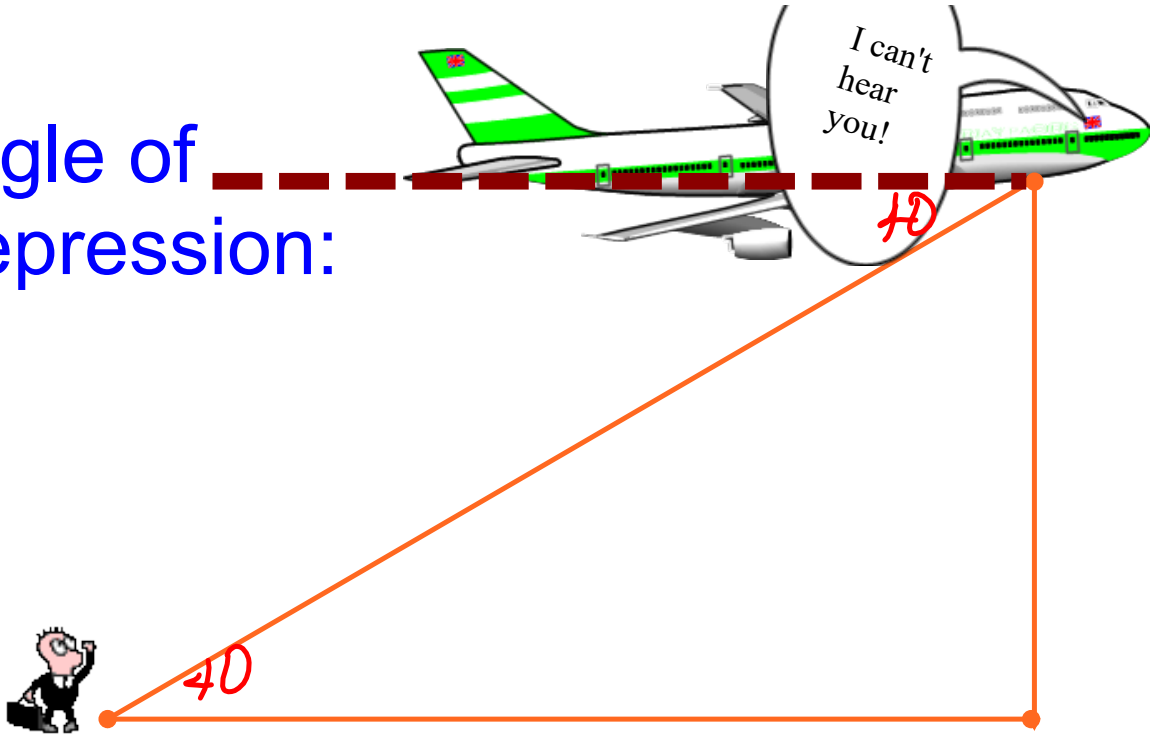
is equal to

Angle of Elevation

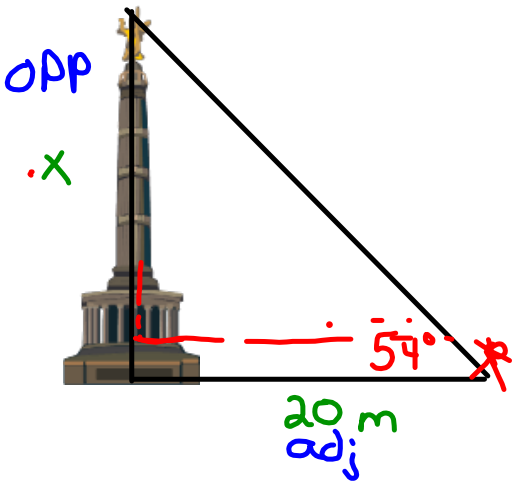
Angle of depression:



Angle of depression:



The angle of elevation to the top of a tower is 54 degrees. If the person is 20m away from the tower, how tall is the tower?



$\tan\theta = \frac{o}{a}$

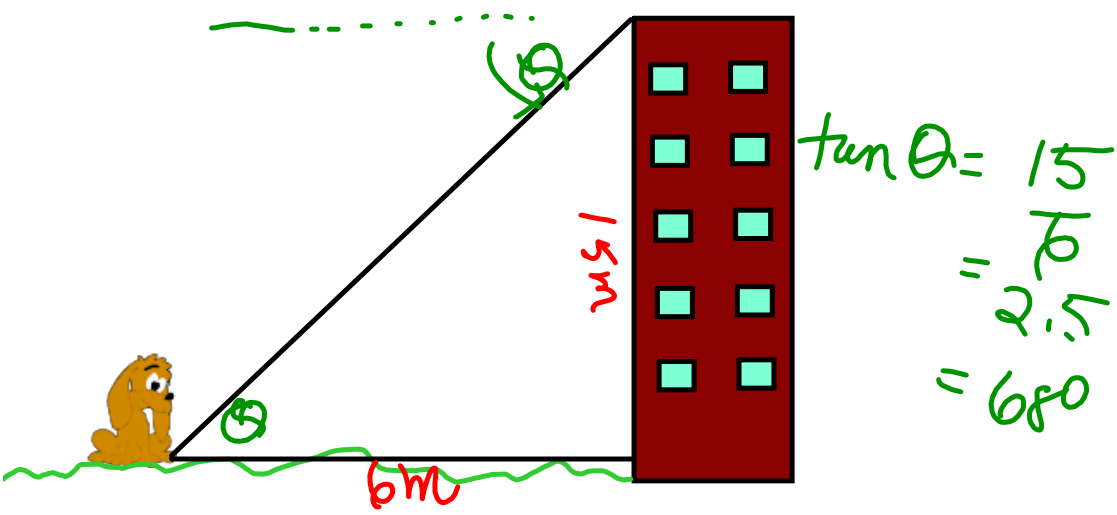
$\tan 54° = \frac{x}{20}$

$x = 20(\tan 54°)$

$x = 20(1.3764)$

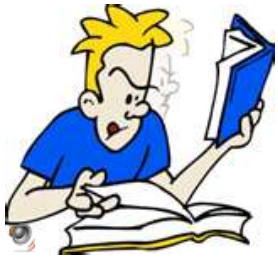
$x = 27.5\ m$

Calculate the angle of depression from the top of a building to a puppy on the ground, if the building is 15m tall and the puppy is 6m from the building.



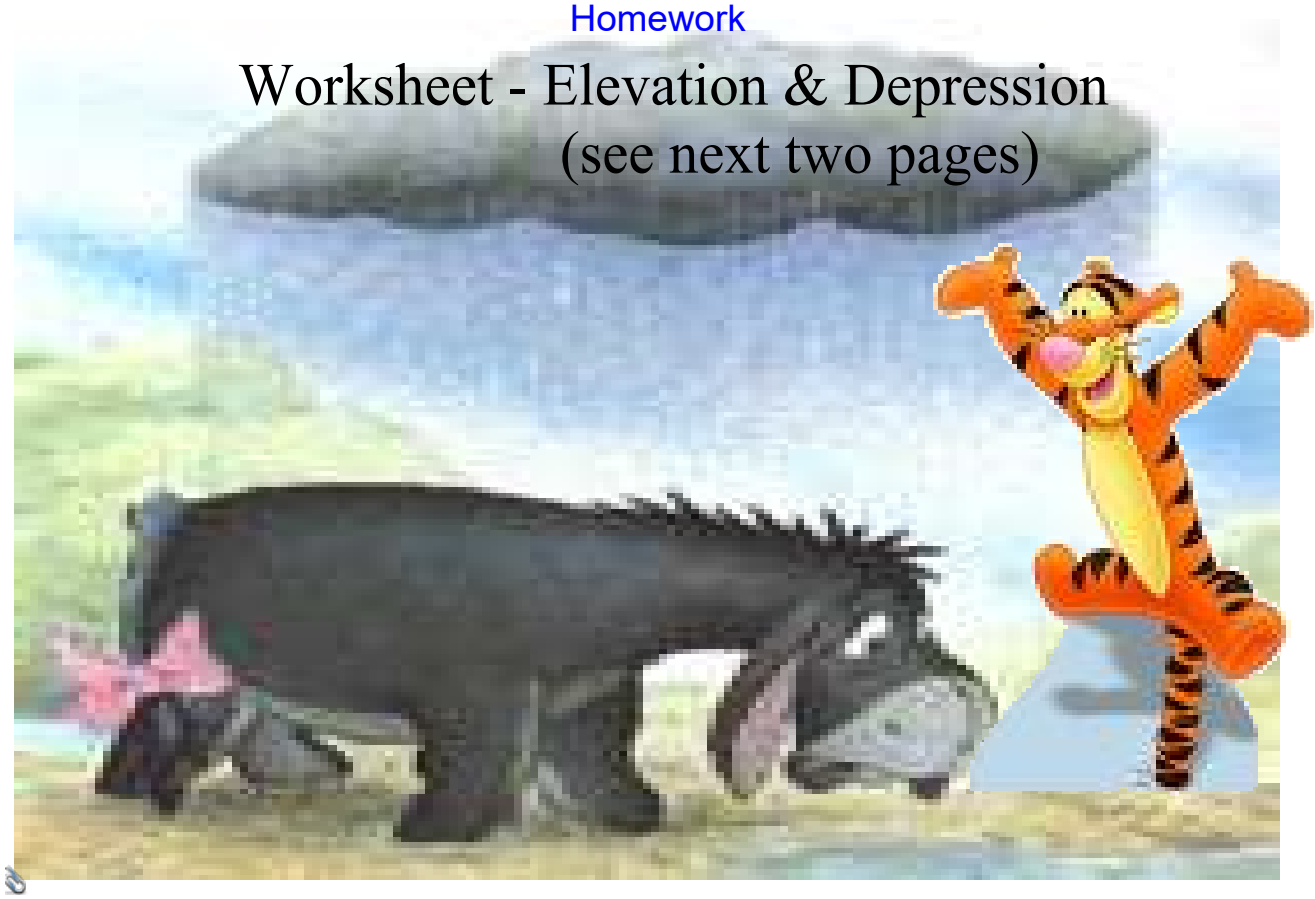
Homework

Worksheet 7- Word Problems



Homework

Worksheet - Elevation & Depression
(see next two pages)



Homework: (see next page also)

4. A television antenna casts a shadow that is 75.0 m long. If the angle of elevation of the sun is 39°, calculate how high above the ground a blackbird perched on the top of the antenna is.

2. From the top of a lighthouse, a hovercraft is sighted at an angle of depression of 47°. If the lighthouse is 42.0 m high, how far is the vessel from the lighthouse?

3. A ladder is in an unsafe position if it makes an angle of less than 15° with a wall. A 10.0 m ladder is placed so that its foot is 3.0 m from the wall. Is the ladder standing safely?

4. The face of a cliff rises vertically to a height of 112.0 m. A sighting is made from a yacht to the top of the cliff. The angle of elevation is read as 14°. How far is the yacht from the base of the cliff? Express your answer to 3 significant digits.

5. The Great Pyramid of Cheops is in Giza.
   (a) If the angle of elevation is 23°, measured 348.0 m from its base, calculate the height of the pyramid to one decimal place.
   (b) The actual height of the pyramid is 146.6 m. How much does your answer in (a) differ from the actual height? How would you account for the difference?

* For the following problems, sketch a diagram to summarize the given information.

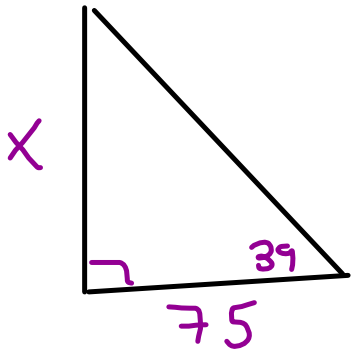
6. A forest ranger in a tower 128.0 m high sights two fires in the same line of sight with angles of depression 42° and 61°. How far apart are the fires?

7. From a window 26.0 m above the ground, the angle of elevation of the top of a building is 39°, while the angle of depression to the bottom of the building is 29°. How high is the building?

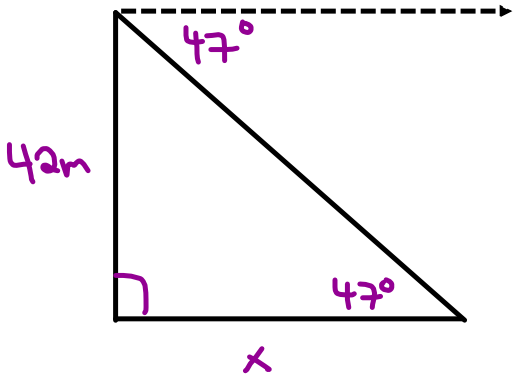
8. A helicopter directly above a building sights a position, A, on the ground at an angle of depression of 38°. The helicopter then rises vertically above the building, a distance of d, in metres, and sights position A, now at an angle of depression of 52°. If position A is 352.0 m from the building, how far has the helicopter risen?

9. The angle of elevation of the top of a building from a point, A, 56.0 m from the building is 58°. A flagpole is on top of the building. The angle of elevation from point A to the top of the flagpole is 62°. What is the length of the flagpole?

1)



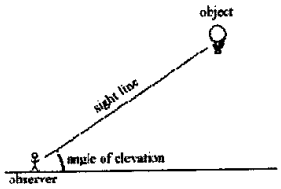
60.7m



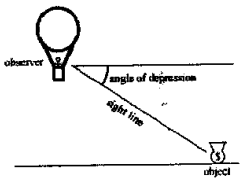
$x = 39.2m$

Angle of Elevation and Depression

Angle of Elevation:
The angle above the horizontal that an observer must look to see an object that is higher than the observer. Example, a bug looking at a bird.

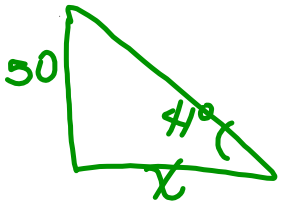


Angle of Depression:
The angle below horizontal that an observer must look to see an object that is lover than the observer. Example, a bird looking down at a bug.

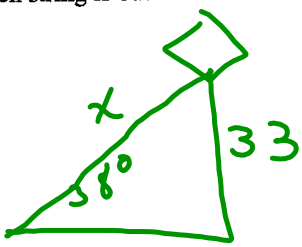


Questions:

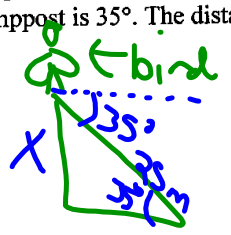
1. A building is 50 feet high. At a distance away from the building, an observer notices that the angle of elevation to the top of the building is 41°. How far is the observer from the base of the building?



2. A kite is 33m above the ground. The angle of elevation is 38°. Assuming that the string is taut, how much string is out?

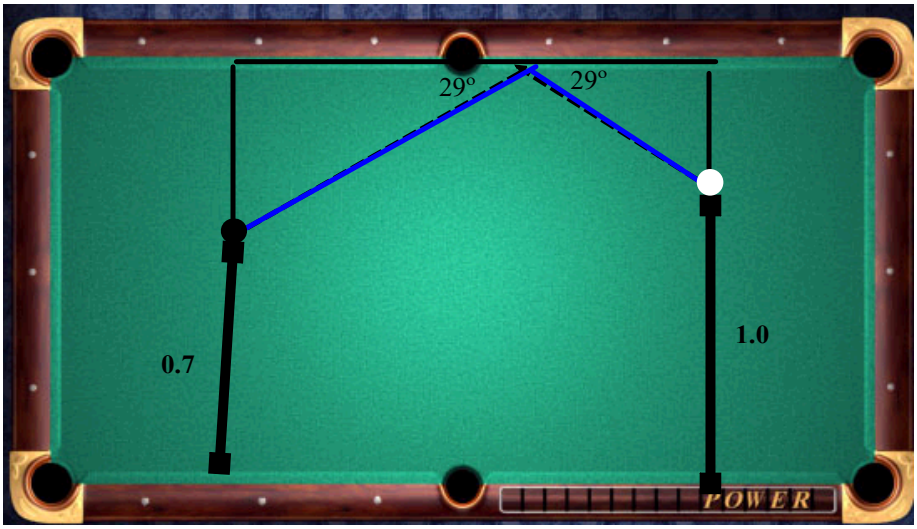


3. A bird sits on top of a lamppost. The angle of depression from the bird to the feet of an observer standing away from the lamppost is 35°. The distance from the bird to the observer is 25m. How tall is the lamppost?



At a construction site, the brace used to retain a wall is 9.6 m in length. The distance from the wall to the lower end of the brace (on the ground) is 5.3 m. Calculate the angle at which the brace meets the wall.

A pool table is 1.3 m wide and 2.6 m long. A white ball is shot to rebound and hit the black ball. The angle at which the ball hits the side is the same as the rebound angle. The positions of the balls are shown on the diagram below. Use trigonometric ratios to find the distance the white ball traveled by the time it hit the black ball.



1.3 m

2.6 m

Attachments

TrigTheta WS 5.docx

TrigTheta WS 8 (ele dpre).docx

good_grief.wav

TrigTheta WS 7 (word problems).docx