

L04 - Lesson - Trigonometry (Multiple Triangles).notebook

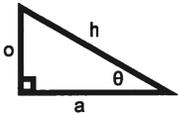
L04 - Math 10C - Multi-Step Triangles (Part 1 - Review)

SohCahToa

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

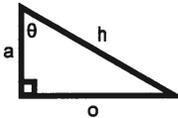
$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

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



o is the side "opposite" to θ .

a is the side "adjacent" to θ which connects it to the 90° angle.

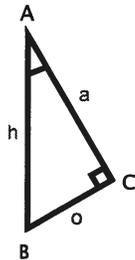


h is the "hypotenuse", or long diagonal side.



This triangle has the following angles: $\angle A$, $\angle B$, $\angle C$

This triangle has the following sides: AB, BC, AC



If we are solving for $\angle A$, label all the sides as "a,o,h" accordingly.

Next, write your Trigonometry ratios.

$$\sin A = \frac{o}{h} = \frac{BC}{AB}$$

$$\cos A = \frac{a}{h} = \frac{AC}{AB}$$

$$\tan A = \frac{o}{a} = \frac{BC}{AC}$$

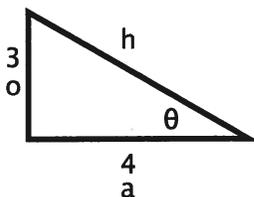
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SohCahToa

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

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

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



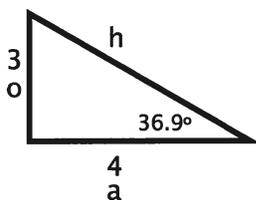
We are going to solve for our angle θ .
We have our opposite (3) and adjacent (4) sides.

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

$$\tan \theta = \frac{3}{4}$$

$$\theta = \tan^{-1}(0.75)$$

$$\theta = 36.9^\circ$$



We are going to solve for our hypotenuse (h).
We could do this several ways:

- 1 $\sin \theta = \frac{o}{h}$
 2 $\cos \theta = \frac{a}{h}$
 3 Pythagoras Theorem

In this example we will use the first option.

$$\sin \theta = \frac{o}{h}$$

$$\sin 36.9^\circ = \frac{3}{h}$$

$$0.600 = \frac{3}{h}$$

Multiply both sides by h

$$0.600h = 3$$

Divide both sides by 0.600

$$h = \frac{3}{0.600}$$

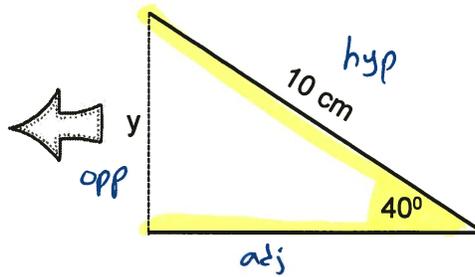
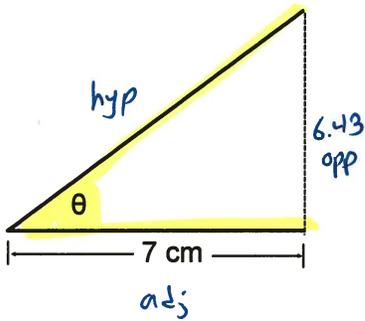
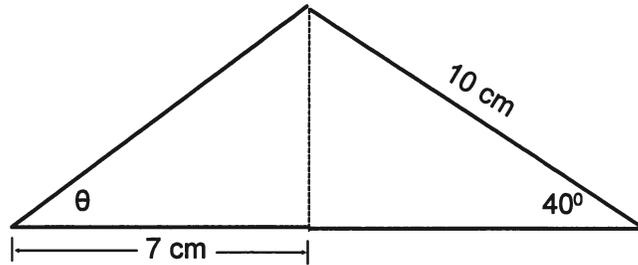
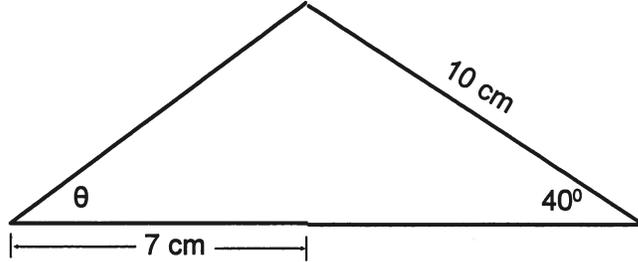
$$h = 5$$

The hypotenuse (h) is 5 units long.

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Part 2 - Multi-Step Triangles

How do we find the measure of the missing angle, θ , in degrees.



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

$$\tan \theta = \frac{6.43}{7}$$

$$\tan \theta = 0.918268\dots$$

$$\theta = \tan^{-1}(0.918268\dots)$$

$$\theta = 42.6^\circ$$

$$\sin \theta = \frac{o}{h}$$

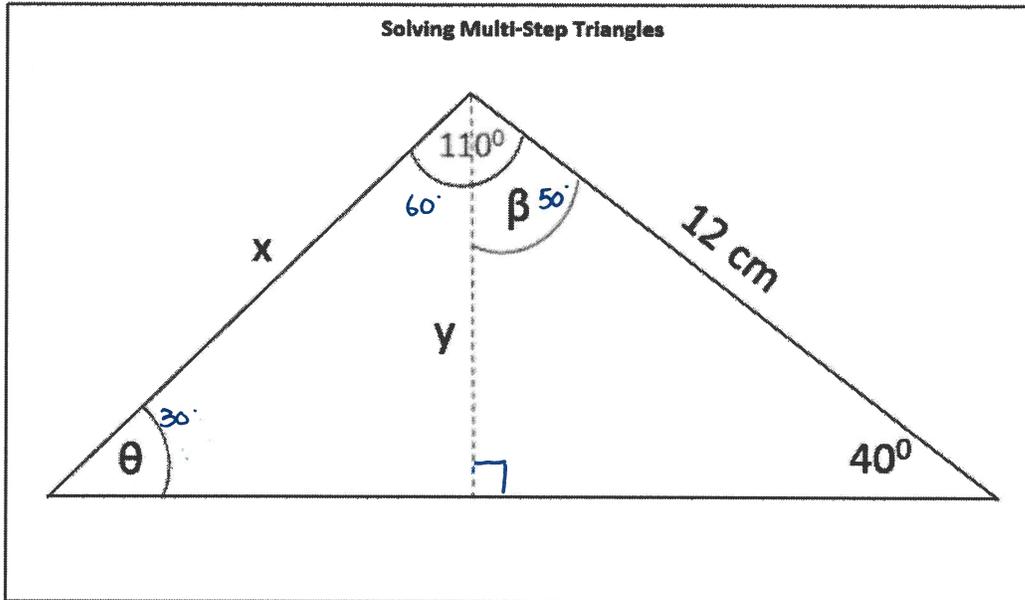
$$\sin 40^\circ = \frac{y}{10}$$

$$0.64278\dots = \frac{y}{10}$$

$$6.43 = y$$

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Use the following information to answer Q1-4:



Q1: What is the value of β , to the nearest degree?

(Record your answer in the Numerical Response boxes below)

Interior angles of the right triangle add to 180°

Q2: The value of θ is $a.bc \times 10^d$, where a , b , c , and d are __, __, __, and __.

(Record your four digit answer in the Numerical Response boxes below)

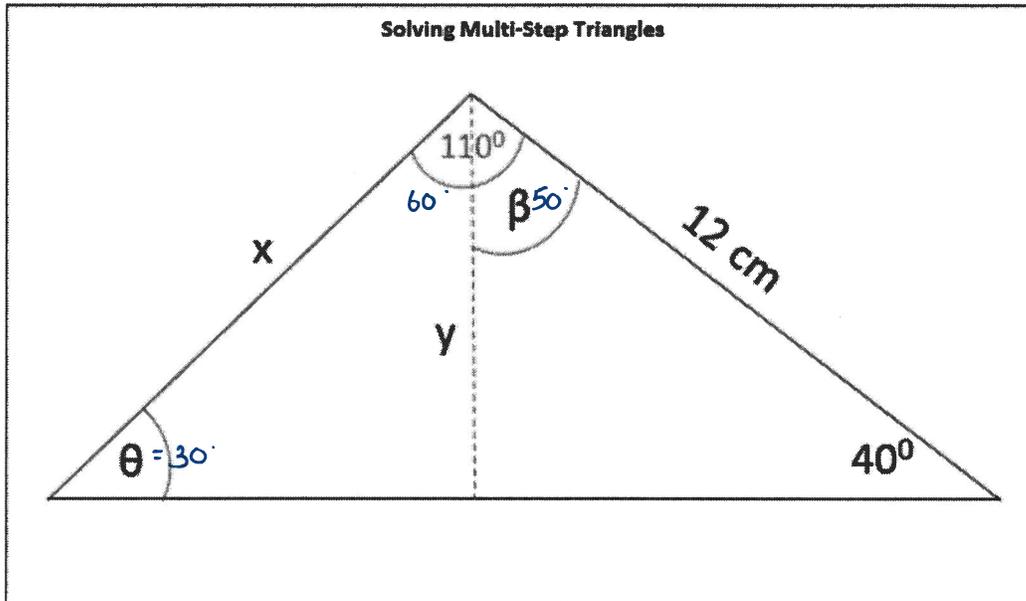
$\theta = 30^\circ$

$\approx 3.00 \times 10^1$
 $a.bc \times 10^d$

$a=3$
 $b=0$
 $c=0$
 $d=1$

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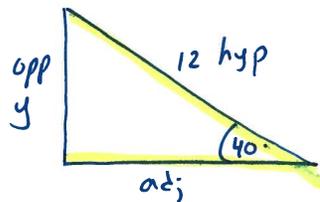
Use the following information to answer Q1-4:



Q3: What is the value of y ?

(Record your three digit answer in the Numerical Response boxes below)

7 . 7 1



$$\sin \theta = \frac{o}{h}$$

$$\sin 40 = \frac{y}{12}$$

$$0.6427876 = \frac{y}{12}$$

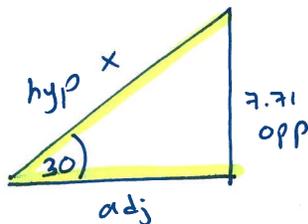
$\cdot 12$
 $\cdot 12$

$$7.71 = y$$

Q4: What is the value of x , to the nearest tenth?

(Record your answer in the Numerical Response boxes below)

1 5 . 4



$$\sin \theta = \frac{o}{h}$$

$$\sin 30 = \frac{7.71}{x}$$

$$0.5 = \frac{7.71}{x}$$

$\cdot x$
 $\cdot x$

$$x(0.5) = 7.71$$

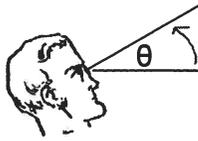
$$\div 0.5 \quad \div 0.5$$

$$x = 15.4$$

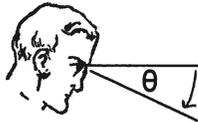
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Part 3 - Word Problems

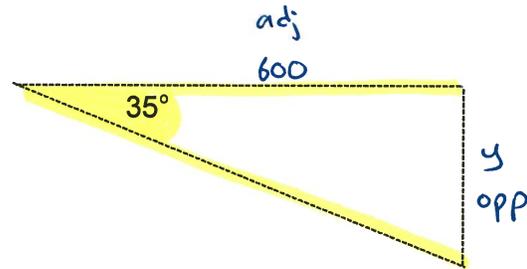
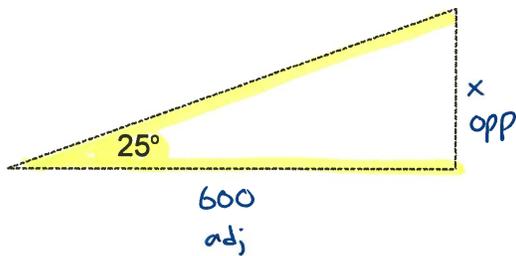
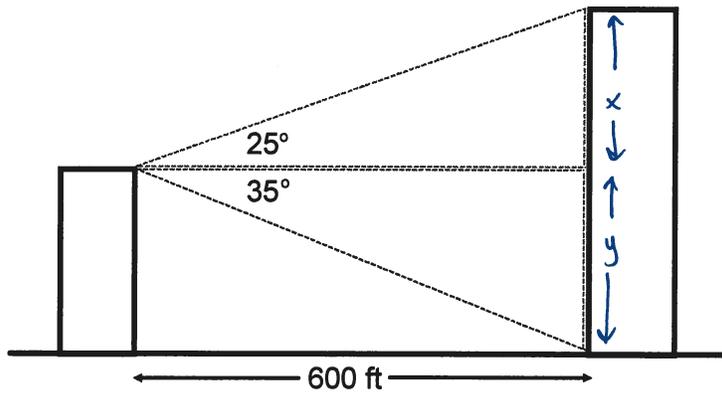
Angle of Elevation (Inclination)
measured from horizontal.



Angle of Depression (Declination)
measured from horizontal



How do we find the height of each building?



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

$$\tan 25 = \frac{x}{600}$$

$$0.4663 = \frac{x}{600}$$

$$\boxed{279.8 = x}$$

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

$$\tan 35 = \frac{y}{600}$$

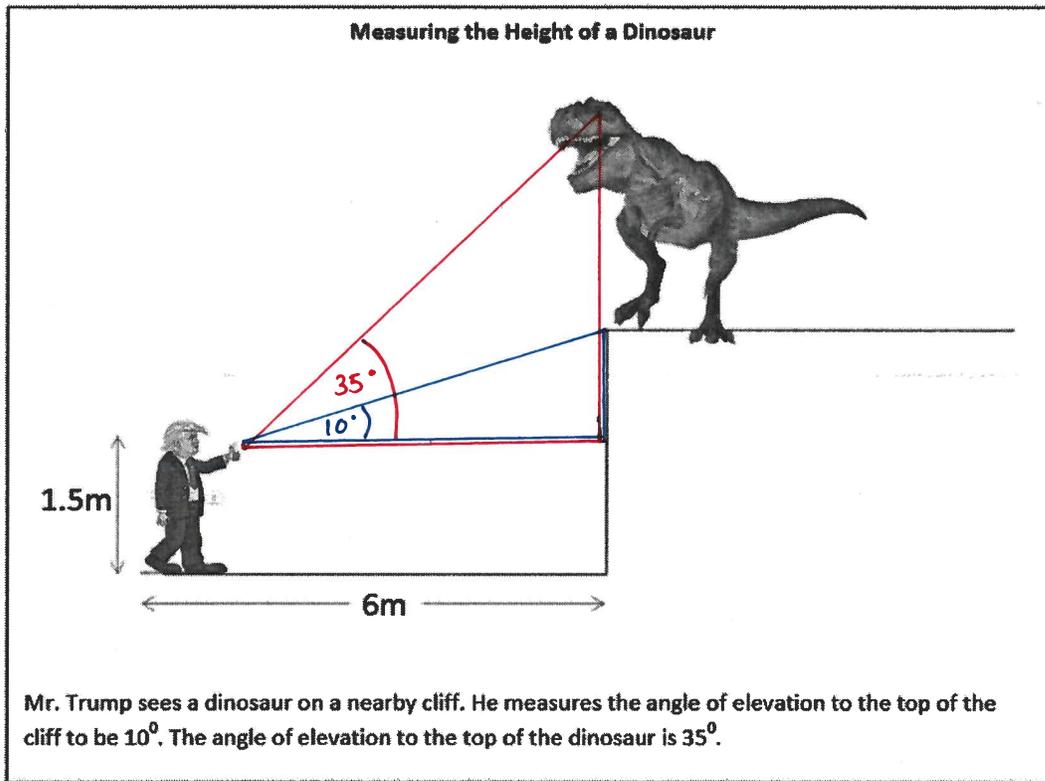
$$0.7002 = \frac{y}{600}$$

$$\boxed{420.1 = y}$$

Left building is 420.1 ft tall.
Right building is 699.9 ft tall

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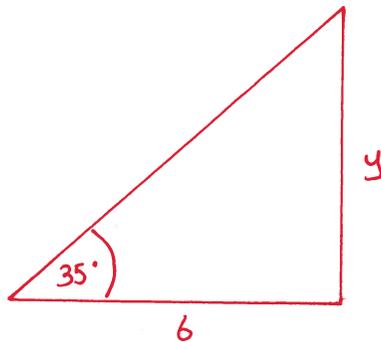
Use the following information to answer Q5-Q6:



Q5: What is the height of the dinosaur, in meters?

(Record your three digit answer in the Numerical Response boxes below)

3.14

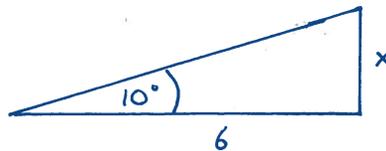


$$\theta = \frac{o}{a}$$

$$\tan 35 = \frac{y}{6}$$

$$0.7002 = \frac{y}{6}$$

$$\boxed{4.20 = y}$$



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

$$\tan 10 = \frac{x}{6}$$

$$0.1763 = \frac{x}{6}$$

$$\boxed{1.06 = x}$$

Dinosaur is
3.14m tall

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Use the following information to answer Q5-Q6:

Measuring the Height of a Dinosaur

Mr. Trump sees a dinosaur on a nearby cliff. He measures the angle of elevation to the top of the cliff to be 10° . The angle of elevation to the top of the dinosaur is 35° .

Q6: What is the height of the cliff, in meters?

(Record your three digit answer in the Numerical Response boxes below)

2	.	5	6
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