

# Geometry Unit 10: Trigonometry

Bronx Early College Academy

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17 April 2023 - 5 May 2023

10.1 Slope and the tangent function	17 April
10.2 Inverse tangent function	18 April
10.3 Algebra practice	24 April
10.4 Applications	25 April
10.6 Applications	28 April
10.7 Quiz: tangent function	2 May
10.8 Sine and cosine functions	3 May
10.9 Inverse trig functions	4 May
10.10 Special triangles	5 May
10.15 Trig word problems	19 May

## Learning Target: I can convert angle measures to slopes using the tangent function.

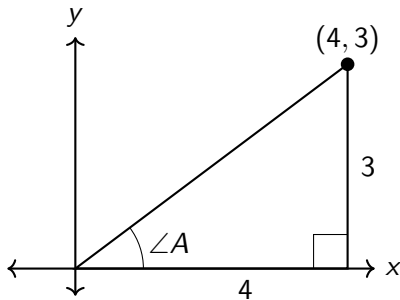
HSG.SRT.C.8 Use trigonometric ratios and the Pythagorean Theorem to solve problems 10.1 Monday 17 April

Do Now: Given right  $\triangle$ , as shown

1. What is the length of the hypotenuse?
2. What is the slope of the hypotenuse?
3. Estimate  $m\angle A$  in degrees.

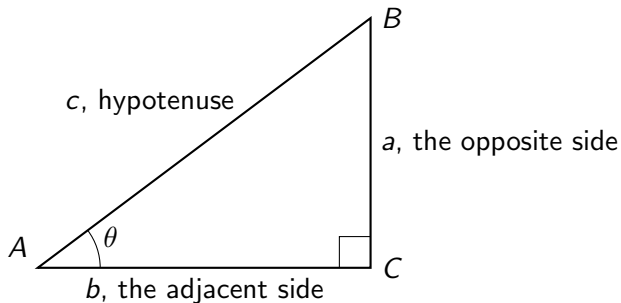
Lesson: The tangent function, calculator use

Homework: Complete the classwork practice, Deltamath problem set



## Standard notation for trigonometric functions

Right triangle  $\triangle ABC$  with side lengths  $a, b, c$ .  $m\angle A = \theta$



**Opposite** The side across from the angle

**Adjacent** The side next to the angle

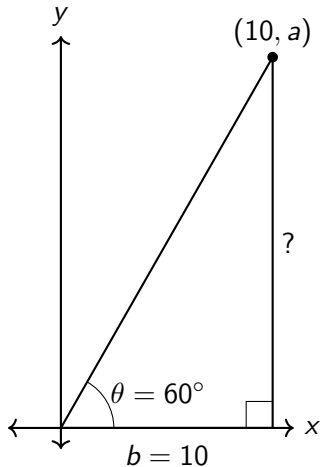
**Theta** A Greek letter used to represent the angle measure

**tangent** The ratio of the opposite side to the adjacent side

Find the height of a triangle with base  $b = 10$  and angle  $60^\circ$

$$\tan(\theta) = \frac{\text{opposite}}{\text{adjacent}}$$

Substitute the given values and use your calculator for  $\tan(60^\circ)$



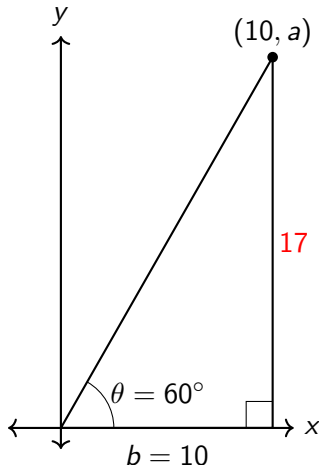
Find the height of a triangle with base  $b = 10$  and angle  $60$  degrees

$$\tan(\theta) = \frac{\text{opposite}}{\text{adjacent}}$$

Substitute the given values and use your calculator for  $\tan(60^\circ)$

$$\tan(60^\circ) = \frac{a}{10} \approx 1.732$$

$$a = 10 \times 1.732 \approx 17.32$$



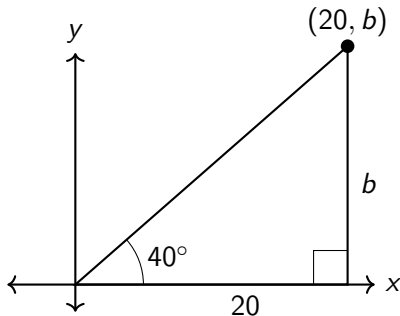
## Learning Target: I can find an angle measure using inverse tangent.

CCSS.HSG.SRT.C.8 Use trig ratios and the Pythagorean Theorem to solve problems 10.2 Tuesday 18 April

Do Now: Given right  $\triangle$  shown, find its height  $b$  to the *nearest tenth*.

Lesson: The inverse tangent function,  $\tan^{-1}$

Homework: Complete the classwork practice,  
Deltamath problem set



## Learning Target: I can model and solve with trigonometry algebra.

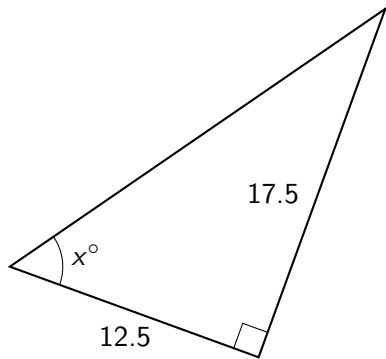
CCSS.HSG.SRT.C.8 Use trig ratios and the Pythagorean Theorem to solve problems 10.3 Monday 24 April

Do Now: Given right  $\triangle$  with leg lengths 12.5 and 17.5. Find the angle measure  $x$  to the *nearest degree*.

Lesson: Practice modeling with tangent function and solving the algebra

**Calculator check** (it should be on your desk)

Homework: Complete the classwork practice, Deltamath problem set

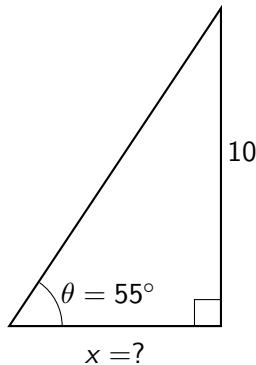




Find the base of a triangle with height  $h = 10$  and angle  $55^\circ$

$$\tan(\theta) = \frac{\textit{opposite}}{\textit{adjacent}}$$

Substitute the given values and use your calculator for  $\tan(55^\circ)$



Find the base of a triangle with height  $h = 10$  and angle  $55$  degrees

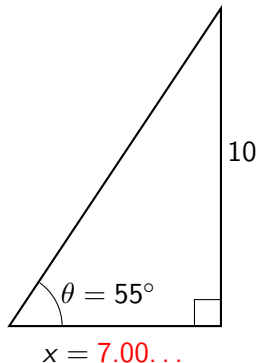
$$\tan(\theta) = \frac{\text{opposite}}{\text{adjacent}}$$

Substitute the given values and use your calculator for  $\tan(55^\circ)$

$$\tan(55^\circ) = \frac{10}{x}$$

$$x(1.428\dots) = 10$$

$$x = \frac{10}{1.428\dots} \approx 7.00\dots$$



## Learning Target: I can solve real world problems with trigonometry.

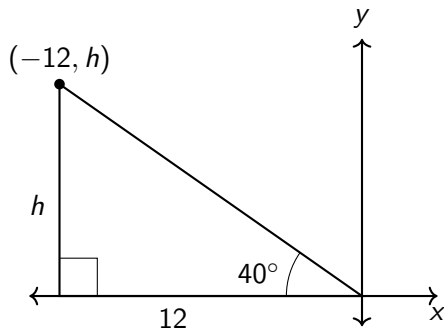
CCSS.HSG.SRT.C.8 Use trig ratios and the Pythagorean Theorem to solve problems 10.4 Tuesday 25 April

Do Now: Given right  $\triangle$  shown, find its height  $h$  to the *nearest tenth*.

Lesson: Applying trigonometry to real world situations

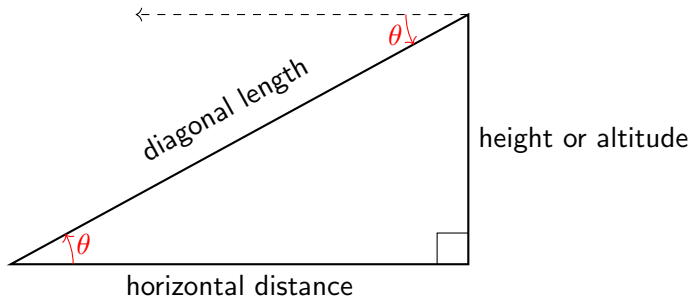
Homework: Complete the classwork,  
Deltamath problem set

Test Tuesday



## Applications to real world situations

For example: heights of trees, wires to a pole, lighthouses, buildings, airplanes...



**Angle of elevation** The upward angle from the horizontal to line of sight

**Angle of declination** The downward angle from the horizon to the object on the ground

**Equal angles** The two alternate interior angles are congruent.

## Learning Target: I can solve real world problems with trigonometry.

CCSS.HSG.SRT.C.8 Use trig ratios and the Pythagorean Theorem to solve problems

10.6 Friday 28 April

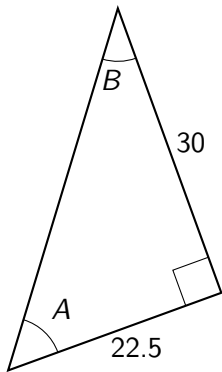
Do Now: "Solve" the  $\triangle$  shown. i.e. calculate the two angle measures and the length of the hypotenuse.

Lesson: Applying trigonometry in a variety of contexts

Deltamath exit quiz (10 minutes)

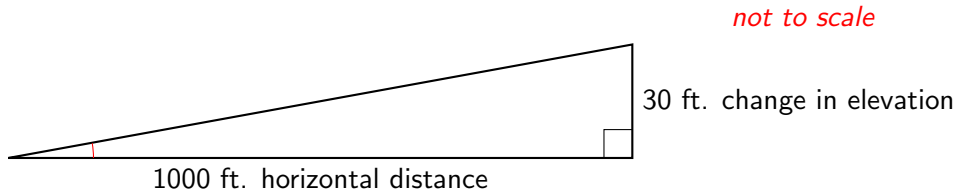
Homework: Complete the classwork practice

Test Tuesday



## Percentage grade of a road

Example: A road rising 30 feet for every 1000 feet of horizontal distance has a 3% grade.



**Grade** The ratio of the vertical change to the horizontal change (percent)

**Elevation** How high something is above sea level

**Altitude** The height of an object above the ground

**not to scale** proportions are not accurate

Learning Target: I can use the tangent function and solve problems with trigonometry.

CCSS.HSG.SRT.C.8 Use trig ratios and the Pythagorean Theorem to solve problems

10.7 Tuesday 2 May

Do Now: Turn in Unit 10 problem sets, stapled in reverse order

Test: Use your notebook and calculator (no computers)

*Do not share calculators*

Early finishers: Deltamath Regents review

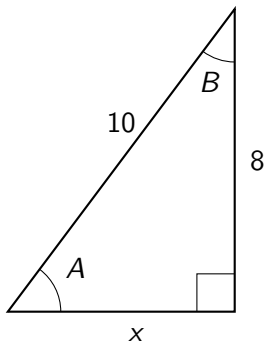
## Learning Target: I can use the sine and cosine functions

CCSS.HSG.SRT.C.8 Use trig ratios and the Pythagorean Theorem to solve problems 10.8 Wednesday 3 May

Do Now: Calculate the length of the base  $x$  and the two angle measures.

Lesson: Using  $\sin \theta$  and  $\cos \theta$

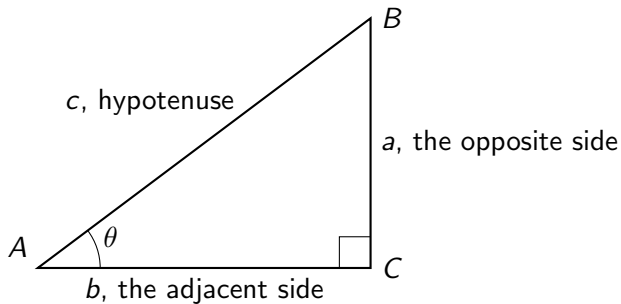
Homework: Complete the classwork practice, Deltamath





## Sine and cosine trigonometric functions

Right triangle  $\triangle ABC$  with side lengths  $a$ ,  $b$ ,  $c$ .  $m\angle A = \theta$



**tangent** The ratio of the opposite side to the adjacent side

**sine** The ratio of the opposite side to the hypotenuse

**cosine** The ratio of the adjacent side to the hypotenuse

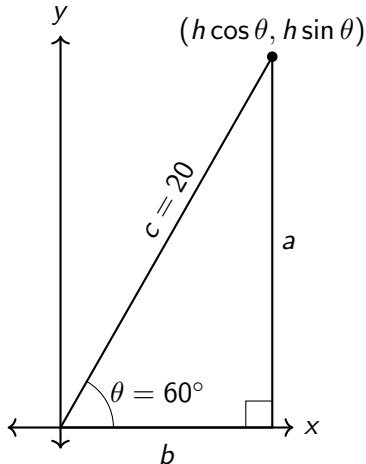
**SOH CAH TOA** *mnemonic device*

Find the legs of a triangle with hypotenuse  $c = 20$  and angle  $60^\circ$

$$\sin(\theta) = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{a}{c}$$

$$\cos(\theta) = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{b}{c}$$

Substitute the given values and solve



Find the legs of a triangle with hypotenuse  $c = 20$  and angle  $60$  degrees

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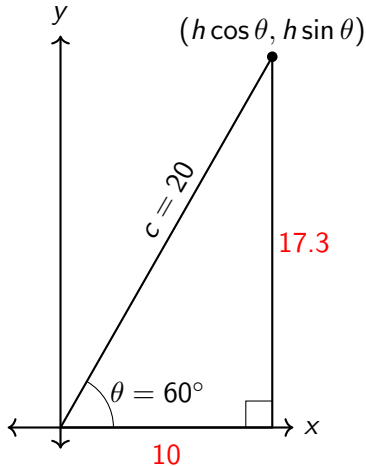
Substitute the given values and solve

$$\sin(60^\circ) = \frac{a}{20} = 0.866 \dots$$

$$a = 20 \times 0.866 \dots \approx 17.3$$

$$\cos(60^\circ) = \frac{b}{20} = 0.5$$

$$b = 20 \times 0.5 = 10$$



## Learning Target: I can use the sine and cosine inverse

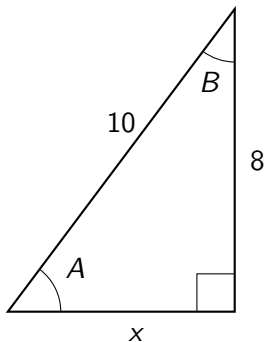
CCSS.HSG.SRT.C.8 Use trig ratios and the Pythagorean Theorem to solve problems

10.9 Thursday 4 May

Do Now: Calculate the length of the base  $x$  and the two angle measures.

Lesson: Using  $\sin \theta$  and  $\cos \theta$

Homework: Complete the classwork practice, Deltamath



## Learning Target: I can calculate exact values using special triangles

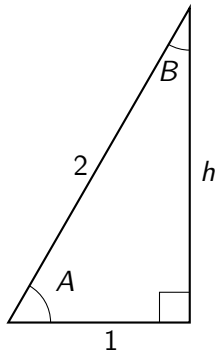
CCSS.HSG.SRT.C.8 Use trig ratios and the Pythagorean Theorem to solve problems

10.10 Friday 5 May

Do Now: Calculate the triangle's height  $h$  and the two angle measures.

Lesson:  $30 - 60 - 90$  and  $45 - 45 - 90$  triangles.

Homework: Complete the classwork practice, Deltamath



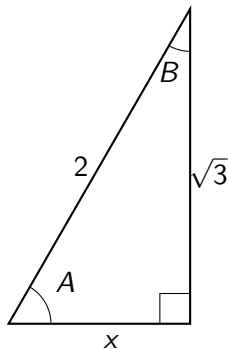
## Learning Target: I can solve real world problems with trigonometry.

CCSS.HSG.SRT.C.8 Use trig ratios and the Pythagorean Theorem to solve problems 10.15 Friday 19 May

Do Now: Calculate the triangle's base  $x$  and the two angle measures.

Lesson: Applications to real world situations.

Homework: Complete the classwork practice, Deltamath



## Regents trigonometry problem

David must buy a ladder to long enough to reach the entrance of his treehouse. The entrance is 8 feet above the ground, and the angle of elevation from the ground to the entrance is  $60^\circ$ . How long must the ladder be to the *nearest inch*?

