

# 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    |

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

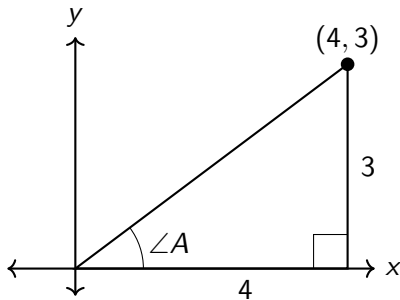
HSG.SRT.C.8 Use trigonometric ratios and the Pythagorean Theorem to solve problems 10.1 Monday 17 April

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.

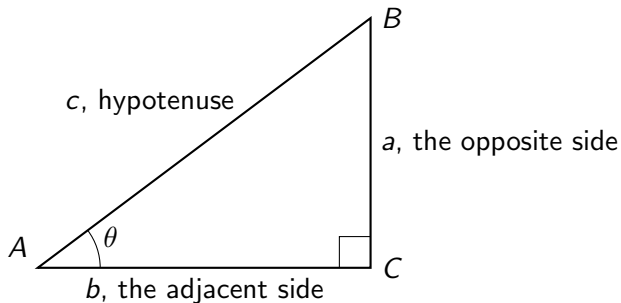
Lesson: The tangent function, calculator use

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

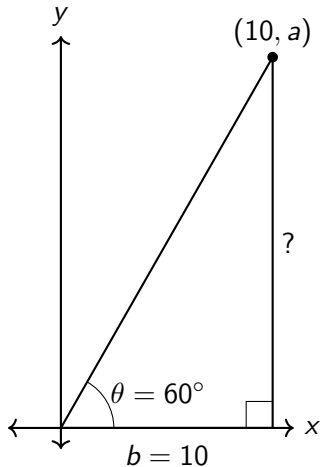
**Theta** A Greek letter used to represent the angle measure

**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  $\tan(60^\circ)$



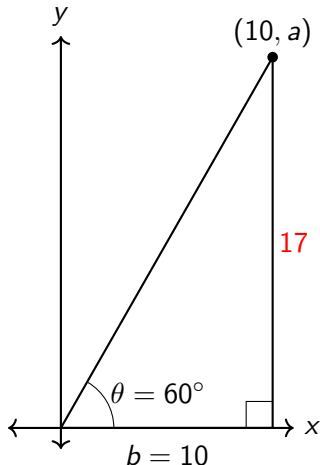
Find the height of a triangle with base  $b = 10$  and angle  $60$  degrees

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

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

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

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



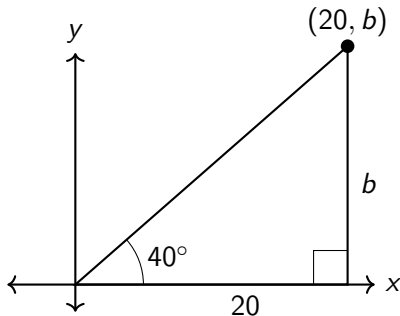
## Learning Target: I can find an angle measure using inverse tangent.

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.

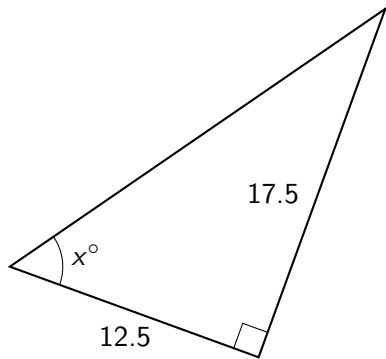
CCSS.HSG.SRT.C.8 Use trig ratios and the Pythagorean Theorem to solve problems 10.3 Monday 24 April

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

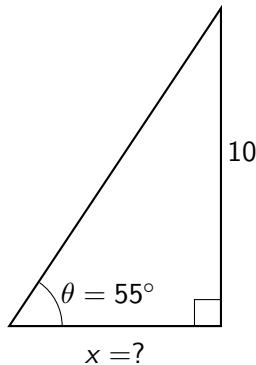




Find the base of a triangle with height  $h = 10$  and angle  $55^\circ$

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

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

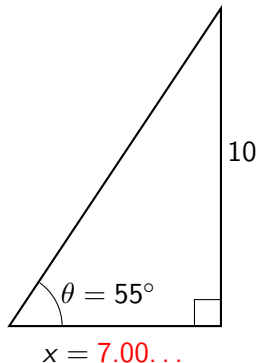
$$\tan(\theta) = \frac{\text{opposite}}{\text{adjacent}}$$

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.

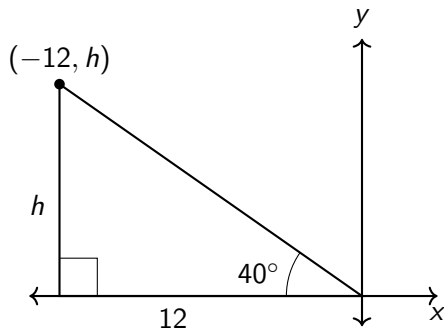
CCSS.HSG.SRT.C.8 Use trig ratios and the Pythagorean Theorem to solve problems 10.4 Tuesday 25 April

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

Lesson: Applying trigonometry to real world situations

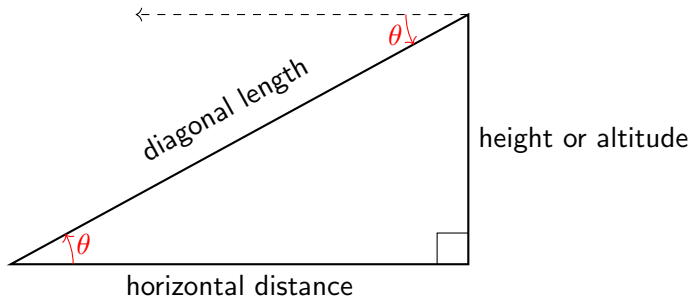
Homework: Complete the classwork,  
Deltamath problem set

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

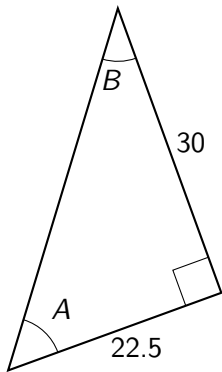
Do Now: "Solve" the  $\triangle$  shown. i.e. calculate the two angle measures and the length of the hypotenuse.

Lesson: Applying trigonometry in a variety of contexts

Deltamath exit quiz (10 minutes)

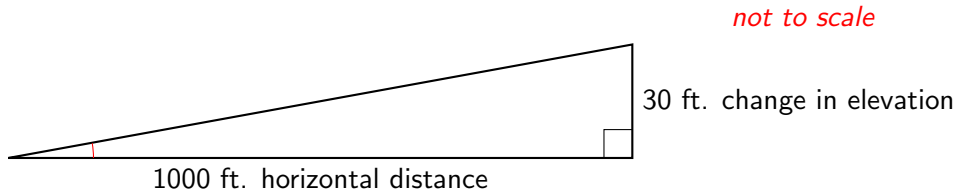
Homework: Complete the classwork practice

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

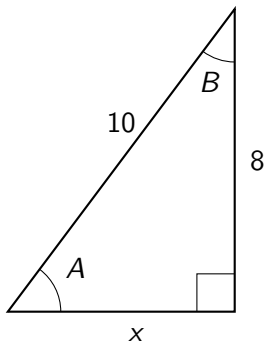
## Learning Target: I can use the sine and cosine functions

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  $\cos \theta$

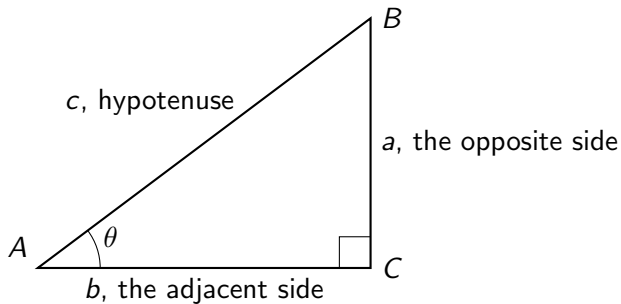
Homework: Complete the classwork practice, Deltamath





## 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

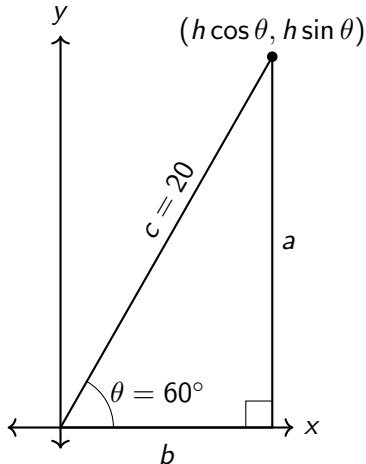
**SOH CAH TOA** *mnemonic device*

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

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

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

Substitute the given values and solve



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

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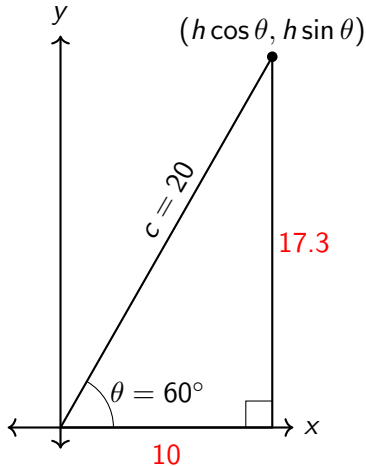
Substitute the given values and solve

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

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

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

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



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

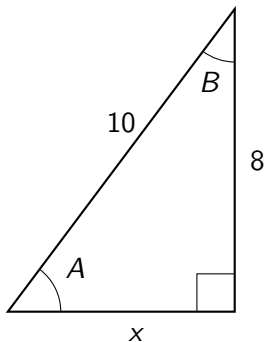
CCSS.HSG.SRT.C.8 Use trig ratios and the Pythagorean Theorem to solve problems

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

