

# GEOOMETRY

## Unit 7

Collage of geometry notes and worksheets:

- PYTHAGOREAN THEOREM**
  - Used to find the missing side.
  - Sides  $a$  and  $b$  are called legs.
  - Side  $c$  is called the hypotenuse.
  - For any right triangle:  $a^2 + b^2 = c^2$ .
- 45°-45°-45° Special Right Triangle**
  - Leg =  $x$
  - Hypotenuse =  $x\sqrt{2}$
- SIMILARITY in Right Triangles**
  - If the altitude is drawn from the right angle to the hypotenuse, the two smaller triangles are similar to the original triangle and to each other.
- Angle of Elevation**
  - When looking UP to an object, the angle of elevation is formed by an observer's line of sight and a horizontal line.
- TRIGONOMETRIC RATIOS**
  - SINE:  $\frac{\text{opposite}}{\text{hypotenuse}}$
  - COSINE:  $\frac{\text{adjacent}}{\text{hypotenuse}}$
  - TANGENT:  $\frac{\text{opposite}}{\text{adjacent}}$
- LAW OF SINES**
  - The Law of Sines shows the proportional relationship between angles and their opposite sides. It can be used to find side lengths and angle measurements for any triangle.

# RIGHT TRIANGLES & TRIGONOMETRY

NOTES • HOMEWORK • QUIZZES • TEST

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## Unit 7 - Right Triangles & Trigonometry: Sample Unit Outline

	TOPIC	HOMEWORK
DAY 1	Pythagorean Theorem & Converse	HW #1
DAY 2	Special Right Triangles	HW #2
DAY 3	Similar Right Triangles & Geometric Mean	HW #3
DAY 4	<b>Quiz 7-1</b>	None
DAY 5	Trigonometry: Ratios & Finding Missing Sides	HW #4
DAY 6	Trigonometry: Finding Missing Angles & Review	HW #5
DAY 7	Angle of Elevation & Depression & Review	HW #6
DAY 8	<b>Quiz 7-2</b>	None
DAY 9	Law of Sines	HW #7
DAY 10	Law of Cosines	HW #8
DAY 11	Solving Triangles & Applications	HW #9
DAY 12	<b>Quiz 7-3</b>	None
DAY 13	Unit 7 Review	Study for Test
DAY 14	<b>UNIT 7 TEST</b>	None

**Note:** The Law of Sines lesson does not include the ambiguous case. If you wish to include the ambiguous case, you may want to consider my [Algebra 2 Trigonometry Unit](#).

Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Topic: \_\_\_\_\_ Class: \_\_\_\_\_

Main Ideas/Questions Notes/Examples

### PYTHAGOREAN THEOREM



- Used to find the missing side.
- Sides  $a$  and  $b$  are called legs.
- Side  $c$  is called the hypotenuse.
- For any right triangle:

Examples

Directions: Find the value of  $x$ .



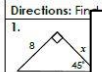
Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Topic: \_\_\_\_\_ Class: \_\_\_\_\_

Main Ideas/Questions Notes/Examples

### 45°-45°-45° Special Right Triangle



- Leg = \_\_\_\_\_
- Hypotenuse = \_\_\_\_\_



Directions: Find the value of  $x$ .

Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Topic: \_\_\_\_\_ Class: \_\_\_\_\_

Main Ideas/Questions Notes/Examples

### SIMILARITY in Right Triangles

**Right Triangle Similarity Theorem:**  
 If the altitude is drawn to the hypotenuse of a right triangle, then the two triangles formed are similar to the original triangle and to each other.

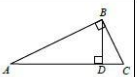
In the diagram to the right:

- Identify the similar triangles in the diagram, then corresponding sides and angles have the same



### GEOMETRIC MEAN Altitude Theorem

**Geometry Mean (Altitude) Theorem:**  
 The length of the altitude is the geometric mean of the lengths of the two segments.



Directions: Find the value of  $x$ .



Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Topic: \_\_\_\_\_ Class: \_\_\_\_\_

Main Ideas/Questions Notes/Examples

### What is TRIGONOMETRY?

### TRIGONOMETRIC RATIOS

Each acute angle of a right triangle has the following trigonometric ratios:

SINE

The ratio of the leg opposite the angle to the hypotenuse.

$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$

Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Topic: \_\_\_\_\_ Class: \_\_\_\_\_

Main Ideas/Questions Notes/Examples

### FINDING ANGLE MEASURES using Trig

If you know the sin, cosine, or tangent ratio of an angle, you can use the inverse of the ratio ( $\sin^{-1}$ ,  $\cos^{-1}$ ,  $\tan^{-1}$ ) to find the measure of the angle.

Directions: Find the value of  $x$ . Round to the nearest tenth.



Note: Make sure your calculator is in degree mode!

Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Topic: \_\_\_\_\_ Class: \_\_\_\_\_

Main Ideas/Questions Notes/Examples

### Angle of Elevation

When looking UP to an object, the angle of elevation is formed by an observer's line of sight and a horizontal line.



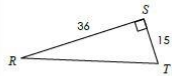
### Examples

Directions: Draw and label a diagram, then solve for the missing part. Round to the nearest tenth.

- Casey sights the top of an 84-foot tall lighthouse at an angle of elevation of  $58^\circ$ . If Casey is 6 feet tall, how far is he standing from the base of the lighthouse?
- The angle of elevation from a kicker's foot on the football field to the top of the goal post bars is  $17^\circ$ . If he is standing 131 feet from the base post, how tall is the goal post?

## TRIGONOMETRY Review!

**Trigonometric Ratios:** Find each trig ratio. Give your answer as a fraction in simplest form.

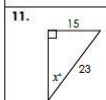
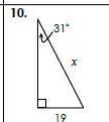
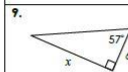
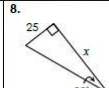
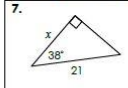


1.  $\sin R =$  \_\_\_\_\_

3.  $\cos R =$  \_\_\_\_\_

5.  $\tan R =$  \_\_\_\_\_

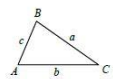
**Finding Sides & Angles:** Find the value of  $x$ . Round your answer to the nearest tenth.



Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Topic: \_\_\_\_\_ Class: \_\_\_\_\_

Main Ideas/Questions Notes/Examples

### LAW OF SINES



We have practiced side lengths and angles. The Law of Sines shows the relationship between angles and their opposite sides.

Given  $\triangle ABC$ :

### FINDING SIDE LENGTHS

Directions: Use the Law of Sines.



## Unit 7 Test Study Guide (Right Triangles & Trigonometry)

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Topic 1: The Pythagorean Theorem**

For any right triangle: \_\_\_\_\_, where  $a$  and  $b$  are legs and  $c$  is the hypotenuse.

Directions: Solve for  $x$ . Round your answer to the nearest tenth.



5. An Olympic-size swimming pool is approximately 50 meters long by 25 meters wide. What distance will a swimmer travel if they swim from one corner to the opposite?

6. A 20-foot ramp is used at the top of a factory. If the base of the ramp is placed 19 feet from the base of the factory, how high is the loading dock?

**Topic 2: Pythagorean Theorem Converse & Classifying Triangles**

Given a triangle with side lengths  $a$ ,  $b$ , and  $c$ :

- If \_\_\_\_\_, then it is a **right** triangle.
- If \_\_\_\_\_, then it is an **acute** triangle.
- If \_\_\_\_\_, then it is an **obtuse** triangle.



Directions: Classify the triangle with the given side lengths as acute, right, obtuse, or not a triangle.

- 20, 21, 29
- 5, 9, 10

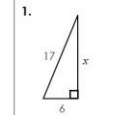
- Not a  $\triangle$
- Acute
- Right
- Obtuse

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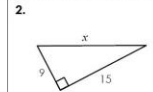
## Unit 7 Test Right Triangles & Trigonometry

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Per: \_\_\_\_\_

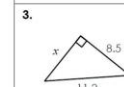
Directions: For questions 1-4, solve for  $x$ . Round your answer to the nearest tenth.



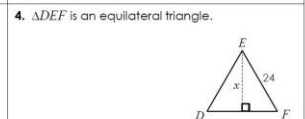
$x =$  \_\_\_\_\_



$x =$  \_\_\_\_\_



$x =$  \_\_\_\_\_



$x =$  \_\_\_\_\_

5. Westfalls is 7 miles south of Edenville and Concord is 13 miles west of Westfalls. What is the distance from Edenville to Concord? Round to the nearest tenth of a mile.

\_\_\_\_\_

6. A rope from the top of a mast on a sailboat is attached to a point 19 feet from the mast. If the rope is 28 feet long, how tall is the mast? Round to the nearest tenth of a foot.

\_\_\_\_\_