

# Unit 6 Trigonometry of General Triangles

## KEY STANDARDS - Apply trigonometry to general triangles

MGSE9-12.G.SRT.9 Derive the formula  $A = (1/2)ab \sin(C)$  for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.

MGSE9-12.G.SRT.10 Prove the Laws of Sines and Cosines and use them to solve problems.

MGSE9-12.G.SRT.11 Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

## RELATED STANDARDS - Define trigonometric ratios and solve problems involving right triangles

MGSE9-12.G.SRT.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.

MGSE9-12.G.SRT.7 Explain and use the relationship between the sine and cosine of complementary angles.

MGSE9-12.G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Date	Topic(s)	Assignment/HW	Credit
Mon. 11/1	Right Triangle Trigonometry		
Tues. 11/2	NO SCHOOL – ELECTION DAY		
Wed. 11/3	Law of Sines		
Thurs. 11/4	Law of Sines – Ambiguous Case		
Fri. 11/5	Law of Cosines		
Mon. 11/8	Area of Oblique Triangles		
Tues. 11/9	Unit 6 Review		
Wed. 11/10	<b>UNIT 6 TEST</b>		

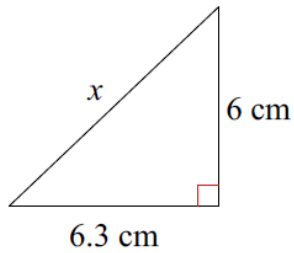
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## WS #1 Right Triangle Trigonometry

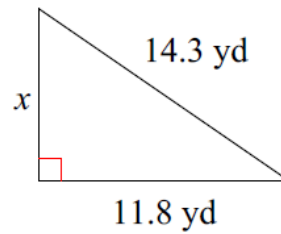
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Find the missing value of each triangle. Round your answers to the nearest tenth if necessary.

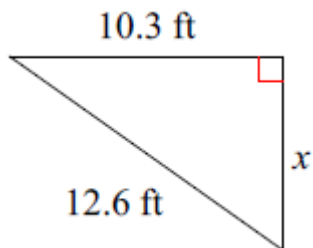
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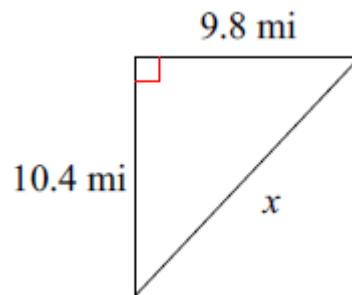
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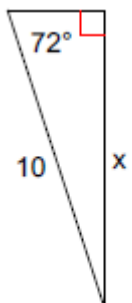
Find the missing side of each right triangle. Side **c** is the hypotenuse. Sides **a** and **b** are the legs. Leave your answers in simplest radical form.

5.  $b = \sqrt{65}$  yd,  $c = 16$  yd

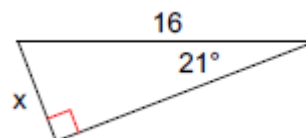
6.  $b = 24$  mi,  $a = 10$  mi

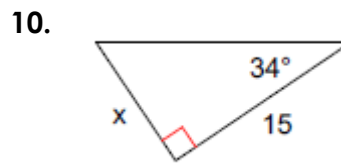
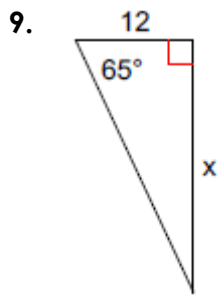
Find the missing side. Round to the nearest tenth.

7.

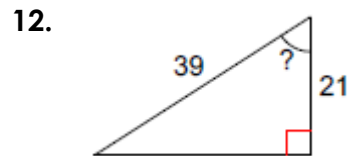
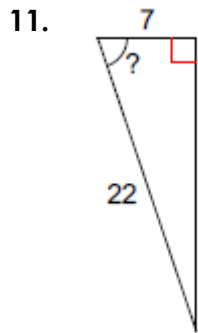


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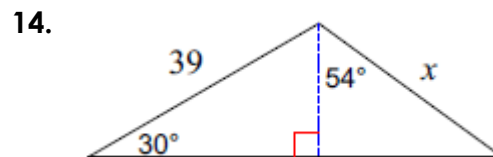
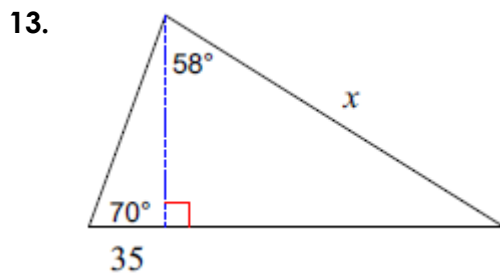




Find the measure of the indicated angle to the nearest degree.



Find the length of the side labeled  $x$ . Round intermediate values to the nearest tenth. Use the rounded values to calculate the next value. Round your final answer to the nearest tenth.



15. An observer is standing on the top of a vertical cliff and spots a house in the adjacent valley at an angle of depression of 12 degrees. The cliff is 60 meters high. How far is the house from the base of the cliff?

16. You are at the beach flying your kite. You have released 325 feet of string. The angle of elevation of the kite string and the sandy beach is 56 degrees. How high is the kite?

## WS #2 Law of Sines

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Solve the triangles given  $\triangle ABC$  with sides  $a$ ,  $b$ ,  $c$ , and opposite angles  $A$ ,  $B$ , &  $C$ . Round your answers to the nearest tenth.

1.  $c = 24$ ,  $A = 30^\circ$ ,  $C = 59^\circ$

2.  $a = 17$ ,  $B = 56^\circ$ ,  $C = 77^\circ$

3.  $B = 135^\circ$ ,  $C = 6^\circ$ ,  $a = 24$

4.  $A = 104^\circ$ ,  $C = 46^\circ$ ,  $c = 23$

5.  $a = 25$ ,  $b = 38$ ,  $B = 87^\circ$

6.  $a = 9$ ,  $b = 26$ ,  $B = 99^\circ$

7.  $a = 27$ ,  $c = 10$ ,  $A = 52^\circ$

8.  $b = 44$ ,  $A = 42^\circ$ ,  $C = 37^\circ$

9.  $A = 17^\circ$ ,  $C = 105^\circ$ ,  $b = 29$

10.  $a = 35$ ,  $c = 34$ ,  $A = 69^\circ$

### WS #3 Law of Sines – Ambiguous Case

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Solve the triangles given  $\triangle ABC$  with sides  $a$ ,  $b$ ,  $c$ , and opposite angles  $A$ ,  $B$ , &  $C$ . Round your answers to the nearest tenth.

1.  $B = 130^\circ$ ,  $a = 26$ ,  $b = 31$

2.  $a = 27$ ,  $b = 20$ ,  $B = 31^\circ$

3.  $B = 30^\circ$ ,  $a = 30$ ,  $b = 15$

4.  $B = 107^\circ$ ,  $a = 27$ ,  $b = 45$

5.  $b = 30$ ,  $c = 29$ ,  $B = 73^\circ$

6.  $a = 26$ ,  $b = 9$ ,  $B = 27^\circ$

7.  $a = 17$ ,  $c = 18$ ,  $A = 33^\circ$

8.  $b = 44$ ,  $A = 42^\circ$ ,  $C = 37^\circ$

9.  $C = 43^\circ$ ,  $c = 4$ ,  $b = 28$

10.  $a = 23$ ,  $b = 21$ ,  $B = 50^\circ$

#### WS #4 Law of Cosines

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Solve the triangles given  $\triangle ABC$  with sides  $a$ ,  $b$ ,  $c$ , and opposite angles  $A$ ,  $B$ , &  $C$ . Round your answers to the nearest tenth.

1.  $C = 105^\circ$ ,  $a = 16$ ,  $b = 25$

2.  $c = 23$ ,  $b = 29$ ,  $A = 111^\circ$

3.  $a = 21$ ,  $b = 9.4$ ,  $c = 15.3$

4.  $a = 9$ ,  $b = 6$ ,  $c = 14$

5.  $b = 14$ ,  $a = 9$ ,  $C = 17^\circ$

6.  $a = 16$ ,  $c = 128$ ,  $B = 117^\circ$

7.  $a = 17.9$ ,  $b = 14.7$ ,  $c = 21.5$

8.  $a = 13$ ,  $b = 26$ ,  $c = 18$

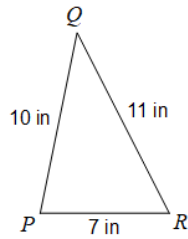
9.  $a = 14$ ,  $b = 24$ ,  $c = 13$

10.  $b = 7.7$ ,  $c = 9.4$ ,  $A = 111.8^\circ$

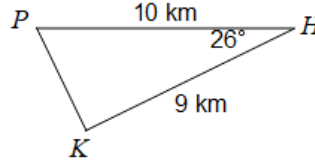
# WS #5 Area of Oblique Triangles

Find the area of each triangle. Round your answers to the nearest tenth.

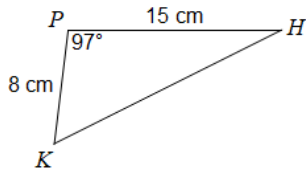
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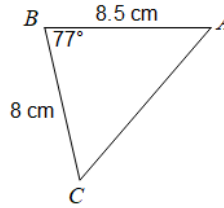
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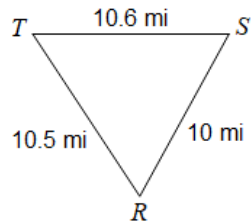
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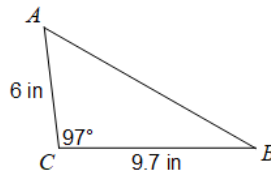
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7. In  $\triangle HPK$ ,  $h = 5$  cm,  $P = 38^\circ$ ,  $H = 114^\circ$

8. In  $\triangle HPK$ ,  $p = 7.5$  km,  $h = 10$  km,  $k = 9$  km

9. In  $\triangle HPK$ ,  $k = 14.7$  km,  $p = 13$  km,  $H = 111^\circ$       10. In  $\triangle KHP$ ,  $p = 8.2$  ft,  $h = 11$  ft,  $K = 29^\circ$

11. In  $\triangle CAB$ ,  $c = 8$  cm,  $C = 135^\circ$ ,  $A = 20^\circ$

12. In  $\triangle XYZ$ ,  $X = 131^\circ$ ,  $Y = 34^\circ$ ,  $x = 7$  m

## WS #6 Triangle Applications

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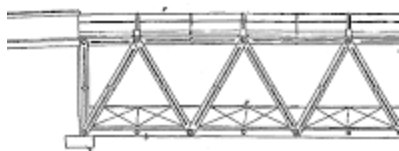
**Draw a picture, label, and solve each problem below.**

1. Points A and B are on opposite sides of the Grand Canyon. Point C is 200 yards from A. Angle B measures  $87^\circ$  and angle C measures  $67^\circ$ . What is the distance between A and B?



2. Two observers are standing on shore  $\frac{1}{2}$  mile apart at points A and B and measure the angle to a sailboat at a point C at the same time. Angle A is  $63^\circ$  and angle B is  $56^\circ$ . Find the distance from each observer to the sailboat.

3. A bridge is supported by triangular braces. If the sides of each brace have lengths 63 feet, 46 feet and 40 feet, find the measure of the angle opposite the 46 ft side.



4. On a map, Orlando is 178 mm due south of Niagara Falls, Denver is 273 mm from Orlando, and Denver is 235 mm from Niagara Falls. Find the angle formed from Niagara Falls to Denver and Orlando.

5. Nancy shines a light from a window of a light house on a cliff 250 feet above the water level. Nick Danger 10 feet above the water level in a ship offshore, finds that the angle of elevation of the light is  $3^\circ$ . Find the length of the line of sight (light beam) from the ship to Nancy. Round to the nearest tenth.





# WS #7 Review

**#1-6: Denote in the margin to the left of the problem number how many triangles can be formed with the given information. Then solve the triangles, if possible. Number & show all work in the space at the bottom of this page.**

	a	b	c	A	B	C
1.	75	58		$105^\circ$		
2.	10		34	$12^\circ$		
3.	6			$25^\circ$		$105^\circ$
4.	68	22			$29^\circ$	
5.	18		74		$75^\circ$	
6.	64	15	75			

**Show work here...**

**For #7-8: Find the area of the following triangles.**

7.  $a = 15$  in,  $b = 18$  in,  $c = 21$  in.

8.  $b = 40$  cm,  $c = 45$  cm,  $A = 51^\circ$

**#9-11: Find the requested information.**

9. A used car lot has a large balloon tied down with wires to stakes 1500 feet apart. The angle of elevation from the stake at the west end of the lot to the balloon is  $50^\circ$ , and the angle of elevation from the stake at the east end of the lot to the balloon is  $72^\circ$ . How long is each wire?

10. The airline distance from Curtis City to Clearfield is 350 miles. It is 620 miles from Curtis City to Spinville and 495 miles from Clearfield to Spinville. Find the angle between the routes from Clearfield.

11. A trigonometry class wants to determine the length of a pond near the school. From a point, A, they measure the distance to each end of the pond and the angle between these two sides. What is the approximate length of the pond? (See figure.)

