

MATH 2 HONORS

Day

Date

Unit 7 Topics

1

5/04/18

L1: Radicals & Pythagorean Theorem

2

5/07

L2: Special Right Triangles

3

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L3: Solving for Sides in a Right Triangle

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L4: Solving for Angles in a Right Triangle

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L5: Angles of Elevation & Depression

8

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Unit 7 **TEST**

QUIZ DATE: _____

TEST DATE: _____

Math 2 – Honors

Name _____

Unit 7 – Right Triangle Trigonometry

Date _____ Pd _____

Lesson 1 → Radicals & Pythagorean Theorem

➤ Review: Simplify each radical

1. $\sqrt{49}$	2. $\sqrt{121}$	3. $\sqrt{20}$	4. $\sqrt{24}$
5. $\sqrt{50}$	6. $3\sqrt{40}$	7. $-2\sqrt{300}$	8. $12\sqrt{50}$

➤ Sometimes we need to be able to multiply and divide radical expressions in order to simplify.

9. $\sqrt{4} \cdot \sqrt{4}$	10. $(5\sqrt{3})^2$	11. $\sqrt{10} \cdot \sqrt{8}$	12. $3\sqrt{2} \cdot 9\sqrt{20}$
13. $-\sqrt{12} \cdot 6\sqrt{5}$	14. $4\sqrt{18} \cdot 3\sqrt{2}$	15. $2\sqrt{16} \cdot 3\sqrt{4}$	16. $-5\sqrt{6} \cdot 4\sqrt{8}$
17. $\frac{\sqrt{36}}{\sqrt{9}}$	18. $\frac{8\sqrt{2}}{2\sqrt{2}}$	19. $\frac{\sqrt{150}}{\sqrt{3}}$	20. $\frac{\sqrt{300}}{\sqrt{5}}$
21. $\frac{2\sqrt{33}}{\sqrt{11}}$	22. $\frac{8\sqrt{48}}{2\sqrt{3}}$	23. $\frac{\sqrt{25}}{\sqrt{36}}$	24. $\frac{35\sqrt{108}}{7\sqrt{6}}$

➤ What happens if a radical is left in the denominator of a fraction?

➤ We will simplify using a process called “rationalizing the denominator.”

25. $\frac{2}{\sqrt{3}}$	26. $\frac{15}{\sqrt{5}}$	27. $\frac{1}{\sqrt{2}}$	28. $\frac{6}{2\sqrt{7}}$
29. $\frac{8}{3\sqrt{2}}$	30. $\frac{18}{\sqrt{27}}$	31. $\frac{1}{3\sqrt{16}}$	32. $\frac{5\sqrt{2}}{\sqrt{6}}$

➤ Solving Right Triangles for Missing Sides

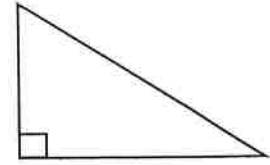
❖ Recall the Pythagorean Theorem:

✓ $a^2 + b^2 = c^2$

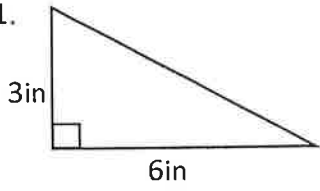
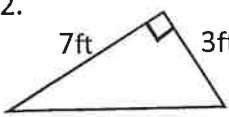
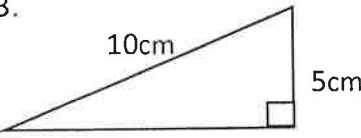
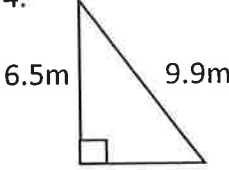
✓ Used to find a missing side of a right triangle.

✓ a and b represent the _____ of the right triangle.

✓ c represents the _____ of the right triangle.



➤ Examples: Solve for the missing side in each right triangle.

<p>1. </p>	<p>2. </p>
<p>3. </p>	<p>4. </p>

5. Determine whether the measures of the sides of each triangle would represent a right triangle:

A. 9, 16, 20

B. 11, 12, 15

C. 18, 24, 30

D. 2, 3, 5

E. 5, 12, 13

F. 15, $\sqrt{31}$, 16

6. Michael is walking around a rectangular crater in the center of Wake Forest. The crater is 5 km long and 7 km wide.

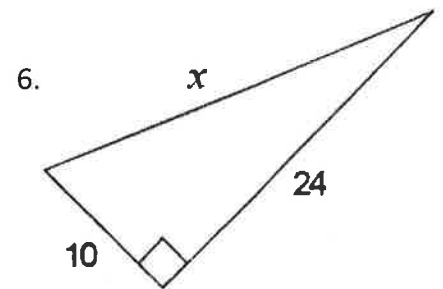
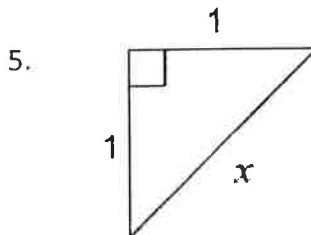
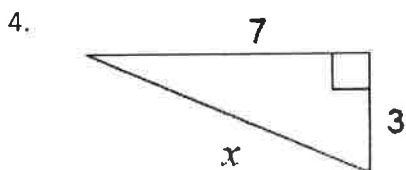
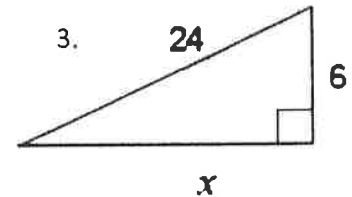
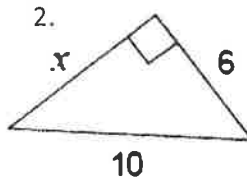
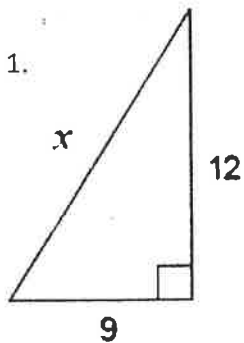
a. How far would Michael have to walk from one corner of the crater to the opposite corner of the crater along the outside of the crater?

b. Captain Pythagoras has the ability to fly. How far would Captain Pythagoras fly if he were to fly from one corner of the crater to the opposite corner of the crater?

➤ Simplify each radical expression:

1. $\sqrt{81}$	2. $\sqrt{484}$	3. $\sqrt{72}$	4. $2\sqrt{500}$
5. $\sqrt{30} \cdot \sqrt{10}$	6. $(3\sqrt{5})^2$	7. $\frac{\sqrt{98}}{\sqrt{7}}$	8. $\frac{\sqrt{32}}{\sqrt{4}}$
9. $\frac{\sqrt{5}}{\sqrt{10}}$	10. $\frac{\sqrt{2}}{\sqrt{3}}$	11. $\frac{5\sqrt{30}}{\sqrt{6}}$	12. $\frac{2\sqrt{3}}{\sqrt{8}}$

➤ Solve for the missing side by using Pythagorean Theorem. Leave answers in simplest radical form.

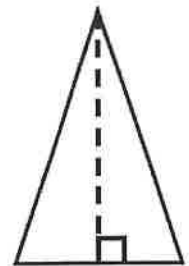


➤ Solve each of the following. Please draw a picture and use the Pythagorean Theorem to solve.
 ✓ Be sure to label all answers and leave answers in exact simplified form.

7. The bottom of a ladder must be placed 3 feet from a wall. The ladder is 12 feet long. How far above the ground does the ladder touch the wall?

8. A soccer field is a rectangle 90 *meters* wide and 120 *meters* long. The coach asks players to run from one corner to the corner diagonally across the field. How far do the players run?
9. How far from the base of the house do you need to place a 15' ladder so that it exactly reaches the top of a 12' wall?
10. What is the length of the diagonal of a 10 *cm* by 15 *cm* rectangle?
11. The diagonal of a rectangle is 25 *in*. The width is 15 *in*. What is the area of the rectangle?
12. Two sides of a right triangle are 8" and 12".
- Find the area of the triangle if 8 and 12 are legs.
 - Find the area of the triangle if 8 and 12 are a leg and hypotenuse.
13. The area of a square is 81 cm^2 . Find the perimeter of the square.

14. An isosceles triangle has congruent sides of 20 *cm*. The base is 10 *cm*.
What is the area of the triangle?



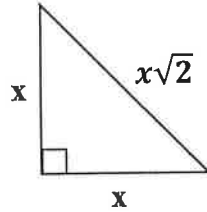
15. A baseball diamond is a square that is 90' on each side. If a player throws the ball from 2nd base to home, how far will the ball travel?
16. Jill's front door is 42" wide and 84" tall. She purchased a circular table that is 96 *inches* in diameter. Will the table fit through the front door?

Math 2 – Honors
 Unit 7 – Right Triangle Trigonometry
 Lesson 2 → Special Right Triangles

Name _____
 Date _____ Pd _____

➤ SPECIAL RIGHT TRIANGLES:

45° – 45° – 90° Triangle Theorem



$$\text{Hypotenuse} = \text{Leg} * \sqrt{2}$$

$$\text{Leg} = \frac{\text{Hypotenuse}}{\sqrt{2}}$$

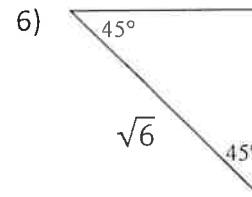
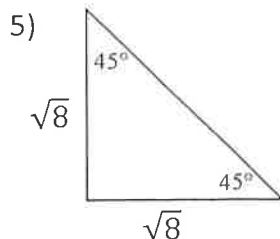
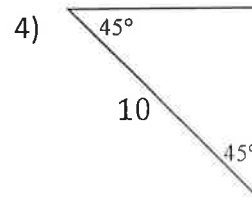
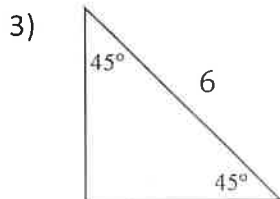
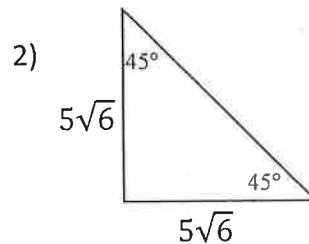
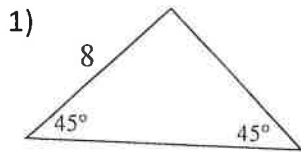
Fill in the table with the missing side lengths of the 45° – 45° – 90° triangle.
 Leave all answers in simplified radical form.

Leg (x)	5							$\sqrt{14}$	
Leg (x)					$2\sqrt{6}$				
Hypotenuse ($x\sqrt{2}$)		$3\sqrt{2}$	$6\sqrt{2}$	10		15		$8\sqrt{6}$	

45° – 45° – 90° Rules:

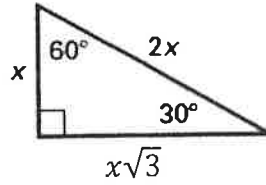
When you are given the length of a LEG _____ by $\sqrt{2}$ to get the length of the HYPOTENUSE.
 When you are given the length of the HYPOTENUSE _____ by $\sqrt{2}$ to get the length of the LEG.

- Find all the missing side lengths. Leave answers in **simplified radical form**.



6

30° – 60° – 90° Triangle Theorem



$$\begin{aligned} \text{Hypotenuse} &= \text{Short Leg} * 2 \\ \text{Long Leg} &= \text{Short Leg} * \sqrt{3} \\ \text{Short Leg} &= \frac{\text{Hypotenuse}}{2} \\ \text{Short Leg} &= \frac{\text{Long Leg}}{\sqrt{3}} \end{aligned}$$

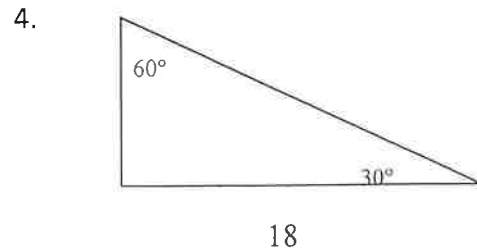
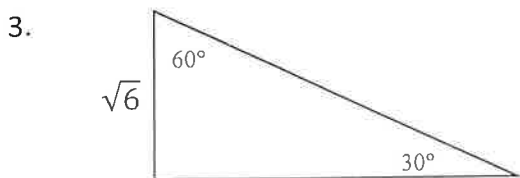
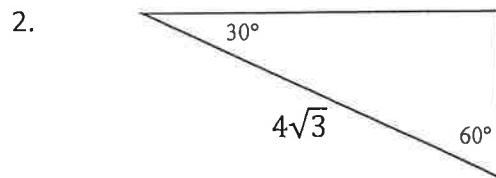
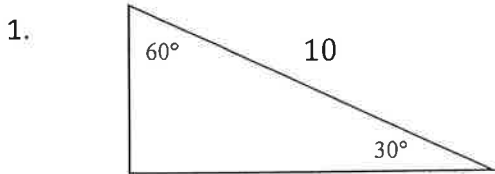
Fill in the table with the missing side lengths of the 30° – 60° – 90° triangle.
Leave all answers in simplified radical form.

<i>Short Leg (x)</i>	6			$2\sqrt{3}$				18
<i>Long Leg (x\sqrt{3})</i>			$4\sqrt{3}$		8	27		
<i>Hypotenuse (2x)</i>		20					$8\sqrt{6}$	

30° – 60° – 90° Rules:

- When you are given the length of a SHORT LEG _____ by 2 to get the length of the HYPOTENUSE.
- When you are given the length of the HYPOTENUSE _____ by 2 to get the length of the SHORT LEG.
- When you are given the length of a SHORT LEG _____ by $\sqrt{3}$ to get the length of the LONG LEG.
- When you are given the length of the LONG LEG _____ by $\sqrt{3}$ to get the length of the SHORT LEG.

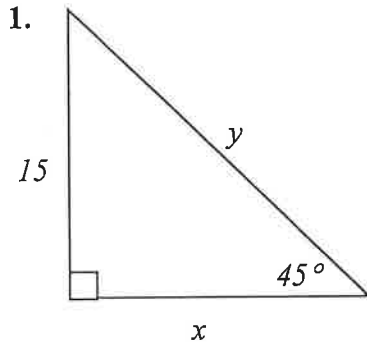
- Find all the missing side lengths. Leave answers in **simplified radical form**.



Math 2 – Honors
 Unit 7 – Right Triangle Trigonometry
 Lesson 2 → Special Right Triangles HOMEWORK

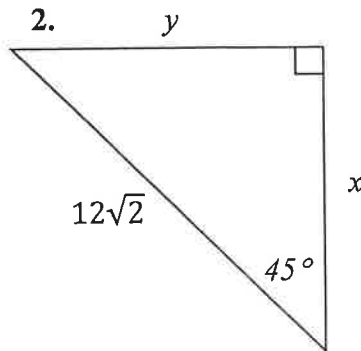
Name _____
 Date _____ Pd _____

Solve for the missing sides in each of the given triangles using the relationships for special right triangles. Leave all answers as simplified radicals.



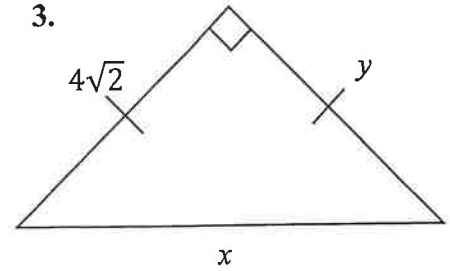
x = _____

y = _____



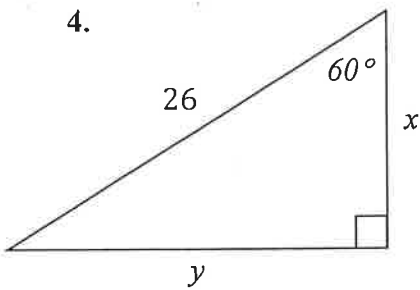
x = _____

y = _____



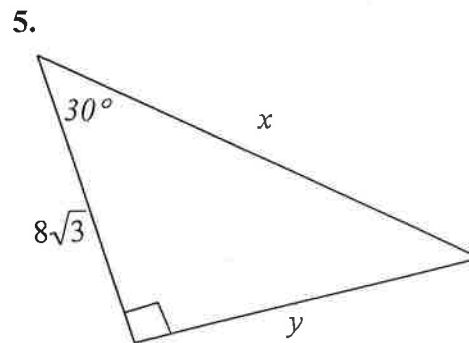
x = _____

y = _____



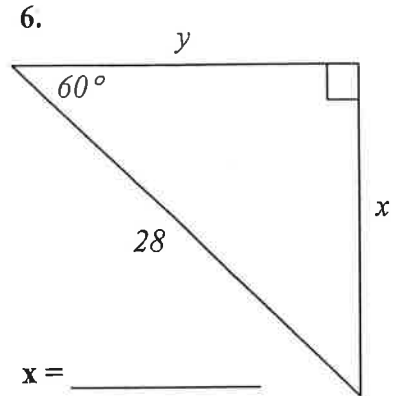
x = _____

y = _____



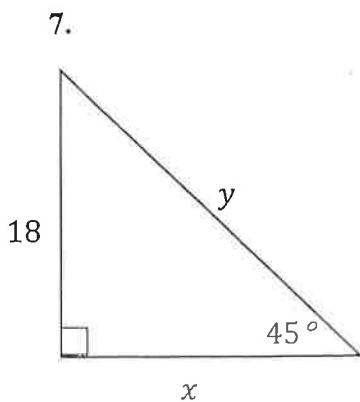
x = _____

y = _____



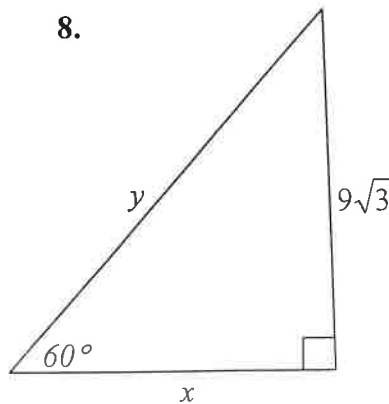
x = _____

y = _____



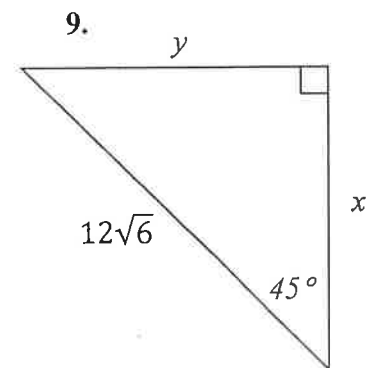
x = _____

y = _____



x = _____

y = _____



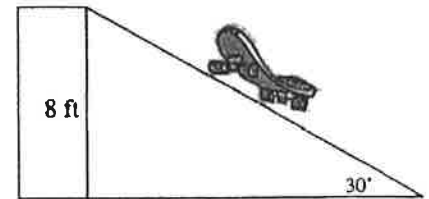
x = _____

y = _____

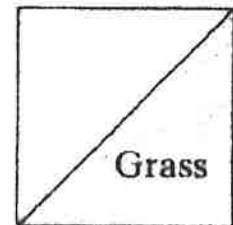
10. Ryan quit bowling and took up sailing. His sail for his sailboat is a $45^\circ - 45^\circ - 90^\circ$ Right Triangle. The base of the sail is 6 ft . long. What would the height of the sail be? What is the length of the hypotenuse?

11. Joe saw a "Yield" sign and "borrowed it." He wanted to hang it up in his room because it looked cool and it was in the shape of an equilateral triangle. The length of one side is 34 inches . What is the height of the sign?

12. Jeremy is going to show off his skateboarding ability to his Math 2 class. He has a skate board ramp must be set up to rise from the ground at 30° . If the height from the ground to the platform is 8 feet , how far is the ramp to the platform? How long is the ramp up to the top of the platform?



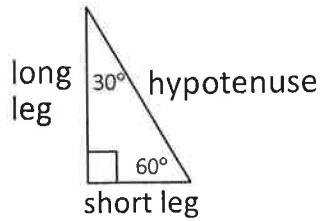
13. Tristan has a square back yard with an area of 225 ft^2 . He started to plant grass seed but only did half his yard. What is the perimeter of the grass section of the backyard?



14. Lorena and Karla are creating an art project in the shape of a right triangle. They have a 92 cm ---long piece of wood, which is to be used for the hypotenuse. The two legs of the triangular support are of equal length. Approximately how many **more** centimeters of wood do they need to complete the support?

15. Mr. Rasczyk has a tree farm. Half the farm is trees that he uses to make pencils, the other half are maple trees that he uses to make "Raz's Sweet Love Maple Syrup". The farm is a square divided into 2 sections along a 400 foot diagonal. What is the area of the Maple Tree Farm section?

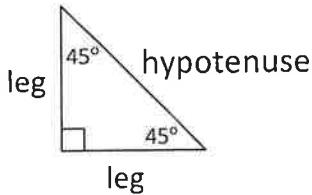
Special Right Triangles



$$\text{short leg} = \frac{1}{2} \cdot \text{hypotenuse}$$

$$\text{long leg} = \sqrt{3} \cdot (\text{short leg})$$

$$\text{hypotenuse} = 2 \cdot (\text{short leg})$$

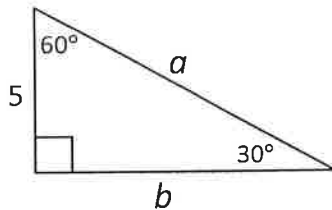


legs are equal

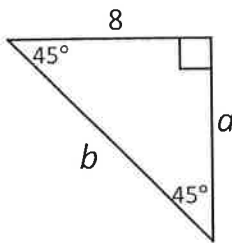
$$\text{hypotenuse} = \sqrt{2} \cdot (\text{leg})$$

Use the 30-60-90 and 45-45-90 triangle relationships to solve for the missing sides. Use the answers to reveal the name of the team that Abraham M. Saperstein established and sent on the road in 1927.

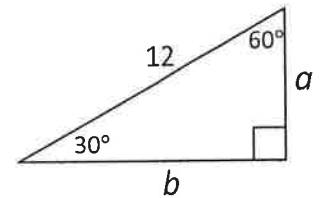
1



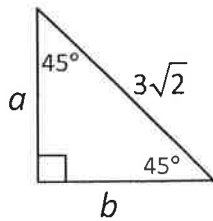
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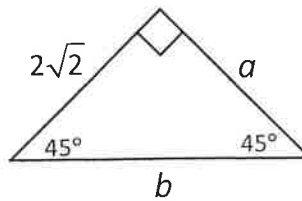
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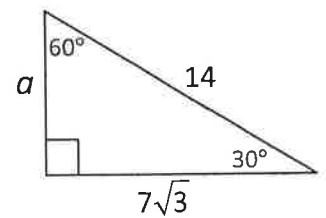
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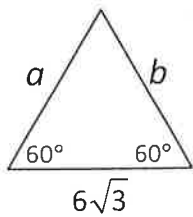
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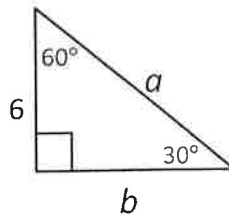
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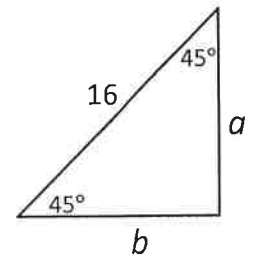
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9

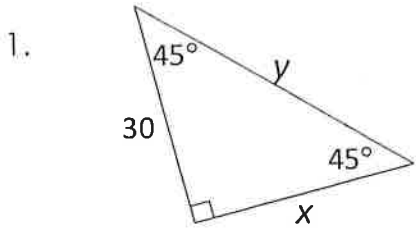


8	$2\sqrt{2}$	3	6	$5\sqrt{3}$	4	7	12	$8\sqrt{2}$	10	$6\sqrt{3}$
A	B	E	G	H	L	M	O	R	S	T

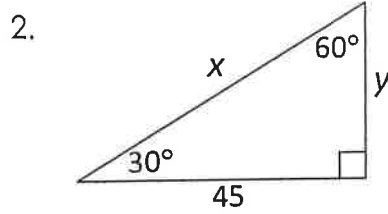
$\overline{8b}$ $\overline{1b}$ $\overline{4a}$ $\overline{1b}$ $\overline{2a}$ $\overline{9b}$ $\overline{5b}$ $\overline{4b}$ $\overline{6a}$

$\overline{3a}$ $\overline{5b}$ $\overline{8a}$ $\overline{5a}$ $\overline{4a}$ $\overline{7a}$ $\overline{2b}$ $\overline{8a}$ $\overline{7b}$ $\overline{3b}$ $\overline{4b}$ $\overline{9a}$ $\overline{1a}$

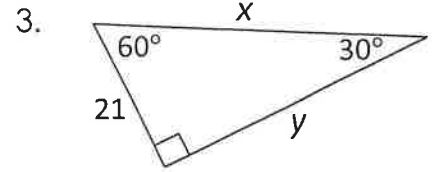
Find the values of x and y in each of the following triangles.



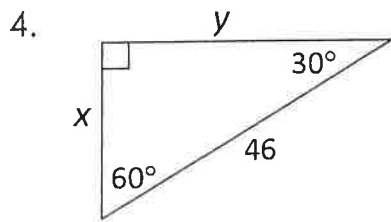
$x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$



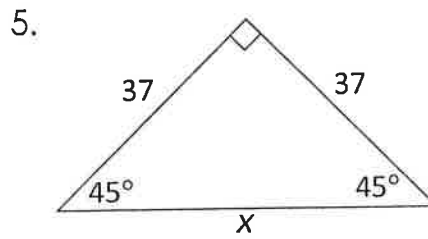
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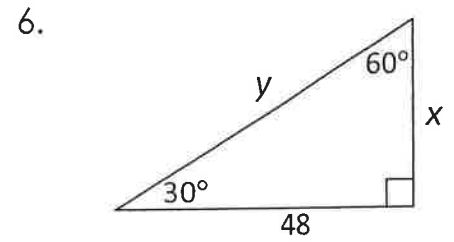
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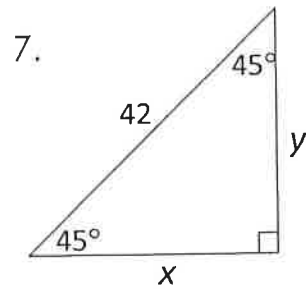
$x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$



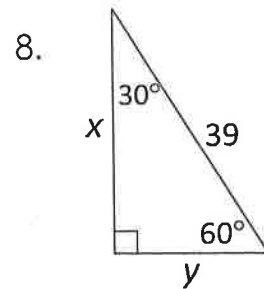
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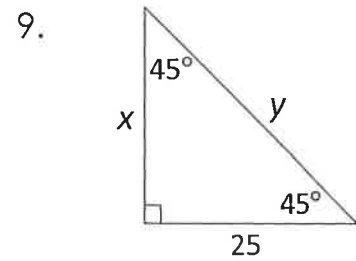
$x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$



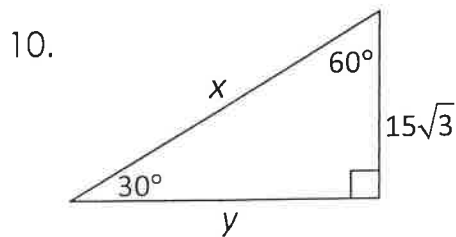
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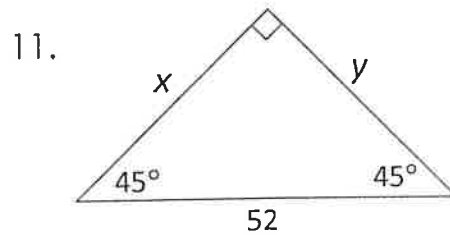
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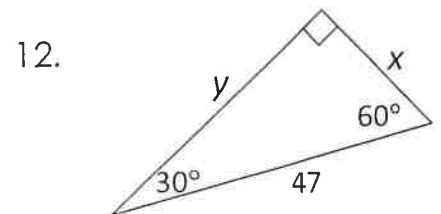
$x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$



$x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$



$x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$



$x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$

Math 2 – Honors
 Unit 7 – Right Triangle Trigonometry
 Lesson 3 → Solving for a Side of a Right Triangle

Name _____
 Date _____ Pd _____

Trigonometry: branch of mathematics that studies relationships involving the sides and the angles of triangles. Trigonometry is often divided into two subgroups: Right Triangles & Nonright (Oblique) Triangles

- **Sine, Cosine and Tangent** – three trigonometric functions that are related to angles and triangles
 - To evaluate an expression means to substitute a given value in for the variable and simplify.
 - We can also evaluate **sine, cosine and tangent** using buttons on the calculator.
 - When evaluating sine, cosine and tangent, we must remember that the value we are substituting into the expression represents an **angle measure**.
 - ❖ Angles can be measured in two different units:
 - ✓ Degrees: $30^\circ, 45^\circ, 60^\circ, 90^\circ, 180^\circ, 270^\circ, 360^\circ$
 - ✓ Radians: $\frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi$
 - ✓ In this class, we will always measure angles in **degrees**.
 - ✓ Unfortunately the calculator is defaulted into radians, so we must make sure to change the MODE → Make sure **DEGREE** is highlighted!!!!!!

➤ Evaluate each of the following (round to 4-decimal places):

1. $\sin(52^\circ)$	2. $\cos(122^\circ)$	3. $\tan(-76^\circ)$	4. $\cos(45^\circ)$
5. $\sin(30^\circ)$	6. $\tan(95^\circ)$	7. $\cos(184^\circ)$	8. $\tan(45^\circ)$

- To solve an equation means to find the value of the variable that makes both sides equal by isolating the variable using **inverse** operations.
- Sine, Cosine and Tangent also have inverse operations: \sin^{-1}, \cos^{-1} and \tan^{-1} 2nd Function

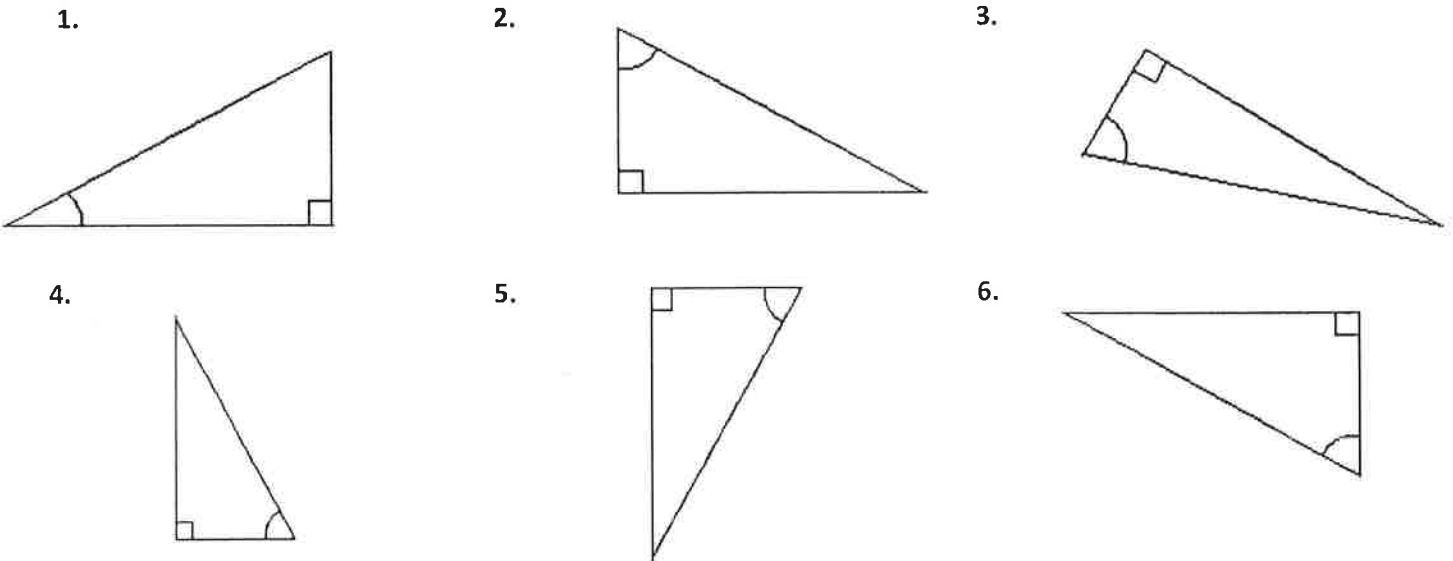
➤ Solve each equation (round to tenth of a degree)

1. $\sin(x) = 0.5$	2. $\sin(x) = 0.6$	3. $\tan(x) = -6.7$
4. $\cos(x) = -0.87$	5. $\cos(x) = 0.5$	6. $\tan(x) = 1$

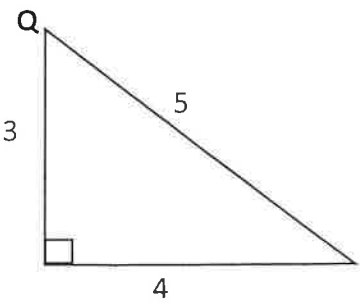
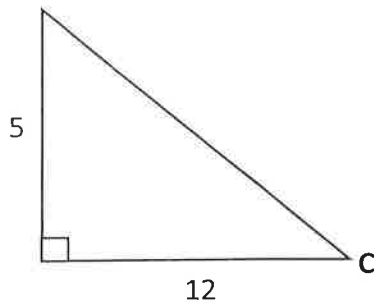
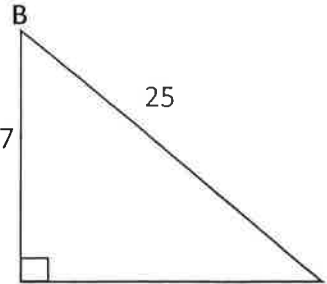
- ❖ Sometimes there is **NOT** enough information to solve for the sides using the Pythagorean Theorem.
- ❖ When this occurs, we use our knowledge of **sine, cosine and tangent**.
- ❖ **SOH CAH TOA** will help to find the missing sides and angles of a right triangle.

SOH → $\text{Sine}\angle = \frac{\text{opposite}}{\text{hypotenuse}}$	CAH → $\text{Cosine}\angle = \frac{\text{adjacent}}{\text{hypotenuse}}$	TOA → $\text{Tangent}\angle = \frac{\text{opposite}}{\text{adjacent}}$
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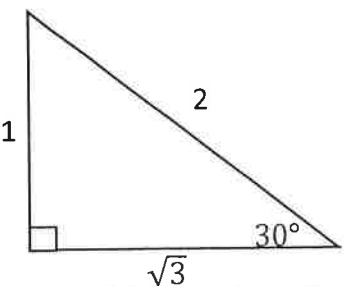
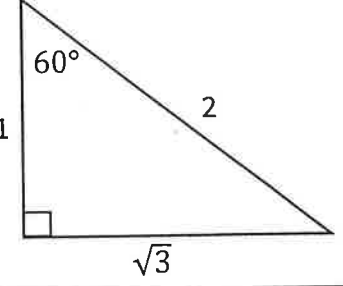
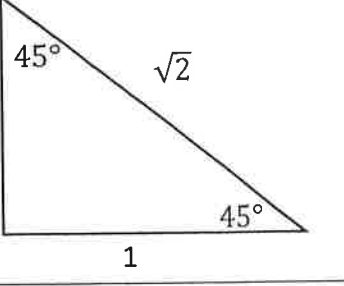
Label each of the sides as **opposite leg**, **adjacent leg**, and **hypotenuse**.



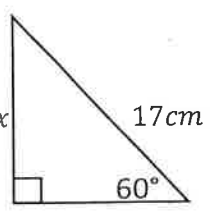
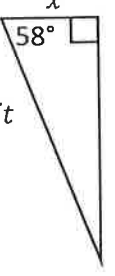
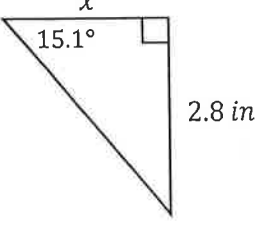
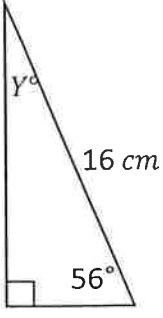
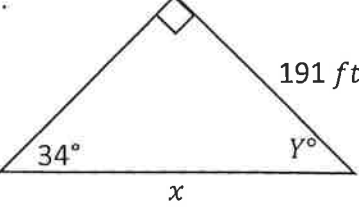
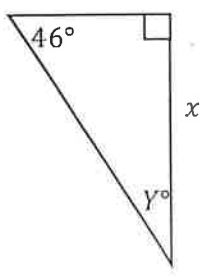
➤ Use the definitions of the three trig ratios to complete each statement.

<p>1. $\sin Q = \underline{\hspace{2cm}}$ $\cos Q = \underline{\hspace{2cm}}$ $\tan Q = \underline{\hspace{2cm}}$</p> 	<p>2. $\sin C = \underline{\hspace{2cm}}$ $\cos C = \underline{\hspace{2cm}}$ $\tan C = \underline{\hspace{2cm}}$</p> 	<p>3. $\sin B = \underline{\hspace{2cm}}$ $\cos B = \underline{\hspace{2cm}}$ $\tan B = \underline{\hspace{2cm}}$</p> 
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➤ Recall Special Right Triangles: Find the value of each function in simplest radical form.

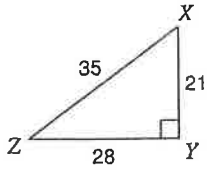
<p>4. $\sin 30^\circ =$ _____</p> <p>$\cos 30^\circ =$ _____</p> <p>$\tan 30^\circ =$ _____</p> 	<p>5. $\sin 60^\circ =$ _____</p> <p>$\cos 60^\circ =$ _____</p> <p>$\tan 60^\circ =$ _____</p> 	<p>6. $\sin 45^\circ =$ _____</p> <p>$\cos 45^\circ =$ _____</p> <p>$\tan 45^\circ =$ _____</p> 
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➤ Examples: Use **SOH CAH TOA** to solve for x and Y in the following right triangles.

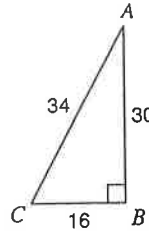
<p>1.</p>  <p style="text-align: center;">$x =$ _____</p>	<p>2.</p>  <p style="text-align: center;">$x =$ _____</p>	<p>3.</p>  <p style="text-align: center;">$x =$ _____</p>
<p>4.</p>  <p style="text-align: center;">$x =$ _____ $Y =$ _____</p>	<p>5.</p>  <p style="text-align: center;">$x =$ _____ $Y =$ _____</p>	<p>6.</p>  <p style="text-align: center;">$x =$ _____ $Y =$ _____</p>

Find the value of each trigonometric ratio.

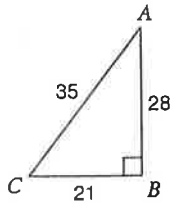
1) $\tan Z$



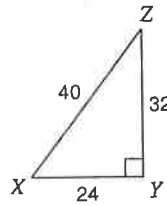
2) $\cos C$



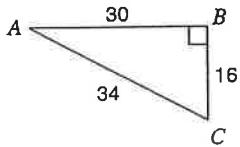
3) $\sin C$



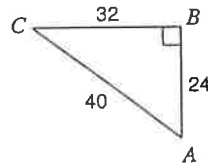
4) $\tan X$



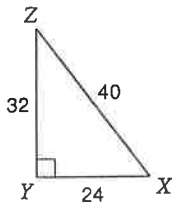
5) $\cos A$



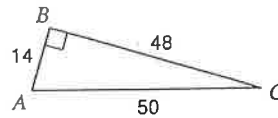
6) $\sin A$



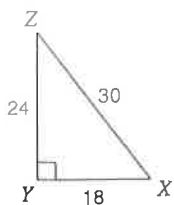
7) $\sin Z$



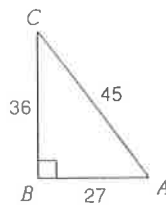
8) $\sin C$



9) $\cos Z$

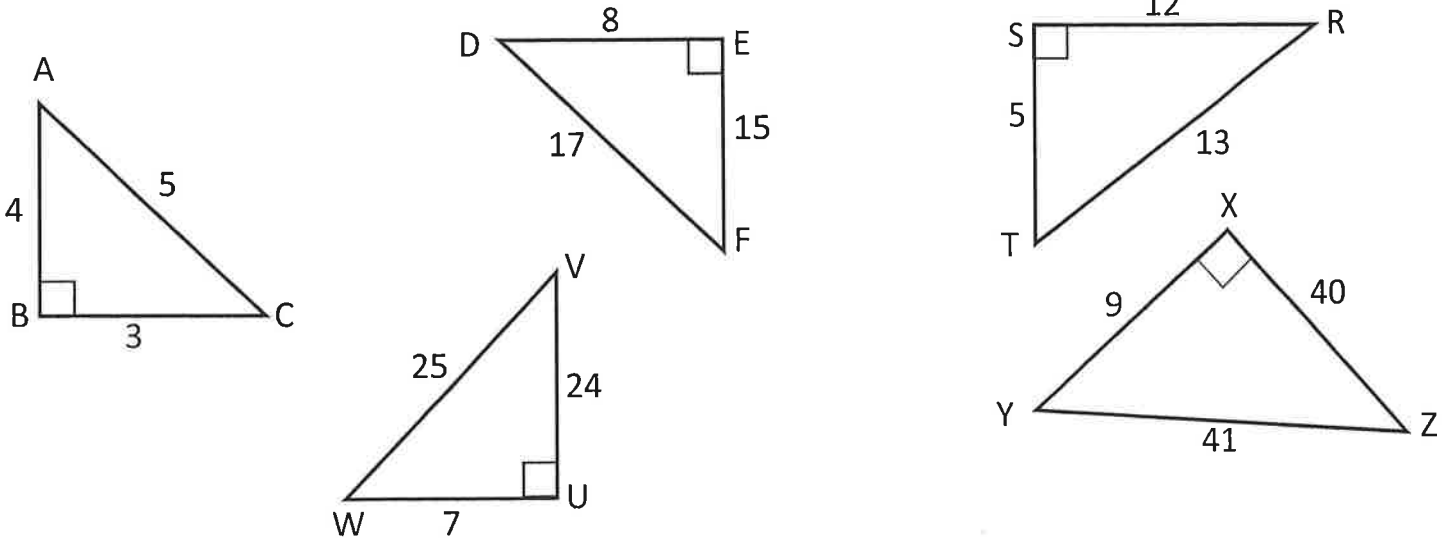


10) $\tan C$



Trigonometric Ratios: SOH CAH TOA

Use the triangles below to match the trigonometric ratios. Your answers will help you to find the name of the first woman in American history to receive a patent.



1. $\sin \angle D$	2. $\cos \angle Y$	3. $\tan \angle A$	4. $\sin \angle R$	5. $\cos \angle V$
6. $\tan \angle C$	7. $\tan \angle F$	8. $\sin \angle C$	9. $\cos \angle R$	10. $\tan \angle T$
11. $\sin \angle A$	12. $\tan \angle Z$	13. $\tan \angle V$	14. $\cos \angle D$	15. $\tan \angle R$
16. $\cos \angle W$	17. $\tan \angle D$	18. $\sin \angle Y$	19. $\tan \angle W$	20. $\tan \angle Y$

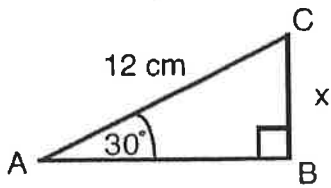
Write the correct letter above corresponding problem number:

$\frac{8}{15}$	$\frac{9}{41}$	$\frac{7}{25}$	$\frac{12}{13}$	$\frac{9}{40}$	$\frac{24}{25}$	$\frac{3}{4}$	$\frac{4}{3}$	$\frac{5}{12}$	$\frac{15}{17}$	$\frac{12}{5}$	$\frac{7}{24}$	$\frac{5}{13}$	$\frac{15}{8}$	$\frac{40}{9}$	$\frac{4}{5}$	$\frac{24}{7}$	$\frac{3}{5}$	$\frac{8}{17}$	$\frac{40}{41}$
A	C	D	E	F	G	H	I	K	M	N	O	P	R	S	T	V	W	X	Y

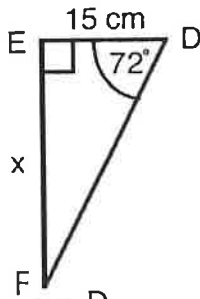
	1	7	17	18		16	6	14	13	10		15	6	9	20						
17	9	2	9	6	19	9	16		7		4	7	8	9	10	8					
	12	13	17		3	9	17		11	9	7	19	6	10	5						
			1	7	2	3	6	10	9		6	10		1809.							

Solve for the missing side of the given triangle:

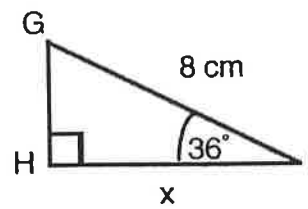
1).



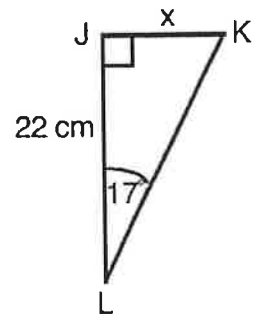
2).



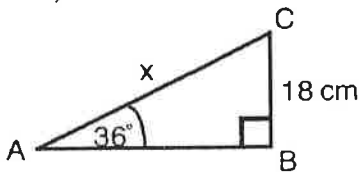
3).



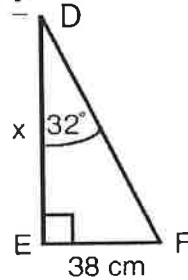
4).



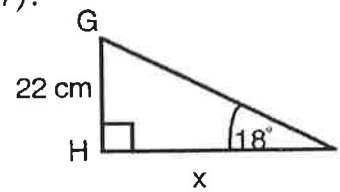
5).



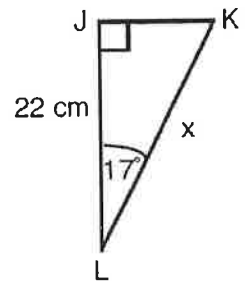
6).



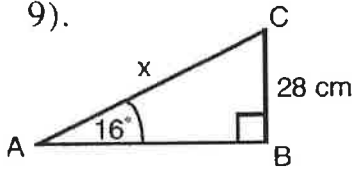
7).



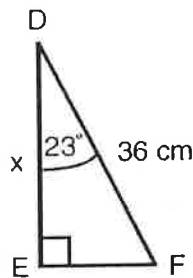
8).



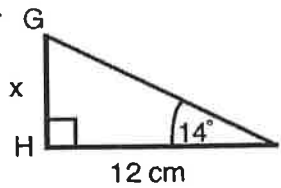
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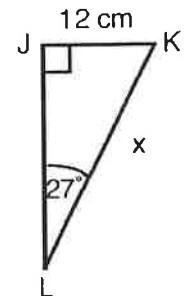
10).



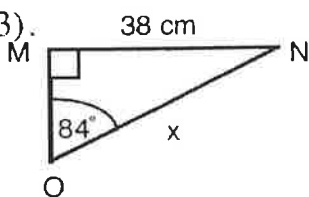
11).



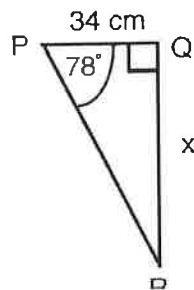
12).



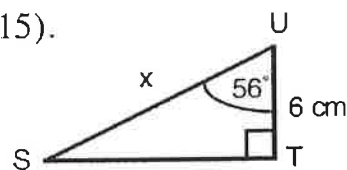
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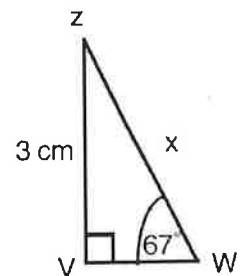
14).



15).



16).



1.	2.	3.	4.
5.	6.	7.	8.
9.	10.	11.	12.
13.	14.	15.	16.

Math 2 – Honors
 Unit 7 – Right Triangle Trigonometry
 Lesson 4 → Solving for an Angle of a Right Triangle

Name _____
 Date _____ Pd _____

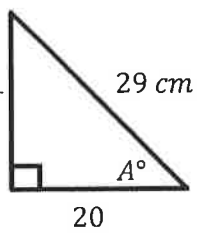
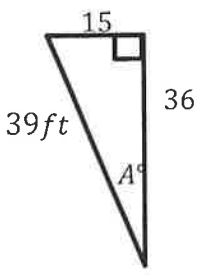
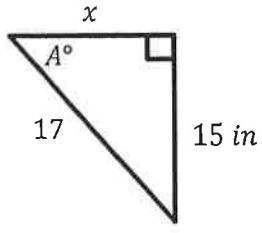
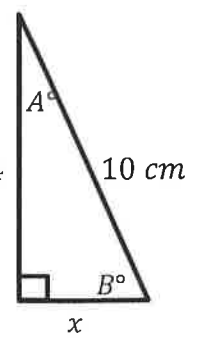
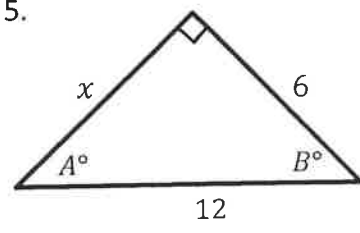
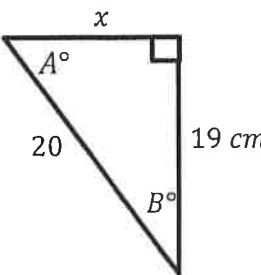
❖ Recall: **SOH CAH TOA** will help to find the missing sides of a right triangle.

SOH → $\text{Sine } \angle = \frac{\text{opposite}}{\text{hypotenuse}}$	CAH → $\text{Cosine } \angle = \frac{\text{adjacent}}{\text{hypotenuse}}$	TOA → $\text{Tangent } \angle = \frac{\text{opposite}}{\text{adjacent}}$
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❖ We can also use **SOH CAH TOA** to help us find the missing angles of a right triangle.

❖ We will need to use **INVERSES**: (\sin^{-1} , \cos^{-1} and \tan^{-1}) since we are looking for an angle measure.

➤ Examples: Use **SOH CAH TOA** to solve for *Angle A* in the following right triangles.

<p>1.</p>  <p style="text-align: center;">$m\angle A = \underline{\hspace{2cm}}$</p>	<p>2.</p>  <p style="text-align: center;">$m\angle A = \underline{\hspace{2cm}}$</p>	<p>3.</p>  <p style="text-align: center;">$m\angle A = \underline{\hspace{2cm}}$</p>
<p>4.</p>  <p style="text-align: center;">$m\angle A = \underline{\hspace{2cm}}$ $m\angle B = \underline{\hspace{2cm}}$ $x = \underline{\hspace{2cm}}$</p>	<p>5.</p>  <p style="text-align: center;">$m\angle A = \underline{\hspace{2cm}}$ $m\angle B = \underline{\hspace{2cm}}$ $x = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$</p>	<p>6.</p>  <p style="text-align: center;">$m\angle A = \underline{\hspace{2cm}}$ $m\angle B = \underline{\hspace{2cm}}$ $x = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$</p>

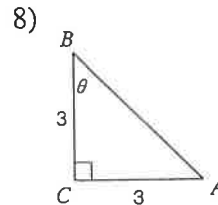
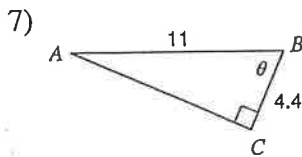
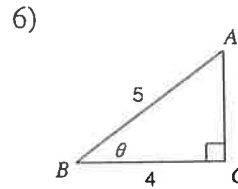
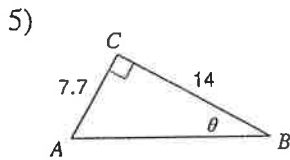
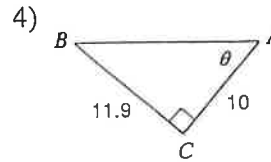
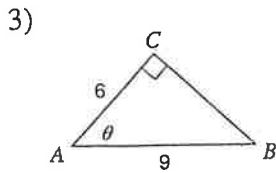
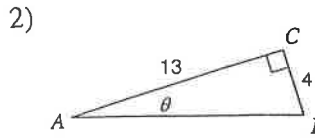
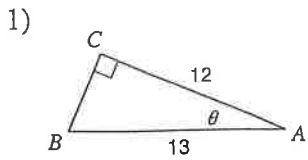
❖ To **Solve a Triangle** means to find all 3 *sides* and all 3 *angles* of the given triangle:

In each triangle ABC, $\angle C$ is the right angle. **Round sides and angles to the nearest tenth.**

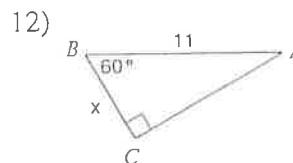
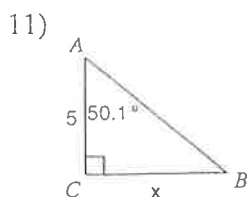
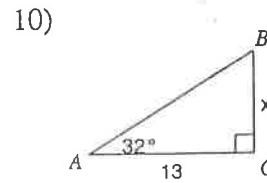
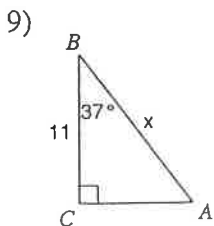
7. $m\angle B = 28.2^\circ$ $c = 60 \text{ cm}$	8. $m\angle A = 56.1^\circ$ $a = 48.1 \text{ m}$	9. $a = 19.5 \text{ ft}$ $c = 41.3 \text{ ft}$
--	---	---

10. Find the length of a skateboard ramp when the height of the ramp is 4 feet and the angle formed where the ramp touches the ground is 18.4° .
11. A ladder is leaning against a building. The ladder is 10m long and it is sitting on the ground 4m out from the building. What is the angle that the ladder makes with the ground?
12. Surveyors wished to know the distance across a lake between A and B. They measured the distance from B to C as 100m and the measure of angle A is 56° . Knowing that the angle between \overline{CB} and \overline{BA} is 90° , what is the distance between A and B?

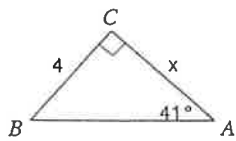
Find the measure of each angle indicated. Round to the nearest tenth.



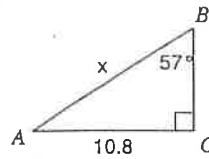
Find the measure of each side indicated. Round to the nearest tenth.



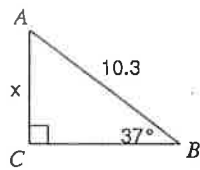
13)



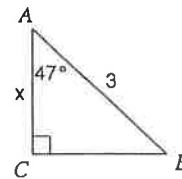
14)



15)



16)

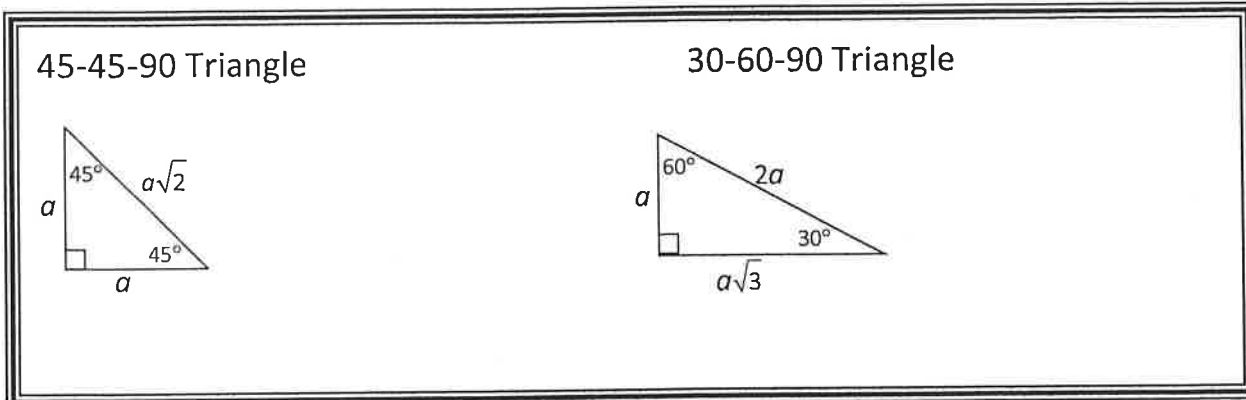


Solve each triangle. Round sides and angles to the nearest tenth.

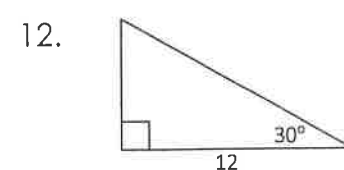
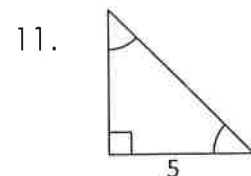
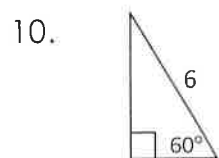
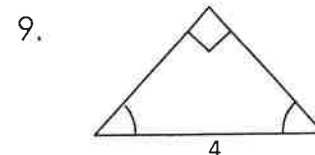
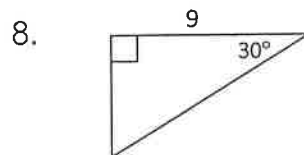
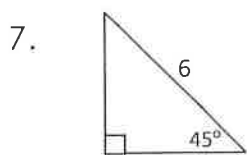
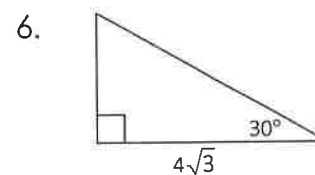
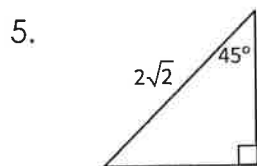
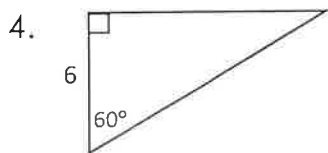
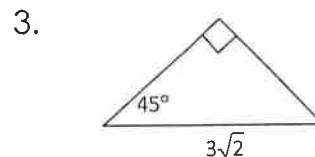
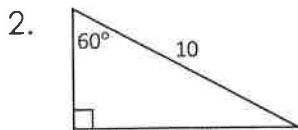
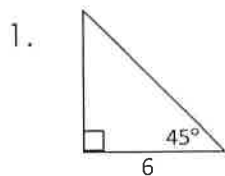
Given: Triangle ABC with $\angle C$ as the right angle

17) $\angle B = 62^\circ$ and $b = 22.6$ miles	18) $\angle A = 51^\circ$ and $a = 9$ inches
19) $\angle B = 42^\circ$ and $b = 4.5$ miles	20) $\angle B = 53^\circ$ and $c = 5$ meters
21) $\angle A = 28^\circ$ and $c = 29.3$ miles	22) $a = 5.7$ miles and $b = 12.8$ miles
23) $a = 1.9$ cm and $c = 3$ cm	24) $\angle B = 28^\circ$ and $a = 6$ inches

Special Right Triangles



Find the missing sides.

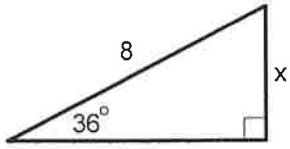
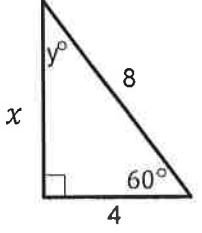
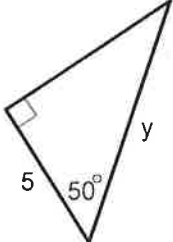
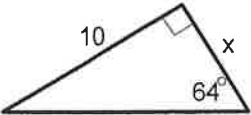
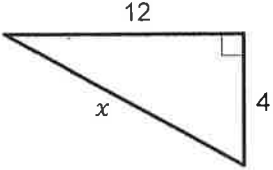
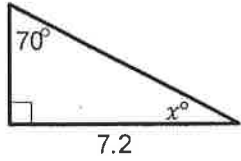
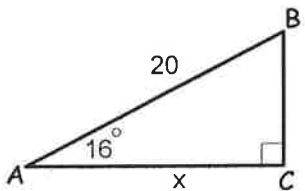
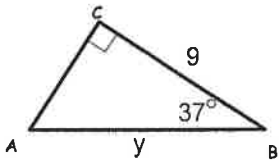
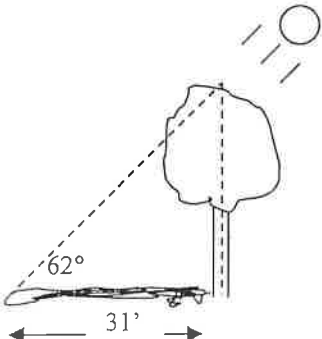


Cross out the correct answers. The remaining letters (one per space) complete the statement.

5	9	$6\sqrt{2}$	3	10	$3\sqrt{2}$	3	$4\sqrt{3}$	$3\sqrt{2}$	12	$2\sqrt{2}$
EQ	HA	UA	LT	LF	OT	HE	SQ	UA	RE	RO
$6\sqrt{3}$	$5\sqrt{3}$	25	$3\sqrt{3}$	$6\sqrt{3}$	5	20	3	$3\sqrt{3}$	36	2
OT	OF	TH	ER	AD	IU	EH	SO	FT	YP	PY
11	4	16	6	8	32	$5\sqrt{2}$	2	7	$8\sqrt{3}$	$2\sqrt{2}$
OT	TH	EN	AG	OR	US	AS	TH	E.	T.	S.

In a 30-60-90 degrees right triangle, the side opposite the 30-degree angle is

For each of the following, write the equation to find the missing value. Then rewrite the equation that you will enter in your calculator. Round your final answer to the nearest tenth.

<p>1.</p> <p>$x \approx$ _____</p> 	<p>2.</p> <p>$x \approx$ _____</p> <p>$y^\circ =$ _____</p> 
<p>3.</p> <p>$y \approx$ _____</p> 	<p>4.</p> <p>$x \approx$ _____</p> 
<p>5.</p> <p>$x \approx$ _____</p> 	<p>6.</p> <p>$x^\circ =$ _____</p> <p>$y \approx$ _____</p> 
<p>7.</p> <p>$x \approx$ _____</p> <p>$m\angle B =$ _____</p> 	<p>8.</p> <p>$y \approx$ _____</p> <p>$m\angle A =$ _____</p> 
<p>9. How tall is the tree?</p>  <p>_____ feet</p>	<p>10. A man is flying a kite. The kite string is 75 feet long. If the angle that the kite string makes with the line horizontal to the ground is 35°, how far above the ground is the kite?</p> <p>_____ feet</p>

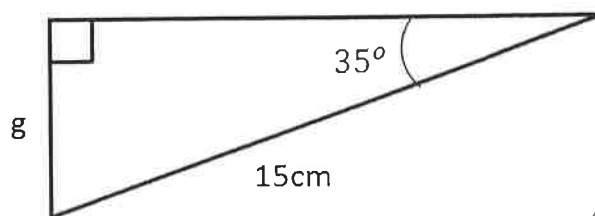
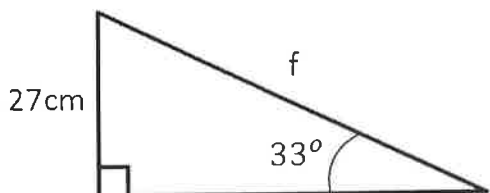
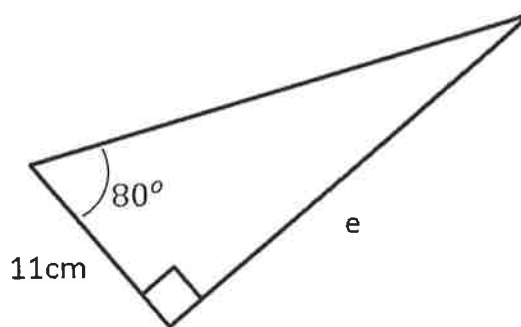
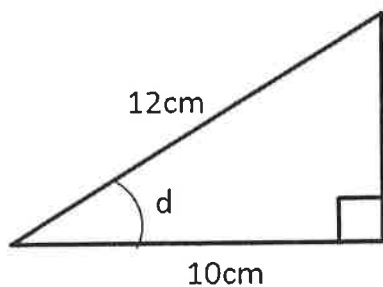
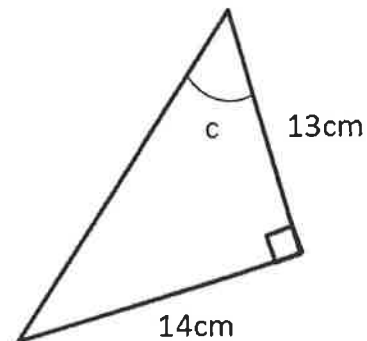
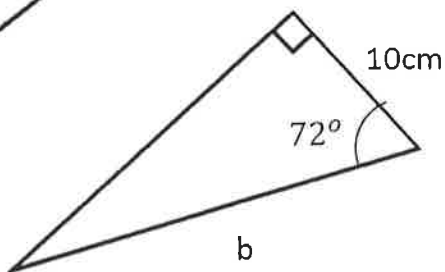
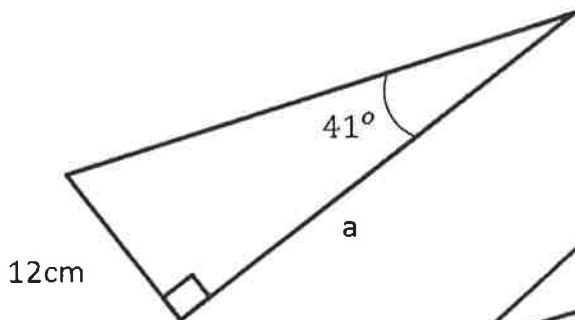


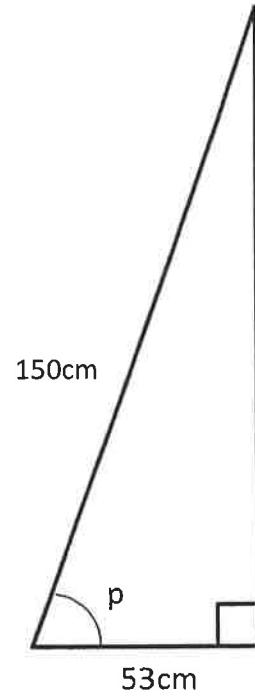
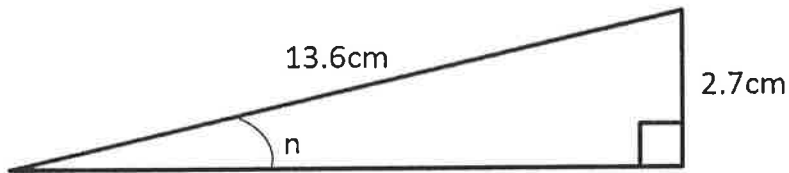
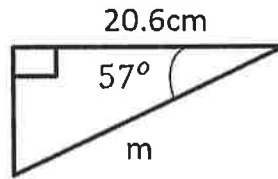
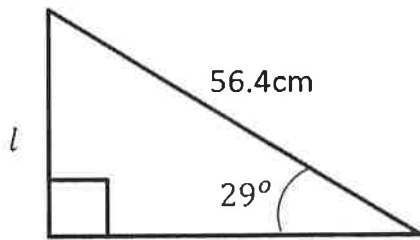
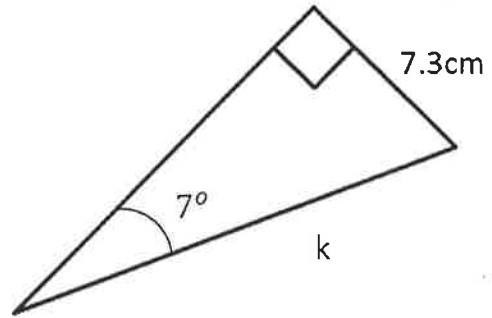
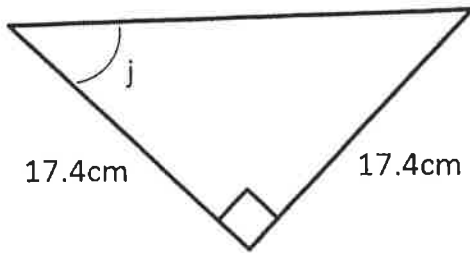
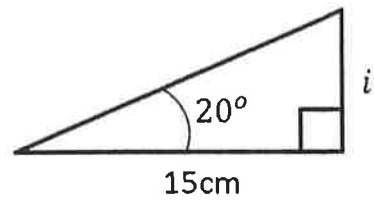
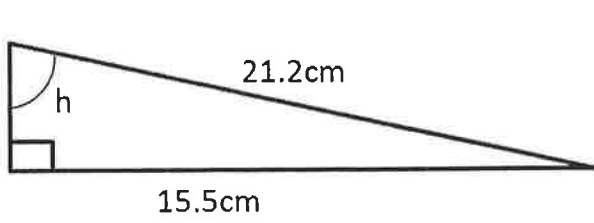
SOHCAHTOA Code Breaker



To	Pub	Obtuse	90	Why	It	Go	Shop	Because	Reflex
9	16	34	11	14	60	50	41	45	40
The	How	What	Was	Sine	Cos	Degrees	Angle	Beach	On
47	18	10	27	65	15	69	62	5	26
Not	Like	Over	30	Tan	Did	Right	Hot	Triangle	Acute
23	48	38	79	83	32	33	40	2	56

Find the missing side or angle labelled (rounded to the nearest whole number), then use the code above to translate your answer into part of the coded joke on the other side.





As you decode your answers, fill in the gaps below.

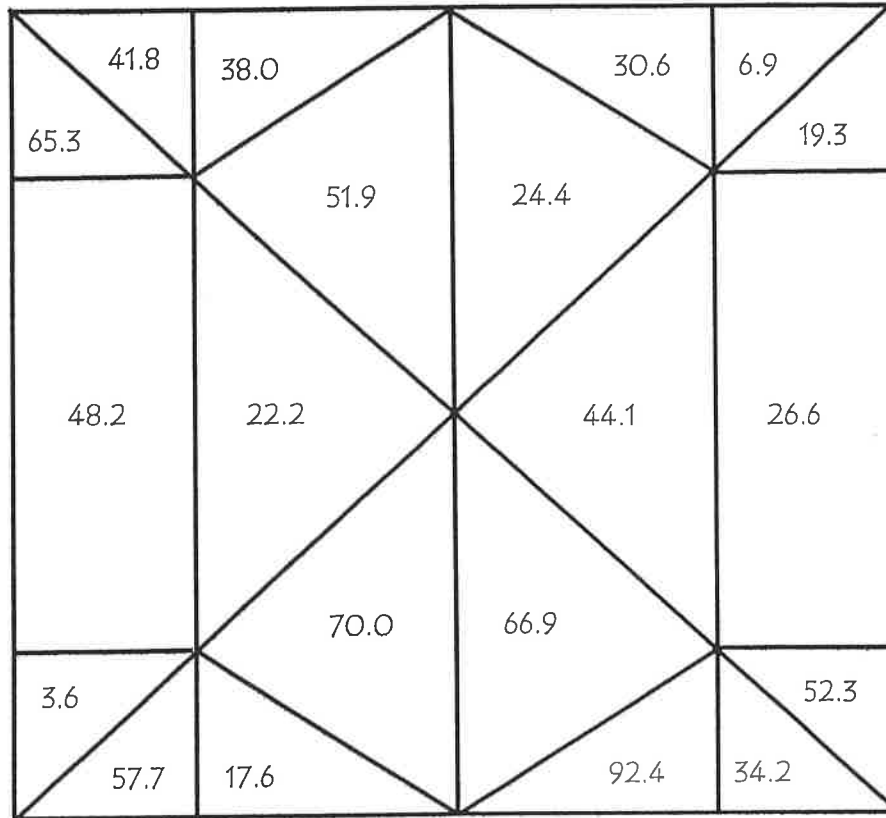
_____ ? _____

Trig Ratio Scavenger Hunt

Name _____

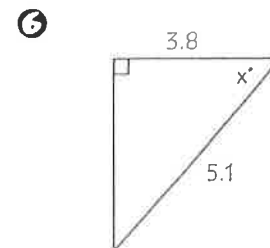
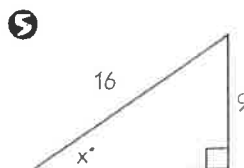
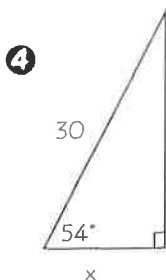
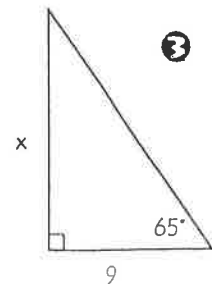
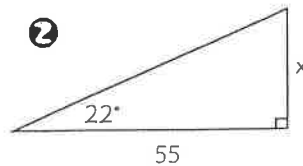
Date _____ Class _____

Directions: Find the value of x in the following problems. Then, find the answer in the puzzle above and color that piece according to your color chart. The answers will only be used once and not all answers will be used.



Color 1

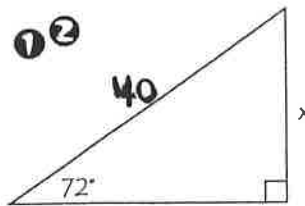
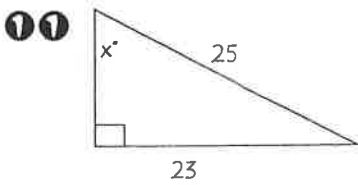
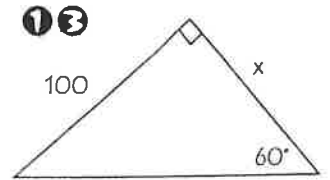
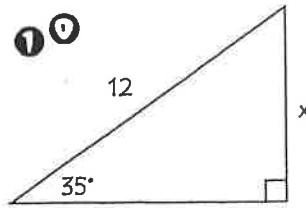
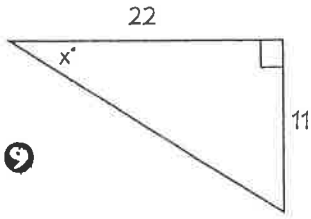
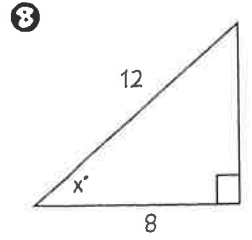
1 $\sin 27^\circ = \frac{x}{8}$



26

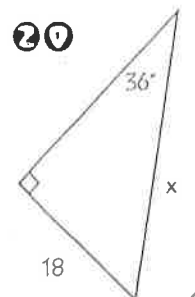
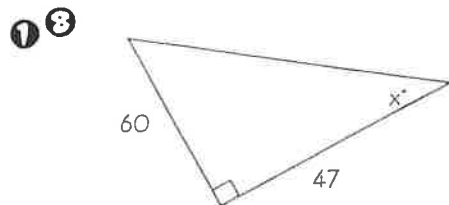
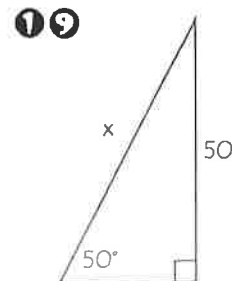
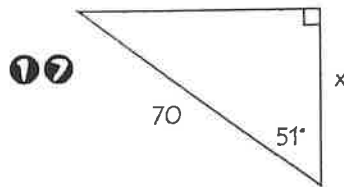
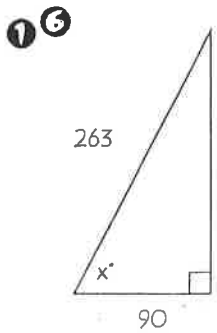
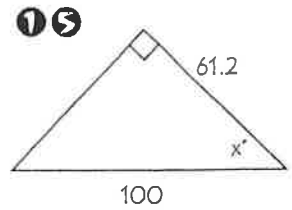
Color 2

7 $\tan 18^\circ = \frac{x}{75}$



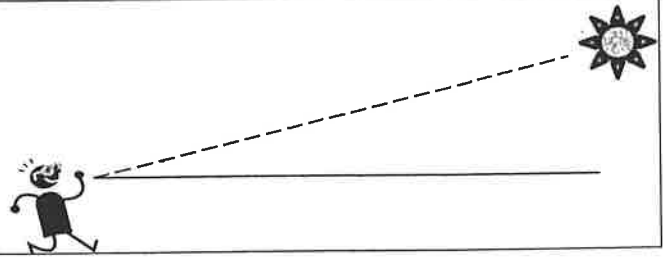
Color 3

14 $\cos 5^\circ = \frac{92}{y}$



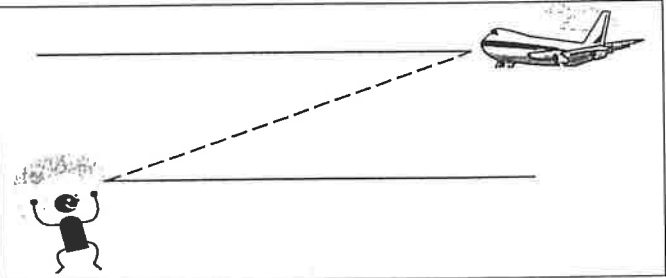
A. Angle of Elevation

If an observer sights an object, the angle formed between a horizontal line and his or her line of sight is the **angle of elevation**.



B. Angle of Depression

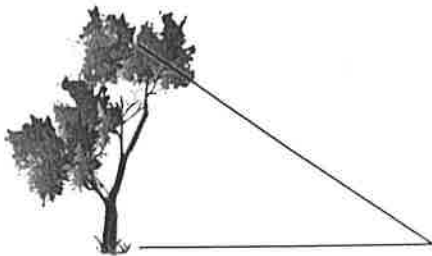
If an observer in the air sights an object below, the angle formed below the horizontal line and the line of sight is called the **angle of depression**.



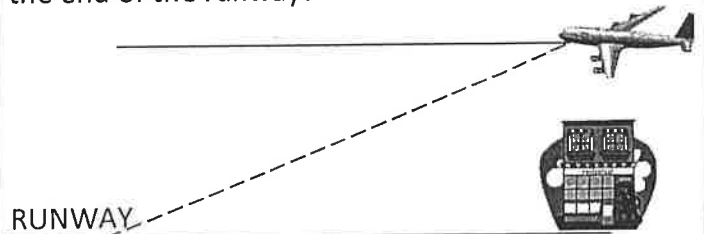
❖ The Angle of Elevation and the Angle of Depression are _____.

➤ Examples:

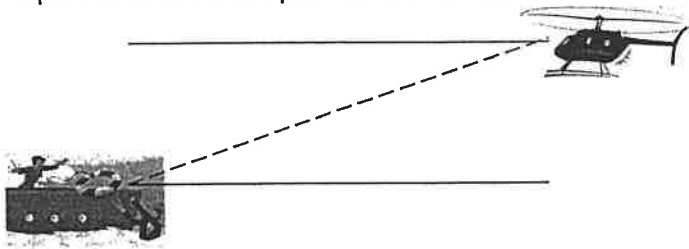
1. From a point on the ground 4.0m from the base of a tree, the angle of elevation to the top of the tree is 62°. Determine the height of the tree.



2. The altimeter of a jet airplane approaching RDU records 5900 ft as it passes over Cracker Barrel on Airport Rd. At the same time the *angle of depression* from the plane to the near end of the runway is 5°. How far is it from the base of the Cracker Barrel to the end of the runway?



3. A stranded boater tries to gain the attention of a rescue helicopter that is 300 ft away. If the helicopter is hovering at 70 ft, what is the angle of depression from the pilot to the boater?

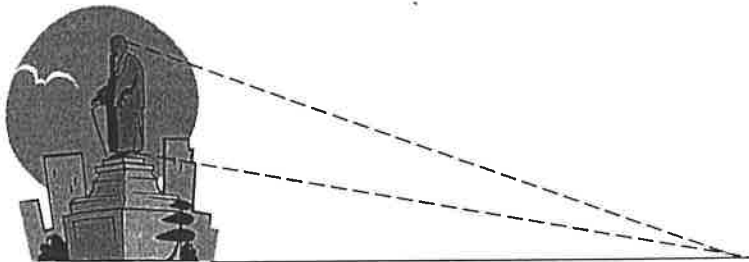


4. Determine an airplanes altimeter reading if the angle of depression to the runway is 40° when the plane is 12 miles from the runway.



_____ runway

5. A statue sits on top of a building. Two observations are taken 400 ft from the building. The angle of elevation to the base of the statue is 45°. The angle of elevation to the top of the statue is 47.2°. What is the height of the statue?

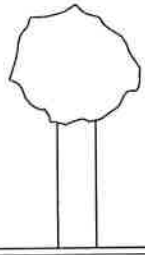


Draw a picture, write a trig ratio equation, and solve each problem. Round answers to the nearest tenth.

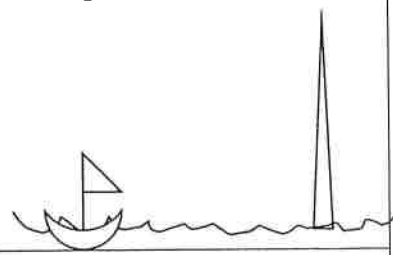
_____ 1. A 20-foot ladder leans against a wall so that the base of the ladder is 8 feet from the base of the building. What is the ladder's angle of elevation?

_____ 2. A 50-meter vertical tower is braced with a cable secured at the top of the tower and tied 30 meters from the base. What is the angle of depression from the top of the tower to the point on the ground where the cable is tied?

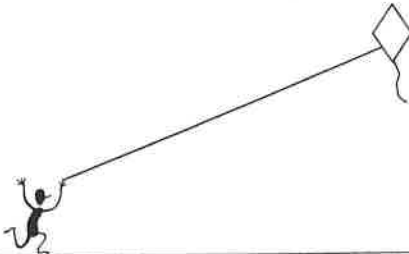
_____ 3. At a point on the ground 50 feet from the foot of a tree, the angle of elevation to the top of the tree is 53° . Find the height of the tree.



_____ 4. From the top of a lighthouse 210 feet high, the angle of depression of a boat is 27° . Find the distance from the boat to the foot of the lighthouse. The lighthouse was built at sea level.

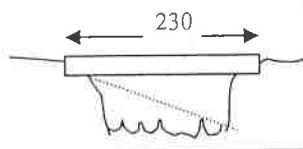


_____ 5. Richard is flying a kite. The kite string has an angle of elevation of 57° . If Richard is standing 100 feet from the point on the ground directly below the kite, find the length of the kite string.



_____ 6. An airplane rises vertically 1000 feet over a horizontal distance of 5280 feet. What is the angle of elevation of the airplane's path?

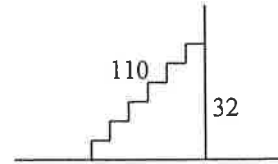
_____ 7. A person at one end of a 230-foot bridge spots the river's edge directly below the opposite end of the bridge and finds the angle of depression to be 57° . How far below the bridge is the river?



_____ 8. The angle of elevation from a car to a tower is 32° . The tower is 150 ft. tall. How far is the car from the tower?

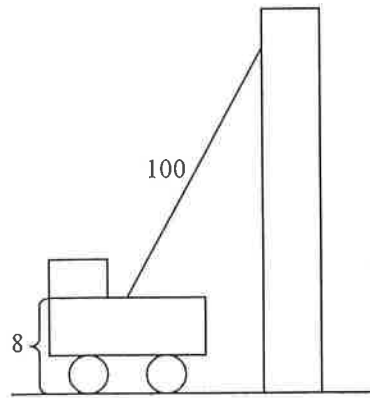
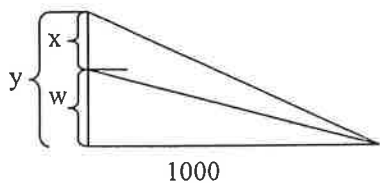
9. A radio tower 200 ft. high casts a shadow 75 ft. long. What is the angle of elevation of the sun?

10. An escalator from the ground floor to the second floor of a department store is 110 ft long and rises 32 ft. vertically. What is the escalator's angle of elevation?



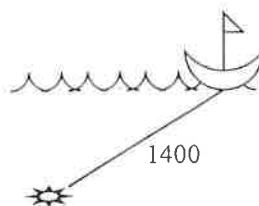
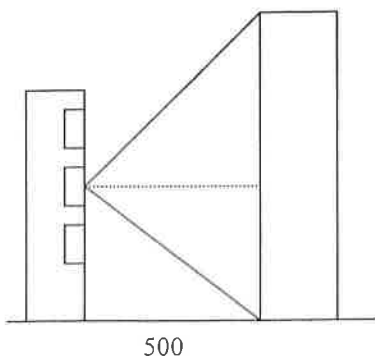
11. A rescue team 1000 ft. away from the base of a vertical cliff measures the angle of elevation to the top of the cliff to be 70° . A climber is stranded on a ledge. The angle of elevation from the rescue team to the ledge is 55° . How far is the stranded climber from the top of the cliff? (Hint: Find y and w using trig ratios. Then subtract w from y to find x)

12. A ladder on a fire truck has its base 8 ft. above the ground. The maximum length of the ladder is 100 ft. If the ladder's greatest angle of elevation possible is 70° , what is the highest above the ground that it can reach?



13. A person in an apartment building sights the top and bottom of an office building 500 ft. away. The angle of elevation for the top of the office building is 23° and the angle of depression for the base of the building is 50° . How tall is the office building?

14. Electronic instruments on a treasure-hunting ship detect a large object on the sea floor. The angle of depression is 29° , and the instruments indicate that the direct-line distance between the ship and the object is about 1400 ft. About how far below the surface of the water is the object, and how far must the ship travel to be directly over it?

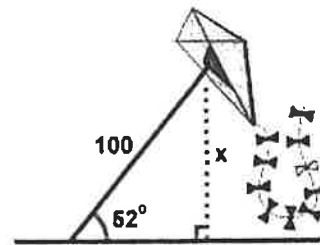


Math 2 – Honors
 Unit 7 – Right Triangle Trigonometry
 More Practice with Angles of Elevation & Depression

Name _____
 Date _____ Pd _____

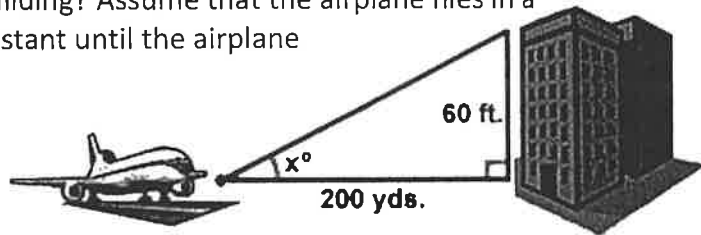
Find all values to the nearest tenth.

1. A man flies a kite with a 100 *foot* string. The angle of elevation of the string is 52° . How high off the ground is the kite?



2. From the top of a vertical cliff 40 *m* high, the angle of depression of an object that is level with the base of the cliff is 34° . How far is the object from the base of the cliff?

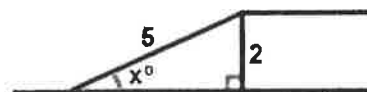
3. An airplane takes off 200 *yards* in front of a 60 *foot* building. At what angle of elevation must the plane take off in order to avoid crashing into the building? Assume that the airplane flies in a straight line and the angle of elevation remains constant until the airplane flies over the building. (60 *feet* = 20 *yards*)



4. A 14 *foot* ladder is used to scale a 13 *foot* wall. At what angle of elevation must the ladder be situated in order to reach the top of the wall?

5. A person stands at the window of a building so that his eyes are 12.6 *m* above the level ground. An object is on the ground 58.5 *m* away from the building on a line directly beneath the person. Compute the angle of depression of the person's line of sight to the object on the ground.

6. A ramp is needed to allow vehicles to climb a 2 *foot* wall. The angle of elevation in order for the vehicles to safely go up must be 30° or less, and the longest ramp available is 5 *feet* long. Can this ramp be used safely?



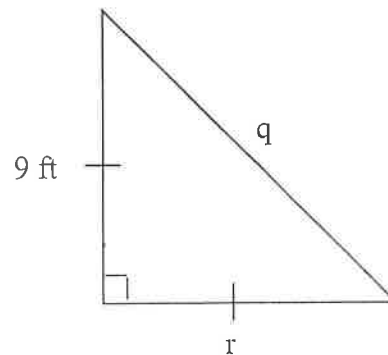
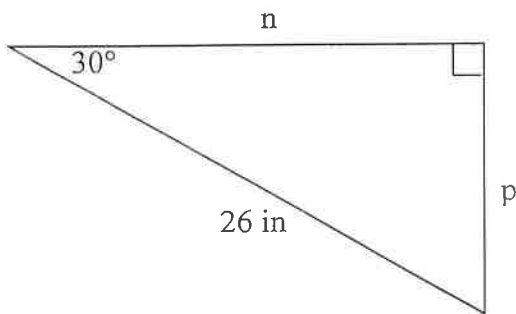
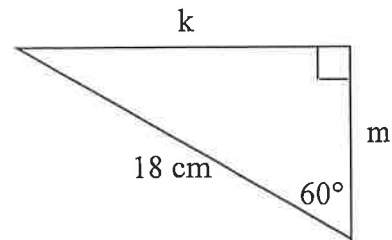
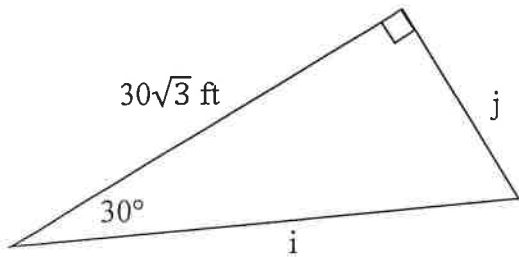
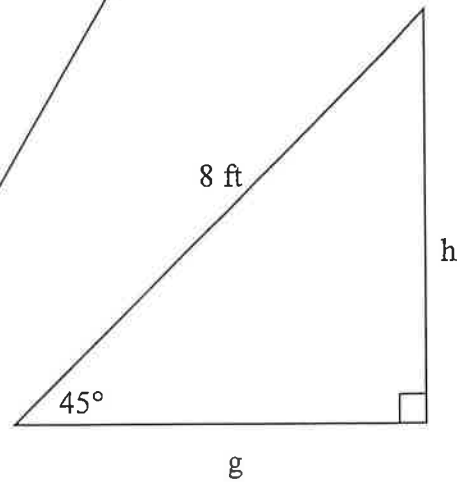
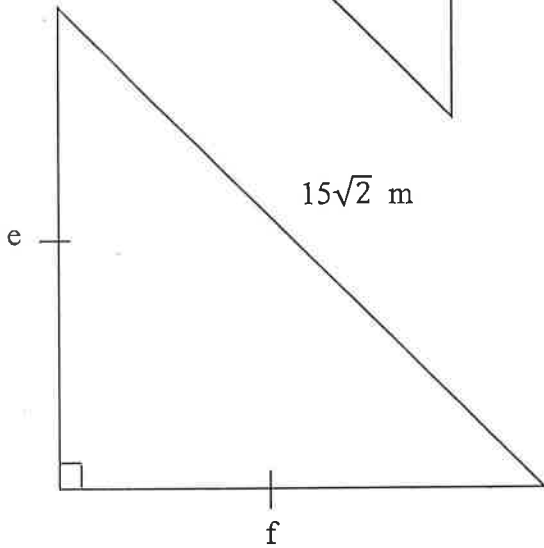
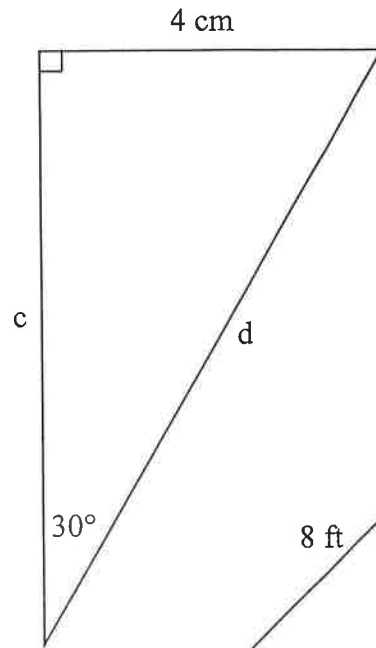
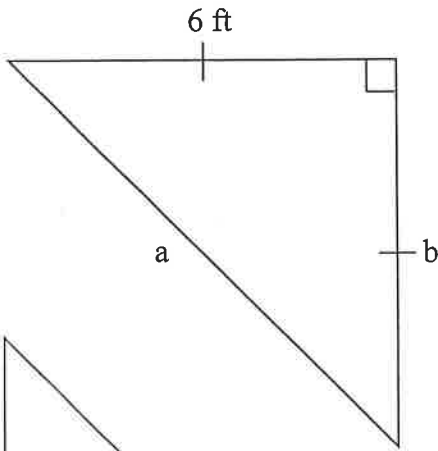
More Practice with Elevation & Depression

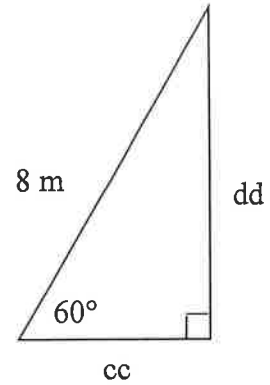
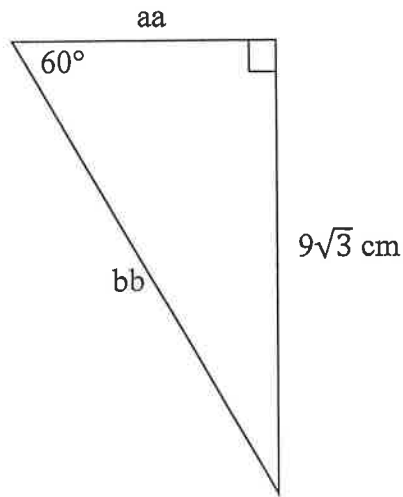
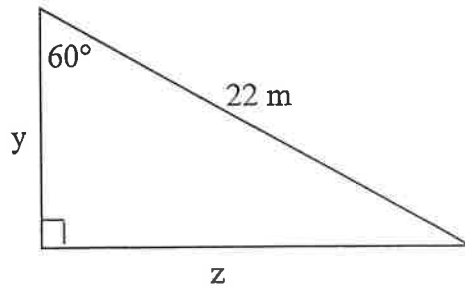
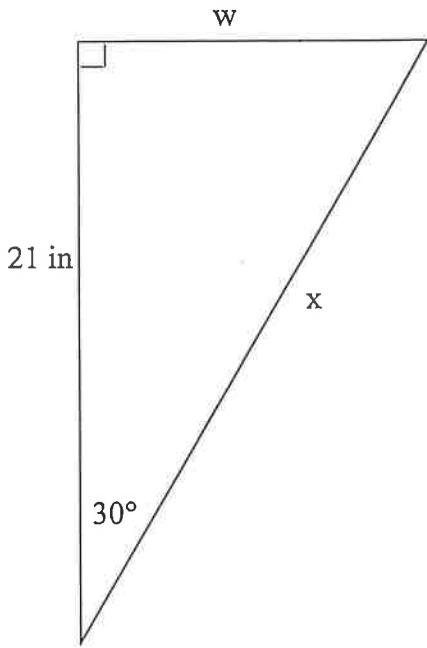
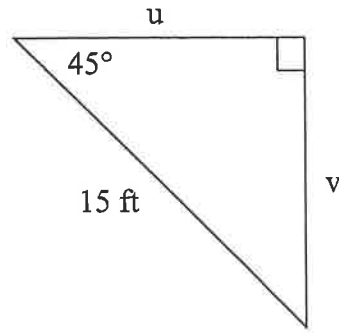
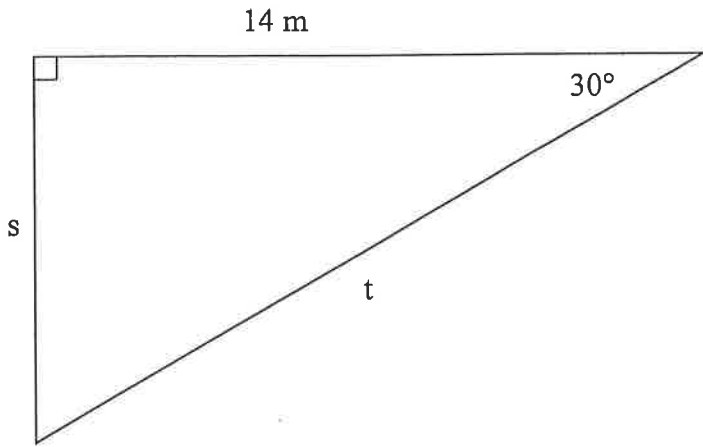
1. A tree casts a shadow 21 m long. The angle of elevation of the sun is 51° . What is the height of the tree?
2. A helicopter is hovering over a landing pad 100 m from where you are standing. The angle of elevation with the ground is 12° . What is the altitude of the helicopter?
3. You are flying a kite and have let out 80 m of string. The angle of elevation with the ground is 40° . If the string is stretched straight, how high is the kite above the ground?
4. A 15 m pole is leaning against a wall. The foot of the pole is 10 m from the wall. Find the measure of the angle of elevation the pole makes with the ground.
5. A guy wire reached from the top of a 120 m television transmitter tower to the ground. The wire makes a 63° angle with the ground. Find the length of the guy wire.
6. The ramp from one level to the next in a city carpark is 14 m long and rises 3.2 m . Find the angle of elevation that the ramp makes with the horizontal.
7. An operator at the top of a lighthouse sights a sailboat. The point from which the sighting is made is 25 m above sea level. If the boat is 142 m from the base of the lighthouse, what is the angle of depression of the sighting?

Math 2 – Honors
 Unit 7 – Right Triangle Trigonometry
 Special Right Triangles TEST REVIEW

Name _____
 Date _____ Pd _____

Find the length of every variable. Leave your answers as **simplified radicals**.





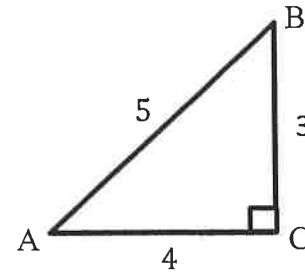
a.	b.	c.	d.	e.	f.
g.	h.	i.	j.	k.	m.
n.	p.	q.	r.	s.	t.
u.	v.	w.	x.	y.	z.
aa.	bb.	cc.	dd.		

Math 2 – Honors
 Unit 7 – Right Triangle Trigonometry
 Test Review

Name _____
 Date _____ Pd _____

➤ Express each ratio in simplest form:

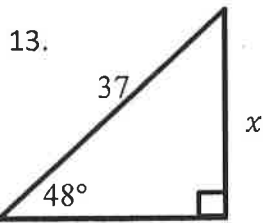
- | | |
|---------------------|---------------------|
| 1. $\sin A =$ _____ | 4. $\sin B =$ _____ |
| 2. $\cos A =$ _____ | 5. $\cos B =$ _____ |
| 3. $\tan A =$ _____ | 6. $\tan B =$ _____ |



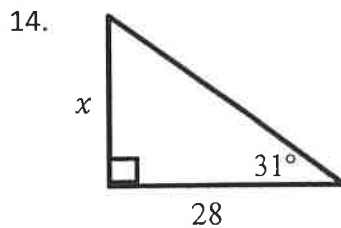
➤ Find each of the following values:

- | | | |
|---------------------------------|---------------------------------|---------------------------------|
| 7. $\sin 70^\circ =$ _____ | 8. $\cos 32^\circ =$ _____ | 9. $\tan 14^\circ =$ _____ |
| 10. $\sin(x) = 0.9744$
_____ | 11. $\cos(x) = 0.9903$
_____ | 12. $\tan(x) = 1.8040$
_____ |

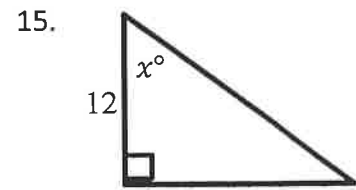
Find each of the following values of x . Round sides and angles to the nearest tenth.



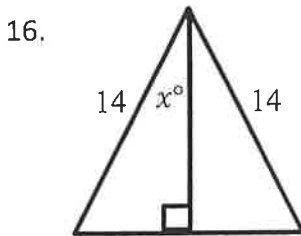
$x =$ _____



$x =$ _____



$x =$ _____



$x =$ _____

17. Given: $\triangle ABC$ with $\angle C = 90^\circ$
 $\angle A = 63^\circ$ and $c = 32$

$\angle B =$ _____ ; $a =$ _____ ; $b =$ _____

18. A support wire is attached to the top of a 150 meter radio tower. The wire is 190 meters long. Find the measure of the angle that the wire makes with the ground.

19. A woman standing on a cliff at the edge of the ocean spots a raft. The cliff is 18 m above sea level and the angle of depression is 7° . Find the distance from the raft to the base of the cliff.

20. A radio tower 200 feet high casts a shadow 75 feet long. What is the angle of elevation of the sun?

21. A guy wire is attached to the top of a 75 *foot* tower and meets the ground at a 65° angle. How long is the wire?
22. When the sun's angle of elevation is 57° , a building casts a shadow 21 *meters* long. How high is the building?
23. A kite is flying at an angle of elevation of about 40° . All 80 *meters* of string have been let out. Ignoring the sag in the string, find the height of the kite.
24. A man stands at the top of a 105 *foot* lighthouse and sees a boat. The angle of depression to sight the boat is 37° , find the distance between the base of the light house and the boat.
25. An observer in an airplane at a height of 500 *meters* sees a car at an angle of depression of 31° . If the plane is over a barn, how far is the car from the barn?
26. From a point 340 *meters* from the base of the Hoover Dam, the angle of elevation to the top of the dam is 33° . Find the height of the dam to the nearest meter.
27. The Pyramid of the Sun in the ancient Mexican city of Teotihuacan was unearthed from 1904 – 1910. From a point on the ground 300 *feet* from the center of its square base, the angle of elevation to its top would have been 31° . What was the height of the pyramid?

Complete the following statements with always, sometimes, or never.

28. The angle of elevation from your eye to the top of a twenty-foot flagpole _____ gets smaller as you walk towards the flagpole.
29. Given the measure of an acute angle in a right triangle and the length of one of the triangle's legs, you can _____ use trigonometry to find the length of the hypotenuse.
30. The angle of depression from the top of a building to a car traveling towards the building _____ increases as the car travels closer.