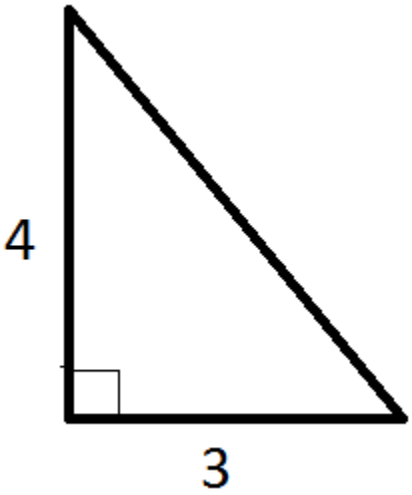
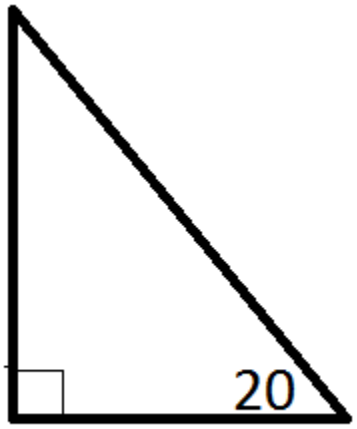
Can we find missing sides?

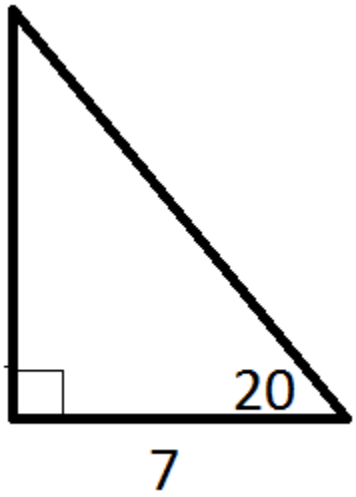


Missing angles?



Goal:

1) Use trigonometry (SOHCAHTOA) to find a side of a right triangle



$$S\frac{O}{H} \quad C\frac{A}{H} \quad T\frac{O}{A}$$

SOH – CAH - TOA

S =

C =

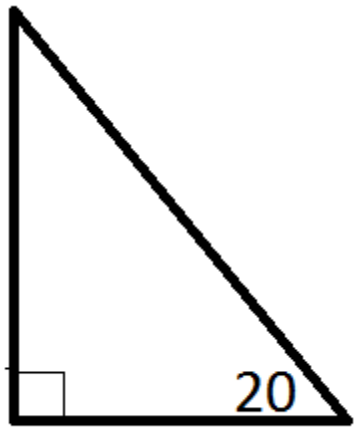
T =

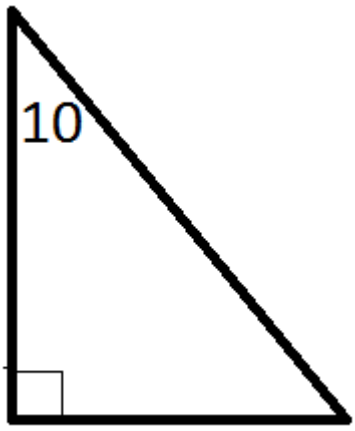
O =

A =

H =

Labeling:

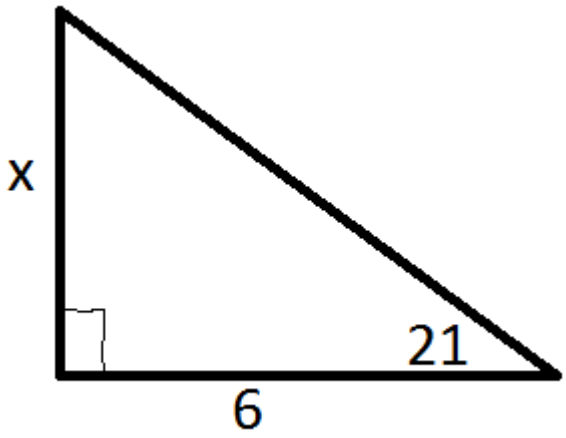




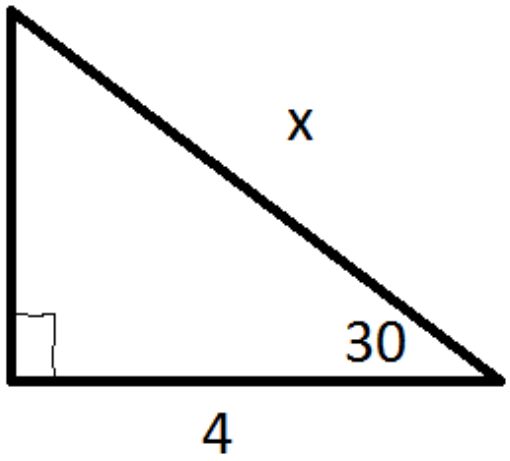
H _____

A _____

O _____

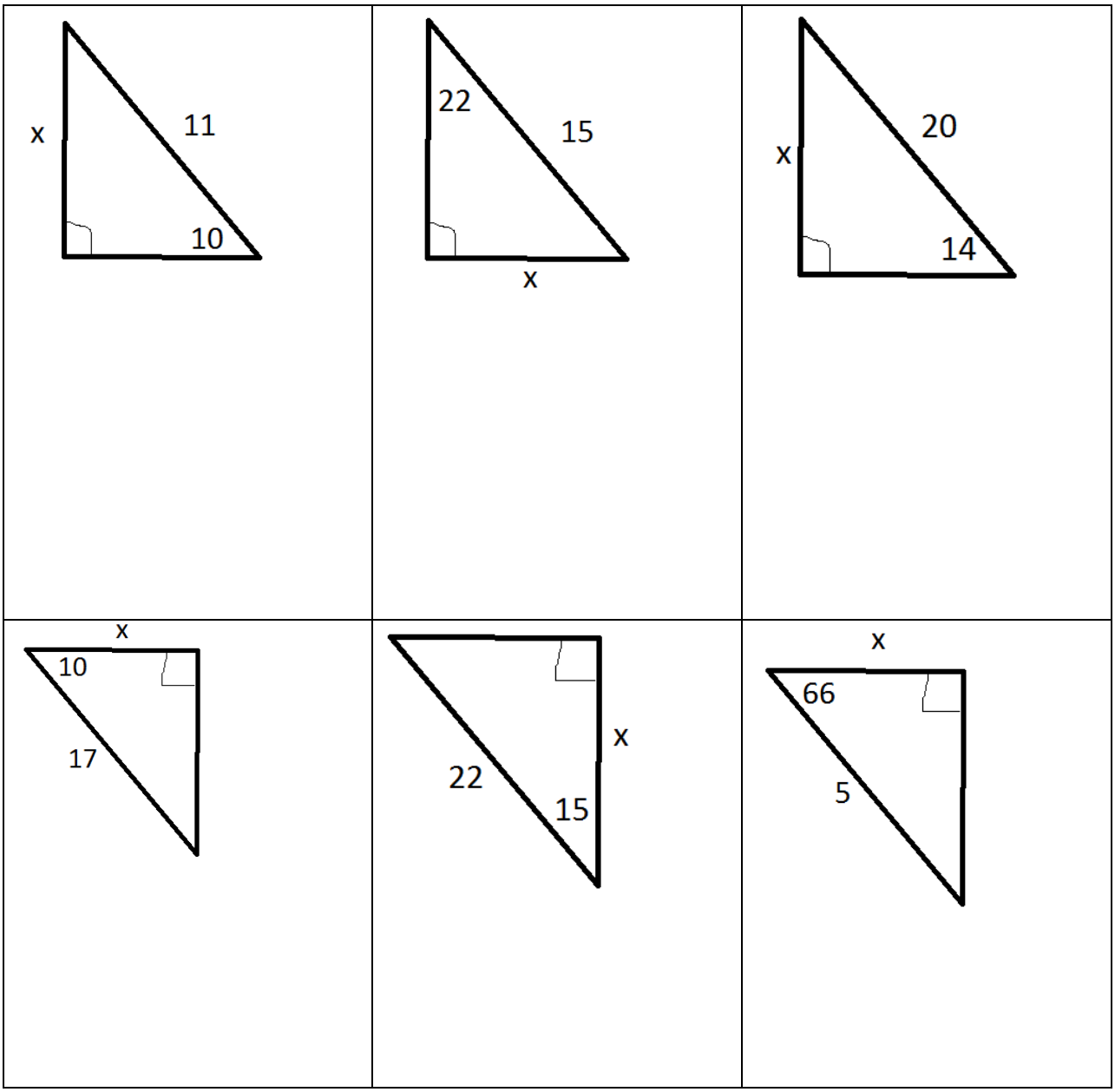
How to find a **side** using **SOHCAHTOA** rounded to the nearest tenth:	Steps:
	1) Circle angle (not 90) 2) Label **H**ypotenuse (Across from 90 angle) 3) Label **A**djacent (side next angle but not hypotenuse) 4) Label **O**pposite (remaining side) 5) Write down which letters (H, O, A) have values attached to them 6) Set up ratio 7) Solve

Find x below rounded to the nearest whole number:

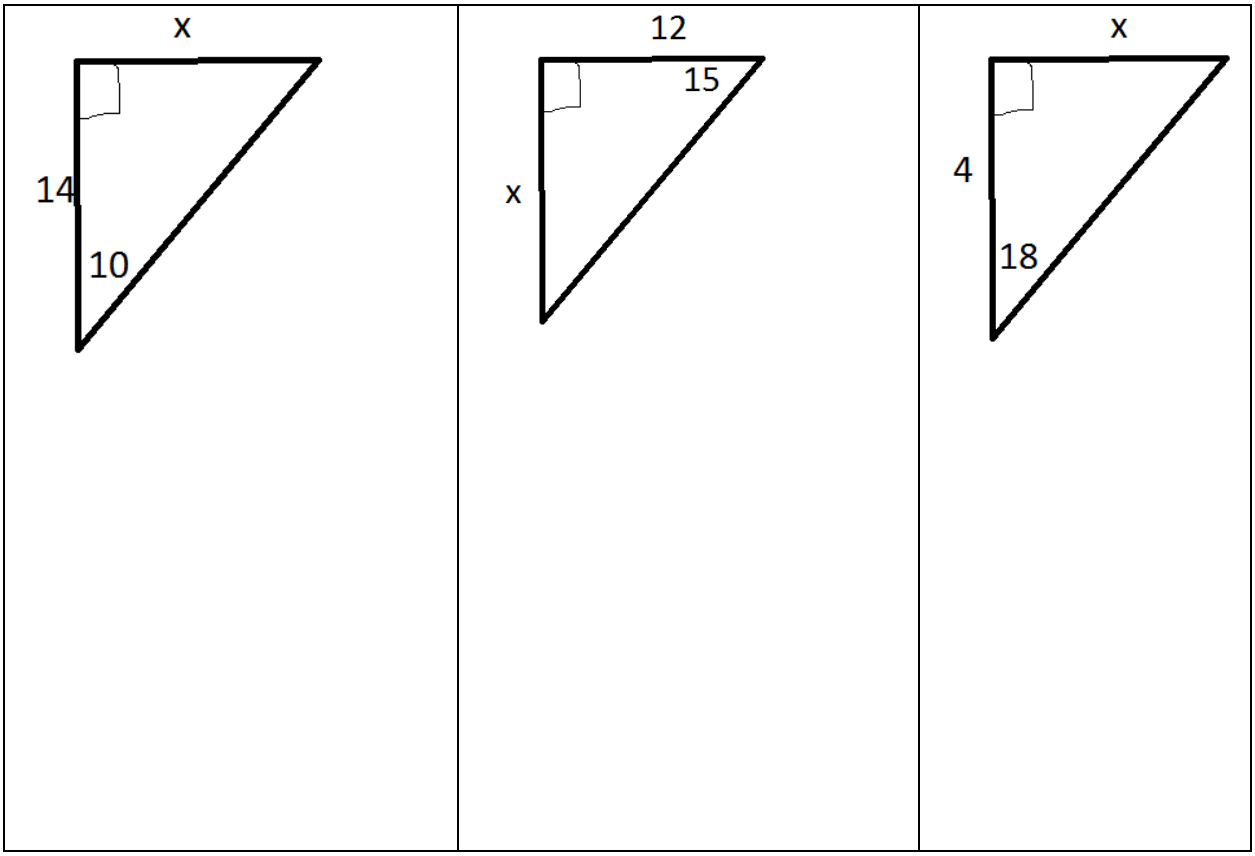


$$S\frac{O}{H} \quad C\frac{A}{H} \quad T\frac{O}{A}$$

For this page, we are going to round to the nearest whole number.



Now, we're going to round to the nearest tenth!



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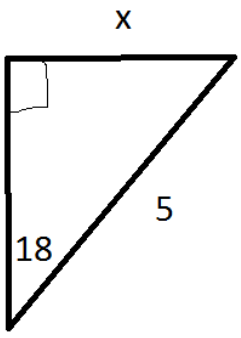
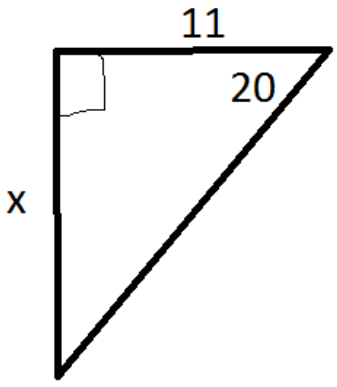
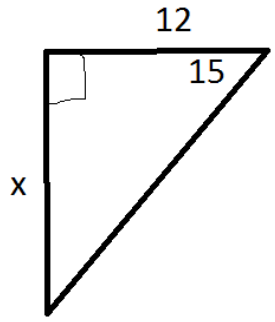
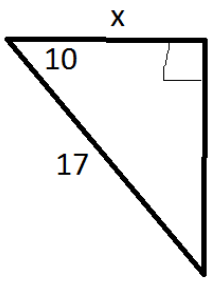
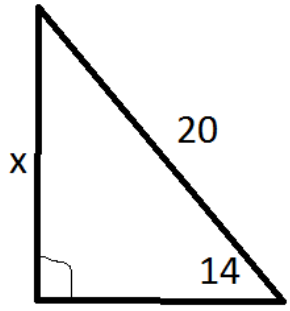


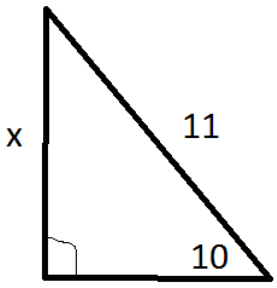


Round to the nearest whole number:









Challenge:

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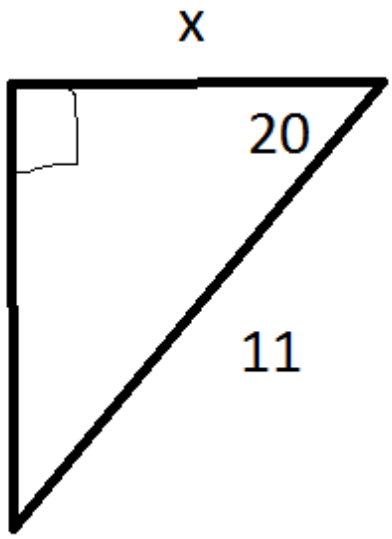

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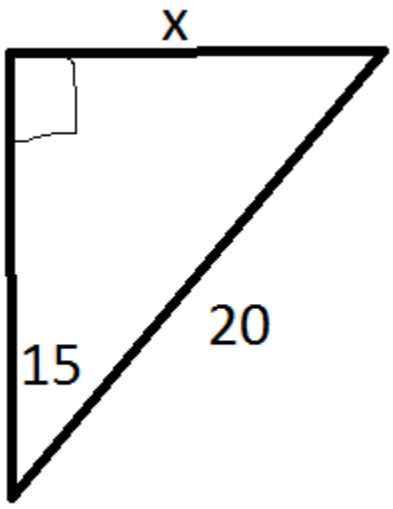
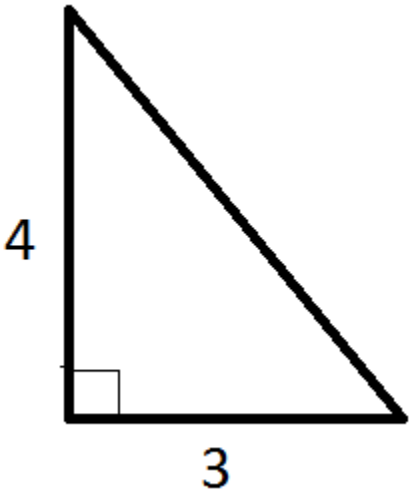
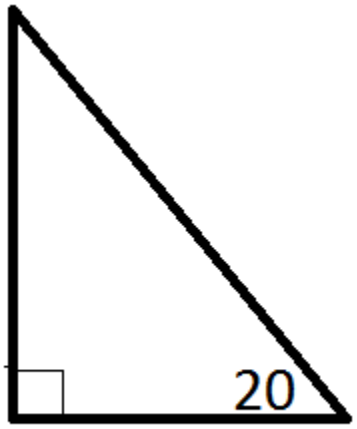


Can we find missing sides?



Missing angles?



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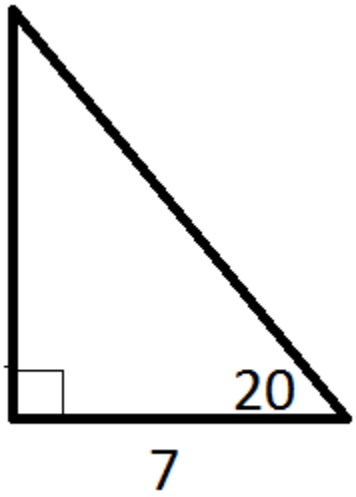

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SOH – CAH - TOA

S =

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T =

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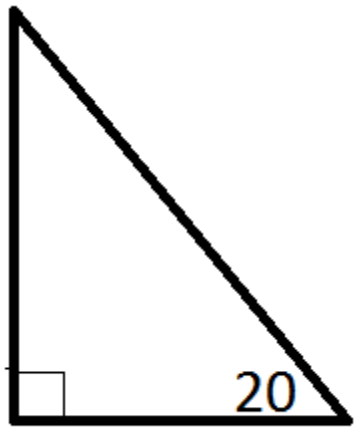
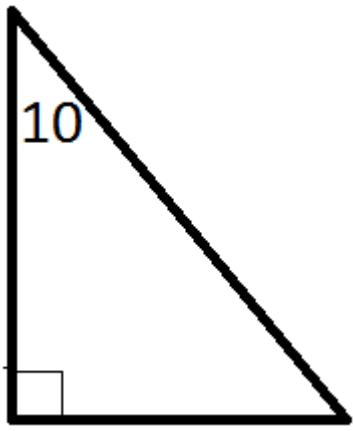
H =

Labeling:





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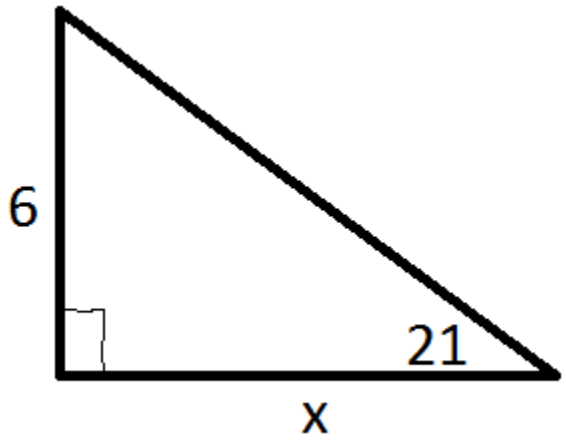
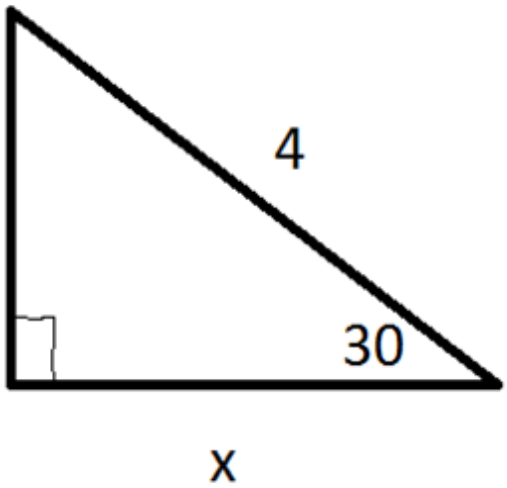
	1) Circle angle (not 90) 2) Label **H**ypotenuse (Across from 90 angle) 3) Label **A**djacent (side next angle but not hypotenuse) 4) Label **O**pposite (remaining side) 5) Write down which letters (H, O, A) have values attached to them 6) Set up ratio 7) Solve

WHEN X IS ON BOTTOM → NUMBER DIVIDED BY TRIG

Find x below rounded to the nearest whole number:



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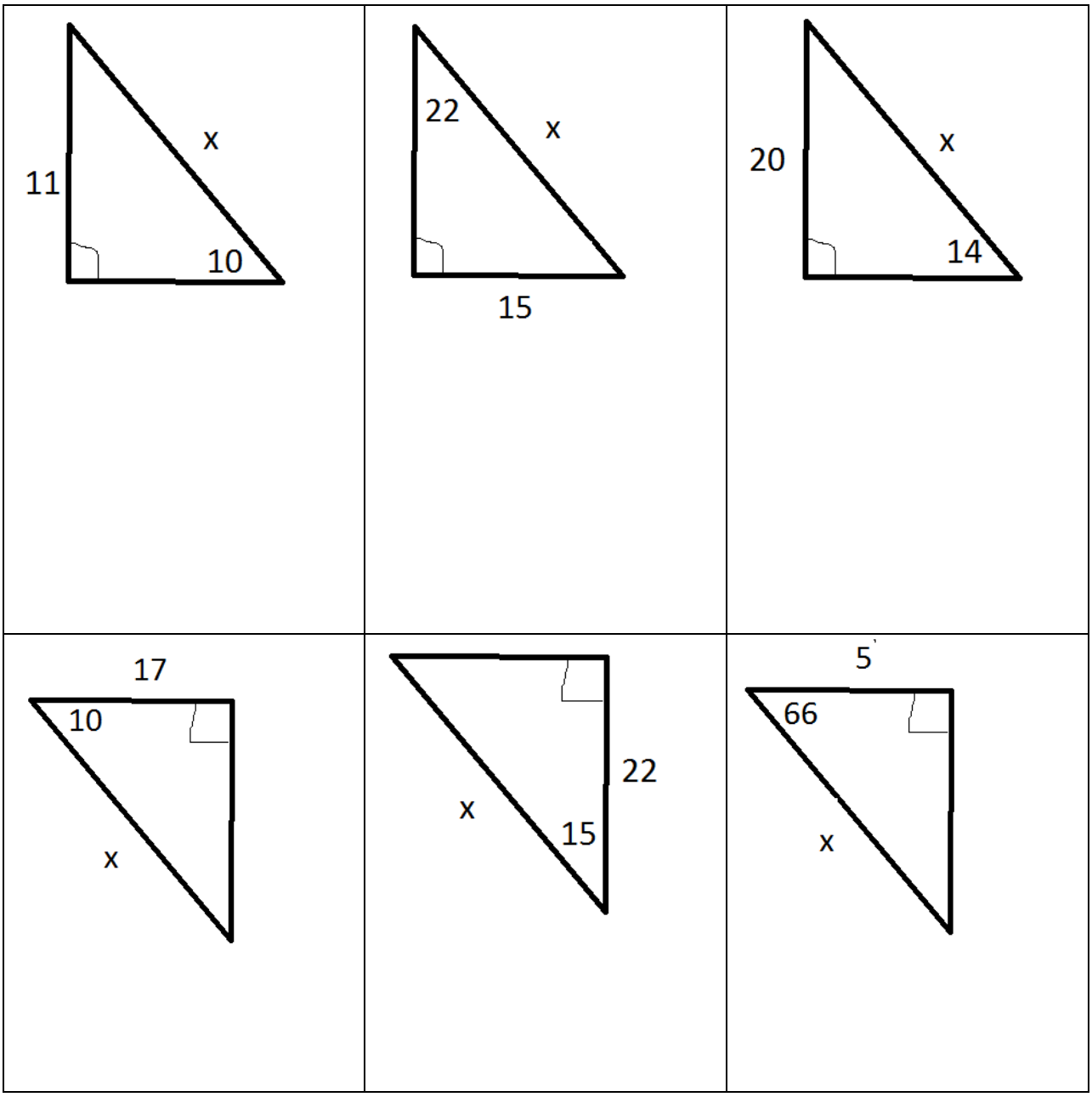

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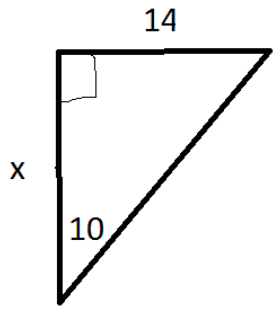

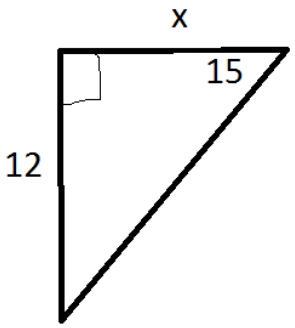

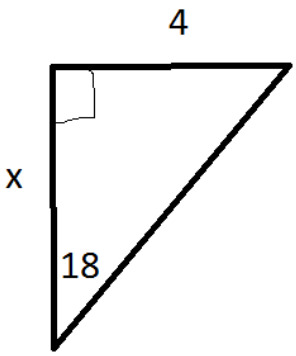

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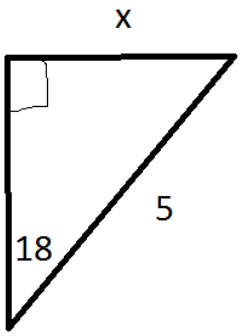

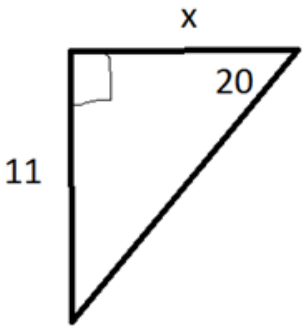

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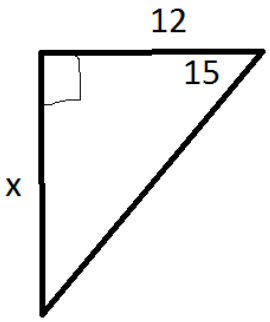

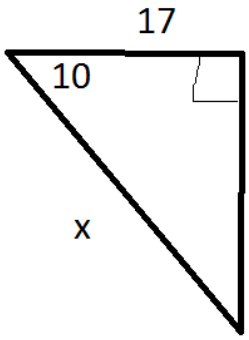

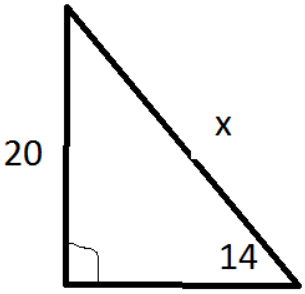

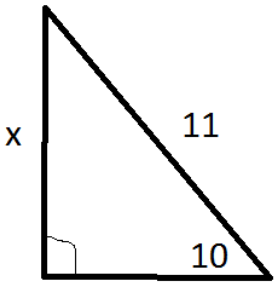

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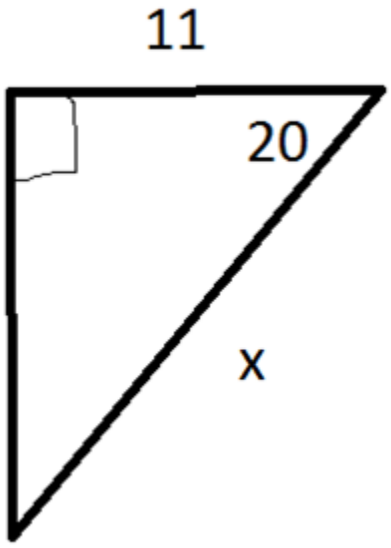
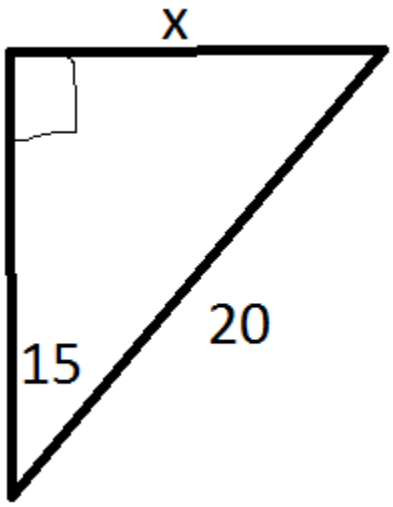
Find x rounded to the nearest whole number:



Find x rounded to the nearest tenth:



1) A damsel is in distress and is being held captive in a tower. Her knight in shining armor is on the ground below with a ladder. When the knight stands 15 feet from the base of the tower and looks up at his precious damsel, the angle of elevation to her window is 60 degrees. How long does the ladder have to be?

2) Suppose you're flying a kite, and it gets caught at the top of the tree. You've let out all 100 feet of string for the kite, and the angle that the string makes with the ground is 75 degrees. Instead of worrying about how to get your kite back, you wonder. "How tall is that tree?"

3) A submersible traveling at a depth of 250 feet dives at an angle of 15º with respect to a line parallel to the water's surface. It travels a horizontal distance of 1500 feet during the dive. What is the depth of the submersible after the dive?

4) Brothers Bob and Tom Katz buy a tent that has a center pole 6.25 feet high. If the sides of the tent are supposed to make a 50° angle with the ground, how wide is the tent?

5) In rhombus ABCD, diagonals AC and BD meet at point E. If the measure of angle DAB is 46°, find the length of EB.

6) Ophelia Payne is walking to her office building which she knows is 150ft high. The angle to the top of the building from her current location is 6°. How much further does she need to walk?

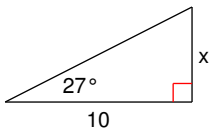
 Name_____

Using Trigonometry To Find Lengths

Date_____ Period____

Find the missing side. Round to the nearest tenth.

1)



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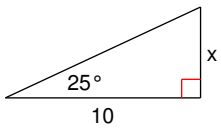

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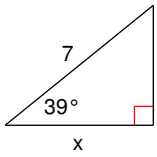

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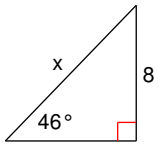

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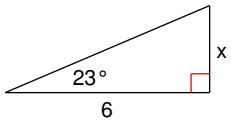

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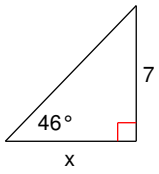
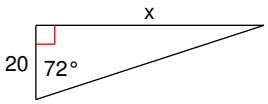
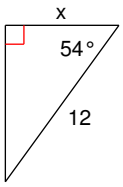


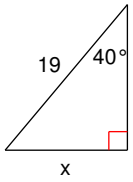
7)



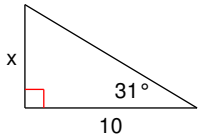
8)



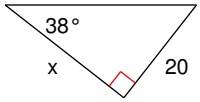
9)



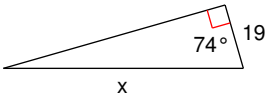
10)



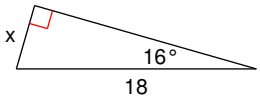
11)



12)



13)



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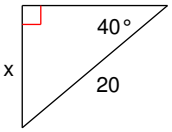

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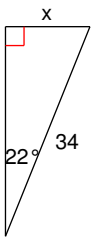

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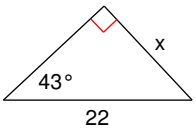

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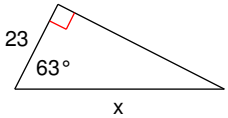

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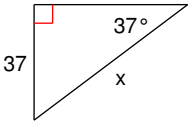

Kuta Software - Infinite Algebra 1 Name_____

Using Trigonometry To Find Lengths

Date_____ Period____

Find the missing side. Round to the nearest tenth.

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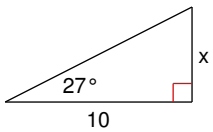

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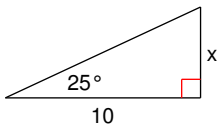

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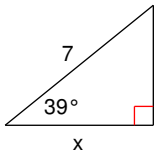

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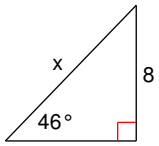

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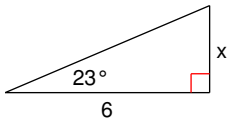

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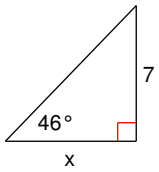

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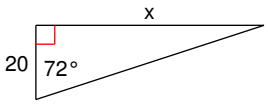

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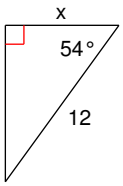

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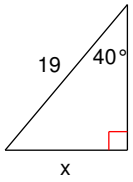

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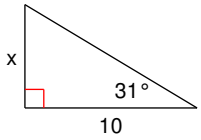

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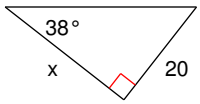

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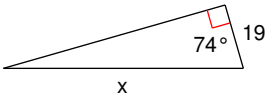

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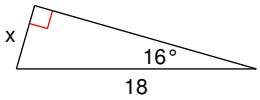

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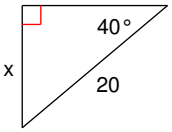

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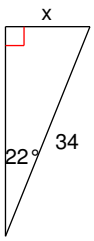

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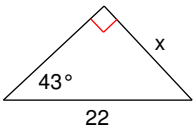

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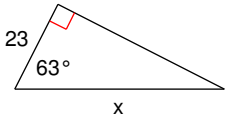

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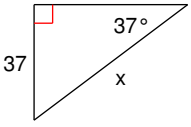

61.5

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 Name_____

Using Trigonometry to Find Angle Measures

Date_____ Period____

Find each angle measure to the nearest degree.

1) tan A = 2.0503

2) cos Z = 0.1219

3) tan Y = 0.6494

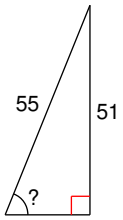
4) sin U = 0.8746

5) cos V = 0.6820

6) sin C = 0.2756

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

7)



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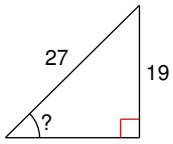

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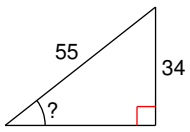

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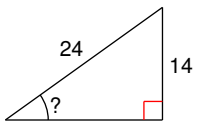

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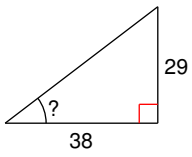

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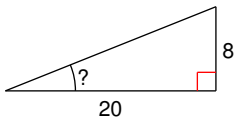

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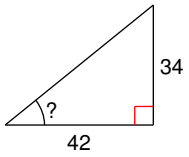

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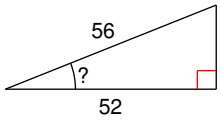

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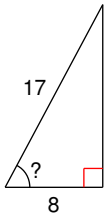

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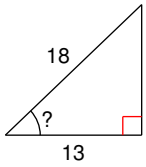

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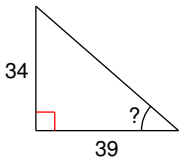

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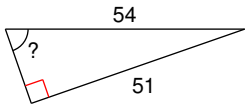

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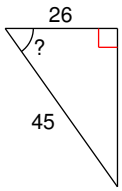

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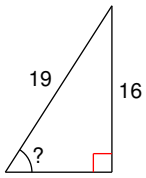

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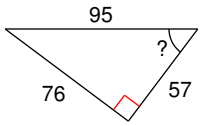

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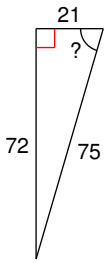

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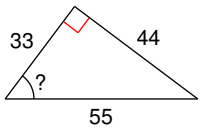

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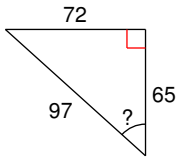

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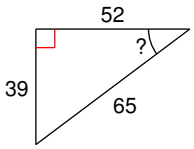

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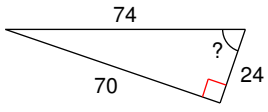


Using Trigonometry to Find Angle Measures

Date_____ Period____

Find each angle measure to the nearest degree.

1) tan A = 2.0503

64°

2) cos Z = 0.1219

83°

3) tan Y = 0.6494

33°

4) sin U = 0.8746

61°

5) cos V = 0.6820

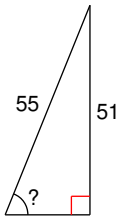
47°

6) sin C = 0.2756

16°

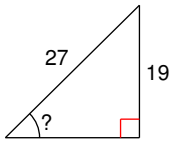
Find the measure of the indicated angle to the nearest degree.

7)



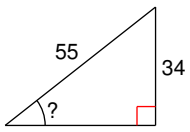
68°

8)



45°

9)



38°

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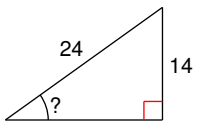

36°

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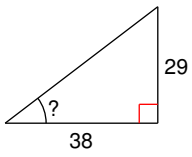

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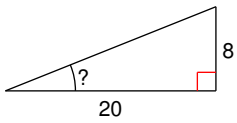

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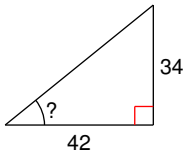

39°

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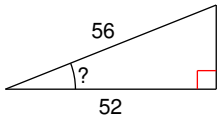
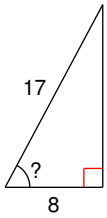


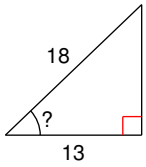
22°

15)



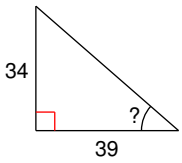
62°

16)



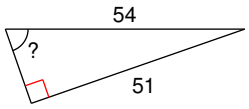
44°

17)



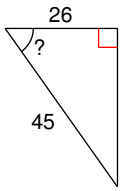
41°

18)



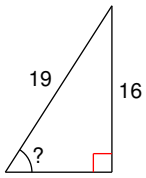
71°

19)



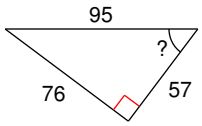
55°

20)



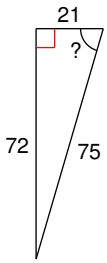
57°

21)



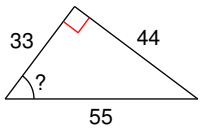
53°

22)



74°

23)



53°

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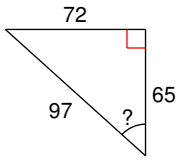

48°

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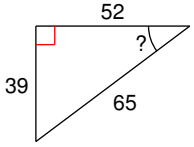
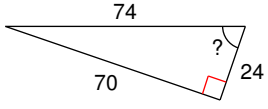


37°

26)



71°

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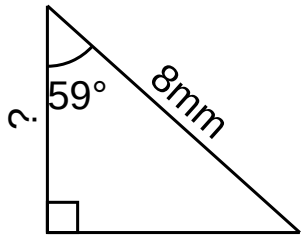
Trigonometry

Find the missing angle/length.

1)



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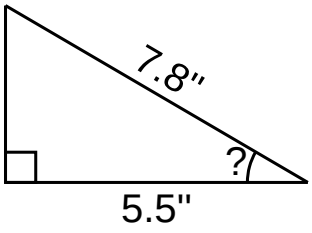

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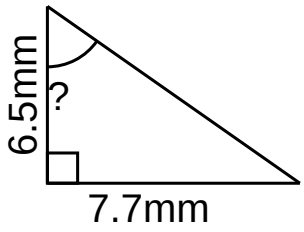

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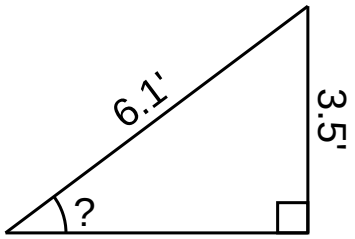

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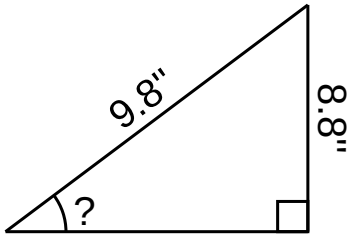

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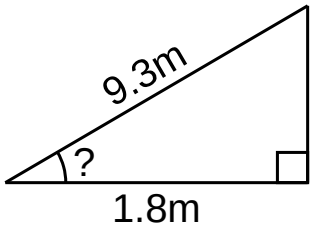

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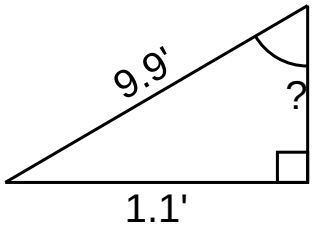

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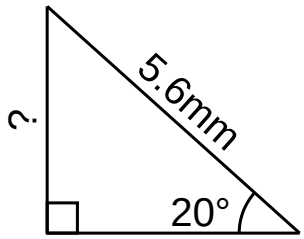

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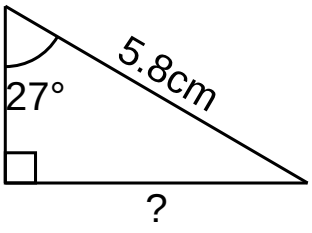

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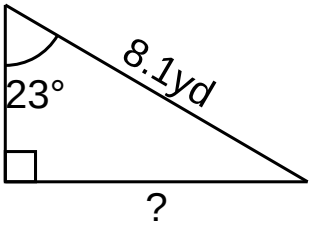

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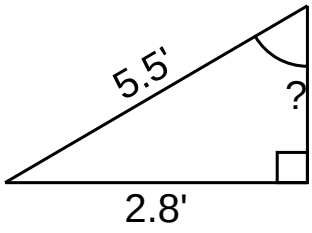

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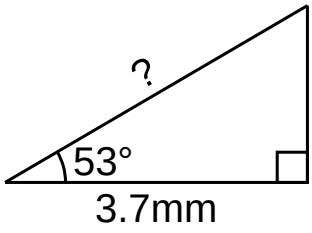

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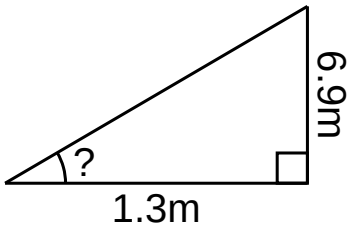

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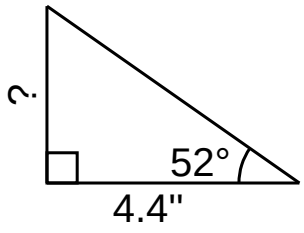

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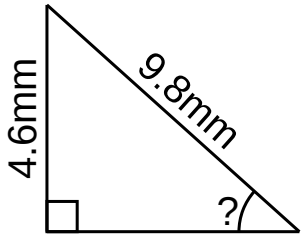
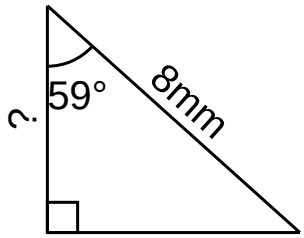


Trigonometry

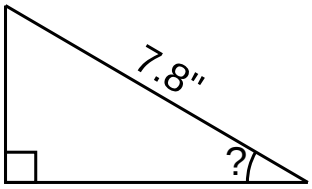
Find the missing angle/length.

1)



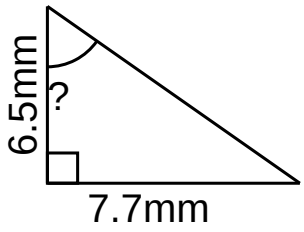
8 × Cos(59) = 4.1mm

2)



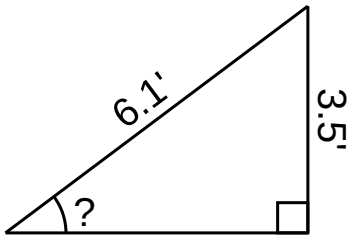
$Cos^{-1}(5.5 \div 7.8) = 45°$

3)



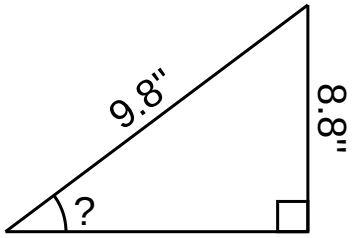
$Tan^{-1}(7.7 \div 6.5) = 50°$

4)



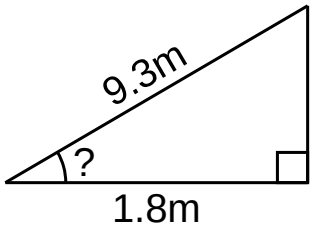
$Sin^{-1}(3.5 \div 6.1) = 35°$

5)



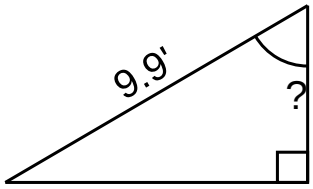
$Sin^{-1}(8.8 \div 9.8) = 64°$

6)



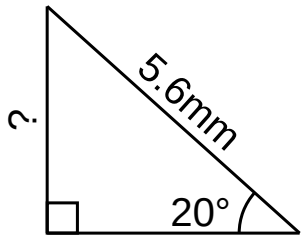
$Cos^{-1}(1.8 \div 9.3) = 79°$

7)



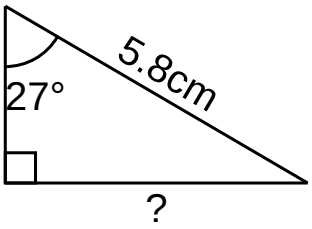
$Sin^{-1}(1.1 \div 9.9) = 6°$

8)



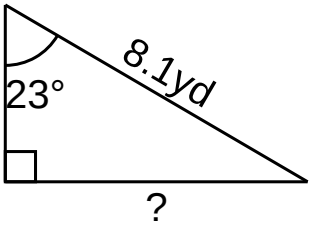
5.6 × Sin(20) = 1.9mm

9)



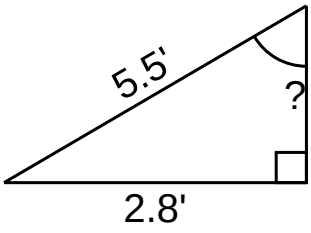
5.8 × Sin(27) = 2.6cm

10)



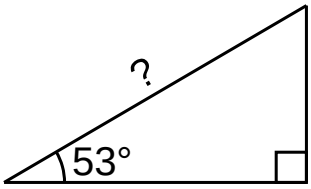
8.1 × Sin(23) = 3.2yd

11)



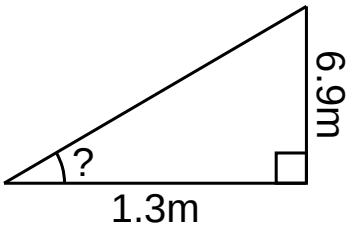
$Sin^{-1}(2.8 \div 5.5) = 31°$

12)



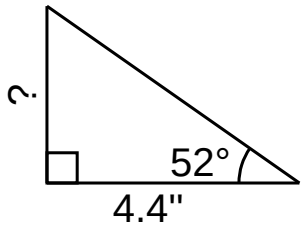
3.7 ÷ Cos(53) = 6.2mm

13)



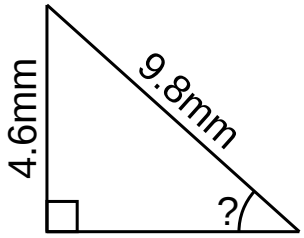
$Tan^{-1}(6.9 \div 1.3) = 79°$

14)



4.4 × Tan(52) = 5.6"

15)

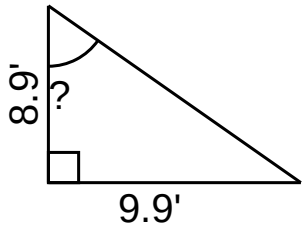


$Sin^{-1}(4.6 \div 9.8) = 28°$

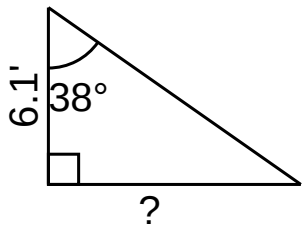
Trigonometry

Find the missing angle/length.

1)



2)



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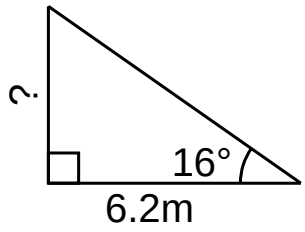

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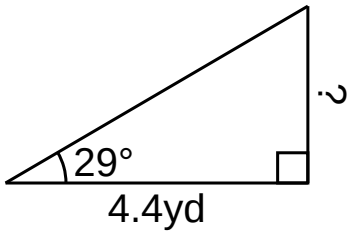

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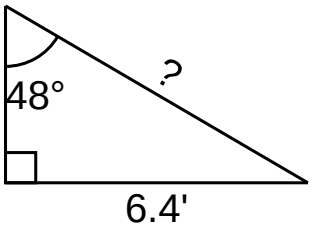

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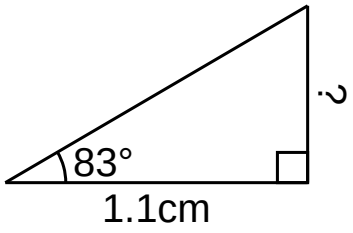

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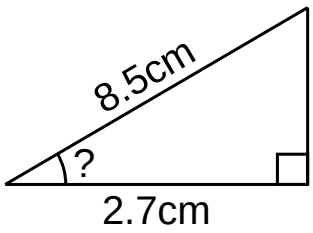

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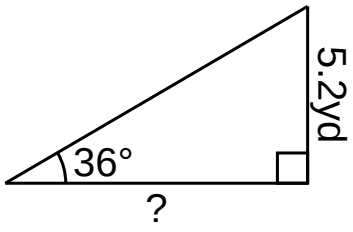

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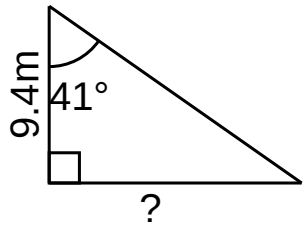

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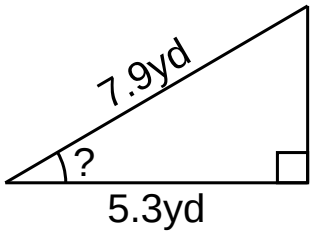

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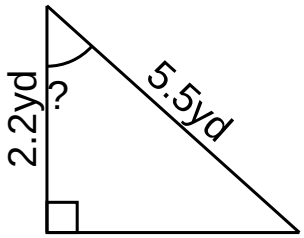
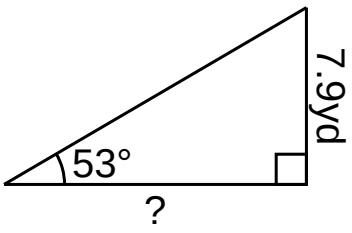
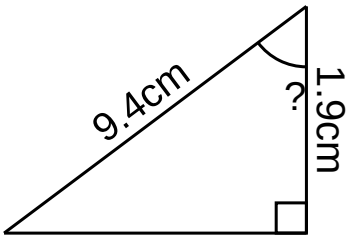


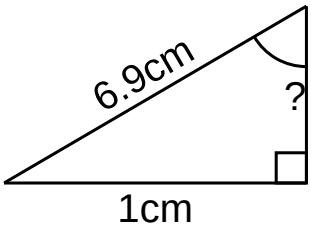
12)



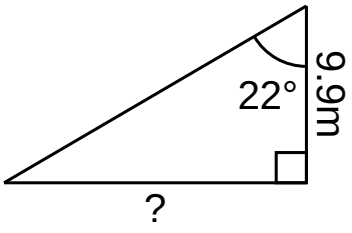
13)



14)



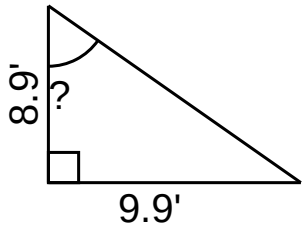
15)



Trigonometry

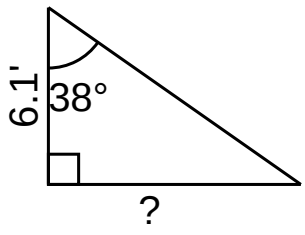
Find the missing angle/length.

1)



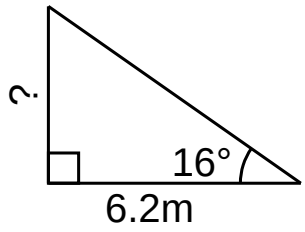
$Tan^{-1}(9.9 \div 8.9) = 48°$

2)



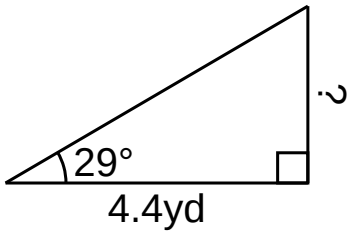
$6.1 \times Tan(38) = 4.8'$

3)



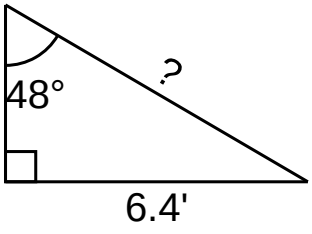
$6.2 \times Tan(16) = 1.8m$

4)



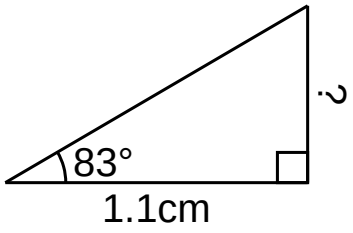
$4.4 \times Tan(29) = 2.4yd$

5)



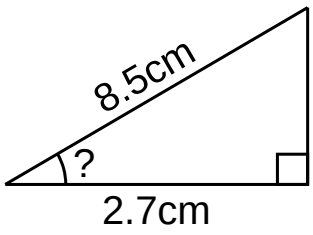
$6.4 \div Sin(48) = 8.6'$

6)



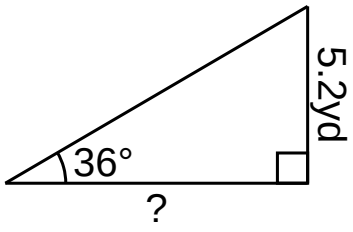
$1.1 \times Tan(83) = 9.5cm$

7)



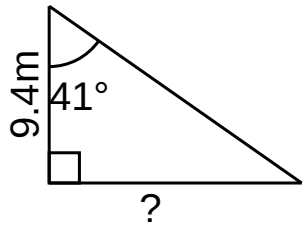
$Cos^{-1}(2.7 \div 8.5) = 71°$

8)



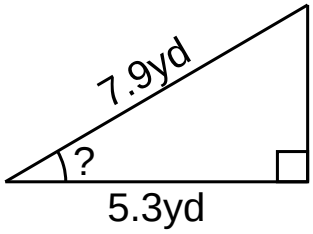
$5.2 \div Tan(36) = 7.1yd$

9)



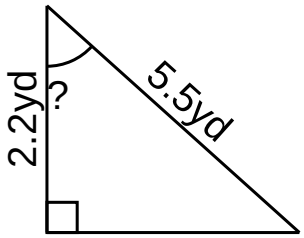
$9.4 \times Tan(41) = 8.1m$

10)



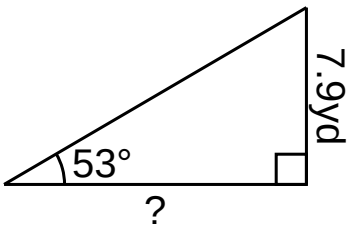
$Cos^{-1}(5.3 \div 7.9) = 48°$

11)



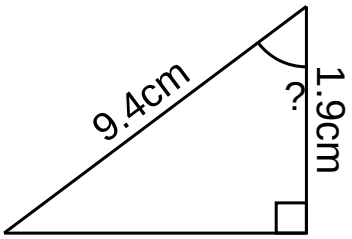
$Cos^{-1}(2.2 \div 5.5) = 66°$

12)



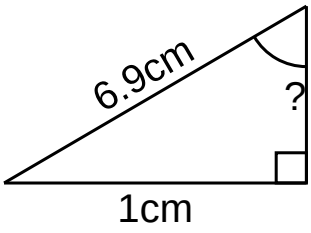
$7.9 \div Tan(53) = 5.9yd$

13)



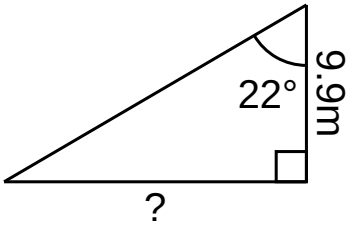
$Cos^{-1}(1.9 \div 9.4) = 78°$

14)



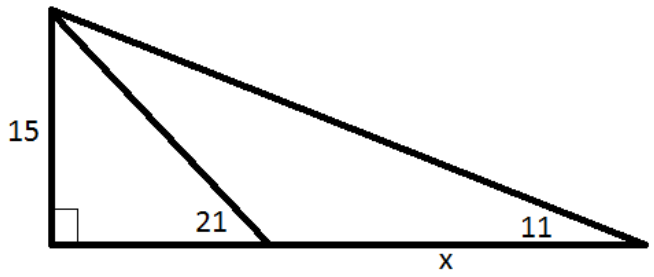
$Sin^{-1}(1 \div 6.9) = 8°$

15)

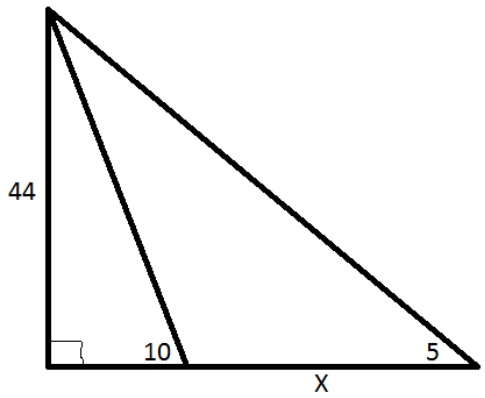


$9.9 \times Tan(22) = 3.9m$

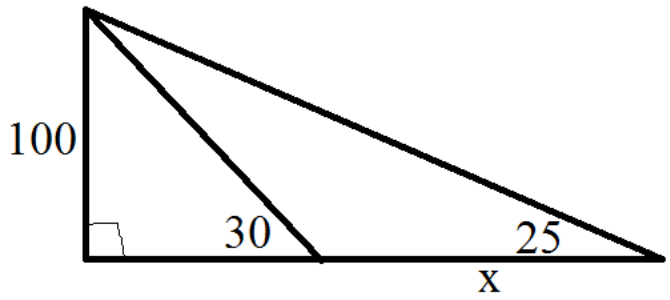
Goal:



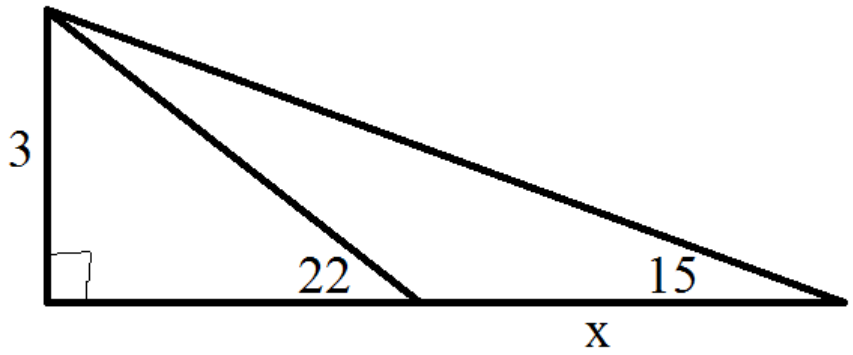
Find x to the nearest tenth.



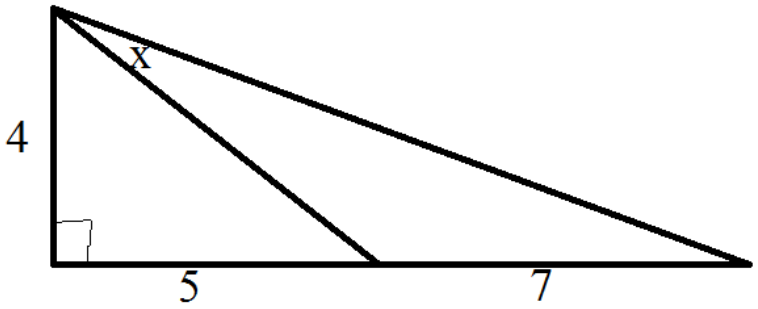
Find x to the nearest whole number.



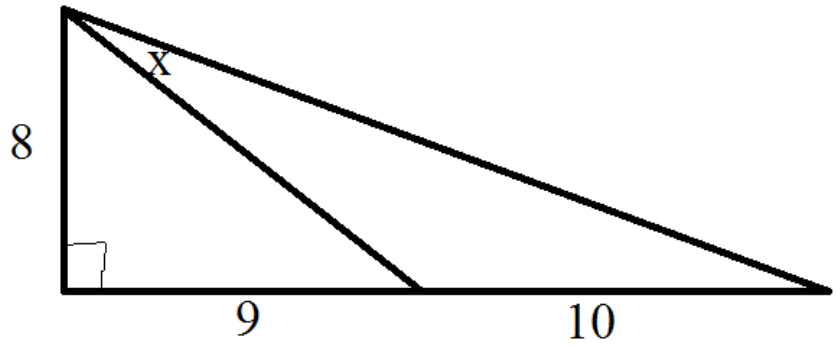
Find x to the nearest tenth.



Find x to the nearest whole number.



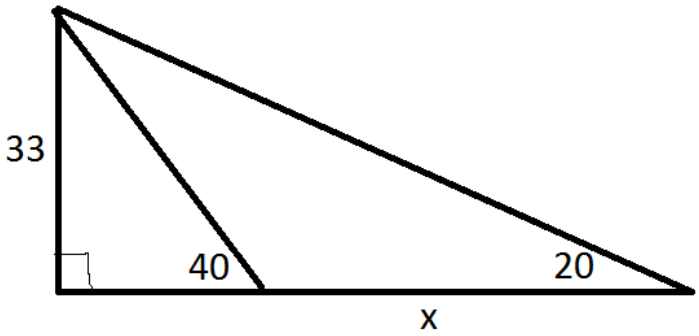
Find the angle x to the nearest whole number.



Find angle x to the nearest tenth.

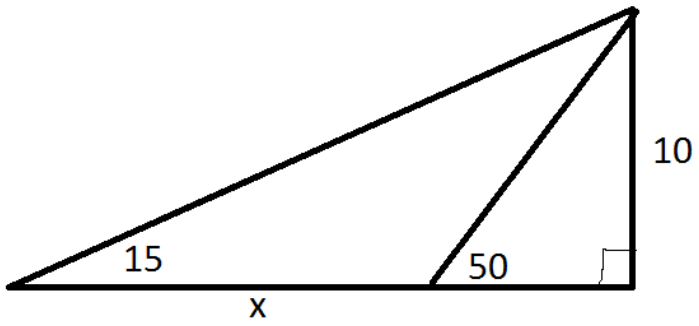
1

Goal:



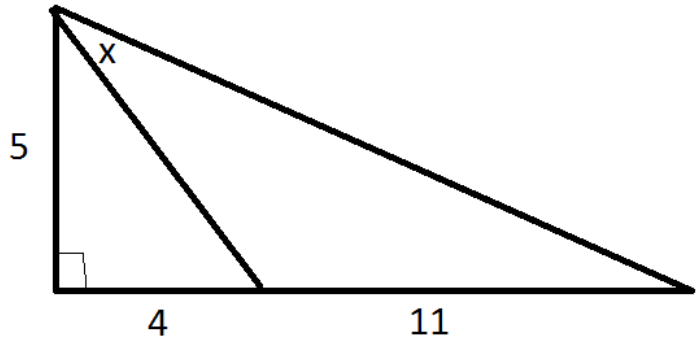
Find x to the nearest whole number.

2



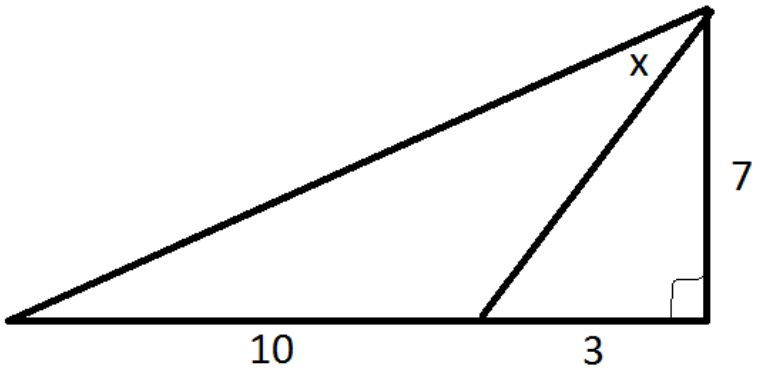
Find x rounded to the nearest whole number.

3



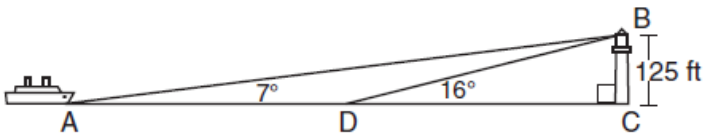
Find angle x rounded to the nearest whole number.

4



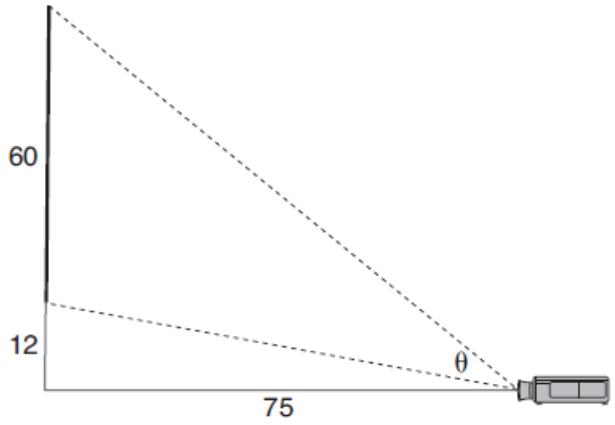
Find angle x rounded to the nearest whole number.

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was 7°. A short time later, at point D, the angle of elevation was 16°.



To the *nearest foot*, determine and state how far the ship traveled from point A to point D.

34 As modeled below, a movie is projected onto a large outdoor screen. The bottom of the 60-foot-tall screen is 12 feet off the ground. The projector sits on the ground at a horizontal distance of 75 feet from the screen.



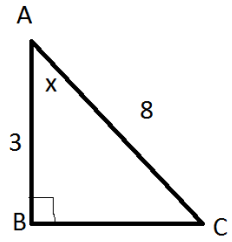
Determine and state, to the *nearest tenth of a degree*, the measure of θ, the projection angle.

CHALLENGE:

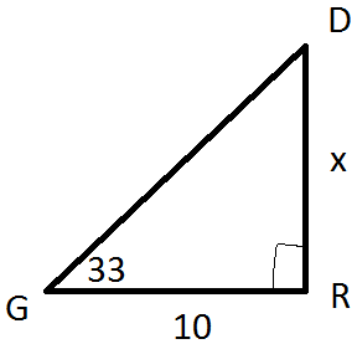
36 Freda, who is training to use a radar system, detects an airplane flying at a constant speed and heading in a straight line to pass directly over her location. She sees the airplane at an angle of elevation of 15° and notes that it is maintaining a constant altitude of 6250 feet. One minute later, she sees the airplane at an angle of elevation of 52°. How far has the airplane traveled, to the *nearest foot*?

Name:
Directions: Show all work to receive full credit

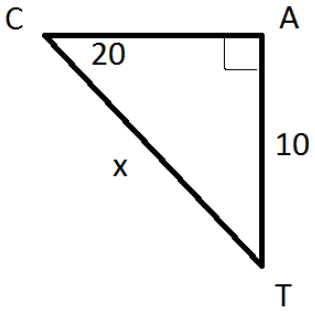
1) Given ΔABC below with $\angle B = 90°$ and $AB = 3$, $AB = 8$, find the value of x rounded to the nearest whole number.



2) Given ΔDRG below, GR = 10 and $\angle G = 33°$, what is the measure of x to the nearest tenth?

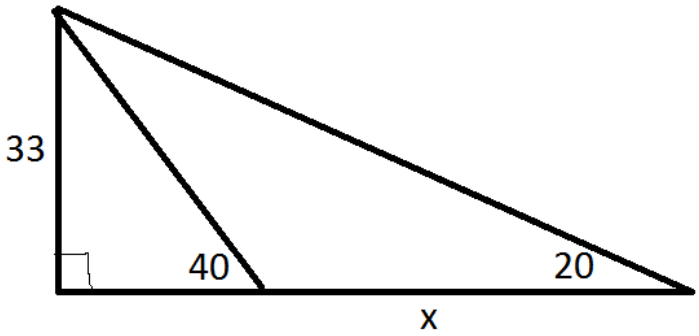


3) Given ΔCAT below, $\angle C = 20^{\circ}$, $AT = 10$, find x rounded to the nearest whole number.



Name:
Directions: Show all work to receive full credit

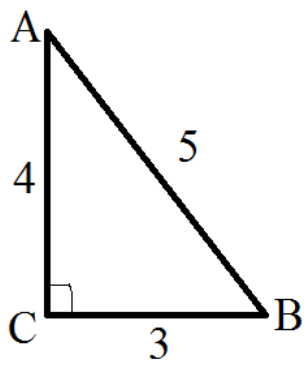
4)



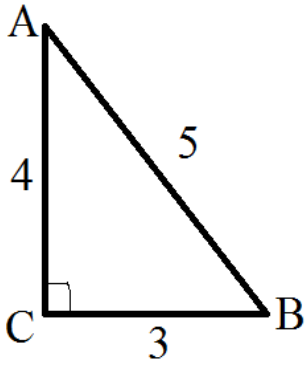
Find x to the nearest whole number.

Goal:

Find angle A using sin cos



Find angle B using



What do you notice about angles A and B? What do you notice about our work?

1) If sin(33) = cos(B), what is the value of B? Explain.

2) If cos(A) = sin(44), what is the value of A? Explain

3) If sin(22) = cos(R), what is the value of R? Explain.

4) If cos(A) = sin(10), what is the value of A? Explain

5) If sin(11) = cos(X), what is the value of X? Explain.

6) If cos(W) = sin(12), what is the value of A? Explain

7) If sin(39) = cos(B), what is the value of B? Explain.

8) If cos(A) = sin(49), what is the value of A? Explain

9) If sin(89) = cos(B), what is the value of B? Explain.

10) If cos(A) = sin(80), what is the value of A? Explain

1) In right triangle ABC, angle C is 90 degrees, if $\sin(A) = \frac{3}{5}$, what is the cos(B)? Explain.

2) In right triangle DRG, angle G is 90 degrees, if $\sin(R) = \frac{2}{9}$, what is the cos(D)? Explain.

3) In right triangle CAT, angle T is 90 degrees, if $\cos(A) = \frac{\sqrt{3}}{5}$, what is the sin(C)? Explain.

4) In right triangle BAT, angle T is 90 degrees, if $\cos(A) = \frac{9}{10}$, what is the sin(B)? Explain.

5) In right triangle ABC, angle C is 90 degrees, if $\sin(A) = \frac{3}{17}$, what is the cos(B)? Explain.

1) Given a right triangle, $\sin(x) = \cos(20 + x)$, what is the value of x? Explain.

2) Given a right triangle, $\sin(2x) = \cos(20 - x)$, what is the value of x? Explain.

3) Given a right triangle, $\sin(3x) = \cos(x + 10)$, what is the value of x? Explain.

4) Given a right triangle, $\sin(4x) = \cos(-x + 30)$, what is the value of x? Explain.

Exit Ticket:

1) If sin(22) = cos(B), what is the value of B? Explain.

2) In right triangle ABC, angle C is 90 degrees, if $\sin(A) = \frac{1}{5}$, what is the cos(B)? Explain.

3) Given a right triangle, $\sin(2x) = \cos(x + 10)$, what is the value of x? Explain.

CHALLENGE:

28 Find the value of R that will make the equation $\sin 73° = \cos R$ true when $0° < R < 90°$. Explain your answer.

3 In right triangle ABC, $m\angle C = 90°$. If $\cos B = \frac{5}{13}$, which function also equals $\frac{5}{13}$?

(1) $\tan A$

(2) $\tan B$

(3) $\sin A$

(4) $\sin B$

6 In $\triangle ABC$, where $\angle C$ is a right angle, $\cos A = \frac{\sqrt{21}}{5}$. What is $\sin B$?

(1) $\frac{\sqrt{21}}{5}$

(2) $\frac{\sqrt{21}}{2}$

(3) $\frac{2}{5}$

(4) $\frac{5}{\sqrt{21}}$

4 Which expression is always equivalent to $\sin x$ when $0° < x < 90°$?

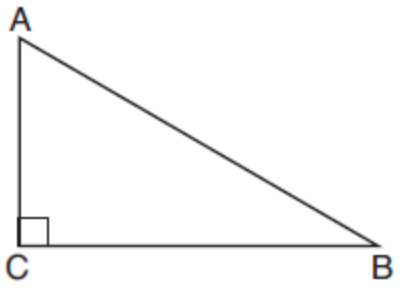
(1) $\cos(90° - x)$

(2) $\cos(45° - x)$

(3) $\cos(2x)$

(4) $\cos x$

12 In scalene triangle ABC shown in the diagram below, $m\angle C = 90°$.



Which equation is always true?

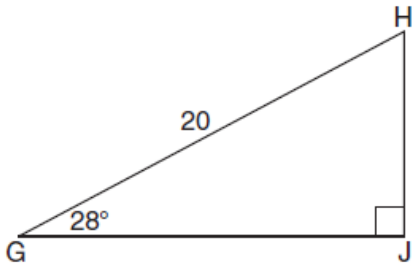
(1) $\sin A = \sin B$

(2) $\cos A = \cos B$

(3) $\cos A = \sin C$

(4) $\sin A = \cos B$

27 When instructed to find the length of $\overline{HJ}$ in right triangle HJG, Alex wrote the equation $\sin 28° = \frac{HJ}{20}$ while Marlene wrote $\cos 62° = \frac{HJ}{20}$. Are both students' equations correct? Explain why.



21 In a right triangle, $\sin (40 - x)° = \cos (3x)°$. What is the value of x?

(1) 10

(2) 15

(3) 20

(4) 25

9 In $\triangle ABC$, the complement of $\angle B$ is $\angle A$. Which statement is always true?

(1) $\tan \angle A = \tan \angle B$

(2) $\sin \angle A = \sin \angle B$

(3) $\cos \angle A = \tan \angle B$

(4) $\sin \angle A = \cos \angle B$

Goal:

Draw ΔDEF with $\angle D = 90°$

Draw ΔCAT with $\angle A = 90°$, $AT = 3$, and $\angle CTA = 30°$

Draw ΔDOG with $O = 90°$, $\angle GDO = 20°$ and $OG = 10$

1) Given ΔTOY with $\angle O = 90°$, TO = 8.9, OY = 9.9, find the value of $\angle T$ rounded to the *nearest degree*.

2) Given ΔCAT with $\angle A = 90°$, AT = 1.1, $\angle T = 83°$, find the value of CA rounded to the *nearest whole number*.

3) Given ΔROY with $\angle O = 90°$, RO = 2.2, RY = 5.5, find the measure of angle R rounded to the *nearest tenth of a degree.*

4) Given ΔBOP with $\angle O = 90°$, BO = 6.1, $\angle B = 38°$, find the measure of OP rounded to the nearest whole number.

5) Given ΔPOI with $\angle O = 90°$, $OI = 2.7$, $PI = 8.5$, find the value of $\angle I$ rounded to the *nearest whole number.*

6) Given ΔFOX with $\angle O = 90°$, $FO = 7.9$, $\angle X = 53°$, find the value of OX rounded to the *nearest tenth*.

7) Given ΔMON with $\angle O = 90°$, $ON = 4.4$, $\angle N = 29°$, what is the measure of MO rounded to the *nearest whole number*.

8) Given ΔWER with $\angle E = 90°$, $WE = 9.4$, $\angle W = 41°$, find the value of ER rounded to the *nearest whole number.*

1) A ladder is learning against a building forming at angle of 30° with the building. If the ladder is 20 feet long, what is the distance from the base of the ladder to the base of the building rounded to the *nearest whole number*?

2) A ladder is leaning against another building forming an angle of 20° with the building. If the height of the building is 50 feet tall, what is the length of ladder *rounded to the nearest tenth?*

3) A support post is leaning against a building. If the support post is 20 feet long and the distance from the base of the support post to the base of the building is 10 feet long, what is the angle formed by the support post and the building rounded to the *nearest tenth?*

Challenge:

1. A boy flying a kite lets out 300 feet of string which makes an angle of 38°
with the ground. Assuming that the string is straight, how high above the ground is the kite?

2. A ladder leaning against the wall makes an angle of 74° with the ground. If the foot of the ladder is 6.5 feet from the wall, how high on the wall is the ladder?

3. A straight road to the top of a hill is 2500 feet long and makes an angle of 12° with the horizontal. Find the height of the hill.

4. An airplane climbs at an angle of 11° with the ground. Find the ground distance it has traveled when it has attained an altitude of 400 feet.

5. A wire attached to the top of a pole reaches a stake in the ground 20 feet from the foot of the pole and makes an angle of 58° with the ground. Find the length of the wire.

6. Henry is flying a kite. The kite string makes an angle of 43°with the ground. If Henry is standing 100 feet from a point on the ground directly below the kite, find the length of the kite string.

7. A 25 foot ladder leans against a building. The ladder's base is 13.5 feet from the building. Find the angle which the ladder makes with the ground.

8. In order to reach the top of a hill which is 250 feet high, one must travel 2000 feet straight up a road which leads to the top. Find the number of degrees contained in the angle which the road makes with the horizontal.

EXIT TICKET:

1) Given ΔWER with $\angle E = 90°$, $WE = 10$, $\angle W = 40°$, find the value of ER rounded to the *nearest whole number.*

2) A ladder leans against a building. The top of the ladder reaches a point on the building which is 18 feet above the ground. The foot of the ladder is 7 feet from the building. Find the measure of the angle which the ladder makes with the level ground.

Name: _____ Period: ____ Date: _____

4-1 Right Triangle Trigonometry Word Problems

Step 1: Draw a triangle.
Step 2: Label the triangle using the given information.
Step 3: Create and solve an equation to find the missing side or angle.

1. A ladder, 500 cm long, leans against a building. If the angle between the ground and the ladder is 57 degrees, how far from the wall is the bottom of the ladder? Round the answer to the *nearest tenth*.

2. The sides of a rectangle are 25 cm and 8 cm. What is the measure, to the *nearest degree*, of the angle formed by the short side and a diagonal of the rectangle?

3. A kite is flying 115 ft above the ground. The length of the string to the kite is 150 ft, measured from the ground. Find the angle, to the *nearest degree*, that the string makes with the ground.

4. An observation tower is 75 m high. A support wire is attached to the tower 20 m from the top. If the support wire and the ground form an angle of 46 degrees, what is the length of the support wire, to the *nearest tenth?*

5. At a point 30 feet from the base of a tree, the angle formed with the ground looking to the top measures 53°. Find, to the *nearest foot*, the height of the tree.

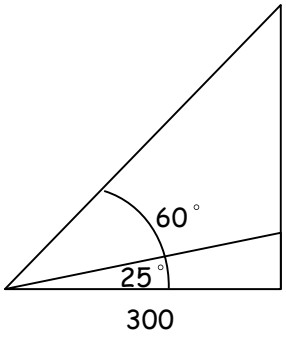
6. An observer is 120 feet from the base of a television tower, which is 150 feet tall. Find, to the *nearest degree*, the angle of elevation of the top of the tower from the point where the observer is standing.

7. The angle of elevation of the top of a flagpole from a point on the ground 30 meters from the base of the flagpole is 18 degrees. What is the height of the flagpole, to the *nearest meter*?

8. From the top of a lighthouse 160 feet high, the angle of depression of a boat out at sea is 24°. Find, to the *nearest foot*, the distance from the boat to the foot of the lighthouse. (The foot of the lighthouse is at sea level.)

9. You are a block away from a skyscraper that is 780 feet tall. Your friend is between the skyscraper and yourself. The angle of elevation from your position to the top of the skyscraper is 42°. The angle of elevation from your friend's position to the top of the skyscraper is 71°. To the nearest foot, how far are you from your friend?

10. At 10:00 am, a person observes a hot air balloon climbing vertically in the air from a point 300 meters away from the launch pad for the balloon. The angle of elevation to the top of the balloon at this time is 25^{o}. At 10:02am, the person observes that the angle of elevation to the balloon is now 60^{o}. What is the change in altitude, to the *nearest meter,* for the balloon over the 2 minutes between the first and second observations?



Goal:

1) A 20 foot ladder is leaning against a building forming an angle of 20 degrees with the building, how far up the building does the ladder touch to the *nearest tenth of a foot.*

2) A ladder is leaning against a wall forming an angle of 50 degrees with the ground, what is the distance from the base of the ladder to the base of the wall? Round to the *nearest whole number*.

3) A ladder is leaning against a wall forming an angle of 30 degrees with the wall. If the distance between the base of the ladder and the base of the wall is 33 feet, what is the length of the ladder rounded to the *nearest tenth of a foot?*

4) A ladder is leaning against a building forming an angle of 40 degrees with the building. If ladder is 20 feet long, how far up the wall does the ladder touch on the building. Round your answer to the *nearest tenth.*

5) A ladder is leaning against a wall. The angle formed between the ladder and the ground is 40 degrees. If the distance between the base of the ladder and the base of the wall is 30 feet, how long is the ladder? Round your answer to the *nearest whole number*.

6) A ladder is leaning against a building. The angle formed between the building and the ladder is 20 degrees. If the ladder touches the building 20 feet above the ground, what is the length of the ladder rounded to the *nearest tenth of a foot*?

7) A 20 foot ladder is leaning against a building. If the distance from the base of the ladder to the base of the building is 40 feet, what is the measure of the angle formed between the base of the ladder and the ground, rounded to the *nearest tenth of a degree?*

8) A ladder is leaning against a building and touches the building 30 feet above the ground. If the distance between the base of the building and the base of the ladder is 20 feet, what is the measure of the angle rounded to the *nearest tenth?*

9) A 20 foot support post is leaning against a building. If the distance between the base of support post and the base of the building is 10 feet, what is the angle of elevation formed between the support post and the ground rounded to the *nearest whole degree*?

10) A 30 foot ladder leans against a wall, such that the distance from the base of the wall to the base of the ladder is 10 feet, what is the angle formed between the ladder and the ground rounded to the *nearest tenth*?

11) A ladder is leaning against a building and touches the building 10 feet above the ground. If the distance between the base of the building and the base of the ladder is 5 feet, what is the measure of the angle rounded to the *nearest whole number?*

CHALLENGE:

1) A surveying crew is given the job of measuring the height of a mountain. From a point on level ground, they measure the angle of elevation to the top of the mountain to be 21°. They move 507 m closer to the mountain and find the angle of elevation is now35°. What is the height of the mountain to the nearest meter?

2) A vertical tower stands on level ground. At a certain point on the ground the angle of elevation of the top of the tower is 40°. At a point on the ground 100 feet nearer to the tower the angle of elevation is 50°. Find the height of the tower to the nearest foot.

Exit Ticket

1) A 20 foot ladder is leaning against a building forming an angle of 20 degrees with the ground. How far up the wall is the ladder touching? Round your answer to the *nearest tenth.*

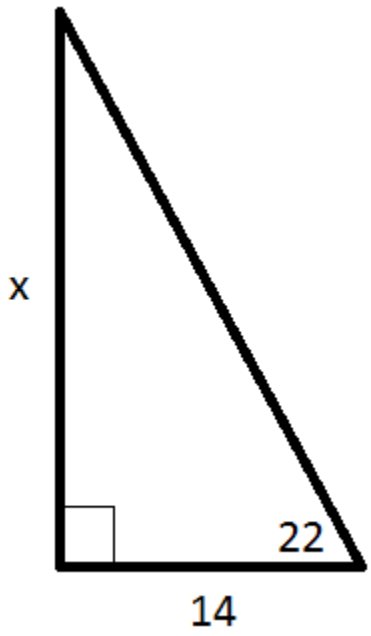
Name:
Trig Test Review

In right triangle DEF, m∠D = 22°, m∠E = 90°, and EF = 5.4 cm. What is the length of $\overline{DE}$, to the *nearest whole centimeter?*

In right triangle CAT, m∠A = 90°. If $\sin(T) = \frac{3}{7}$, which function also equals $\frac{3}{7}$?

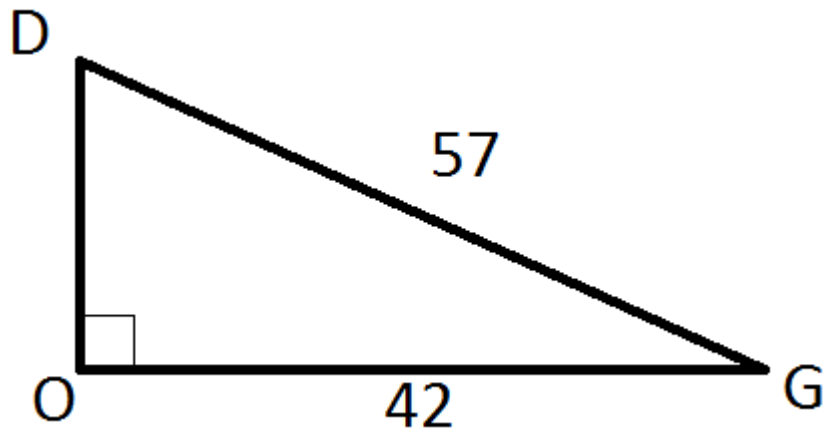
(1) tan(T)
(2) tan(A)
(3) sin(C)
(4) cos(C)

Given the right triangle in the diagram below, what is the value of x, rounded to the *nearest tenth?*



Name:
Trig Test Review

In the diagram of ΔDOG below, $m\angle G = 90°$, $DG = 57$, and $OG = 42$.



What is the measure of $\angle D$ rounded to the *nearest tenth of a degree?*

A support beam that is 50 feet long leans against a wall, forming an angle of 20° with the level ground. To the *nearest foot*, how high up the wall does the support beam touch the wall?

Name:
Trig Test Review

Zamzam leans a ladder against a house, so that the ladder is 20 feet above the ground. The ladder makes a 40° angle with the ground. To the *nearest foot*, determine and state the length of the ladder.

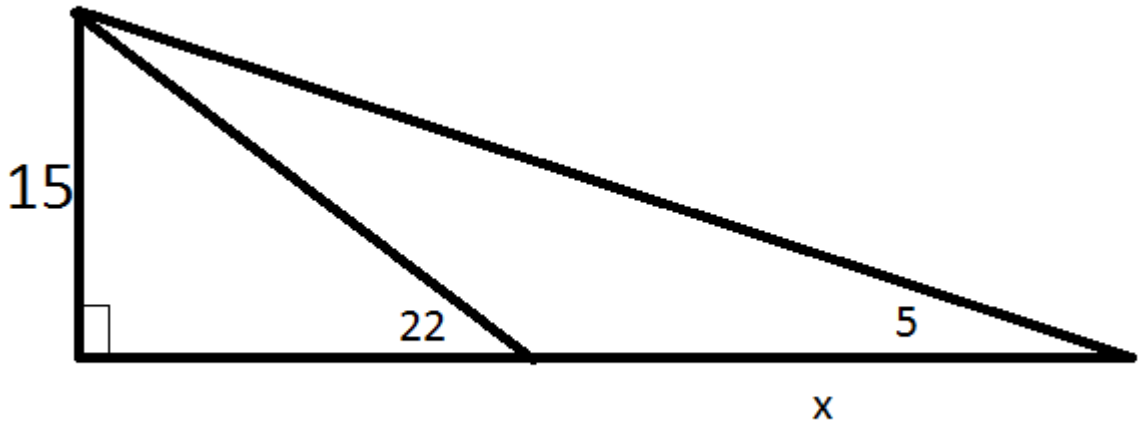
A ladder leans against a building. The top of the ladder touches the building 20 feet above the ground. The foot of the ladder is 2 feet from the building. Find, to the *nearest degree*, the angle that the ladder makes with the level ground.

Name:
Trig Test Review

Find the value of A that will make the equation $\sin(23°) = \cos(A)$ true. Explain your answer.

Given ΔNAH with $\angle A = 90°$, $NA = 6$, $AH = 8$, and $NH = 10$, what is the measure of angle N to the *nearest degree?*

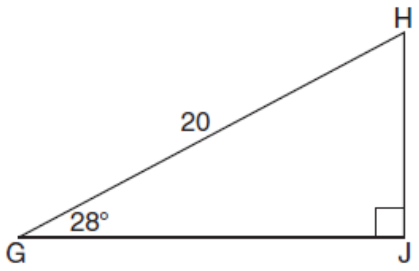
Name:
Trig Test Review



Find x rounded to the *nearest tenth.*

Name:
Trig Test Review

21 In a right triangle, $\sin(40 - x)^\circ = \cos(3x)^\circ$. What is the value of x?

(1) 10
(2) 15
(3) 20
(4) 25

27 When instructed to find the length of $\overline{HJ}$ in right triangle HJG, Alex wrote the equation $\sin 28^\circ = \frac{HJ}{20}$ while Marlene wrote $\cos 62^\circ = \frac{HJ}{20}$. Are both students' equations correct? Explain why.