Pyth's

Do you need to spend a day simplifying radicals? Yes

Geometry Unit 7 Day 1 The Pythagorean Theorem and It's Converse

Learning Target – Students will use the Pythagorean theorem to solve problems and it's converse to classify triangles.

Geometry Activity 20 – The Pythagorean Theorem and it's Converse

Although many applications of the **Pythagorean Theorem** were known and used by the Babylonians, Chinese, Hindus, and Egyptians well before Pythagoras was born (about 570 B.C.E.), he is given credit for being the first to formally prove the theorem. Many others since Pythagoras's time, including a young man named James Garfield who would go on to be president of the United States, have also offered formal proofs of the well-known theorem.

The Pythagorean Theorem – If a triangle is a right triangle, then the square of the hypotenuse is equal to the sum of the squares of the legs.

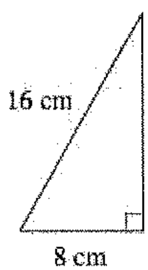
1. Explain how this theorem translates into the equation that use today.

$a^2+b^2=c^2$

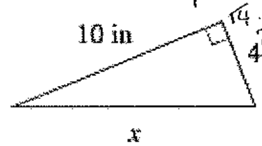
square of the sum of the legs

square of hypotenuse

Use the Pythagorean theorem to find the unknown side of each triangle. Leave your answers in simplest radical form.

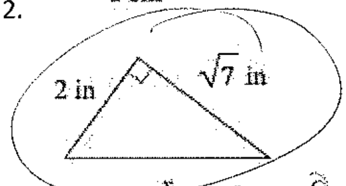


$16^2=8^2+x^2$
$256=64+x^2$
$\sqrt{192}=\sqrt{x^2}$
$\sqrt{64}\cdot\sqrt{3}=x$
$8\sqrt{3}=x$



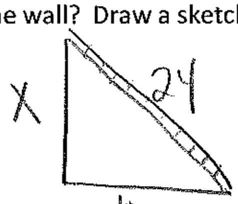
$10^2+4^2=x^2$
$100+16=x^2$
$\sqrt{116}=\sqrt{x^2}$
$\sqrt{4}\cdot\sqrt{29}=x$
$2\sqrt{29}=x$

2. 3. 4.



$2^2+\sqrt{7}^2=x^2$
$4+7=x^2$
$\sqrt{11}=\sqrt{x^2}$
$\sqrt{11}=x$

5. How high up a vertical wall will a 24 foot ladder reach if the foot of the ladder is placed 10 feet from the wall? Draw a sketch and show the calculations to support your answer.



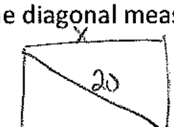
$10^2+x^2=24^2$
$100+x^2=576$
$x^2=476$
$x=21.82$ feet

$13^2+x^2=20^2$
$169+x^2=400$
$x^2=231$
$x=15.20$

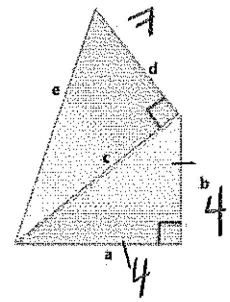
space

6. Find the area of a rectangular rug if the width of the rug is 13 feet and the diagonal measures 20 feet. Draw a sketch and show the calculations to support your answer.

$A=l\cdot w=15.20\times13=197.58\ ft^2$



7. In the diagram a is congruent to b. a=4 inches and d= 7 inches. Find the length of e.



$4^2+4^2=c^2$
$16+16=c^2$
$32=c^2$
$4\sqrt{2}=c^2$

$(4\sqrt{2})^2+7^2=e^2$
$32+49=e^2$
$81=e^2$
$9=e$

Bold

8. A Pythagorean Triple is a set of three nonzero whole numbers that satisfy the Pythagorean Theorem. Explain why the numbers 3, 4, and 6 do not form a Pythagorean Triple, but the numbers 5, 12, and 13 do.

$3^2+4^2 \neq 6^2$
$9+16 \neq 36$
$25 \neq 36$
not a Pythag. triple

$5^2+12^2=13^2$
$25+144=169$
$169=169$
Does form a pythag. triple!

9. Write the converse of the Pythagorean theorem. Is the converse true?

If the square of the hypotenuse is equal to the sum of the squares of the legs, then a triangle is a right △. true

10. So we can use the converse of the Pythagorean theorem to determine whether a triangle is a right triangle. Write your notes about how in the space below.

if $a^2+b^2=c^2$ – right
if $a^2+b^2>c^2$ – obtuse
if $a^2+b^2<c^2$ – acute

11. Use the Converse of the Pythagorean theorem to determine whether each of the following sets of side lengths forms a right triangle. If a right triangle is not possible, tell whether an acute or obtuse triangle can be formed. Show the method you use to determine your answers.

a. 12, 34, 37

$12^2+34^2 \stackrel{?}{=} 37^2$
$1300 < 1369$
acute

b. $\frac{6}{7}, \frac{8}{7}, \frac{10}{7}$

$\left(\frac{6}{7}\right)^2+\left(\frac{8}{7}\right)^2 \stackrel{?}{=} \left(\frac{10}{7}\right)^2$
$\frac{100}{49} = \frac{100}{49}$
right

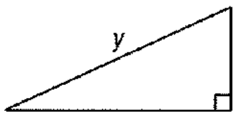
c. 20, $\sqrt{42}$, 21

$20^2+\sqrt{42}^2 = 21^2$
$400+42 = 441$
$442 > 441$
obtuse

Geometry Unit 7 Day 1 HW

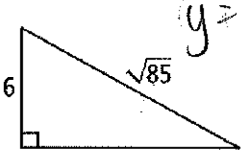
Find the value of *y*. Express in simplest radical form.

1.



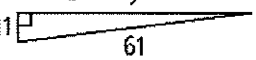
$y = 5\sqrt{5}$

2.



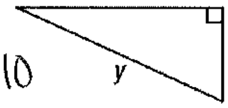
$y = 7$

3.



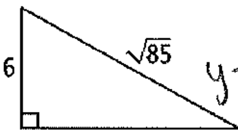
$y = 60$

4.



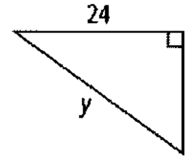
$y = 10$

5.



$y = 7$

6.



$y = 30$

The lengths of the sides of a triangle are given. Classify each triangle as *acute, right,* or *obtuse.*

7. 3, 8, 10
acute

8. 4, 5, 7
acute

9. 12, 15, 19
obtuse

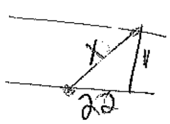
13. A square has side length 10 yd. What is the length of a diagonal of the square? Express in simplest radical form. $10\sqrt{2}$ yd.

14. A square has diagonal length 9 m. What is the side length of the square, to the nearest centimeter? ≈ 2 yd.

15. A repairman leans the top of an 8-ft ladder against the top of a stone wall. The base of the ladder is 5.5 ft from the wall. About how tall is the wall? Round to the nearest tenth of a foot.

≈ 5.8 ft

16. A river runs straight through the center of a park. A man stands on one bank of the river, and his daughter stands across the river and 22 ft upstream. The man's son swims from the man to his daughter. If the river is 11 ft wide, how far does the son swim? Round to the nearest foot.



about 25 feet

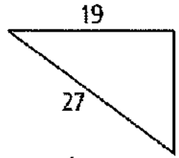
For each pair of numbers, find a third whole number such that the three numbers form a Pythagorean triple.

omit

18. 13, 84 **19.** 16, 12 **20.** 32, 60

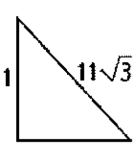
Is each triangle a right triangle? Explain.

24.



No $19^2+18^2 \neq 27^2$

25.



No $11^2+11^2 \neq 11\sqrt{3}$

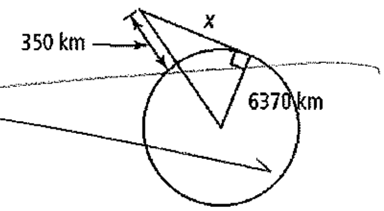
28. A square is drawn inside a circle so that its vertices touch the circle. If the radius of the circle is 15 cm, what is the perimeter of the square?

$4\sqrt{15}$ cm

29. The playing surface of a football field is 300 ft long and 160 ft wide. If a player runs from one corner of the field to the opposite corner, how many feet does he run?

340 feet

33. The International Space Station orbits 350 km above Earth's surface. Earth's radius is about 6370 km. Use the Pythagorean Theorem to find the distance from the space station to Earth's horizon. Round your answer to the nearest 10 kilometers. (Diagram is not to scale.



Geometry Unit 7 Day 2 Special Right Triangles.

Learning Target – Students will find side lengths of 45-45-90 and 30-60-90 triangles.

45-45-90 Triangle Relationships

The four triangles below are special right triangles called 45-45-90 triangles because their angle measures are 45, 45, and 90. Each side is related to each other side.

1.) If you know a leg of the triangle, how can you find the length of the other leg? Justify your answer. They are = b/c the Δ is isosceles

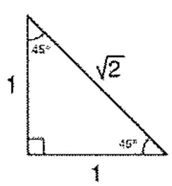
2.) If you know a leg of the triangle, how can you find the length of the hypotenuse? Justify your answer. pythagorean theorem can show us that

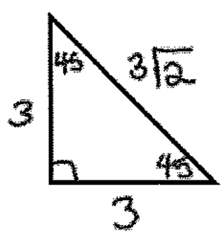
$\text{leg} \cdot \sqrt{2} = \text{hypotenuse}$

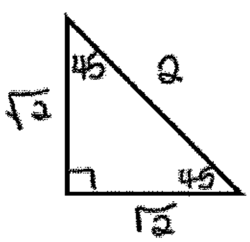
3.) If you know the hypotenuse of the triangle, how can you find the length of a leg? Justify your answer.

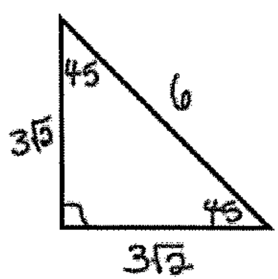
so $\dfrac{\text{hypotenuse}}{\sqrt{2}} = \text{leg}$

b/c division is the inverse of x.

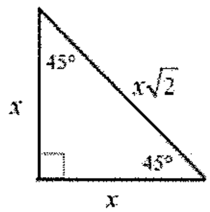




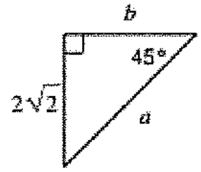




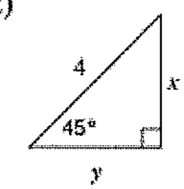
45-45-90 Triangles



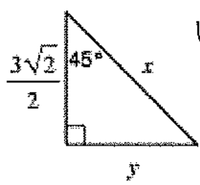
Find the missing side lengths. Leave your answers as radicals in simplest form.

1)


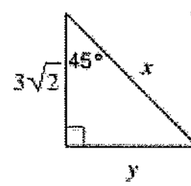
$b = 2\sqrt{2}$
$a = 2\sqrt{2} \cdot \sqrt{2} = 4$

2)


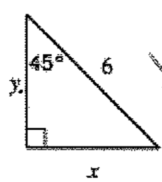
$x = y = \frac{4}{\sqrt{2}} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$

3)


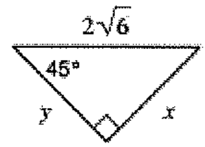
$y = \frac{3\sqrt{2}}{2}$
$x = 3$

4)


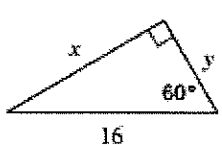
$y = 3\sqrt{2}$
$x = 6$

5)


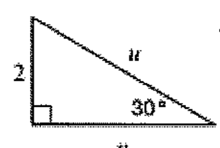
$x = y = 3\sqrt{2}$

6)


$x = y = 2\sqrt{3}$

7)


$y = 8$
$x = 8\sqrt{3}$

8)


$u = 4$
$v = 2\sqrt{3}$

Put HW 21-7
due
But remove area + perimeter problems

Another type of special right triangle is a 30-60-90 triangle. These triangles have angle measures that are 30, 60, and 90 degrees. A special relationship exists between the sides of 30-60-90 triangles.

1.) If I know the shortest leg of the triangle, how can I find the hypotenuse? Justify your answer.

Short leg * 2 = hypotenuse

2.) If I know the shortest leg of the triangle, how can I find the other leg? Justify your answer.

Shat leg * $\sqrt{3}$ = long leg

3.) If I know the longest leg of the triangle, how can I find the shortest leg? Justify your answer.

longleg ÷ $\sqrt{3}$ = short leg

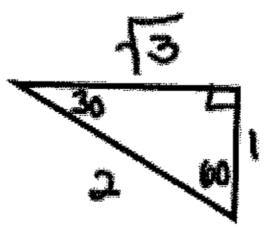
4.) If I know the longest leg of the triangle, how can I find the hypotenuse? Justify your answer.

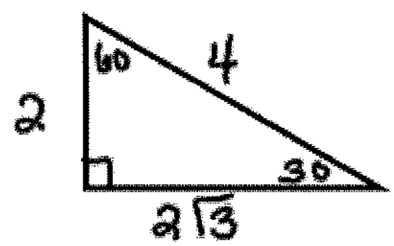
long leg ÷ $\sqrt{3}$ "gives short leg, then *2 to get hyp.

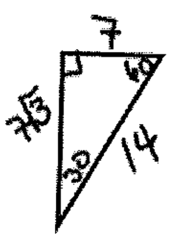
5.) If I know the hypotenuse of the triangle, how can I find the shortest leg? Justify your answer. hyp divide by 2 = short leg

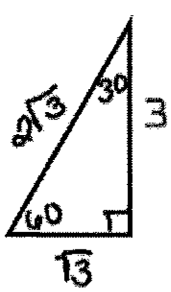
6.) If I know the hypotenuse of the triangle, how can I find the longest leg? Justify your answer.

hyp divide by 2 = short leg then * $\sqrt{3}$ = long leg

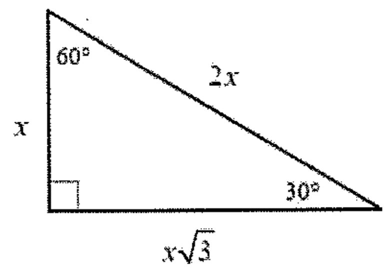




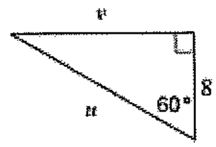




30-60-90



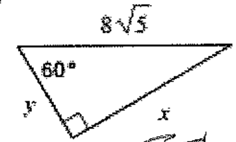
9)



$8\sqrt{3} = v$

$16 = u$

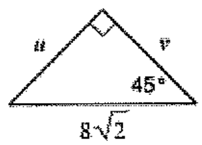
10)



$y = 4\sqrt{5}$

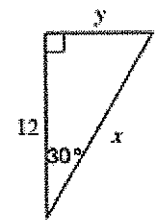
$x = 4\sqrt{15}$

13)



$u = v = 8$

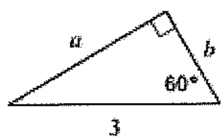
14)



$y = 4\sqrt{3}$

$x = 8\sqrt{3}$

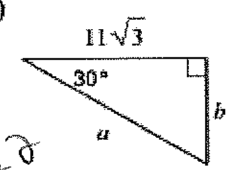
15)



$b = 3/2$

$a = 3\sqrt{3}$

16)



$b = 11$

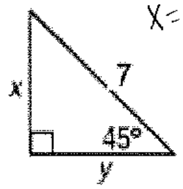
$a = 22$

Put HW 22 - 2 here but remove 7 + 4 problems

Make this it's own day

Find the area of each triangle.

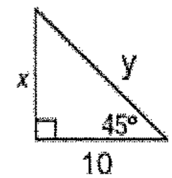
9.



$x = y = \frac{7\sqrt{2}}{2}$

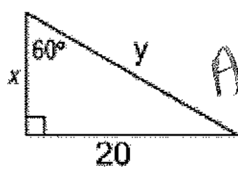
$A = \frac{49}{4}\ in^2$

10.



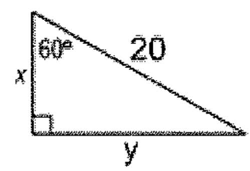
$A = 50\ in^2$

12.



$A = \frac{200\sqrt{3}}{3}$

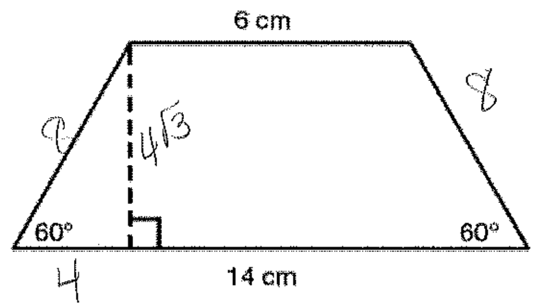
13.



$A = 50\sqrt{3}\ in^2$

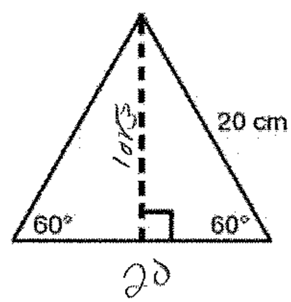
14. Calculate the perimeter of the trapezoid.

$P = 36\ cm$



15. Calculate the area.

$A = 100\sqrt{3}\ cm^2$



16. One side of an equilateral triangle is 8 inches. Find the length of the altitude.

$4\sqrt{3}$ in.

17. The length of an altitude of one side of an equilateral triangle is $2\sqrt{3}in$. Find the length of a side of the triangle.

4 in

Move this one ... P+A

Geometry Unit 7 Day 2 HW

ACTIVITY 21 PRACTICE

Write your answers on notebook paper.
Show your work.

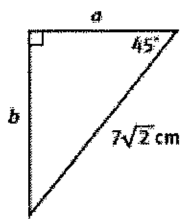
Unless otherwise indicated, write all answers in simplest radical form.

Lesson 21-1

1. In a 45°-45°-90° triangle, if the length of a leg is 6 cm, the length of the hypotenuse is:
   A. 12 cm
   B. $6\sqrt{3}$ cm
   C. $6\sqrt{5}$ cm
   D. $6\sqrt{2}$ cm

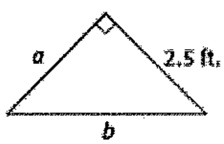
2. For each 45°-45°-90° triangle, find a and b.

   a.



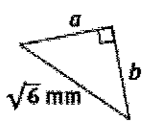
$a = b = 7$

   b.



$a = 2.5$
$b = 2.5\sqrt{2}$

   c.



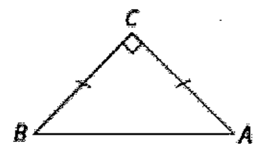
$a = b = \sqrt{3}$

3. Square *MNOP* has a diagonal of 12 inches. Find the length of each side of the square. $6\sqrt{2}$ in

4. The length of the hypotenuse of an isosceles right triangle is 8.
   a. Find the perimeter of the triangle. $8\sqrt{2}+8$ in
   b. Find the area of the triangle. 64 in^2

5. Find the perimeter of a square, as a simplified radical, if the length of its diagonal is $4\sqrt{10}$ inches. $16\sqrt{5}$ in

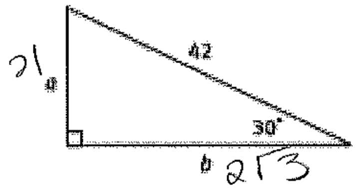
6. Which of the following statements is true?



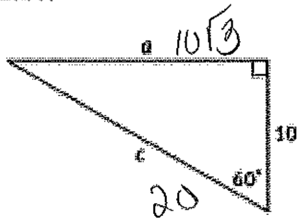
   A. $BC = \sqrt{2}BA$
   B. $BA = BC$
   C. $BA = \sqrt{2}BC$
   D. $BC = 2BA$

Lesson 21-2

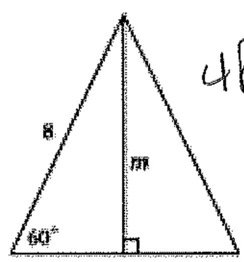
7. Find a and b.



8. Find a and c.



9. Find m.



$4\sqrt{3}$

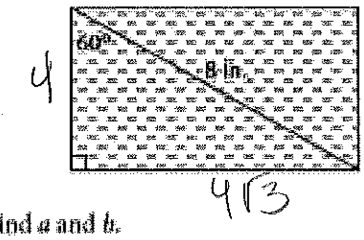
A. 4
B. $4\sqrt{2}$
C. $4\sqrt{3}$
D. $8\sqrt{3}$

10. A ladder leaning against a house makes an angle of 60° with the ground. The foot of the ladder is 7 feet from the house. How long is the ladder?

14 feet

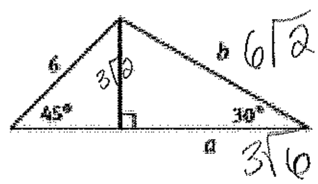
11. An equilateral triangle has a side length of 4 ft. What is the area of the triangle?
A. 12 ft^2
B. $4\sqrt{3}$ ft^2
C. 6 ft^2
D. $2\sqrt{3}$ ft^2

12. What is the area of the quilt patch, as a simplified radical?



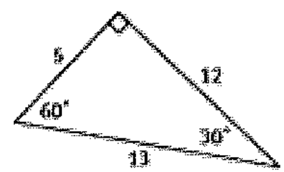
$16\sqrt{3}$ in^2

13. Find a and b.



MATHEMATICAL PRACTICES
Construct Viable Arguments and Critique the Reasoning of Others

14. Brayden's teacher asked him to draw a 30°-60°-90° right triangle. He drew the figure shown. Tell why it is not possible for Brayden's triangle to exist.

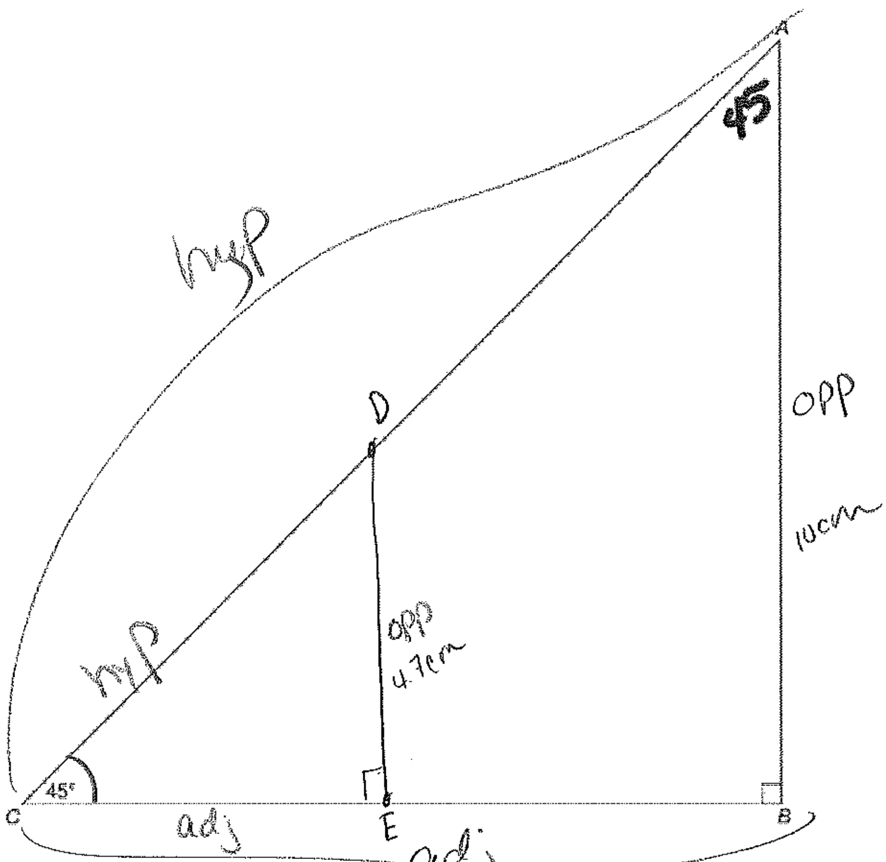


They aint in the ratio $x : x\sqrt{3} : 2x$

Geometry Unit 7 Day 5

Learning Target – Students will understand that similar triangles allow us to define the trig ratio.

Triangle *ABC* shown is a 45°-45°-90° triangle.



1. Draw a vertical line segment, *DE*, connecting the hypotenuse of triangle *ABC* with side $\overline{BC}$. Label the endpoint of the vertical line segment along the hypotenuse as point *D*. Label the other endpoint as point *E*.

2. Explain how you know that triangle ABC is similar to triangle DEC.

AA~ ∠C ≅ ∠C
and ∠E ≅ ∠B

3. ~~AB=~~ 4.7cm and DE= 10cm. ~~Find the other side lengths of both triangles.~~

use a ruler to measure in cm

$CE = 4.7cm$ $CB = 10cm$

$CD = 4.7\sqrt{2}$ $CA = 10\sqrt{2}$

~~without measuring~~

You know that the hypotenuse of a right triangle is the side that is opposite the right angle. In trigonometry, the legs of a right triangle are often referred to as the *opposite side* and the *adjacent side*. These references are based on the angle of the triangle that you are looking at, which is called the **reference angle**. The **opposite side** is the side opposite the reference angle. The **adjacent side** is the side adjacent to the reference angle that is *not* the hypotenuse.

Add a picture

4. For triangles *ABC* and *DEC*, identify the opposite side, adjacent side, and hypotenuse, using angle *C* as the reference angle.

5. Determine each side length ratio for triangles *ABC* and *DEC*, using angle *C* as the reference angle. Write your answers as decimals rounded to the nearest thousandth.

		$\triangle ABC$	$\triangle DEC$
sin	**a.** $\dfrac{\text{side opposite } \angle C}{\text{hypotenuse}}$	$\frac{4.7}{4.7\sqrt{2}} = \frac{1}{\sqrt{2}}$	$\frac{10}{10\sqrt{2}} = \frac{1}{\sqrt{2}}$
cos	**b.** $\dfrac{\text{side adjacent to } \angle C}{\text{hypotenuse}}$	$\frac{4.7}{4.7\sqrt{2}} = \frac{1}{\sqrt{2}}$	$\frac{10}{10\sqrt{2}} = \frac{1}{\sqrt{2}}$
tan	**c.** $\dfrac{\text{side opposite } \angle C}{\text{side adjacent to } \angle C}$	$\frac{4.7}{4.7} = 1$	$\frac{10}{10} = 1$

teach this?

This got screwed up in printing

6.

a. $\frac{\text{length of opposite leg}}{\text{length of hypotenuse}} =$

b. $\frac{\text{length of adjacent leg}}{\text{length of hypotenuse}} =$

c. $\frac{\text{length of opposite leg}}{\text{length of adjacent leg}} =$

Write each ratio in simplest form.

$\sin X =$ ______

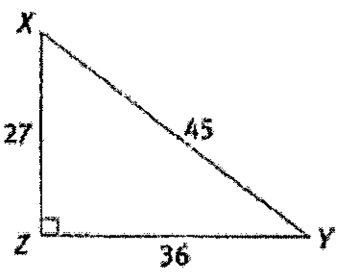
$\cos X =$ ______

$\sin Y =$ ______

$\cos Y =$ ______

$\tan X =$ ______

$\tan Y =$ ______

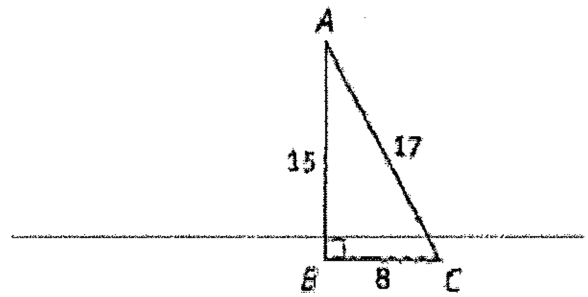


a. For $\triangle ABC$, write the ratios in simplest form.

$\sin A =$ $\sin C =$

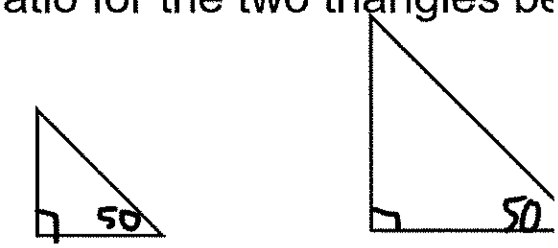
$\cos A =$ $\cos C =$

$\tan A =$ $\tan C =$



9.

Reflection - Explain why tar
ratio for the two triangles be



keep

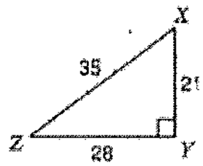
Geometry Unit 7 Day 5 HW

Find day 5 ...

more this class work for Day 6

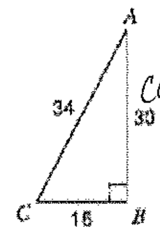
Find the value of each trigonometric ratio.

1) $\tan Z$



$\tan Z = \frac{21}{28} = \frac{3}{4}$

2) $\cos C$

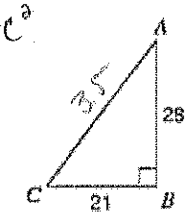


$\cos C = \frac{16}{34} = \frac{8}{17}$

3) $\sin C$

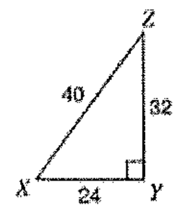
$21^2 + 28^2 = AC^2$

$AC = 35$



$\sin C = \frac{28}{35} = \frac{4}{5}$

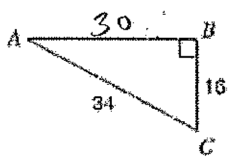
4) $\tan X$



$\tan X = \frac{32}{24} = \frac{4}{3}$

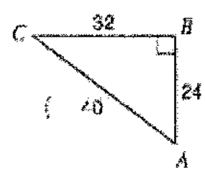
5) $\cos A$

$16^2 + AB^2 = 34^2$



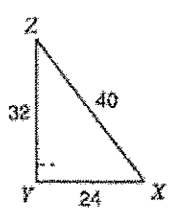
$\cos A = \frac{16}{30} = \frac{8}{15}$

6) $\sin A$



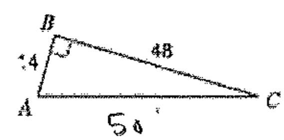
$\sin A = \frac{32}{40} = \frac{4}{5}$

7) $\sin Z$



$\sin Z = \frac{24}{40} = \frac{3}{5}$

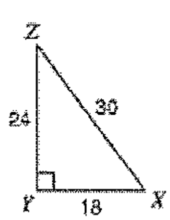
8) $\sin C$



$14^2 + 48^2 = AC^2$

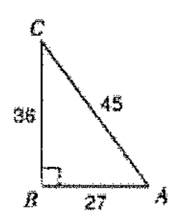
$\sin C = \frac{14}{15} = 7/25$

9) $\cos Z$



$\cos Z = \frac{18}{30} = \frac{3}{5}$

10) $\tan C$



$\tan C = \frac{27}{36} = \frac{3}{4}$

Geometry Unit 7 Day 6 Using trig ratios to find sides

Learning Target – Students will use the trig ratios to find side lengths in right triangles.

1.) Find the length of x to the thousandths place

~~Set up the trigonometric ratio involving the given side lengths.~~

2.) We will solve them together ~~Find the sides~~

Remove

1)

$x \cdot \cos 72 = \frac{6}{\cancel{x}} \cdot \cancel{x}$

$\frac{x \cdot \cancel{\cos 72}}{\cancel{\cos 72}} = \frac{6}{\cos 72}$

$x = 19.416$

2)

$6 \cdot \cos 73 = \frac{x}{\cancel{6}} \cancel{\cdot 6}$

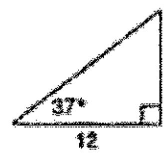
$1.754 = x$

3)

$12 \cdot \tan 24 = \frac{x}{12} \cdot 12$

$x = 5.343$

4)



$12 \cdot \tan 37 = \frac{x}{\cancel{12}} \cancel{\cdot 12}$

$9.043 = x$

6)

$x \cdot \sin 51 = \frac{14}{x} \cdot x$

$\frac{x \cdot \cancel{\sin 51}}{\cancel{\sin 51}} = \frac{14}{\sin 51}$

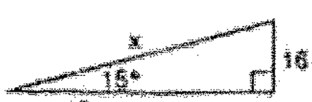
$x = 18.015$

11)

$29 \cdot \sin 19 = \frac{x}{29} \cdot 29$

$9.441 = x$

8)

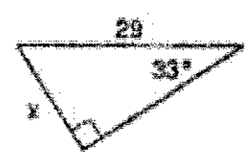


$x \cdot \sin 15 = \frac{16}{x} \cdot x$

$\frac{x \cdot \sin 15}{\sin 15} = \frac{16}{\sin 15}$

$x = 61.820$

13)

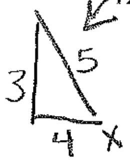


$29 \cdot \sin 33 = \frac{x}{29} \cdot 29$

$15.795 = x$

$3^2 + 4^2 = 5^2$

1. If $\tan X = \frac{3}{4}$, find $\sin X$ and $\cos X$.

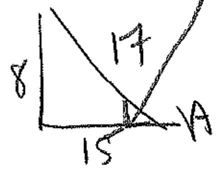


$\sin x = \frac{3}{5}$

$\cos x = \frac{4}{5}$

$17^2 = 8^2 + b^2$

2. If $\sin A = \frac{8}{17}$, find $\tan A$ and $\cos A$.



$\tan A = \frac{8}{15}$

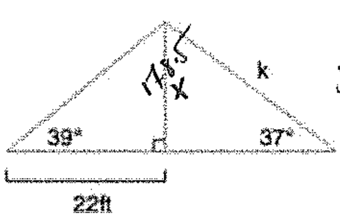
$\cos A = \frac{15}{17}$

3. Use the diagram to solve for k.

k = 29.603 ft

$\tan 39 = \frac{x}{22}$

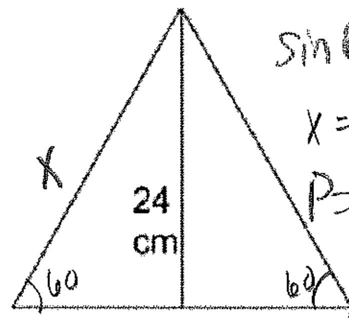
$x = 17.815$



$\sin 37 = \frac{17.815}{K}$

$K = 29.603$

4. Find the perimeter of the equilateral triangle if the altitude is 24 cm.



$\sin 60 = \frac{24}{x}$

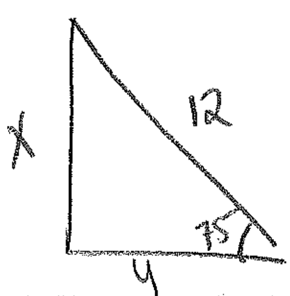
$x = 27.713$

$P = 27.713$
$\times 3$

83.138 cm

Make sense of problems. Tricia did such an exceptional job creating logos that she was given the task of making a banner and representing her company at a job fair. When Tricia got to the job fair, she was relieved to see there was a ladder she could use to hang the banner. While Tricia waited for someone to help her, she leaned the 12-foot ladder against the wall behind the booth. The ladder made an angle of 75° with the floor.

a. Use the information above to draw and label a right triangle to illustrate the relationship between the ladder and the wall.



b. Set up and solve an equation to find how far up the wall the top of the ladder reaches. $\sin 75 = \frac{x}{12}$ $\quad x = 11.591$

c. Find the distance from the base of the wall to the base of the ladder using two different methods.

$11.591^2 + y^2 = 12^2$

$y^2 = 9.646$

$y = 3.106$

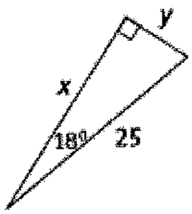
Geometry Unit 7 Day 6 HW

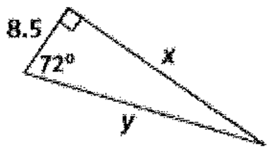
7. Find each unknown side length.

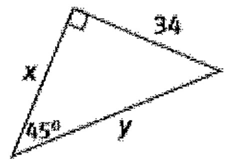
a. $x =$ 23.725 $y =$ 7.725

b. $x =$ 26.160 $y =$ 27.501

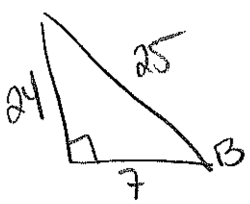
c. $x =$ 34 $y =$ 48.083 or $34\sqrt{2}$







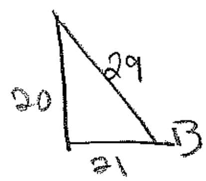
1. If $\cos B = \frac{24}{25}$, find $\sin B$ and $\tan B$.



$\sin B = \frac{24}{25}$

$\tan B = \frac{24}{7}$

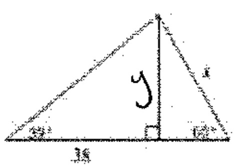
2. If $\tan B = \frac{20}{21}$, find $\sin B$ and $\cos B$.



$\sin B = \frac{20}{29}$

$\cos B = \frac{21}{29}$

1)

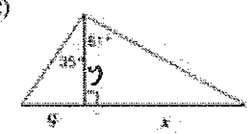


$\tan 39 = \frac{y}{38}$

$\sin 60 = \frac{30.772}{x}$

$x = 35.532$

2)



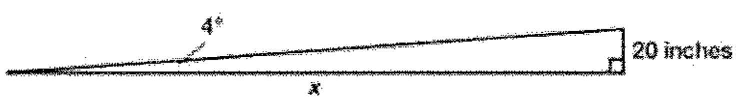
$\tan 35 = \frac{9}{y}$

$y = 12.853$

$\tan 61 = \frac{x}{12.853}$

$x = 23.188$

5. Construction workers are building a wheelchair ramp for a local family home and need to make sure the front sidewalk leading up to the door is long enough. The sidewalk length is 25 feet. If the ramp is to be made with the dimensions shown, determine if the sidewalk is long enough.



$\tan 4 = \frac{20}{x}$

$x = 286.1013$

6.

Another proposed wheelchair ramp is shown. What is the rise of this ramp? If necessary, round your answer to the nearest inch.

$\tan 4 = \frac{x}{100}$

$x = 6.993$

Geometry Unit 7 Day 7 Using trig ratios to find angles.

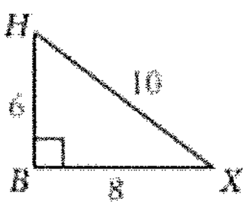
Learning Target – students will use the inverse trig ratios to calculate the angles measures of right triangles.

- You have already learned to use trig ratios to find side lengths of right triangles.
- Today we need to learn to use trig ratios to find angle measures in right triangles.
- If the angle is unknown, the equation may look like $sin\ x = \frac{4}{5}$
- What do you need to do to isolate x?

get rid of the sin. So we use inverse of sine $\sin^{-1}$.

1. Example

The lengths of the sides of $\triangle BHX$ are given. Find $m\angle X$ to the nearest degree.



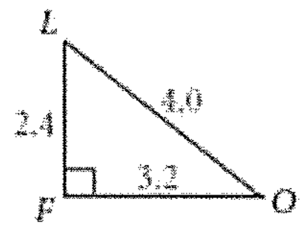
$\tan X = \frac{6}{8}$

$X = \tan^{-1}\left(\frac{6}{8}\right)$

$X = 36.870$

2. You try.

Find $m\angle L$ to the nearest degree.



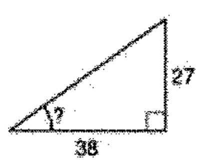
$\sin L = \frac{3.2}{4.0}$

$L = \sin^{-1}\left(\frac{3.2}{4.0}\right)$

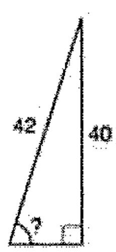
$L = 53.130$

Practice

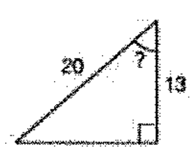
Find the measure of the indicated angle to the nearest degree.



1.



2.



3.

$\tan x = \frac{27}{38}$

$X = 35.395$

$\sin X = \frac{40}{42}$

$X = 72.247$

$\cos X = \frac{13}{20}$

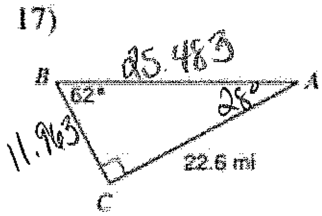
$X = 49.458$

Make this

Add a day here!

Solve each right triangle. Find all side lengths and all angle measures.

17)



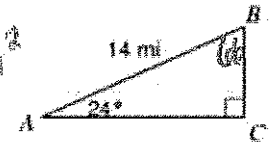
$\tan 28 = \frac{BC}{22.5}$

$BC = 11.963$

$11.963^2 + 22.5^2 = BA^2$

$BA = 25.483$

22)



$\sin 24 = \frac{BC}{14}$

$BC = 5.694$

$AC^2 + 5.694^2 = 14^2$

$AC = 12.790$

23. A skateboard ramp has a slope of 4/9. What is the measure of the angle the ramp forms with the ground? 4 9 X $\tan X = \frac{4}{9}$ $X = 23.962$

24. Given that $\sin B = \frac{24}{25}$

a. Draw right triangle ABC with right angle C and label the side lengths. A 25 24 C 7 B

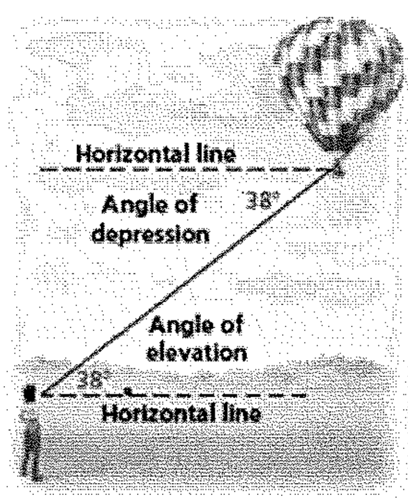
b. Determine the length of the missing side. $25^2 = 24^2 + CB^2$

$CB = 7$

c. Find tan B. $\tan B = \frac{24}{7}$

c. Find the measure of angle A. $\sin A = \frac{7}{25}$ $A = 16.260$

Today I will teach you to apply inverse trig functions to solve problems about angles of elevation and depression.



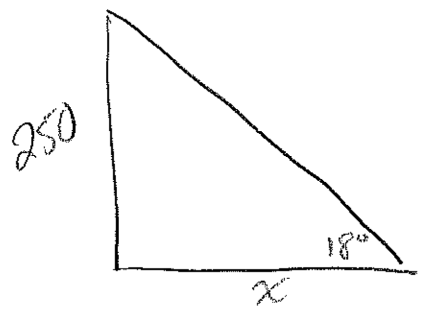
- Identify the special relationship between pairs of lines and pairs of angles in the picture to the left.

- We can use angles of elevation and depression to help us measure objects and distances indirectly. Erathosthenes did this over 2000 years ago to measure the circumference of the Earth.

Examples

Indirect Measurement Miguel looks out from the crown of the Statue of Liberty approximately 250 ft above ground. He sights a ship coming into New York harbor and measures the angle of depression as 18°. Find the distance from the base of the statue to the ship to the nearest foot.

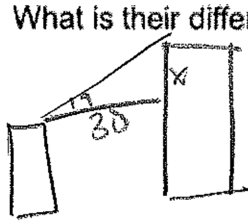
1.



X = 769 feet

Two buildings are 30 feet apart. The angle of elevation from the top of one to the top of the other is 19 degrees. What is their difference in height?

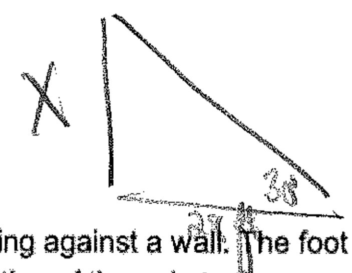
2.



X = 10.330 feet

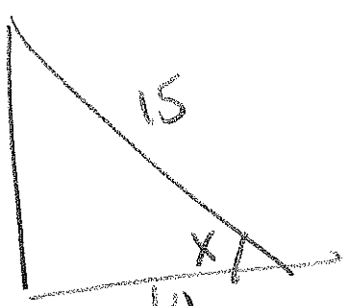
Practice

1. The angle of elevation of the top of a tree is 30° from a point 28 ft. away from the foot of the tree. Find the height of the tree rounded to the nearest feet.



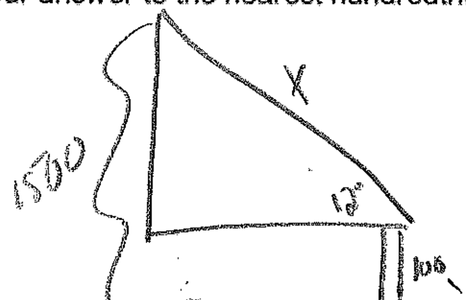
16feet

2. A 15 m pole is leaning against a wall. The foot of the pole is 10 m from the wall. Find the angle the angle of elevation of the pole to the nearest hundredth.



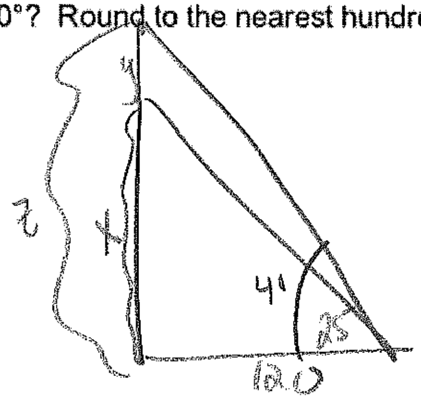
48.19°

3. The angle of depression from a helicopter flying at an altitude of 1500 feet is 12°. How far will the helicopter fly before it reaches the landing pad on top of a hospital that is 100 feet tall? Round your answer to the nearest hundredth.



7114.60 feet

4. The angle of elevation of an unfinished tower from a point 120 m away from its base is 25°. How much higher should the tower be raised so that its angle of elevation from the same point will be 40°? Round to the nearest hundredth.



x = 55.957

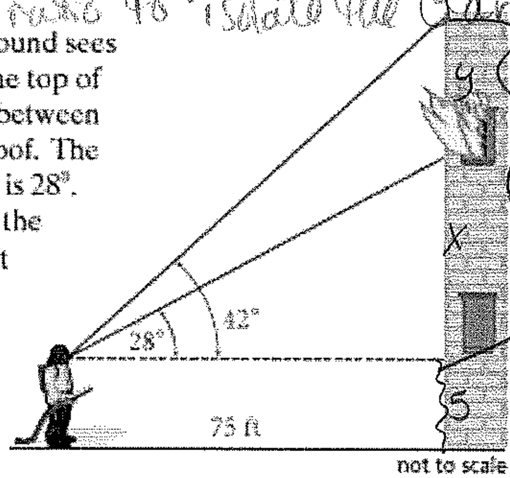
z = 100.692

y = 44.74 feet

5. Describe the difference in using a trig ratio to find a side length and using a trig ratio to use an angle measure.

when using a trig ratio to find a side length you do not need to use an inverse trig ratio. you just need to either × or divide to isolate the variable. But when solving for the angle measure you need an inverse trig ratio to isolate the variable

29. Firefighting A firefighter on the ground sees fire break through a window near the top of the building. There is voice contact between the ground and firefighters on the roof. The angle of elevation to the windowsill is 28°. The angle of elevation to the top of the building is 42°. The firefighter is 75 ft from the building and her eyes are 5 ft above the ground. What roof-to-windowsill distance can she report to the firefighters on the roof? [redacted]



6.

x = 39.878

z = 67.530

y = 27.652 feet