

Geometry Assignments: Trigonometry

| Day | Topics | Homework | HW Grade | Quiz Grade |
|-----|---------------------------------|------------------|----------|------------|
| 1 | Intro to trig | HW Trig - 1 | | |
| 2 | Trigonometric ratios | HW Trig - 2 | | |
| 3 | Inverse Trigonometric Functions | HW Trig - 3 | | |
| 4 | Solving triangles | HW Trig - 4 | | |
| 5 | Word problems | HW Trig - 5 | | |
| 6 | Special angles and cofunctions | HW Trig - 6 | | |
| 7 | Practice | HW Trig - 7 | | |
| 8 | Review Day | HW Trig - Review | | |
| 9 | **TEST** | | | |

NOTE: Make sure your calculator is in **DEGREE** mode before using \sin , \cos , \tan , \sin^{-1} , \cos^{-1} or \tan^{-1} .

MODE

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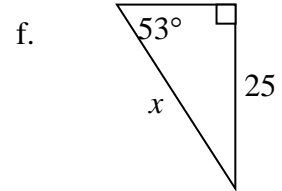
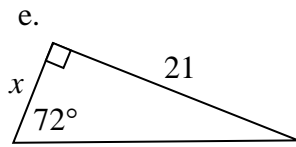
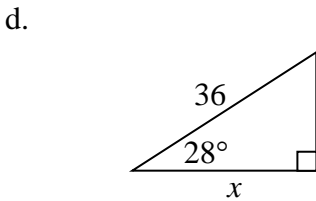
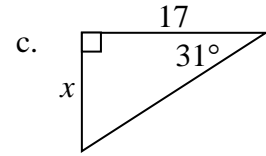
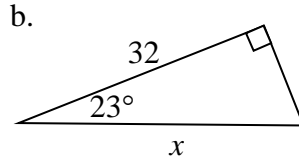
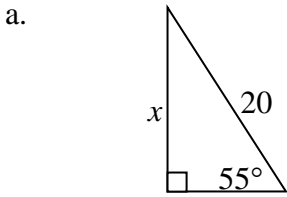
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(Highlight "degree" on line 3.)

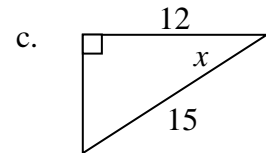
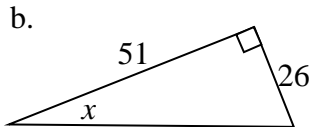
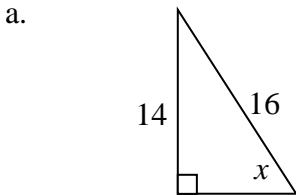
Geometry HW Trigonometry - 1

Use the table in the notes to do the following. Show work.

1. Solve for the missing side in each of the following diagrams.



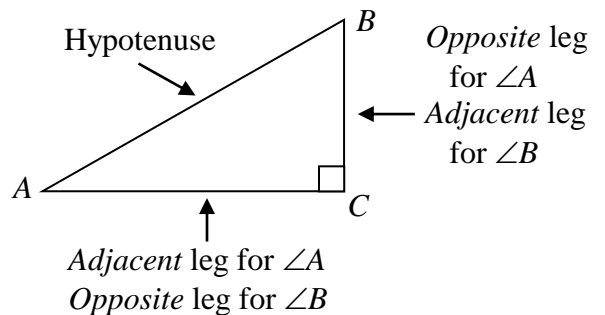
2. In each of the following, find the measure of $\angle A$ to the nearest degree.



3. a. Draw $\triangle ABC$ with right angle C . Choose any two different values to be the lengths of the legs. Find the length of the hypotenuse.

b. Find the value of opp/hyp, adj/hyp and opp/adj for angle A . Find the same ratios for angle B . How do the ratios for angle A compare to the ratios for angle B ?

You MUST know the terminology (opposite, adjacent and hypotenuse) in the diagram at right.

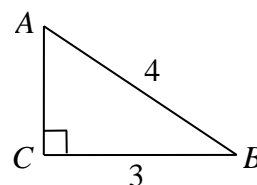


Geometry HW Trigonometry - 2

1. Use the diagram to find the numerical value of each trig function both as a fraction and as a decimal to the nearest ten-thousandth:

a. $\sin A$ b. $\cos A$ c. $\tan A$

d. $\sin B$ e. $\cos B$ f. $\tan B$



2. Experiment with your calculator to figure out the following. As the degree measure of angle A increases from 0° to 90° , determine whether the value of each of the following increases or decreases:

a. $\sin A$ b. $\cos A$ c. $\tan A$

3. Experiment some more on your calculator to decide if the following are True or False.
Important note: $\sin 2A$ means $\sin(2A)$; *not* $(\sin 2)A$.

a. $\sin 2A = 2\sin A$ b. $\cos 2A = 2\cos 2A$ c. $\tan 2A = 2\tan A$

3. In right triangle PQR , $PR = 24$, $QR = 7$ and hypotenuse $PQ = 25$. From that triangle:

a. Name two trig functions that have the value $\frac{24}{25}$.

b. Name two trig functions that have the value 0.28.

c. Name one trig function that has the approximate value 3.4286.

5. In ΔRST , R is a right angle and $\cos T = \frac{5}{7}$. Draw a possible diagram of ΔRST and find the values of

a. $\sin S$ b. $\cos S$ c. $\tan S$

d. $\sin^2 S + \cos^2 S$ **Important note:** $\sin^2 S$ means $(\sin S)^2$, *not* $\sin(\sin S)$ or $\sin(S^2)$.

6. Solve the following equations for x . Express answers to the nearest tenth.

a. $0.6235 = \frac{x}{12}$

b. $0.3528 = \frac{8}{x}$

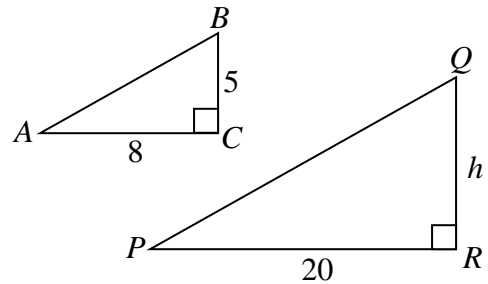
7. In the triangles at right, $\angle A \cong \angle P$.

a. Explain why the two triangles are similar.

b. Find the value of h .

c. Find $\tan A$ and $\tan P$ in decimal form.

d. Suppose a third right triangle contains $\angle K$ with $\angle K \cong \angle A$. Find $\tan K$.



8. Tim has a triangle with sides measuring 8, 15, and 17.

a. Is Tim's triangle a right triangle? Justify your answer.

b. If T is the larger acute angle in Tim's triangle, find the value of $\sin T$ as a fraction in simplest form.

9. Kim has a triangle that is similar to Tim's (see problem 8 above) but is exactly 692,317 times as large.

a. Is Kim's triangle a right triangle? Justify your answer.

b. If K is the larger acute angle in Kim's triangle, find the value of $\sin K$ as a fraction in simplest form.

10. Jim has a triangle with sides 17, 25 and 28. $\angle J$ is between the sides measuring 17 and 28.

a. Is Jim's triangle a right triangle? Justify your answer.

b. Jim's older brother Slim, who takes A2Trig, uses the Law of Cosines to show that $\angle J$ is congruent to $\angle T$ in Tim's triangle (problem 8 above). Find the value of $\sin J$ as a fraction in simplest form.

11. MacGyver is stranded on a desert island without his calculator. To get off the island, he is building a hang glider out of coconut shells and palm leaves. As part of the design, he needs to know $\sin 60^\circ$. Explain, concisely but completely, how MacGyver can find the answer to his problem.
12. a. Rufus has to solve the equation $3x = 36$. He decides to divide both sides by 3. Is this the correct thing to do? Explain why. (Note: “That’s just how you do it” or “That’s just not how you do it” are *not* explanations. Neither is “Mr. LaShomb said so.” Think of a more mathematical explanation.)
- b. Doofus has to solve the equation $\sqrt{x} = 36$. He decides to divide both sides by $\sqrt{\quad}$. Is this the correct thing to do? Explain why.

Geometry HW Trigonometry - 3

Use your calculator to find the value of x to the nearest degree for each of the following. No work is required for #1 – 6, just answers.

1. $\sin x = .8660$

2. $\cos x = .7071$

3. $\tan x = .3640$

4. $\sin x = \frac{1}{3}$

5. $\cos x = \frac{\sqrt{3}}{2}$

6. $\tan x = 3$

Solve the following equations. **Just an answer is NOT enough.** Show what you put into your calculator to find x . For example, $x = 15 \sin 36^\circ$ or $x = \tan^{-1}\left(\frac{12}{7}\right)$. Round all angles to the *nearest degree*. Round all other variables to the *nearest hundredth*.

7. $\tan 42^\circ = \frac{x}{16}$

8. $\sin x = \frac{12}{35}$

9. $\cos 56^\circ = \frac{12}{x}$

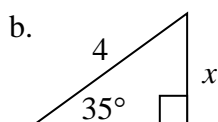
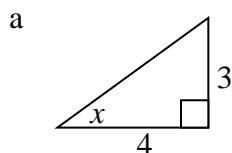
10. $\tan x = \frac{100}{8}$

11. $\cos x = \frac{5}{13}$

12. $\sin 25^\circ = \frac{15}{x}$

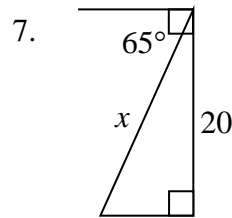
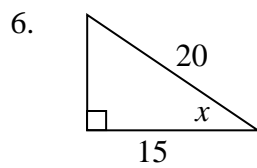
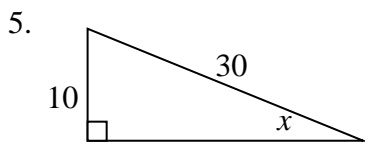
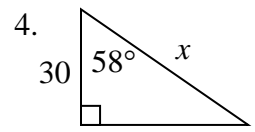
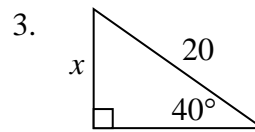
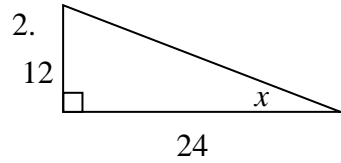
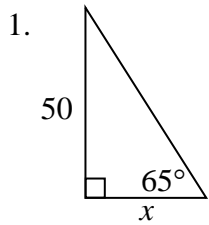
13. Rufus had to solve $\cos x = 0.8$. He used his calculator and got $x = 0.9999$ which he rounded to 1. His teacher, Mr. Hipparchus, marked him wrong. What was Rufus's mistake and what was the correct answer?

14. Find the value of x in each diagram below. Show work.

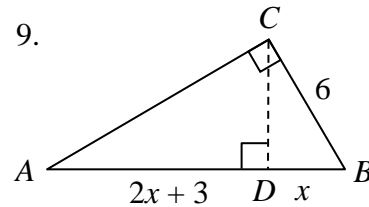
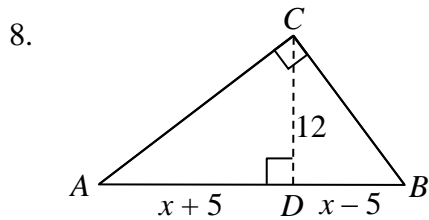


Geometry HW Trigonometry - 4

Use the information in each figure to *write an equation, solve the equation to get x by itself, and then find the value of x* . Round angles to the nearest degree and sides to the nearest hundredth.



For problems #8 and 9, first find the value of x . Then find $m\angle A$.

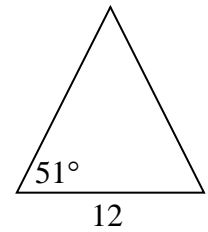


10. Triangle OMG has vertices $O(0, 0)$, $M(9, 3)$ and $G(10, 0)$.

a. Prove using coordinate geometry that $\triangle OMG$ is a right triangle.

c. Find $m\angle G$.

11. An isosceles triangle has a base of length 12 and base angles measuring 51° .
- a. Find the perimeter of the triangle to the nearest hundredth. (Note that you have a problem: You only know how to do trigonometry with *right* triangles. Figure out a way to fix this problem.)



- c. Find the area of the triangle to the nearest tenth.

12. The following question appeared on one of Mr. Hipparchus's math quizzes:

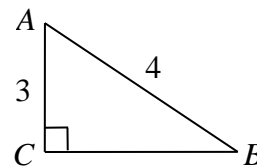
Using the diagram at right, find the value of $\sin A$.

Dolly wrote $\frac{x}{4}$.

Holly wrote $\frac{5}{4}$.

Molly wrote $\frac{\sqrt{7}}{4}$.

Polly wrote 41° .



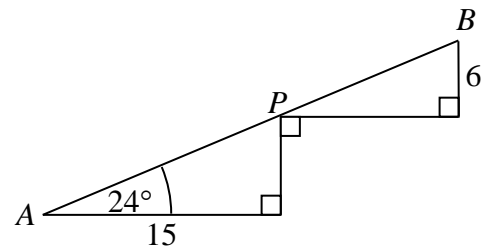
Who got full credit and why? (Try not to mess this up on a quiz.)

Geometry HW Trigonometry - 5

For each problem, draw an appropriate diagram, write an equation, solve the equation to get x by itself and then find the value of x .

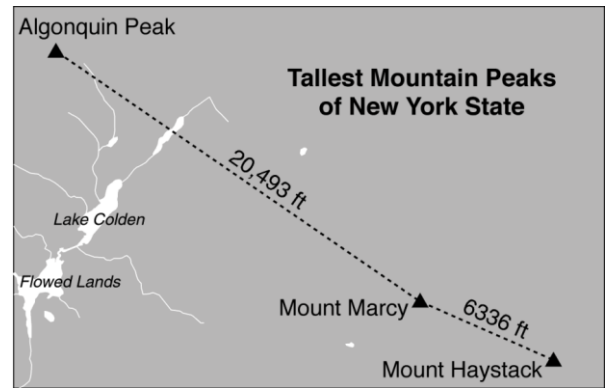
1. A guy wire (a wire used to stabilize something; not necessarily male) 115' long runs from a radio tower to a point on the ground 50' from the center of the tower's base. What angle does the wire make with the ground?
2. A tourist on the South Rim of the Grand Canyon observes a point on the North Rim at an angle of elevation of 1.2° . The canyon is 12 miles wide at that point. How many feet higher is the North Rim than the South Rim there?

3. Given that A , P and B are collinear, find the length of \overline{AB} in the diagram at right to the nearest tenth.



4. A boy flying a kite lets out 150' of string that makes an angle of 52° with the horizontal. The boy holds the end of the string at a height 3' above the ground. Assuming the string is stretched taut, find to the nearest foot how high the kite is above the ground.
5. Ralph is loading some stuff onto a truck with the help of a handcart. When he uses 10-foot long boards to make a ramp up to the back of his truck, the boards make an angle of 17.5° with the ground. This turns out to be too steep.
 - a. What will be the angle if he uses 16' long boards?
 - b. How much farther behind the truck will the 16' boards hit the ground compared to the 10' boards?

5. The map shows the three tallest mountain peaks in New York State: Mount Marcy, Algonquin Peak, and Mount Haystack. Mount Haystack, the shortest peak, is 4960 feet tall. Surveyors have determined the horizontal distance between Mount Haystack and Mount Marcy is 6336 feet and the horizontal distance between Mount Marcy and Algonquin Peak is 20,493 feet. The angle of depression from the peak of Mount Marcy to the peak of Mount Haystack is 3.47 degrees. The angle of elevation from the peak of Algonquin Peak to the peak of Mount Marcy is 0.64 degrees. What are the heights, to the *nearest foot*, of Mount Marcy and Algonquin Peak? Justify your answer. (All you people who think my problems are too hard, please note that this problem came from the most recent sample geometry Regents problems from State Ed.)

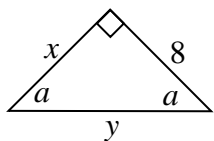


7. Rufus wants to rig a zip line from the flat roof of a tall building to the flat roof of a shorter nearby building. From the roof of the shorter building, 30 feet above the ground, the angle of depression to the base of the taller building is 14.036° and the angle of elevation to the roof of the taller building is 22.620° . Find the length of the zip line. (It's helpful to first find the distance between the buildings.)

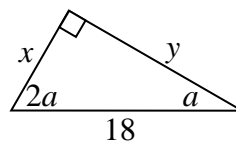
Geometry HW Trigonometry - 6

1. In each diagram, find the values of a , x and y . Irrational answers may be left in radical form. In both problems, a represents the measure of an angle; x and y represent the measures of sides,

a.



b.



2. Find a value of θ (in degrees) that will solve each equation.

a. $\sin \theta = \cos 35^\circ$

b. $\cos \theta = \sin(3\theta)$

c. $\sin \theta = \cos\left(\frac{1}{2}\theta + 30\right)$

d. $\cos 4\theta = \sin(\theta^2 - 6)$

d. $\cos \theta = \sin(90 - \theta)$

3. Find the exact value of each of the following without using your calculator.

a. $\sin 30^\circ$

b. $\cos 30^\circ$

c. $\tan 30^\circ$

d. $\sin 45^\circ$

e. $\cos 45^\circ$

f. $\tan 45^\circ$

g. $\sin 60^\circ$

h. $\cos 60^\circ$

i. $\tan 60^\circ$

4. Triangle ABC has vertices $A(3, 6)$, $B(4, -2)$, and $C(0, 4)$.

a. Show using coordinate geometry that $\angle C$ is a right angle.

b. Find the lengths of \overline{AC} and \overline{BC} .

d. Find the measure of $\angle A$ to the nearest degree.

6. Doofus has a tree house 17 feet off the ground. His neighbor Goofus has an even higher tree house. From Doofus's tree house, the angle of elevation to Goofus's tree house is 18° . The angle of depression to the bottom of the tree containing Goofus's tree house is 23° .

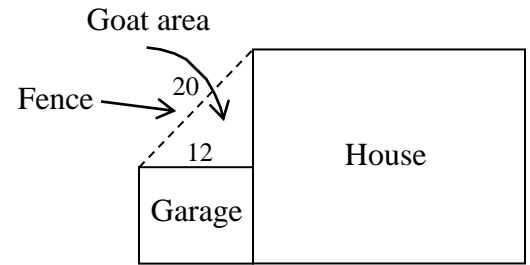
7.

a. How far apart are Doofus's and Goofus's trees to the nearest foot?

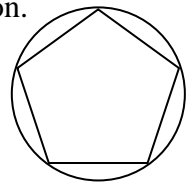
b. How high is Goofus's tree house to the nearest foot?

Geometry HW Trigonometry - 7

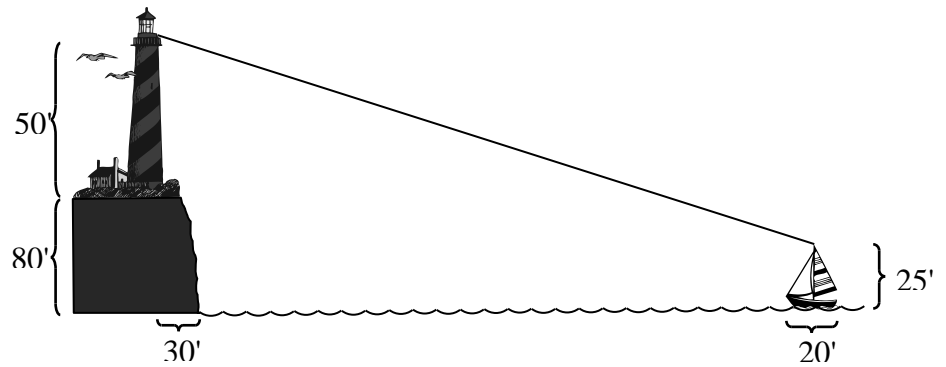
1. Orville Gunkmeuller's 12 foot wide one-car garage sticks out to the side of his house. He has a twenty foot length of single strand electric fence running from the far corner of the garage to the back corner of the house forming a triangular area to keep his goats in. (See diagram at right; you might want to redraw the goat area on your own paper.) After winning the lottery, Orv buys a new car, boat, snowmobile and four-wheeler and decides to double the width of his garage.



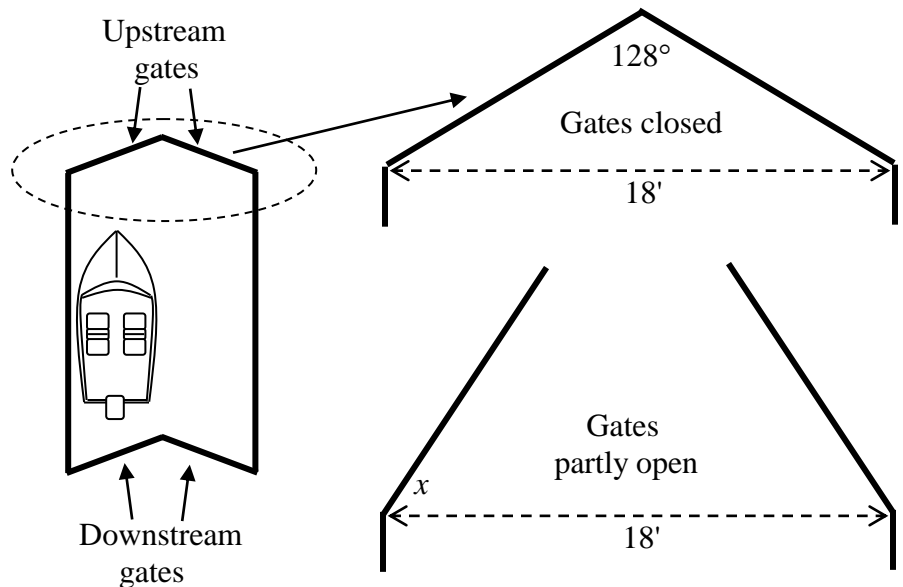
- a. How much *additional* wire will Orv need to fence in the new triangle formed by the house and garage?
- b. To the nearest degree, what angle will the new fence make with the side of the house?
2. A climber is scaling a vertical cliff face. Her boyfriend is watching her through binoculars while sitting on the ground 100' feet from the base of the cliff. From where he sits, the angle of elevation to the climber is 35° and the angle of elevation to the top of the cliff is 61° . **How far is the climber from the top of the cliff?**
3. Ashlinn rides a Ferris wheel having a radius of 30 feet and with its lowest point 4 feet above the ground. Let A represent Ashlinn and C represent the center of the Ferris wheel. When the wheel stops to let passengers off and on, the angle between \overline{AC} and the horizontal is 40° . **How high is Ashlinn above the ground?**
4. A regular pentagon is inscribed in a circle of radius 8. Find the perimeter of the pentagon. (Suggestion: Draw radii to two consecutive vertices of the pentagon, find the measure of the vertex angle of the triangle, then drop an altitude.)



5. A sailboat sails toward a lighthouse atop a steep cliff (see diagram, not even close to scale). The angle of depression from the deck of the lighthouse to the top of the mast of the sailboat is 3.3° . **To the nearest foot, how far is the bow (front) of the sailboat from the base of the cliff?**



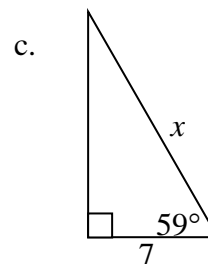
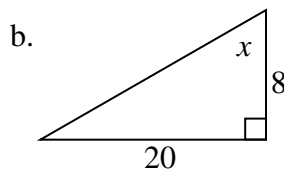
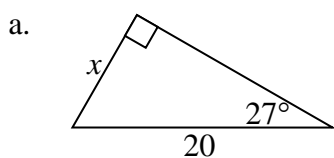
6. A lock* on the Dreary Canal is 18 feet wide. When closed, the gates form an angle of 128° . The gates part in the middle and swing open to let boats into and out of the lock.
- How wide is each lock gate?
 - What minimum angle x (see diagram) must the gates make to create an opening that a boat 8 feet wide could fit through?
- *For those who don't know, a lock is like a boat elevator. The boat goes in, the gates close, and then water is either let into or let out of the lock to make the boat go up or down.



Geometry HW Trigonometry - Review

1. What is the perimeter of an equilateral triangle whose altitude is 9?
2. What is the exact value of $\tan 30^\circ$? (Note: the answer is *not* 0.57735026919)
3. Find a value of A for which $\cos A = \sin(3A - 40)$.
4. In right triangle ABC , if $m\angle C = 90$ and $\cos A = 8/17$, what is $\tan B$?

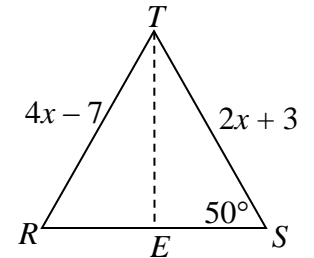
5. Solve for x in each figure.



5. In $\triangle ABC$, $\angle C$ is a right angle. If $BC = a$, $AC = b$, and $AB = c$,
- a. What trig function has the same value as $\sin A$?
 - b. What trig function has the same value as $\cos A$?
 - c. How are the values of $\tan A$ and $\tan B$ related?
7. a. The intermediate ski slope at Gory Mountain is angled 24° from the horizontal. If Suzy Slalom skis 120 yards down the slope, what horizontal distance has she traveled?
- b. While skiing 180 yards down the expert slope at Gory Mountain, Suzy drops a vertical distance of 120 yards. What (average) angle does the expert slope make with the horizontal?

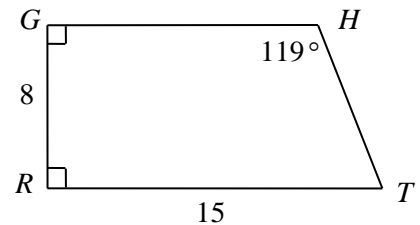
8. The extension ladder on a fire truck is extended to a total length of 32'. The base of the ladder is on top of the truck and about 8 feet off the ground. What angle does the ladder have to make with the horizontal to reach the bottom of a window 36' above the ground?

8. (This problem is in honor of Jaime Wilson, who made it up.) In the diagram, $\triangle RST$ is isosceles with $\angle R \cong \angle S$ and altitude \overline{ET} . If $RT = 4x - 7$, $ST = 2x + 3$ and $m\angle S = 50^\circ$, find



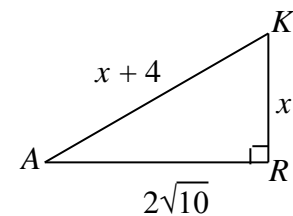
- the length of \overline{ET} and
- the length of the base \overline{RS} .

9. In trapezoid $RGHT$, R and G are right angles, $m\angle H = 119^\circ$, $RG = 8$, and $RT = 15$.



- Find the area of $RGHT$ to the nearest tenth.
- Find the perimeter of $RGHT$ to the nearest tenth.
- Find the length of diagonal \overline{RH} to the nearest tenth.
- Find to the nearest degree the measure of $\angle HRT$.

11. Use the diagram of $\triangle ARK$ to answer the following.



- find the value of x .
- Find the numerical value of $\sin A$.
- Name another trig function with the same value as $\sin A$.
- Find the measure of $\angle K$ to the nearest degree.

12. A small aircraft is 8 miles horizontally from its intended runway and flying 5100 feet above the ground. For a normal landing, the pilot wants to begin his final approach at an altitude of 500' and maintain an angle of descent of 3° . What angle of descent must the plane fly from its present position to the beginning of its final approach? In the diagram, the aircraft starts at A , final approach begins at F , and the runway is at R .

