

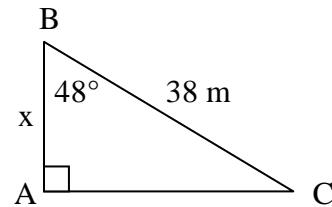
Part II) Practice Problems

1. Calculate the value of x to the nearest tenth: $\sin 38^\circ = \frac{x}{80}$

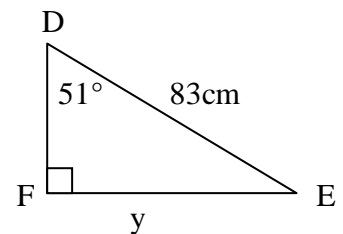
2. Calculate the value of y to the nearest tenth: $\cos 52^\circ = \frac{y}{80}$

3. Calculate the value of z to the nearest hundredth: $\tan 24^\circ = \frac{z}{34.627}$

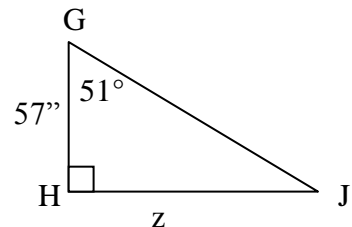
4. Determine the length of side x to the nearest tenth.



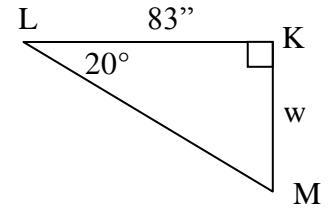
5. Determine the length of side y to the nearest hundredth.



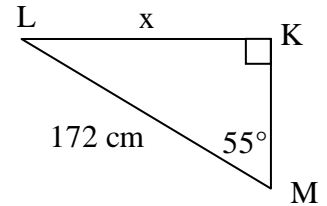
6. Determine the length of side z to the nearest inch.



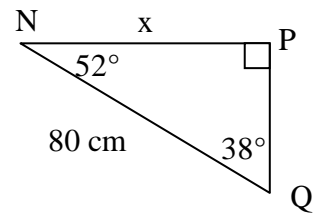
7. Determine the length of side w to the nearest inch.



8. Determine the length of side x to the nearest hundredth.



9. For the triangle pictured, Marcy placed her finger on the 38° angle and concluded that $\sin 38^\circ = \frac{x}{80}$. Likewise, Timmy placed his finger on the 52° angle and concluded that $\cos 52^\circ = \frac{x}{80}$.



a) If you solve it Marcy's way, what answer will she get?

b) If you solve it Timmy's way, what answer will he get?

c) Are these results reasonable? Explain.

Part III) Challenge Problems

10. As we saw in problem 9, there is a connection between $\sin 38^\circ$ and $\cos 52^\circ$.

a) How are the angles 38° and 52° geometrically related? (Think back to what you know about angles from Geometry.)

b) Make a conjecture based on problems 9 and 10a: The sine of 20° must be equal to the cosine of _____ $^\circ$ because the two angles _____.

c) State your conjecture as a formula: $\sin \theta =$ _____

d) Verify that your formula works correctly for $\theta = 37^\circ$.

11. Error Analysis: Consider the following equation: $\tan 24^\circ = \frac{34.627}{z}$

a) Calculate the value of z to the nearest hundredth.

b) Substitute your answer for z into the expression $\frac{34.627}{z}$ and show that it really is the same as $\tan 24^\circ$.

c) If your answers match, move on to the next problem. If your answers don't match, you probably multiplied both sides of the equation in part (a) by 34.627. Redo the problem by multiplying both sides by z or by using cross-multiplication. It may help to refer back to example 3.

12. Consider the equation $\tan 74^\circ = \frac{x}{58\text{cm}}$

a) Sketch and label a right triangle that matches this equation.

- b) Solve for x . Round to the nearest hundredth.

- c) Determine the hypotenuse of your triangle. Round to the nearest hundredth.

- d) Use the Pythagorean Theorem to confirm that this is, in fact, a right triangle.

13. Consider the following information: In $\triangle ABC$ with right $\angle C$, the measure of $\angle A = 31^\circ$. The length of side AB is 42cm.

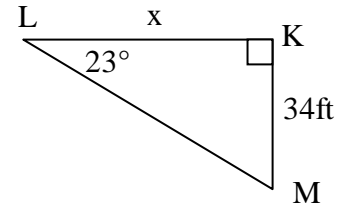
- a) Sketch and label a right triangle that matches this description.

- b) Determine the length of side BC .

- c) Determine the length of the third side.

(continued on next page)

14. Error Analysis: Consider the right triangle pictured at right, which Camryn and Isabel are both trying to solve. They both set it up using the equation $\tan 23^\circ = \frac{34}{x}$

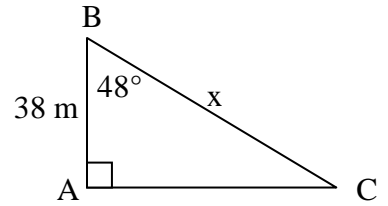


The steps of their work is shown below. Analyze their work and determine who, if anyone, is doing it correctly.

| Camryn's work | Isabel's work |
|--|---|
| $\tan 23^\circ = \frac{34}{x}$ $34 \cdot \tan 23^\circ = 34 \cdot \frac{34}{x}$ $34 \tan 23^\circ = x$ $x = 14.43$ | $\tan 23^\circ = \frac{34}{x}$ <p><i>rewrite over 1:</i></p> $\frac{\tan 23^\circ}{1} = \frac{34}{x}$ <p><i>cross - multiply :</i></p> $x \cdot \tan 23^\circ = 34$ $\frac{x \cdot \tan 23^\circ}{\tan 23^\circ} = \frac{34}{\tan 23^\circ}$ $x = \frac{34}{\tan 23^\circ}$ $x = 80.10$ |

15. Consider the triangle at right:

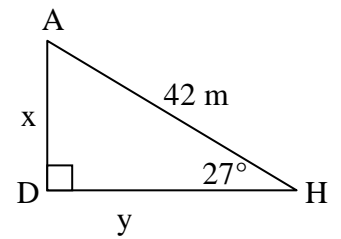
- a) Determine the length of side x to the nearest tenth.



- b) Is side x , the hypotenuse, actually longer than 38 m? If not, find your error.

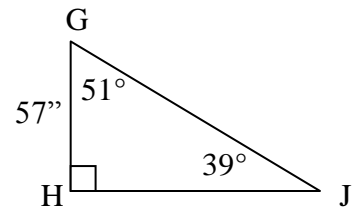
16. Answer the following questions about $\triangle DAH$:

- a) How long is side x ? [Hint: Ignore side y . Just pretend it's erased for a minute.]



- b) How long is side y ? [Hint: Ignore side x – just pretend it got erased for a minute.]

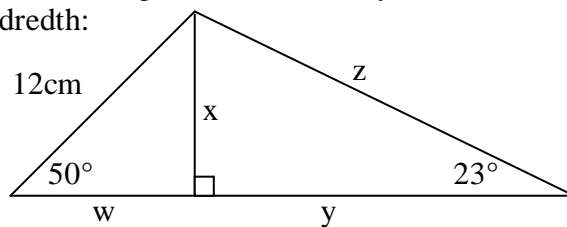
17. Determine the perimeter of the following triangle:



18. A 32-foot ladder is leaning against a tree. The ladder forms a 72° angle with the ground, not the tree. Assuming the tree is growing straight up:

- Make a labeled sketch of the situation.
- How high up the tree does the ladder reach?
- How far away from the tree is the base of the ladder?

19. Determine the lengths of sides w , x , y , and z in the figure. Round answers to the nearest hundredth:



Part IV) Answer Key

1. 49.3
2. 49.3
3. 15.42
4. 25.4 m
5. 64.50 cm
6. 70"
7. 30"
8. 140.89 cm
9.
 - a) 49.3 cm
 - b) 49.3 cm
 - c) These results match, which is reasonable, because it's the same triangle and both are solving for the same side.
10.
 - a) These two angles are complementary; their measures add up to 90°.
 - b) The sine of 20° must be equal to the cosine of 70° because the two angles are complementary (or their measures add up to 90°).
 - c) $\sin \theta = \cos(90^\circ - \theta)$
 - d)

$$\sin 37^\circ = \cos(90^\circ - 37^\circ)$$

$$\sin 37^\circ = \cos(53^\circ) \quad ; \text{ Yes, it checks.}$$

$$0.602 = 0.602$$

11. Consider the following equation: $\tan 24^\circ = \frac{34.627}{z}$

a) Correct answer is 77.77; (Note: the most common wrong answer is 15.42.)

b)

$$\tan 24^\circ = \frac{?}{77.77} \quad ; \text{ yes, it matches. (Note: some will get } 0.445 \neq 2.25)$$

$$0.445 = \frac{?}{0.445}$$

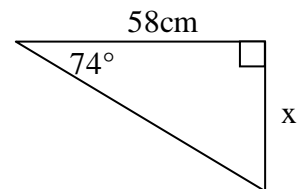
c) Students who found it matched move on; those who didn't should go back and multiply both sides by z or cross-multiply instead of multiplying both sides by 34.627.

12. a) One possible sketch is shown at right:

b) 202.27 cm

c) 210.42 cm

d)

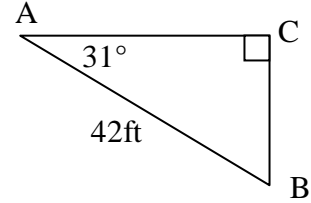


$$58^2 + 202.27^2 = 210.42^2$$

$3364 + 40913.1529 = 44276.5764$; This is within roundoff error.

$$44277.1529 = 44276.5764$$

13. a) One possible sketch is shown at right:
 b) 21.63 cm
 c) 36.00 cm



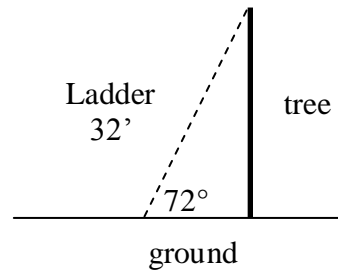
14. Camryn is incorrectly multiplying both sides by the numerator; Isabel's procedure is correct.

15. a) 56.8 m (Note: the most common wrong answer is 25.4 m).
 b) Yes, the hypotenuse is longer than the leg.

16. a) 19.07 m
 b) 37.42 m

17. 217.96"

18. a) One possible sketch is shown at right.
 b) 30.43 feet
 c) 9.89 feet



19. w = 7.71 cm
 x = 9.19 cm
 y = 21.66 cm
 z = 23.53 cm