MAT-222-840

Name: _____

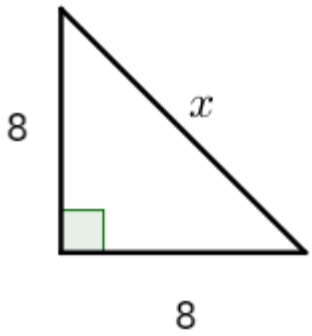
Team Problems for Chapter 9

Date: _____

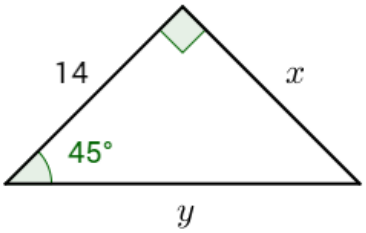
Problem #1: Special Right Triangles

1. Find the value of each variable in the following figures.

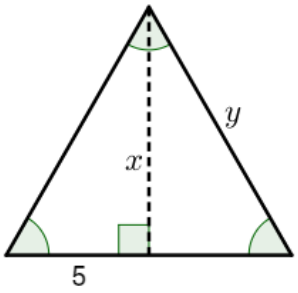
a.



b.



c.



Problem #2: More Special Right Triangles

1. The perimeter of a square is 48 meters. Find the length of its diagonal.

2. The perimeter of an equilateral triangle is 18 feet. Find the length of its altitude.

Problem #3: What does "6 square inches" mean?

What does it mean to say that a shape has an area of 6 square inches? Give an example of one such shape below by using 1-inch-by-1-inch tiles.

If we weren't thinking carefully, we might try to illustrate 6 square inches by drawing a square that is 6 inches wide and 6 inches long. Why is it easy to think that such a square has area 6 square inches, and why is this *not correct?* (Use 1-inch-by-1-inch tiles to explain.)

Problem #4: The Biggest Tree in the World

Listed below are several different trees that could perhaps qualify as the biggest tree in the world. Compare these trees. Why can reasonable people differ about which tree is the biggest?

Tree #1: "General Sherman" is a giant sequoia located in Sequoia National Park in California. According to the National Park Service, General Sherman is 275 feet tall, has a circumference (at its base) of 103 feet, and has a volume of 52,500 cubic feet.

Tree #2: "General Grant" is a giant sequoia located in Sequoia National Park in California. According to the National Park Service, General Grant is 268 feet tall, has a circumference (at its base) of 108 feet, and has a volume of 46,600 cubic feet.

Tree #3: "Mendocino tree" is a redwood tree in Montgomery Redwoods State Reserve near Ukiah, California. It is 368 feet tall and has a diameter of 10.4 feet, which means that its circumference should be about 33 feet.

Tree #4: A Banyan tree in Calcutta, India, has a circumference of 1350 feet (meaning the circumference of the whole tree, not just the trunk) and covers three acres.

Tree #5: A tree in Santa Maria del Tule near Oaxaca, Mexico, is 130 feet tall and is described as requiring 40 people holding hands to encircle it.

Problem #5: Conversions: Which are Correct? Which are Not?

Analyze the calculations that follow, which are intended to convert 25 square meters to square feet. Which use legitimate methods and are correct, and which are not? Explain.

A. $25\ \text{m}^2 = 25\ \text{m} \times \frac{100\ \text{cm}}{1\ \text{m}} \times \frac{1\ \text{in}}{2.54\ \text{cm}} \times \frac{1\ \text{ft}}{12\ \text{in}} = 82\ \text{ft}^2$

B. $25\ \text{m}^2 = 25\ \text{m}^2 \times \frac{100 \times 100\ \text{cm}^2}{1\ \text{m}^2} \times \frac{1\ \text{in}^2}{2.54 \times 2.54\ \text{cm}^2} \times \frac{1\ \text{ft}^2}{12 \times 12\ \text{in}^2} = 269\ \text{ft}^2$

C. $25\ \text{m} = 25\ \text{m} \times \frac{100\ \text{cm}}{1\ \text{m}} \times \frac{1\ \text{in}}{2.54\ \text{cm}} \times \frac{1\ \text{ft}}{12\ \text{in}} = 82\ \text{ft}$

Therefore, $25\ \text{m}^2 = 82^2\text{ft}^2 = 6727\text{ft}^2$.

D. 25 square meters is the area of a square that is 5 meters wide and 5 meters long, so

$$5\ \text{m} = 5\ \text{m} \times \frac{100\ \text{cm}}{1\ \text{m}} \times \frac{1\ \text{in}}{2.54\ \text{cm}} \times \frac{1\ \text{ft}}{12\ \text{in}} = 16.404\ \text{ft}$$

Therefore, $25\ \text{m}^2 = 16.404 \times 16.404\ \text{ft}^2 = 269\ \text{ft}^2$.