MAT-222-840

Spring 2017

Activities for Chapter 9 and Measurement

Name: Solutions

Date: _____

Activity 1: Pythagorean Puzzle

For this activity you will need a copy of the Pythagorean Puzzle handout, scissors, and a protractor.

1. Measure the three angles of ΔXYZ.

$m\angle X =$ 55° $\quad m\angle Y =$ 90° $\quad m\angle Z =$ 35°

2. Fill in the blank: ΔXYZ is a right triangle.

3. Cut out Square A and the four pieces of Square B. Put them together to form Square C.

4. What conclusion can you make about the sum of the areas of Square A and Square B as compared to the area of Square C?

The sum of the areas of Square A and Square B is equal to Square C.

5. How does this relate to the Pythagorean Theorem?

If we call $\overline{XY} = a$, $\overline{YZ} = b$, and $\overline{XZ} = c$, then we see that

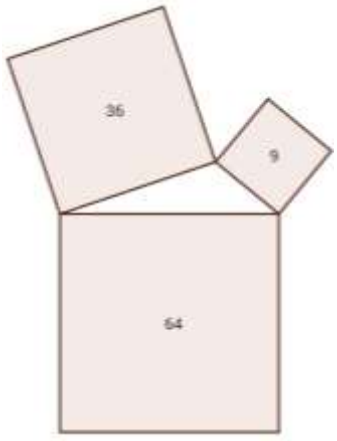
$a^2 + b^2 = c^2$

6. Would this have worked if ΔXYZ was an acute or obtuse triangle?

No! The Pythagorean Theorem holds only for right triangles.

Activity 2: Right or not?

For this activity, you will need a "Right or not?" handout and scissors.



Cut out the squares with areas 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, and 169.

Put three squares together as in the picture to the right to form a triangle, and determine whether that triangle is acute, right, or obtuse. If necessary, compare the angles of the triangles to the corner of an index card to determine if the angles are acute, right, or obtuse.

Complete the table below. Some examples have been started for you.

Triangle side lengths a, b, c in order of smallest to largest	$a^2 + b^2 =$	$c^2 =$	**Is the triangle acute, right, or obtuse?**
3, 6, 8	$9 + 36 = 45$	64	obtuse
6, 8, 10	$36+64=100$	100	right
4, 5, 6	$16+25=41$	36	obtuse
3, 4, 5	$9+16=25$	25	right
6, 7, 12	$36+49=85$	144	obtuse
11, 12, 13	$121+144=265$	169	acute
7, 9, 11	$49+81=130$	121	acute
4, 5, 7	$16+25=41$	49	obtuse
5, 12, 13	$25+144=169$	169	right

Use the data from the table to complete the following statements.

1. If the square of the length of the longest side of a triangle is **less than** the sum of the squares of the lengths of the two shorter sides (Column 4 is less than Column 3), then the triangle is a(n):

   acute triangle

2. If the square of the length of the longest side of a triangle is **equal to** the sum of the squares of the lengths of the two shorter sides, then the triangle is a(n):

   right triangle

3. If the square of the length of the longest side of a triangle is ~~**less than**~~ more than the sum of the squares of the lengths of the two shorter sides, then the triangle is a(n):

   obtuse triangle

Activity 3: Measurement

For this activity, you will need a tape measure.

1. Measure the width of your team's table in centimeters. Express that length in decimeters, millimeters, meters, and kilometers.

(Your answers will vary, but here's a suggestion)

96 cm

$96\text{ cm} \times \frac{1\text{ decimeter}}{10\text{ cm}} = \boxed{9.6\text{ decimeters}}$

$96\text{ cm} \times \frac{10\text{ mm}}{1\text{ cm}} = \boxed{960\text{ mm}}$

$96\text{ cm} \times \frac{1\text{ m}}{100\text{ cm}} = \boxed{0.96\text{ m}}$

$0.96\text{ m} \times \frac{1\text{ km}}{1000\text{ m}} = \boxed{0.00096\text{ km}}$

2. Measure the width of your team's table in inches. Express that length in feet, yards, and miles.

$38\text{ in} \times \frac{1\text{ ft}}{12\text{ in}} = 3.1\overline{6}\text{ ft}$

$38\text{ in} \times \frac{1\text{ yd}}{36\text{ in}} = 1.0\overline{5}\text{ yd}$

$38\text{ in} \times \frac{1\text{ ft}}{12\text{ in}} \times \frac{1\text{ mi}}{5280\text{ ft}} = 0.00059975\text{ mi}$

3. Divide your centimeters measurement from question 1 by the inches measurement in question 2. You should get a number near 2 and a half. Why?

$\frac{96\text{ cm}}{38\text{ in}} = 2.526\text{ cm/in}$ This sounds reasonable, since $1\text{ in} = 2.54\text{ cm}$.

4. Why might a student prefer using the metric system when making measurements?

Dividing/multiplying by 10's is simple!

5. Why might a student prefer the US Customary system when making measurements?

In the US, at least, we have a better intuitive understanding of feet than meters, etc. Students might be tempted to stick with what they know.