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Summer Edition

Eighth Grade Math

Activity 2

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This packet includes four sections that cover the major content of 8th grade math. Each section includes four pages of notes and practice for each topic. For additional support, visit KCS TV on YouTube for instructional videos that accompany each section.

The following content is included in this packet:

	Topic			
	I. Solving Equations and Systems of Equations	**II. The Pythagorean Theorem**	**III. Proportional Relationships and Functions**	**IV. Exponents and Scientific Notation**
Activity 1	Equations with the Distributive Property	The Pythagorean Theorem	Representing Proportional Relationships	Integer Exponents
Activity 2	Solving Systems of Linear Equations by Graphing	Converse of the Pythagorean Theorem	Interpreting the Unit Rate as Slope	Scientific Notation with Positive Powers of 10
Activity 3	Solving Systems by Substitution	Distance Between Two Points	Writing Linear Equations from a Table	Scientific Notation with Negative Powers of 10
Activity 4	Solving Systems by Elimination	Distance Between Two Points 2	Identifying and Representing Functions	Operations with Scientific Notation

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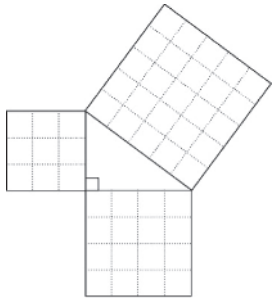
Section II Activity 1

The Pythagorean Theorem

In a **right triangle,**

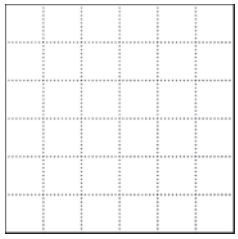
the sum of the areas of the squares on the legs
is equal to
the area of the square on the hypotenuse.

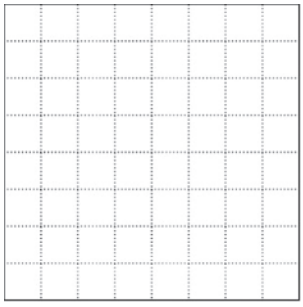
$3^2 + 4^2 = 5^2$
$9 + 16 = 25$



Given the squares that are on the legs of a right triangle, draw the square for the hypotenuse below or on another sheet of paper.

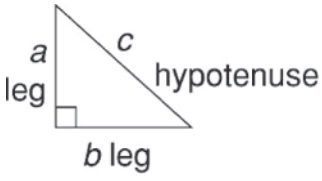
1. leg leg hypotenuse



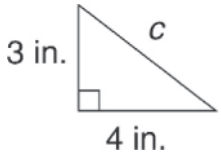


Without drawing the squares, you can find a missing leg or the hypotenuse when given the other sides.

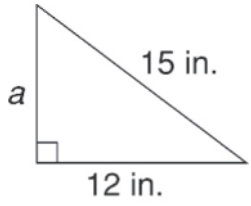
Model



Example 1



Example 2

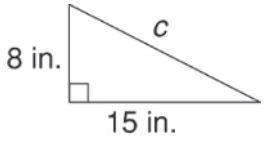


Solution 1
$a^2 + b^2 = c^2$
$3^2 + 4^2 = c^2$
$9 + 16 = c^2$
$25 = c^2$, so $c = 5$ in.

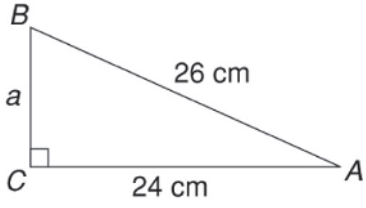
Solution 2
$a^2 + b^2 = c^2$
$a^2 + 12^2 = 15^2$
$a^2 = 225 - 144$
$a^2 = 81$, so $a = 9$ in.

Find the missing side.

2.



3.



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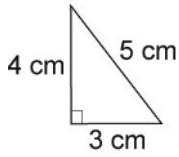
Section II Activity 2

Converse of the Pythagorean Theorem

Step 1 The first step in verifying that a triangle is a right triangle is to name the three sides. One side is the hypotenuse and the other two sides are legs.

- In a right triangle, the hypotenuse is opposite the right angle.

  → The hypotenuse is 5 cm.



- The hypotenuse is greater than either leg.

  → 5 cm > 4 cm and 5 cm > 3 cm

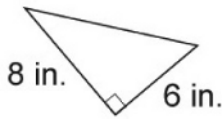
Step 2 Next, the lengths of the hypotenuse and legs must satisfy the Pythagorean Theorem.

$$(\text{hypotenuse})^2 = (\text{first leg})^2 + (\text{second leg})^2$$

In the example above, $5^2 = 3^2 + 4^2 = 25$, so the triangle is a right triangle.

Conclusion If the lengths of the hypotenuse and the two legs satisfy the conditions of the Pythagorean Theorem, then the triangle is a right triangle. If they do not satisfy the conditions of the Pythagorean Theorem, the triangle is not a right triangle.

Find the length of each hypotenuse.

1. 

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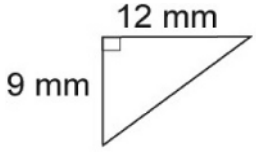
2. 

_____

First, fill in the length of the hypotenuse in each problem. Then, determine if the sides form a right triangle.

3. 1, 2, 3

   Hypotenuse: _____

   _____

4. 8, 7, 6

   Hypotenuse: _____

   _____

5. 15, 20, 25

   Hypotenuse: _____

   _____

Show that these sides form a right triangle.

6. 2, 3, $\sqrt{13}$

   _____

7. 3, 6, $3\sqrt{5}$

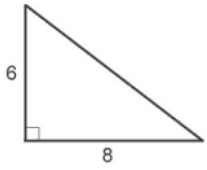
   _____

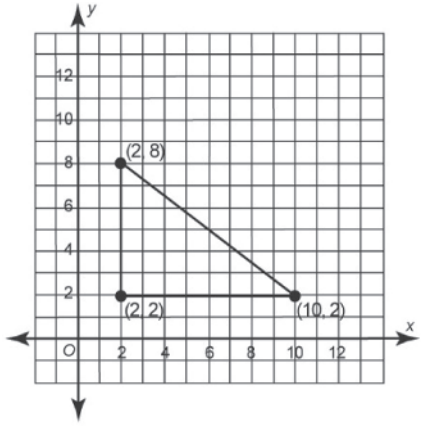
Name _____ Date _____ Class _____

Section II Activity 3

Distance Between Two Points

Look at the triangles shown below.





1. Are the triangles the same size? _____

2. What formula should you use to find the length of the hypotenuse for the triangle on the left? _____

3. What formula should you use to find the length of the hypotenuse for the triangle on the right? _____

4. Using the Pythagorean Theorem:

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

$\_\_\_^2 + \_\_\_^2 = c^2$

$\_\_\_ + \_\_\_ = c^2$

$\_\_\_\_ = c^2$

$\sqrt{\_\_\_\_} = c$

$\_\_\_\_ = c$

5. Using the Distance Formula:

$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

$d = \sqrt{(\_\_\_ - \_\_\_)^2 + (\_\_\_ - \_\_\_)^2}$

$d = \sqrt{(\_\_\_)^2 + (\_\_\_)^2}$

$d = \sqrt{\_\_\_ + \_\_\_}$

$d = \sqrt{\_\_\_\_}$

$d = \_\_\_$

6. What do you notice about the last two steps of the formulas above?

_____

_____

Name _____ Date _____ Class _____

Section II Activity 4

Distance Between Two Points

Problem 1

How do you know which coordinate is which in the distance formula?

Here are two points: $A(1, 2)$ and $B(4, 7)$.

Step 1 The Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Step 2 What is "x_1"? ⟶ "x_1" is the x-coordinate of point A, the first point.

Step 3 What is "x_2"? ⟶ "x_2" is the x-coordinate of point B.

Point A: (**1**, 2) Point B: (**4**, 7)

Step 4 What is y_1 in (1, **2**)? ⟶ y_1 = "y sub one" = **2**

Step 5 What is y_2 in (4, **7**)? ⟶ y_2 = "y sub two" = **7**

Problem 2

Find the distance between the two points using the Distance Formula.

Here's the formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Substitute the numbers from Problem 1: $d = \sqrt{(4-1)^2 + (7-2)^2}$

Simplify: $d = \sqrt{(4-1)^2 + (7-2)^2} = \sqrt{3^2 + 5^2} = \sqrt{9 + 25} = \sqrt{34}$.

You can leave the answer as a square root, or you can use a calculator to find that the square root of 34 is about 5.8.

Name x_1, x_2, y_1, and y_2. Then, find the distance between the points.

1. $C(6, 4)$ and $D(9, 5)$

   x_1: ____ ; x_2: ____ ; y_1: ____ ; y_2: ____

   $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

   _____

   _____

2. $X(0, 6)$ and $Y(1, 8)$

   x_1: ____ ; x_2: ____ ; y_1: ____ ; y_2: ____

   $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

   _____

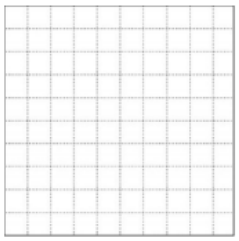
   _____

Answer Key

II. The Pythagorean Theorem

Activity 1: The Pythagorean Theorem

1. Drawings may vary, but should be squares of side 10. Sample:



2. c = 17
3. a = 10cm

Activity 2: Converse of the Pythagorean Theorem

1. 10 in
2. 15 mm
3. 3; $1^2 + 2^2 = 5$; $3^2 = 9$; no
4. 8; $6^2 + 7^2 = 85$; $8^2 = 64$; no
5. 25; $15^2 + 20^2 = 625$; $25^2 = 625$; yes
6. $2^2 + 3^2 = 13$; $(\sqrt{13})^2$ 13 = 13
7. $3^2 + 6^2 = 45$; $(3\sqrt{5})^2$ 35 = 9(5) = 45

Activity 3: Distance Between Two Points

1. Yes
2. the Pythagorean Theorem
3. the Distance Formula
4. $6^2 + 8^2 = c^2$; 36 + 64 = c^2 ; 100 = c^2 ; $\sqrt{100}$ = c ; 10 = c
5. $d = \sqrt{(10-2)^2 + (2-8)^2}$

   $d = \sqrt{8^2 + 6^2}$

   $d = \sqrt{64 + 36}$

   $d = \sqrt{100}$

   $d = 10$
6. Answers may vary, but should mention, at a minimum, that both of the last two steps involve finding a square root.

Activity 4: Distance Between Two Points 2

1. 6, 9, 4, 5; d = $\sqrt{10}$ or about 3.2
2. 0, 1, 6, 8; d = $\sqrt{5}$ or about 2.2