MATH 7 Accelerated:
Week of May 26

- Go through the slides (notes) and work through the examples on a separate piece of paper.
- Do the given practice problems (again, on a separate piece of paper).
- Check your answers with the key given (last slide).
- Take a photo or scan in your work and submit it in Google Classroom. If you have questions or would like feedback on your work, add that as a comment with your submitted work.
- The other option for turn in is to send it in on Monday when the new packet is available.
- Zoom help session invites will be sent to your school email address.

Day 1: Slides 2-8
Day 2: Slides 9-12
Day 3: Slides 13-14
Answers on Slide 15

Day 1: L16

The Pythagorean Theorem

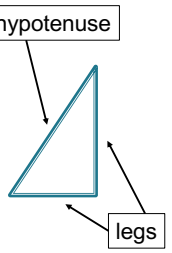
Target: Use the Pythagorean Theorem to find missing side lengths in right triangles.

Vocabulary

Hypotenuse: The side opposite the right angle in a right triangle.

Legs: The two sides that form a right angle in a right triangle.

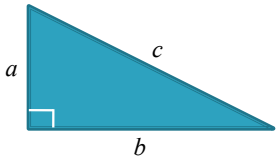
Theorem: A relationship in mathematics that has been proved.



The Pythagorean Theorem

- In a right triangle, the sum of the squares of the lengths of the legs is equal to the square of the length of the hypotenuse.

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



Example 1

Find the length of the hypotenuse in a right triangle with leg lengths of 9 and 12 units.

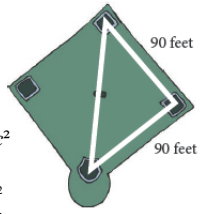
Write the Pythagorean Theorem.	$a^2 + b^2 = c^2$
Substitute known lengths.	$9^2 + 12^2 = c^2$
Simplify by squaring.	$81 + 144 = c^2$
Add.	$225 = c^2$
Square root both sides.	$\sqrt{225} = \sqrt{c^2}$
	$15 = c$

The length of the hypotenuse is 15 units.

Example 2

A baseball diamond is a square. Baseball regulations require the bases to have 90 feet between them. What is the shortest distance between home plate and second base to the nearest foot?

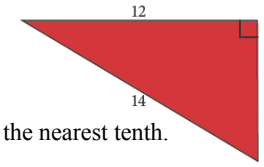
Draw a diagram.



Write the Pythagorean Theorem.	$a^2 + b^2 = c^2$
Substitute known lengths.	$90^2 + 90^2 = c^2$
Simplify, by squaring.	$8100 + 8100 = c^2$
Add.	$16200 = c^2$
Square root.	$\sqrt{16200} = \sqrt{c^2}$
Round to the nearest integer.	$127 \approx c$

The shortest distance from second base to home plate is about 127 feet.

Example 3



Find the missing side length. Round to the nearest tenth.

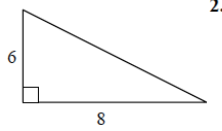
Write the Pythagorean Theorem.	$a^2 + b^2 = c^2$
Substitute the known lengths.	$12^2 + b^2 = 14^2$
Simplify by squaring.	$144 + b^2 = 196$
Subtract 144 from both sides.	$-144 \quad -144$
	$b^2 = 52$
Square root both sides of the equation.	$\sqrt{b^2} = \sqrt{52}$
Round to the nearest tenth.	$b \approx 7.2$

The length of the missing side is about 7.2 units.

L16 Practice Problems:

Find the length of the hypotenuse in each right triangle. If necessary, round to the nearest tenth.

1.



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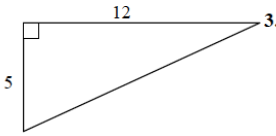

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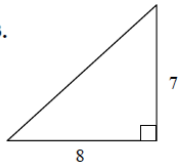

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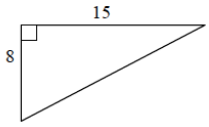

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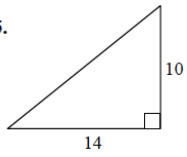

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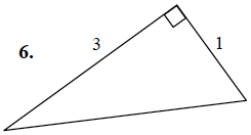


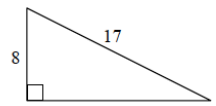
L16 Practice Problems:

Find the length of the hypotenuse in each right triangle. If necessary, round to the nearest tenth.

7. Find the length of the hypotenuse given the two leg lengths.
a. 3, 4, ____ **b**. 12, 16, ____ **c**. 14, 48, ____

Find the missing measure. If necessary, round to the nearest hundredth.

8.



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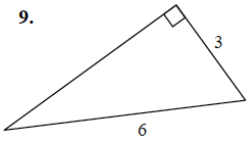

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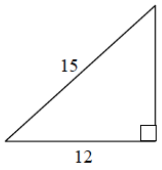


11. A square has side lengths of 7 inches. Find the length of the square's diagonal.

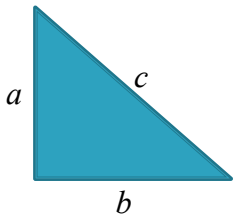
END DAY 1

Day 2: L17

Converse of the Pythagorean Theorem

Target: Determine if three side lengths create a right triangle.

If $a^2 + b^2 = c^2$, then the triangle is a right triangle.



Example 1

A triangle has side lengths of 4, 10 and 9 inches.
Determine if this triangle is a right triangle.

- The longest side is the hypotenuse: 10
- Write the Pythagorean Theorem. $a^2 + b^2 = c^2$
- Substitute values for hypotenuse and legs. $4^2 + 9^2 \stackrel{?}{=} 10^2$
- Simplify by squaring. $16 + 81 \stackrel{?}{=} 100$
- Check to see the sides of equation are equal. $97 \neq 100$

- A triangle with side lengths of 4, 10 and 9 is not a right triangle.

PYTHAGOREAN TRIPLES

A Pythagorean triple is a set of three positive integers such that $a^2 + b^2 = c^2$.

Three positive integers that work in the Pythagorean Theorem are called Pythagorean triples. Recognizing the common Pythagorean triples will save you time when you find them in problems or real-world situations. Some of the common sets of Pythagorean triples are:

3, 4, 5 | 5, 12, 13 | 8, 15, 17 | 7, 24, 25

9, 12, 15 | 10, 24, 26 | 6, 8, 10

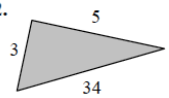
Notice that the Pythagorean triples in the second row are multiples of a Pythagorean triple in the top row. You can create an infinite number of Pythagorean triples just by multiplying all numbers in a Pythagorean triple by a constant.

L17 Practice Problems:

Determine if the given lengths form a right triangle.

1. 3, 4, 5

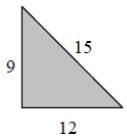
2.



3. 5, 7, 9

4. 4.3, 8.3, 6.9

5.



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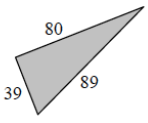

Determine if the set of numbers is a Pythagorean triple.

7. 6, 8, 10 **8.** 21, 28, 35 **9.** 10, 11, 14

10. 4, 4.2, 5.8 **11.** 8, 40, 41 **12.** $\frac{3}{5}, \frac{4}{5}, 1$

END DAY 2

Day 3: Creating Pythagorean Triples

There are two kinds of Pythagorean triples: primitive and multiple. Look at examples of each.

Primitive:	3, 4, 5
Multiples: Multiplied by 2:	6, 8, 10
Multiplied by 3:	9, 12, 15
Multiplied by 10:	30, 40, 50

The primitive Pythagorean triple is the "original". The three numbers have no common factors. The multiple Pythagorean triples are made by multiplying each number in the primitive Pythagorean triple by a constant.

You can create your own primitive Pythagorean triple by following the steps outlined on the next slide. Read the steps and follow along with the example provided.

step 1: Choose an odd, positive integer. 21

step 2: Square it. $21^2 = 441$

Step 3: Break the square into two numbers. The two numbers need to sum to the square in step 2 and have a difference of 1. $441 = 220 + 221$

step 4: Write the Pythagorean triple. $21, 220, 221$

step 5: Verify it.

$$21^2 + 220^2 = 221^2$$
$$441 + 48400 = 48841$$
$$48841 = 48841$$

Create five of your own primitive Pythagorean triples using the process outlined above. Find two multiples for each of your primitive Pythagorean triples.

END DAY 3

ANSWER PAGE
Reminder: ALL work must be shown for EVERY problem!

Day 1:
1. 10
2. 13
3. 10.6
4. 17
5. 17.2
6. 3.2
7. a. 5 b. 20 c. 50
8. 15
9. 5.2
10. 9
11. 9.9 inches

Day 2:
1. Yes 2. No
3. No 4. No
5. Yes 6. Yes
7. Yes 8. Yes
9. No 10. No
11. No 12. No

Day 3:
There are an infinite number of possibilities for this problem. You are welcome to share your answers during our Thursday Zoom session or have a Math 7A friend check them (and you check theirs!).

MATH 7A: LAST SLIDE for this week!