Name: Key
UNIT 6

Date: _____
LESSON 1

AIM: WHAT IS THE PYTHAGOREAN THEOREM?

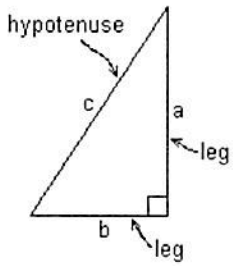
Do Now: The sides of a triangle are $4\sqrt{3}$, $\sqrt{12}$, and $\sqrt{75}$. What is the **perimeter** of this triangle? *(HINT: Simplify the radicals first!)*

$4\sqrt{3} + \sqrt{12} + \sqrt{75}$ = perimeter

$\sqrt{4}\sqrt{3}$ $\sqrt{25}\sqrt{3}$

$4\sqrt{3} + 2\sqrt{3} + 5\sqrt{3} = \boxed{11\sqrt{3}}$

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

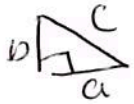


Pythagorean Triples

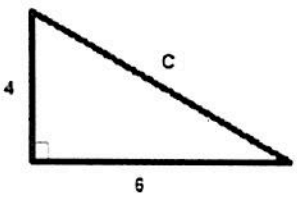
(3, 4, 5)	(5, 12, 13)	(7, 24, 25)	(8, 15, 17)
(9, 40, 41)	(11, 60, 61)	(12, 35, 37)	(13, 84, 85)
(16, 63, 65)	(20, 21, 29)	(28, 45, 53)	(33, 56, 65)
(36, 77, 85)	(39, 80, 89)	(48, 55, 73)	(65, 72, 97)

NOTES:

- The 'a' and 'b' values of the Pythagorean Theorem represent the legs of the right triangle.
- The 'c' value of the Pythagorean theorem represents the hypotenuse which is the longest side of the right triangle. across from right ∠.



1. Given the diagram below, what is the length of the hypotenuse in simplest radical form?



$4^2 + 6^2 = c^2$

$16 + 36 = c^2$

$\sqrt{52} = \sqrt{c^2}$

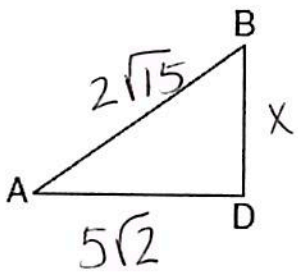
$\sqrt{4}\sqrt{13}$

$\boxed{c = 2\sqrt{13}}$

2. In the diagram below of $\triangle ADB$, $m\angle BDA = 90$, $AD = 5\sqrt{2}$, and $AB = 2\sqrt{15}$. What is the length of $\overline{BD}$?

use calc!

(1) $\sqrt{10}$
2) $\sqrt{20}$
3) $\sqrt{50}$
4) $\sqrt{110}$



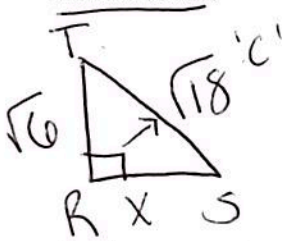
$x^2 + (5\sqrt{2})^2 = (2\sqrt{15})^2$

$x^2 + 50 = 60$

$\sqrt{x^2} = \sqrt{10}$

$x = \sqrt{10}$

3. In triangle *RST*, angle *R* is a right angle. If $TR = \sqrt{6}$ and $TS = \sqrt{18}$, what is the length of *RS* in simplest radical form?



$(\sqrt{6})^2 + x^2 = (\sqrt{18})^2$

$6 + x^2 = 18$

$\sqrt{x^2} = \sqrt{12}$

$\sqrt{4}\sqrt{3}$

$\boxed{x = 2\sqrt{3}}$

4. The diagonal of a rectangle measures 65 centimeters. The length of the rectangle is 33 centimeters.

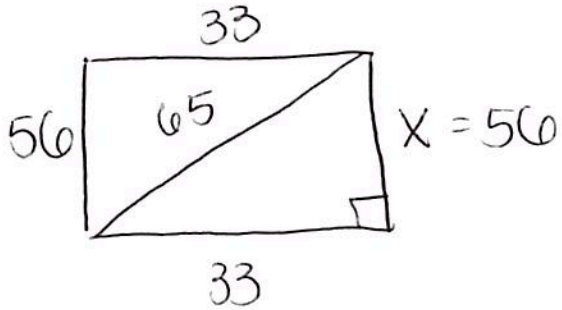
a) Find the width of the rectangle.

$x^2 + 33^2 = 65^2$

$x^2 + 1089 = 4225$

$\sqrt{x^2} = \sqrt{3136}$

$\boxed{x = 56}$



b) Find the area of the rectangle.

$A = l \cdot w$

$A = 33 \cdot 56 = \boxed{1848}$

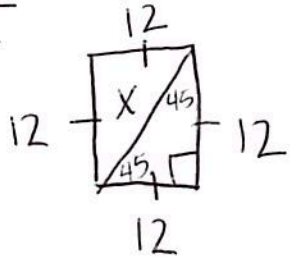
5. The area of a square is 144 cm^2. What is the measure of the diagonal, in simplest radical form?

$A = s^2$

$A = 144\ cm^2$

$\sqrt{s^2} = \sqrt{144}$

$s = 12$



$12^2 + 12^2 = x^2$

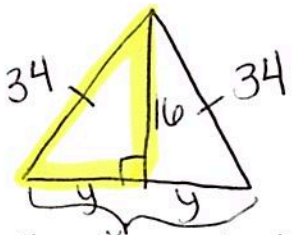
$144 + 144 = x^2$

$\sqrt{288} = \sqrt{x^2}$

$\sqrt{144}\sqrt{2}$

$\boxed{x = 12\sqrt{2}}$

6. In an isosceles triangle, each of the equal sides measures 34 inches. The altitude drawn to the base measures 16 inches. Find the length of the base.



$16^2 + y^2 = 34^2$

$256 + y^2 = 1156$

$\sqrt{y^2} = \sqrt{900}$

$y = 30$

$30 + 30 = \boxed{60}$

7. In the accompanying diagram of right triangles *ABD* and *DBC*, $AB = 5$, $AD = 4$, and $CD = 1$. Find the length of $\overline{BC}$, to the *nearest tenth*. → decimal!

$y^2 + 4^2 = 5^2$

$y^2 + 16 = 25$

$\sqrt{y^2} = \sqrt{9}$

$y = 3$

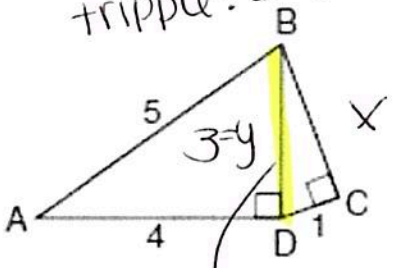
$x^2 + 1^2 = 3^2$

$x^2 + 1 = 9$

$\sqrt{8} = \sqrt{x^2}$

$\boxed{x = 2.8}$

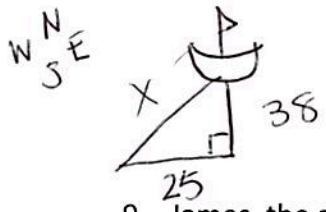
tripple! 3-4-5



need this² first!

DECIMAL

8. Claudia sailed her boat due south for 38 miles, then due west for 25 miles. To the nearest tenth, how far is Claudia from where she began?

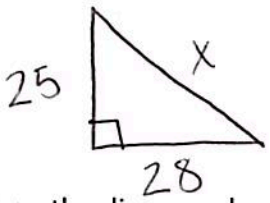


$25^2 + 38^2 = x^2$

$\sqrt{2069} = \sqrt{x^2}$

$x = 45.5\text{mi}$

9. James, the skunk, is traveling from point *A* to point *B* by taking a shortcut through the pond. A path that avoids the pond is 25 feet south and 28 feet east. To the *nearest tenth of a foot*, how many feet will James save by going through the pond instead of following the path?



$25^2 + 28^2 = x^2$

$\sqrt{1409} = \sqrt{x^2}$

$x = 37.5\text{ft}$

10. Given the diagram shown at the right, as labeled in feet with *B-C-D* collinear. A chain is laid along the hypotenuse in each triangle. Find the total length of the chain.

$15^2 + 20^2 = x^2$

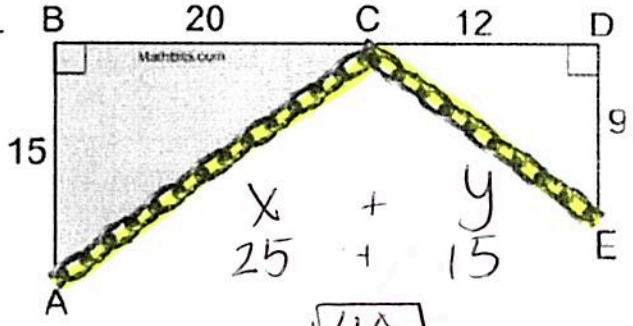
$\sqrt{625} = \sqrt{x^2}$

$x = 25$

$12^2 + 9^2 = y^2$

$\sqrt{225} = \sqrt{y^2}$

$y = 15$



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11. The lengths of the sides of a right triangle can be

check using $a^2+b^2=c^2$
c = largest #!

1) 9, 12, 15 (c) $9^2+12^2=15^2$ ✓
2) 8, 10, 13 (c) $8^2+10^2 \neq 13^2$ X
3) 5, 5, 10 (c) $5^2+5^2=10^2$ X
4) 4, 5, 6 (c) $4^2+5^2=6^2$ X

12. Which set of numbers could *not* represent the lengths of the sides of a right triangle?

1) $\{1, 3, \sqrt{10}\}$ (c) $1^2+3^2=\sqrt{10}^2$ ✓
2) $\{2, 3, 4\}$ (c) $2^2+3^2=4^2$ X
3) $\{3, 4, 5\}$ (c) $3^2+4^2=5^2$ ✓
4) $\{8, 15, 17\}$ (c) $8^2+15^2=17^2$ ✓

Name: Kelly

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UNIT 6

LESSON 1

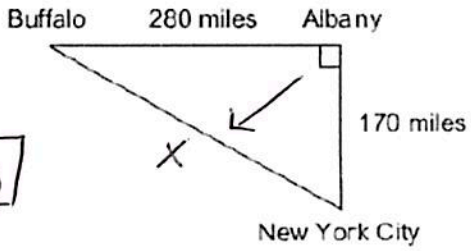
HOMEWORK

1. As seen in the accompanying diagram, a person can travel from New York City to Buffalo by going north 170 miles to Albany, and then west 280 miles to Buffalo. To the *nearest mile*, how many miles would be saved by traveling directly from New York City to Buffalo rather than by traveling first to Albany and then to Buffalo?

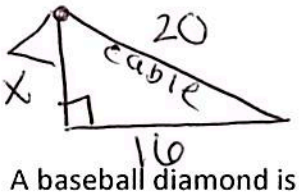
$280^2 + 170^2 = x^2$

$\sqrt{107300} = \sqrt{x^2}$

$x = 327.5607 \approx$ **328 miles**



2. A cable 20 feet long connects the top of a flagpole to a point on the ground that is 16 feet from the base of the pole. How tall is the flagpole?



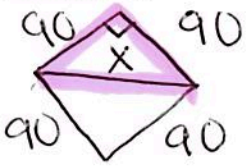
$x^2 + 16^2 = 20^2$

$x^2 + 256 = 400$

$\sqrt{x^2} = \sqrt{144}$

$x =$ **12 ft**

3. A baseball diamond is a square with sides of 90 feet. What is the shortest distance, to the *nearest tenth of foot*, from first base to third base?



$90^2 + 90^2 = x^2$

$\sqrt{16200} = \sqrt{x^2}$

$x =$ **127.3 ft**

4. Which set of numbers could be the lengths of the sides of a right triangle?

1) {10, 24, 26} (c) $10^2 + 24^2 = 26^2$ ✓
2) {12, 16, 30} (c) $12^2 + 16^2 = 30^2$ X
3) {3, 4, 6} (c) $3^2 + 4^2 = 6^2$ X
4) {4, 7, 8} (c) $4^2 + 7^2 = 8^2$ X

5. Which set of numbers does *not* represent the sides of a right triangle?

1) {6, 8, 10} (c) $6^2 + 8^2 = 10^2$ ✓
2) {8, 15, 17} (c) $8^2 + 15^2 = 17^2$ ✓
3) {8, 24, 25} (c) $8^2 + 24^2 = 25^2$ X
4) {15, 36, 39} (c) $15^2 + 36^2 = 39^2$ ✓

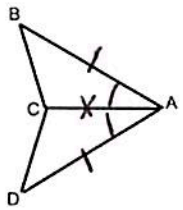
REVIEW:

write this sentence 100 times: A rhombus does not have ≅ diagonals!

6. Which polygon must have congruent diagonals?
   (1) rhombus (3) parallelogram
   (2) square (4) trapezoid

7. Given $\overline{CA}$ bisects $\angle BAD$ and $\overline{BA} \cong \overline{DA}$. Which reason could be used to prove $\Delta ABC \cong \Delta ADC$?

only!



   (1) ASA ≅ ASA (3) SSS ≅ SSS
   (2) SAS ≅ SAS (4) AAA ≅ AAA

8. Line *n* is represented by the equation: $3x + 4y = 20$.

   a. Determine and state the equation of line *p*, the image of line *n*, after a dilation of scale factor $\frac{1}{3}$ centered at the point (4, 2).

$y = -\frac{3}{4}x + 5$

put in y=!

$3x + 4y = 20$
$-3x \quad -3x$
$\frac{4y}{4} = \frac{-3x}{4} + \frac{20}{4}$

(4,2) IS on the line, equation does not change!

   b. Determine and state the equation of line *q*, the image of line *n*, after a dilation of scale factor 2 centered at the origin.

(0,0) is NOT on the line, multiply y-int by scale factor (not slope)

$2 \times 5 = 10 \rightarrow$ new y-intercept

$y = -\frac{3}{4}x + 10$