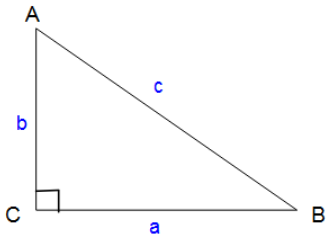
Geometry **Name:** _____
Guided Notes
Pythagorean Theorem **Date:** _____ **Period:** _____

The Pythagorean Theorem is named after a Greek mathematician named Pythagoras (however, there are records of its use in northern Africa hundreds of years before Pythagoras lived).

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

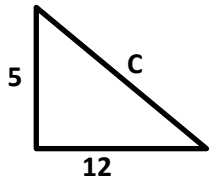
Pythagorean Theorem: $a^2 + b^2 = c^2$



Pythagorean Triple - a set of three positive *integers,* a, b, and c, that satisfy the Pythagorean Theorem **$a^2 + b^2 = c^2$**

Example #1: Show that 3, 4, and 5 is a Pythagorean triple since

Example #2: Show that the 3 sides of the triangle are a Pythagorean triple.



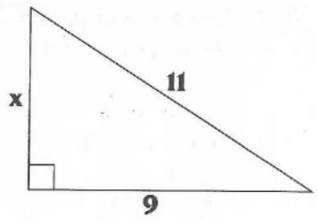
Example #3: Decide whether the numbers are a Pythagorean triple.

a. 9, 40, 41

b. 10, 49, 50

Example #4: Find the unknown side length. Do the lengths form a Pythagorean triple?

1.



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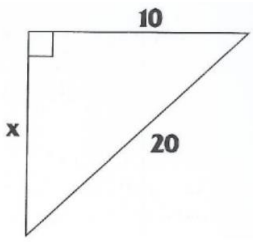

Geometry
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Pythagorean Theorem

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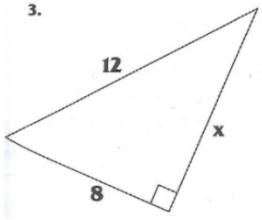
3.



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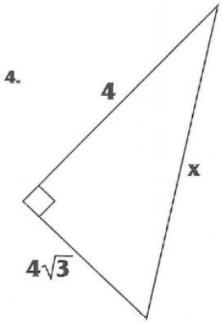

Example #5: A baseball diamond is a square with sides of 90 feet. What is the shortest distance, to the nearest tenth of a foot, between first base and third base?

Example #6: Two joggers run 8 miles north and then 5 miles west. What is the shortest distance, to the nearest tenth of a mile, they must travel to return to their starting point?

Geometry
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Pythagorean Theorem

Name: Key

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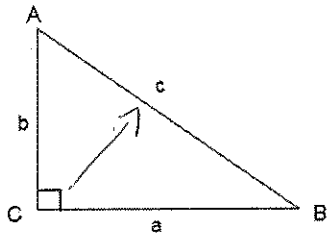
The Pythagorean Theorem is named after a Greek mathematician named Pythagoras (however, there are records of its use in northern Africa hundreds of years before Pythagoras lived).

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

Pythagorean Theorem: $a^2 + b^2 = c^2$



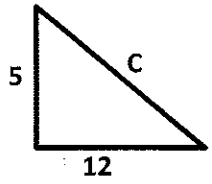
Pythagorean Triple - a set of three positive *integers,* a, b, and c, that satisfy the Pythagorean Theorem $a^2 + b^2 = c^2$

Example #1: Show that 3, 4, and 5 is a Pythagorean triple since

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

$25 = 25$

Example #2: Show that the 3 sides of the triangle are a Pythagorean triple.



$5^2 + 12^2 = c^2$

$25 + 144 = c^2$

$169 = c^2$

$c = 13$

13 is whole

Example #3: Decide whether the numbers are a Pythagorean triple.

a. 9, 40, 41 YES

$9^2 + 40^2 = 41^2$

$81 + 1600 = 1681$

$1681 = 1681$

b. 10, 49, 50 NO

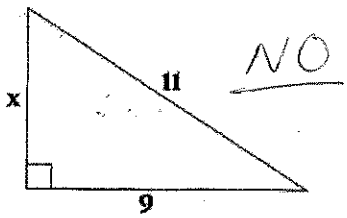
$10^2 + 49^2 = 50^2$

$100 + 2401 = 2500$

$2501 \neq 2500$

Example #4: Find the unknown side length. Do the lengths form a Pythagorean triple?

1.



NO

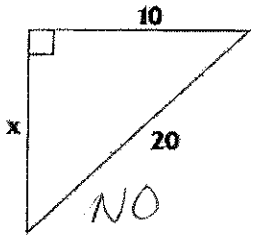
$x^2 + 9^2 = 11^2$

$x^2 + 81 = 121$

$x^2 = 40$

$x = \sqrt{40} = \boxed{2\sqrt{10}}$

2.



NO

$x^2 + 10^2 = 20^2$

$x^2 + 100 = 400$

$x^2 = 300$

$x = \sqrt{300} = \boxed{10\sqrt{3}}$

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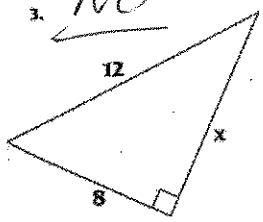
3. NO



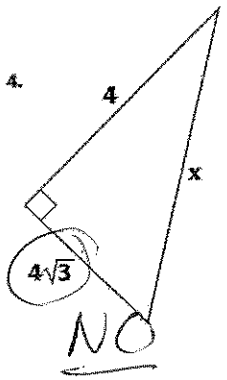
$x^2 + 8^2 = 12^2$

$x^2 + 64 = 144$

$x^2 = 80$

$x = \sqrt{80} = 4\sqrt{5}$

4.



$4^2 + (4\sqrt{3})^2 = x^2$

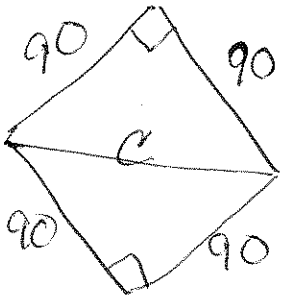
$16 + 48 = x^2$

$64 = x^2$

$x = 8$

NO

Example #5: A baseball diamond is a square with sides of 90 feet. What is the shortest distance, to the nearest tenth of a foot, between first base and third base?

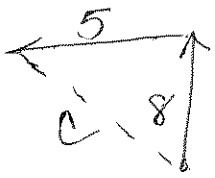


$90^2 + 90^2 = c^2$

$16200 = c^2$

$c = 127.3 ft.$

Example #6: Two joggers run 8 miles north and then 5 miles west. What is the shortest distance, to the nearest tenth of a mile, they must travel to return to their starting point?



$5^2 + 8^2 = c^2$

$25 + 64 = c^2$

$89 = c^2$

$c = \sqrt{89} = 9.4 miles$