Warm Up: Simplify

1. $\sqrt{49} = 7$

2. $\sqrt{288}$ $144 = 12 \cdot 12$, $288 = 144 \cdot 2$ $= 12\sqrt{2}$

3. $3\sqrt{6} \cdot \sqrt{3}$
$3\sqrt{18}$ $18 = 9 \cdot 2$, $9 = 3 \cdot 3$ $= 3 \cdot 3\sqrt{2}$
$= 9\sqrt{2}$

4. $\left(3\sqrt{11}\right)^2 = 3^2 \cdot \sqrt{11}^2$
$= 9 \cdot 11 = 99$

5. $\frac{5}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$
$\frac{5\sqrt{3}}{3}$

Unit 9 Day 2:
Right Triangles/Trigonometry
9.1: Apply The Pythagorean Theorem and Use the Converse of the Pythagorean Theorem

Today's I Can Statements:

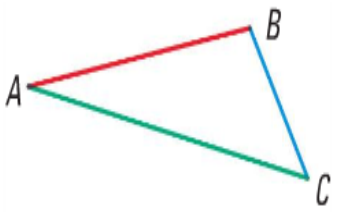
TR-2: I can use the Pythagorean theorem to find a missing side length in a right triangle

TR-3: I can use the Pythagorean converse to determine if a triangle is acute, right, or obtuse.

I. Triangle Inequalities

THEOREM 5.12 Triangle Inequality Theorem

The sum of the lengths of any two sides of a triangle is greater than the length of the third side.



$AB + BC > AC$ $AC + BC > AB$ $AB + AC > BC$

I. Triangle Inequalities

Example

Test if the three side lengths given form a triangle:

5 cm, 6 cm, 10 cm

$5 + 6 = 11 > 10$ ✓

$6 + 10 = 16 > 5$ ✓

$10 + 5 = 15 > 6$ ✓

yes, we have a △

I. Triangle Inequalities

Example

Test if the three side lengths given form a triangle:

2 ft, 9 ft, 11 ft

$2 + 9 = 11 > 11$ ✗

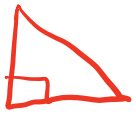
$9 + 11 = 20 > 2$ ✓

$11 + 2 = 13 > 9$ ✓

NO △

3 Ways to Classify Triangles by its Angles:

1. Right ∠ 90°



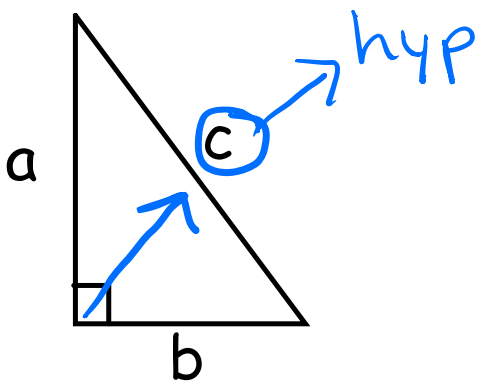
2. Acute ∠ less than 90°

3. Obtuse ∠ greater than 90°

II. Pythagorean Thrm

Recall: **Pythagorean Theorem**

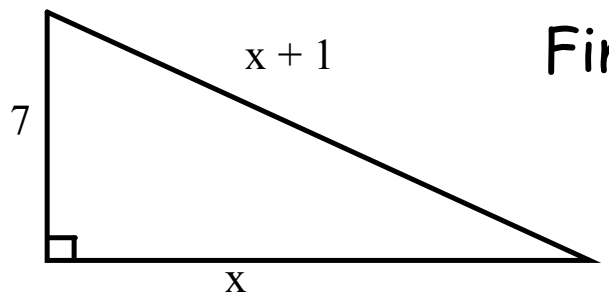
$a^2 + b^2 = c^2$



The hypotenuse is always the longest side.

II. Pythagorean Thrm

Example



Find x.

$(x+1)^2 = 7^2 + x^2$

$x^2 + 2x + 1 = 49 + x^2$

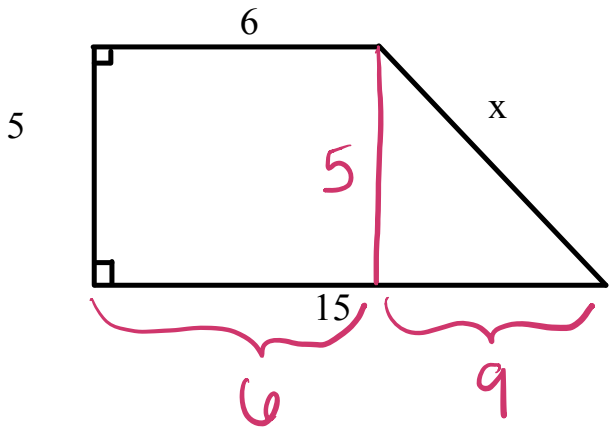
$-x^2 \quad -1 \quad -x^2$

$\frac{2x}{2} = \frac{48}{2}$

$x = 24$

II. Pythagorean Thrm

Example



Find x.

$x^2 = 5^2 + 9^2$

$x^2 = 106$

$x = \sqrt{106}$

II. Pythagorean Thrm

Pythagorean Triples: a set of three positive integers a, b, and c that satisfy the equation $c^2 = a^2 + b^2$

3 positive whole #'s (not decimals or rationals)

Example

ex: 6, 8, 10 → right △

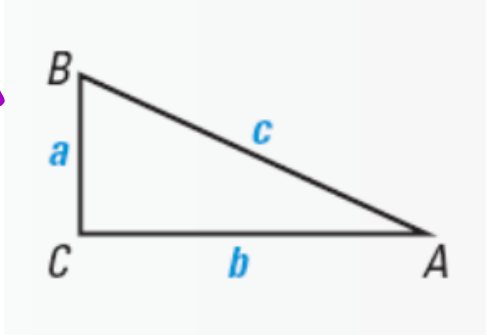
ex: 5, 12, 13 → right △

III. Converse of Pythagorean Thrm

Converse of the Pythagorean Theorem

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

use to prove right △ when no variables are given



III. Converse of Pythagorean Thrm

What about the other types of triangles??

If $c^2 < a^2 + b^2$, then the triangle is acute.

↳ less than

If $c^2 > a^2 + b^2$, then the triangle is obtuse.

↳ greater than

III. Converse of Pythagorean Thrm

Example

Decide whether the set of numbers can represent the side lengths of a triangle. If they can classify the triangle as right, acute, or obtuse.

a) 8, 18, 24

$8+18 > 24$ ✓
$18+24 > 8$ ✓
$24+8 > 18$ ✓

$24^2 > 8^2+18^2$
$576 > 388$ obtuse △

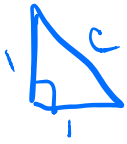
b) $2\sqrt{3}$, 4, 6

$2\sqrt{3}+4 > 6$ ✓
$4+6 > 2\sqrt{3}$ ✓
$6+2\sqrt{3} > 4$ ✓

$6^2 > (2\sqrt{3})^2+4^2$
$36 > 28$ obtuse △

Challenge!! **NO DECIMALS**

Solve for x in the partial spiral shown at the right.



$1^2+1^2=c^2$

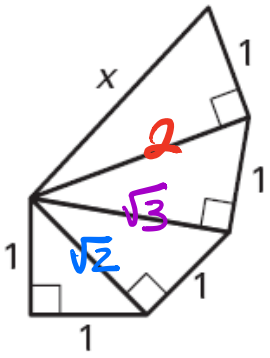
$2=c^2$

$\sqrt{2}=c$

$\sqrt{2}^2+1^2=y^2$

$2+1=y^2$

$\sqrt{3}=y$

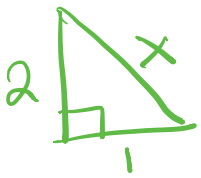


$\sqrt{3}^2+1^2=z^2$

$3+1=z^2$

$\sqrt{4}=z$

$2=z$



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

$4+1=x^2$

$5=x^2$

$\sqrt{5}=x$

Tonight's Assignment:

Page 468 #3, 4, 7, 8, 12, 15-17, 22-28 even, 31

Remember: Unit 9 Quiz will be

Tuesday 2/18 Wednesday 2/19

Today's I Can Statements:

TR-3: I can use the Pythagorean theorem to find a missing side length in a right triangle

TR-4: I can use the Pythagorean converse to determine if a triangle is acute, right, or obtuse.