5-7

PYTHAGOREAN THEOREM

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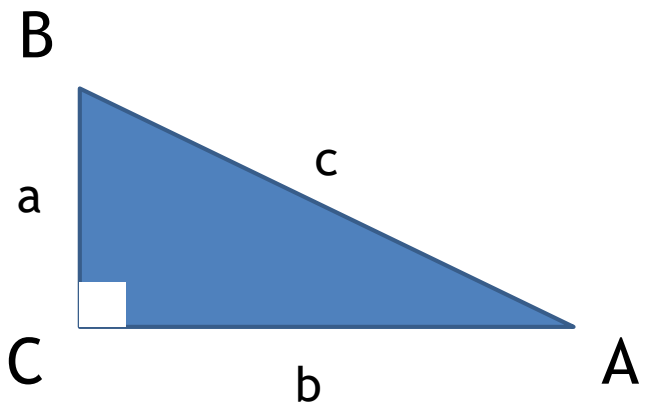
If ΔABC is a right triangle, then

$(leg_1)^2 + (leg_2)^2 = (hypotenuse)^2$



$\mathbf{a^2 + b^2 = c^2}$

$a=6;\ b=8;\ c=?$

$6^2 + 8^2 = c^2$

$36 + 64 = c^2$

$100 = c^2$

$c = 10$

TRIANGLE CLASSIFICATION

"c" represents the longest side of the triangle.

Converse of Pythagorean Theorem:

If $c^2 = a^2 + b^2$, the Δ is a right Δ

Pythagorean Inequalities Theorem:

If $c^2 < a^2 + b^2$, the Δ is an acute Δ

If $c^2 > a^2 + b^2$, the Δ is an obtuse Δ

CLASS WORK

The lengths of the sides of a triangle are given. Classify each triangle as *acute*, *right*, or *obtuse*.

1. 20, 21, 28

28^2 20^2+21^2

784 $400+441$

$784 < 841$

acute △

2. 4, 5, $\sqrt{45}$

$(\sqrt{45})^2$ 4^2+5^2

45 $16+25$

$45 > 41$

obtuse △

3. 5, 12, 13

13^2 5^2+12^2

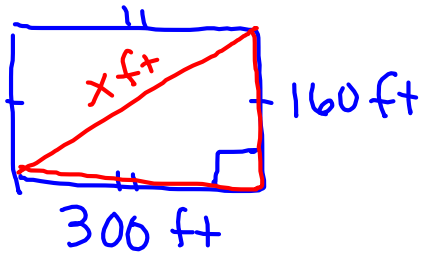
169 $25+144$

$169 = 169$

right △

CLASS WORK

4. The playing surface of a football field is 300 ft long and 160 ft wide. If a player runs from one corner of the field to the opposite corner, how many feet does he run?



$300^2 + 160^2 = x^2$

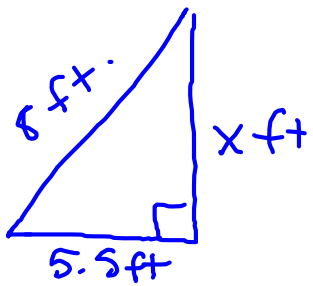
$90000 + 25600 = x^2$

$115600 = x^2$

$x = 340$ ft

CLASS WORK

5. A repairman leans the top of an 8-ft ladder against the top of a stone wall. The base of the ladder is 5.5 ft from the wall. About how tall is the wall? Round to the nearest tenth of a foot.



$5.5^2 + x^2 = 8^2$

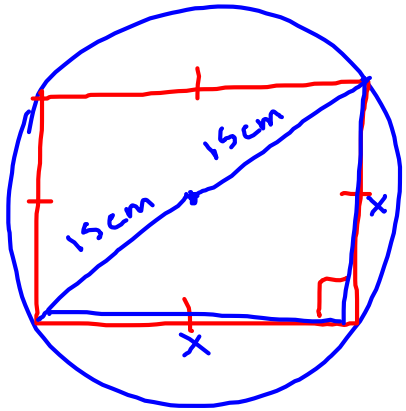
$30.25 + x^2 = 64$

$x^2 = 33.75$

$x \approx 5.8 \text{ ft}$

CLASS WORK

7. A square is drawn inside a circle so that its vertices touch the circle. If the radius of the circle is 15 cm, what is the perimeter of the square?



$x^2 + x^2 = 30^2$

$2x^2 = 900$

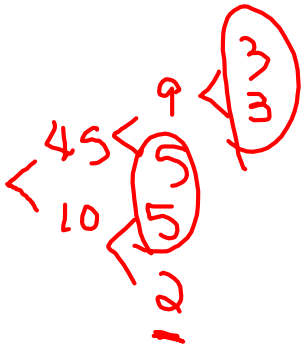
$x^2 = 450$

$x = \sqrt{450}$

$x = 15\sqrt{2}$

$P = 4s = 4(15\sqrt{2})$

$= 60\sqrt{2} \approx 84.9\text{cm}$



Exit Problems

8. Classify the triangle with the following side lengths as *acute*, *right*, or *obtuse*:

   20, 48, 52

right $\triangle$

52^2 $48^2 + 20^2$

2704 $2304 + 400$

$2704 = 2704$

Exit Problems

9. A river runs straight through the center of a park. A man stands on one bank of the river, and his daughter stands across the river and 22 ft upstream. The man's son swims from the man to his daughter. If the river is 11 ft wide, how far does the son swim? Round to the nearest foot.

$$x^2 = 11^2 + 22^2$$
$$x^2 = 121 + 484$$
$$\sqrt{x^2} = \sqrt{605}$$
$$x \approx 25$$

Triangles can be classified as acute (<), right (=), or obtuse (>) by comparing the square of the longest side to the sum of the squares of the other two sides.

SUMMARY

LEARNING RUBRIC

- Got It: To use the Pythagorean Theorem to solve real world/complex problems in unrepresented situations
- Almost There: To use the Pythagorean Theorem to solve real world/complex problems in represented situations
- Moving Forward: To apply the Pythagorean Inequalities to classify triangles
- Getting Started: To apply the Pythagorean Theorem to find a third side length

Pages 365 – 366:
16 – 42 even

HOMEWORK