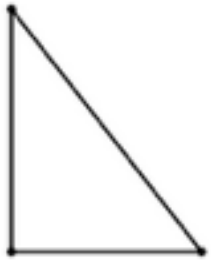
Geometry Lesson- The Pythagorean Theorem

The Pythagorean Theorem:
In a right triangle, $a^2 + b^2 = c^2$, where a and b are the legs of the triangle and c is the hypotenuse. OR
The sum of the squares of the legs of a right triangle is equal to the square of the hypotenuse.

Ex 1- A right triangle has legs of length 16 and 30. Find the length of the hypotenuse.

16

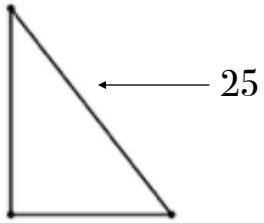


30

$16^2 + 30^2 = c^2$
$256 + 900 = c^2$
$1156 = c^2$
$\sqrt{1156} = \sqrt{c^2}$
$c = 34$

Source: https://commons.wikimedia.org/wiki/File:Triangle-right.svg

Ex 2- A right triangle has a hypotenuse of length 25 and a leg of length 10. Find the length of the other leg.



7

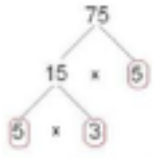
$a^2 + 7^2 = 25^2$
$a^2 + 49 = 625$
$a^2 = 576$
$\sqrt{a^2} = \sqrt{576}$
$a = 24$

Ex 3- Simplify each square root using prime factorization trees.

(a) $\sqrt{8}$

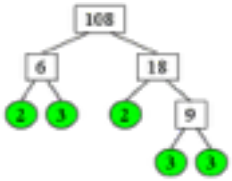
$2\sqrt{2}$

(b) $\sqrt{75}$



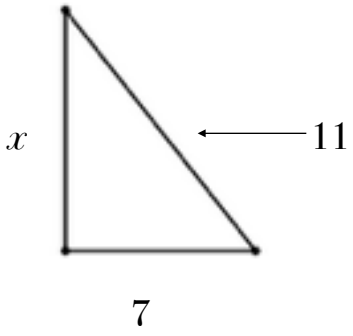
$5\sqrt{3}$

(c) $\sqrt{108}$



$6\sqrt{3}$

Ex 4- Find the value of x in each triangle. Leave your answer in simplest radical form.



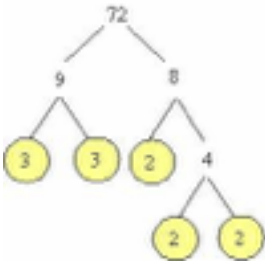
$x^2 + 7^2 = 11^2$

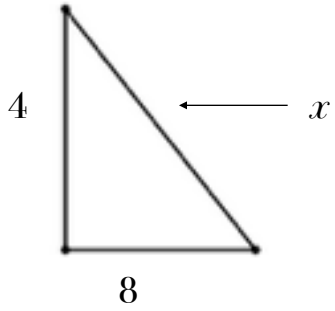
$x^2 + 49 = 121$

$x^2 = 72$

$\sqrt{x^2} = \sqrt{72}$

$x = 6\sqrt{2}$





$4^2 + 8^2 = x^2$

$16 + 64 = x^2$

$80 = x^2$

$\sqrt{80} = \sqrt{x^2}$

$x = 4\sqrt{5}$