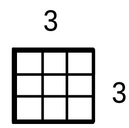
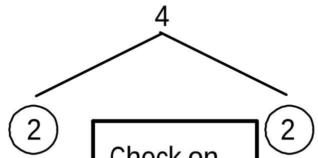
M8 - 3.2 - Solving Square Roots Prime Factorization Notes

Perfect Square: A number that is the product of the same two factors. $9 = 3 \times 3 = 3^2$



$\sqrt{9} = 3$ $\quad 3^2 = 3 \times 3 = 9$

$\sqrt{4} = ?$



Check on Calculator!

$\sqrt{4} = 2$

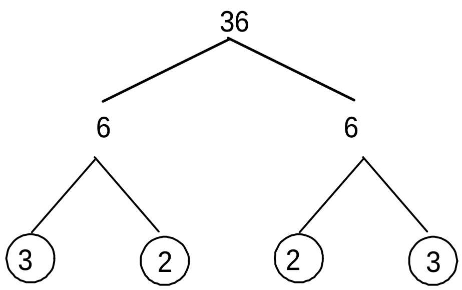
4 is a perfect square because it is a product of the same two factors: 2 and 2.

$\sqrt{4} = \sqrt{2 \times 2}$
$\sqrt{4} = \sqrt{(2 \times 2)}$
$= (2)$

Two identical numbers under a square root: one comes out. Nothing is left.

OR Think about two identical numbers that multiply together to make that number

$\sqrt{36} = ?$



36 is a perfect square because it is a product of even pairs of numbers: 3 and 2, and 3 and 2.

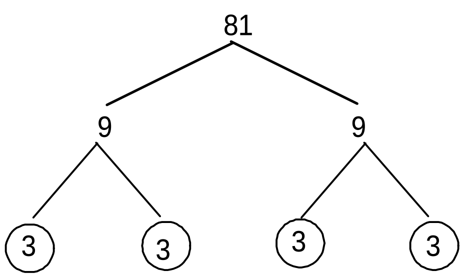
$\sqrt{36} = \sqrt{2 \times 2 \times 3 \times 3}$
$\sqrt{36} = \sqrt{(2 \times 2) \times (3 \times 3)}$
$\sqrt{36} = 2 \times 3$
$\sqrt{36} = (6)$

Two identical pairs of numbers under a square root: one of each comes out. Nothing is left.

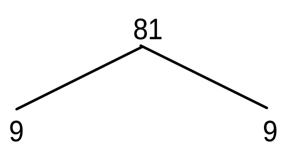
Check on Calculator!

$\sqrt{36} = 6$

$\sqrt{81} = ?$



OR



81 is a perfect square because it is a product of even pairs of numbers: 3 and 3, and 3 and 3.

$\sqrt{81} = \sqrt{3 \times 3 \times 3 \times 3}$
$\sqrt{81} = \sqrt{(3 \times 3) \times (3 \times 3)}$
$\sqrt{81} = 3 \times 3$
$\sqrt{81} = (9)$

Two identical pairs of numbers under a square root: one of each comes out. Nothing is left.

$\sqrt{81} = \sqrt{(9 \times 9)}$
$= (9)$

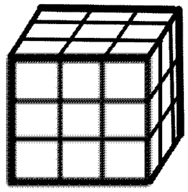
Check on Calculator!

$\sqrt{81} = 9$

Notice: when solving square roots using prime factorization either circle a pair of two identical numbers or multiple pairs of identical numbers.

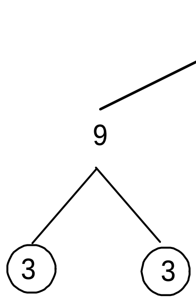
M8 - 3.2 - Solving Cube Roots Prime Factorization Notes

Perfect Cube: a number that is a product of the same three factors. $8 = 2 \times 2 \times 2 = 2^3$



$\sqrt[3]{27} = 3$ $\quad 3 \times 3 \times 3 = 3^3 = 27$

$\sqrt[3]{27} = ?$



Check on Calculator!

$\sqrt[3]{27} = 3$

27 is a perfect cube because it is the product of three identical factors:

$\sqrt[3]{27} = \sqrt[3]{3 \times 3 \times 3}$

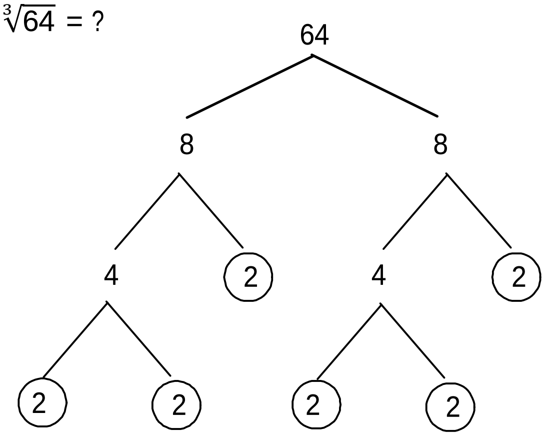
$\sqrt[3]{27} = \sqrt[3]{3 \times 3 \times 3}$

$= 3$

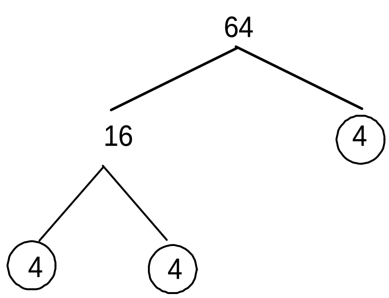
Three identical numbers under a cube root: one comes out. Nothing is left.

OR Think about three identical numbers that multiply together to make that number

$\sqrt[3]{64} = ?$



OR



$\sqrt[3]{64} = \sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2}$

$\sqrt[3]{64} = \sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2}$

$= 2 \times 2$

$= 4$

Three identical numbers under a square root: one of each comes out. Nothing is left.

Check on Calculator!

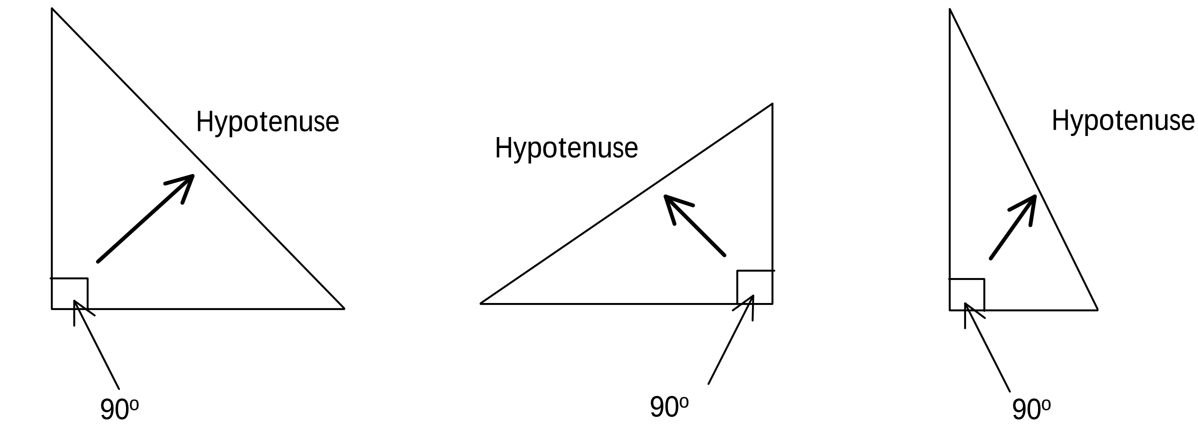
$\sqrt[3]{64} = 4$

$\sqrt[3]{64} = \sqrt[3]{4 \times 4 \times 4}$

$= 4$

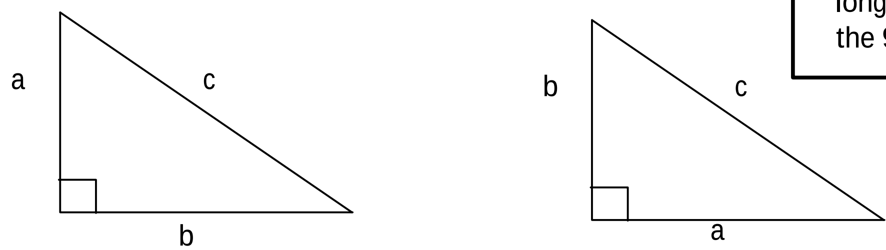
Notice: when solving cube roots using prime factorization either circle a triplet of three identical numbers or multiple triplets of identical numbers.

M8 - 3.3 - Identifying "a, b, c" Notes

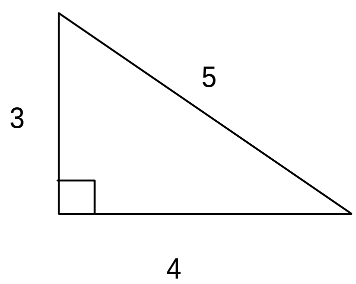


"a" and "b" can switch.
"c" is always the hypotenuse, the longest side, the side opposite of the 90^o angle.

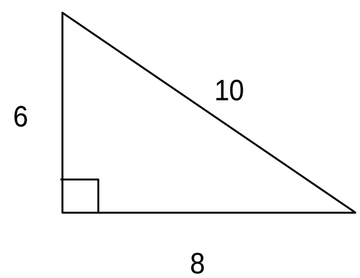
Identifying a, b, and c.



Identifying a, b, and c.



$a = 3$
$b = 4$
$c = 5$



$a = 8$
$b = 6$
$c = 10$

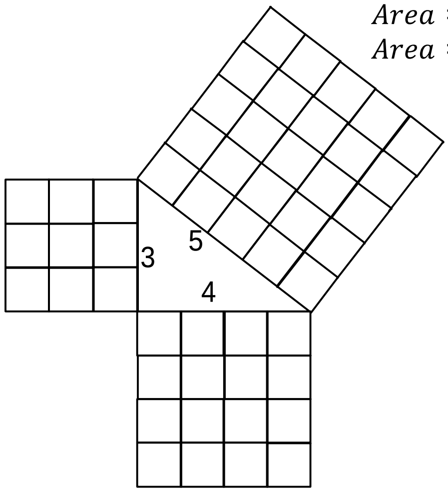
M8 - 3.3 - Pythagoras' Theorem Notes

Pythagoras' Theorem: $a^2 + b^2 = c^2$

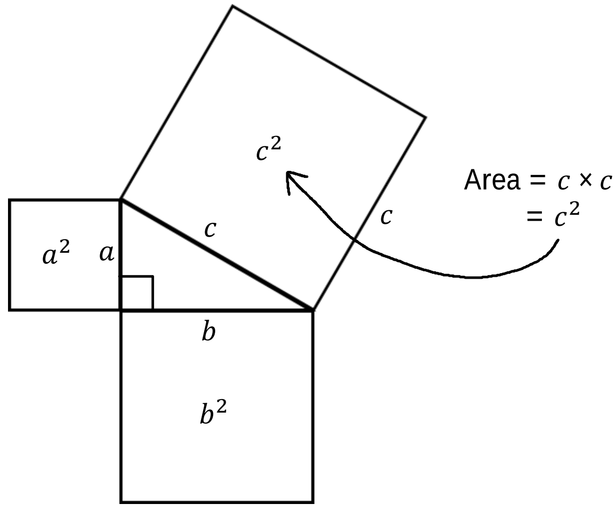
Remember: "c" is always the Hypotenuse: the longest side

$Area$ = 5 × 5
$Area$ = 25

$Area$ = 3 × 3
$Area$ = 9



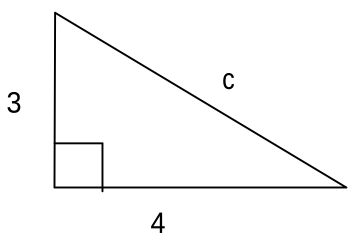
$Area$ = 4 × 4
$Area$ = 16



$$9\ squares + 16\ squares = 25\ squares$$

$$\sqrt{25} = 5$$

Solve for "c".

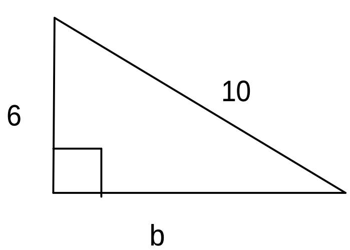


$a^2 + b^2 = c^2$
$3^2 + 4^2 = c^2$
$9 + 16 = c^2$
$25 = c^2$
$\sqrt{25} = \sqrt{c^2}$
$5 = c$

Remember:
The Area of the two small squares adds to the area of the large square.

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

Solve for "a" or "b".



$a^2 + b^2 = c^2$
$6^2 + b^2 = 10^2$
$36 + b^2 = 100$
$-36 \qquad - 36$
$b^2 = 64$
$\sqrt{b^2} = \sqrt{64}$
$b = 8$

OR

Remember:
Bigger square minus smaller square equals other smaller square.

$c^2 - a^2 = b^2$
$10^2 - 6^2 = b^2$
$100 - 36 = b^2$
$64 = b^2$
$\sqrt{64} = \sqrt{b^2}$
$b = 8$

$b = \sqrt{c^2 - a^2}$