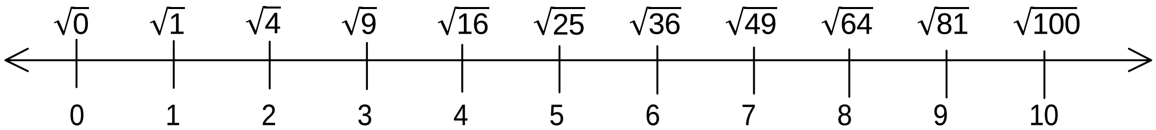
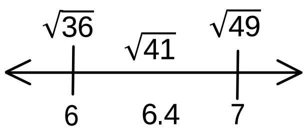
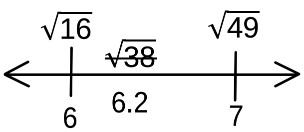
M8 - 3.1 - Estimating Square/Roots Number Lines Notes



Estimate the square root of 41.

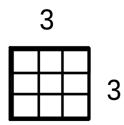


Estimate the square of 6.2.

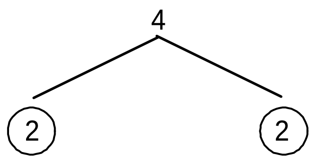


M8 - 3.1 - Solving Square Roots Prime Factorization Notes

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



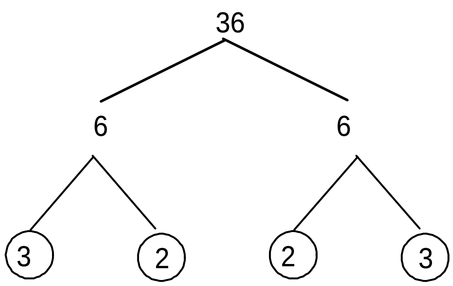
$\sqrt{9} = 3$, $3^2 = 9$, $\sqrt{9} = 3$



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

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

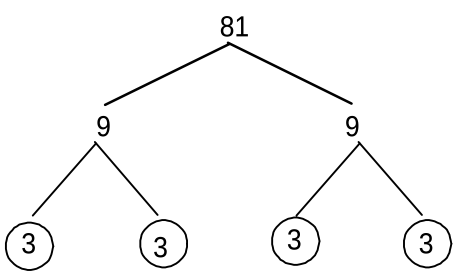
Two identical numbers under a square root: one comes out. Nothing is left.



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.

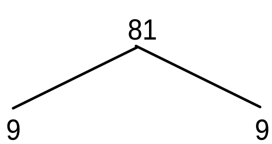


81 is a perfect square because it is a product of even pairs of numbers: 3 and 3, and 3 and 3.

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

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

Or

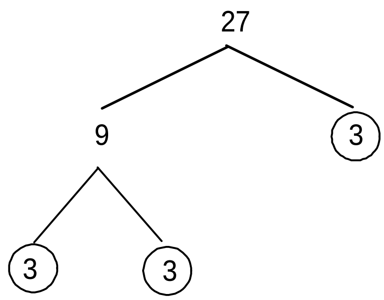


$$\sqrt{81} = \sqrt{9 \times 9}$$
$$= 9$$

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

M8 - 3.1 - Solving Cube Roots Prime Factorization Notes

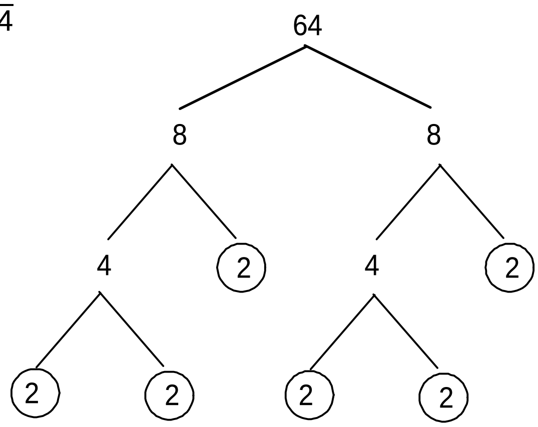
$\sqrt[3]{27}$



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

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

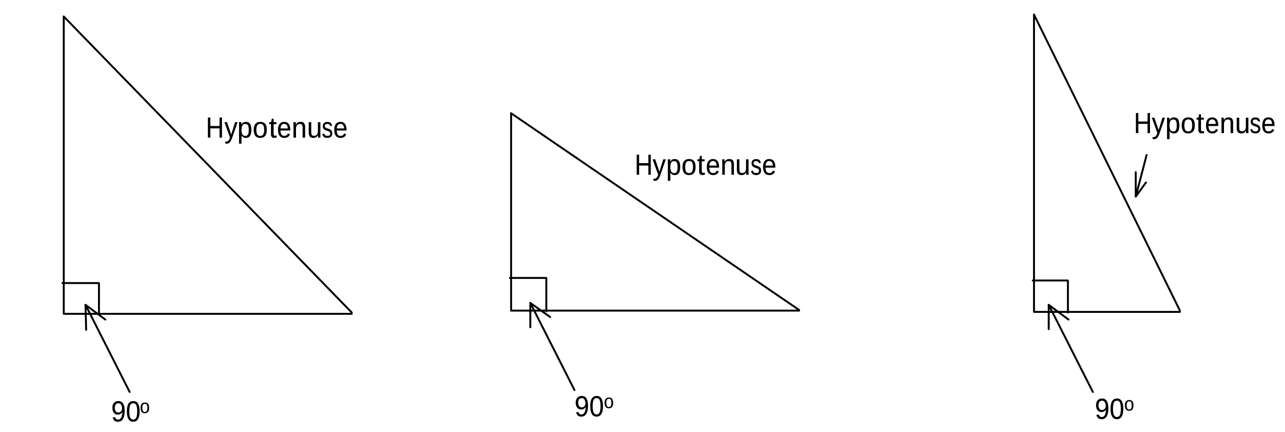
$\sqrt[3]{64}$



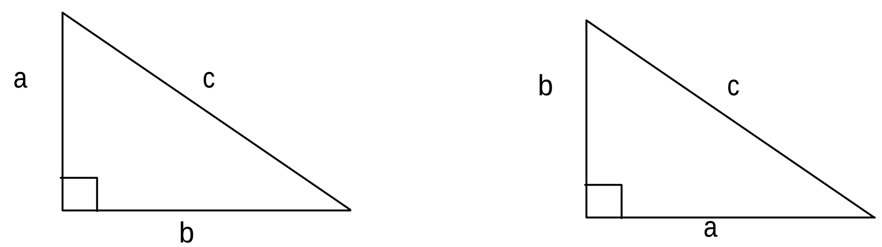
$$\sqrt[3]{64} = \sqrt[2]{2 \times 2 \times 2 \times 2 \times 2 \times 2}$$
$$\sqrt[3]{64} = \sqrt[2]{2 \times 2 \times 2 \times 2 \times 2 \times 2}$$
$$= 2 \times 2$$
$$= 4$$

Notice: when solving cube roots using prime factorization either circle three single numbers or more than one group of three single numbers.

M8 - 3.2 - Identifying "a, b, c" Notes

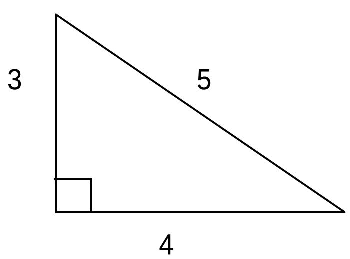


Identifying a, b, and c.

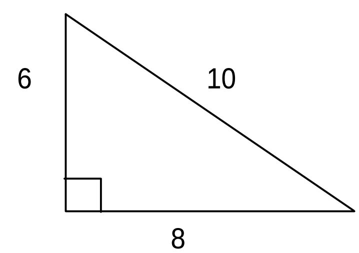


"a" and "b" can switch.
"c" is always the hypotenuse, the longest side, the side opposite of the 90^o angle.

Identifying a, b, and c.



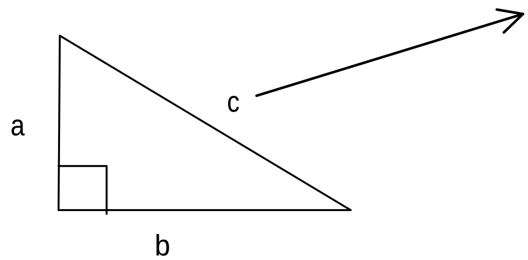
$a = 3$
$b = 4$
$c = 5$



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

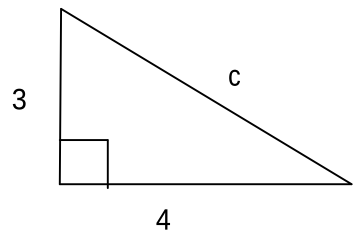
M8 - 3.2 - Pythagoras' $a^2 + b^2 = c^2$

Pythagoras' Theorem: $\boldsymbol{a^2 + b^2 = c^2}$



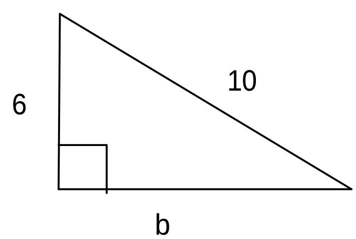
c is always the side opposite the right angle!

Solve for c.



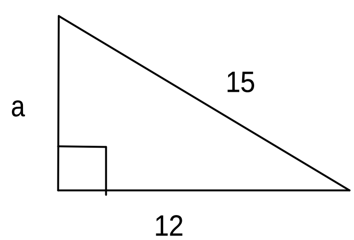
$$
\begin{aligned}
a^2 + b^2 &= c^2 \\
3^2 + 4^2 &= c^2 \\
9 + 16 &= c^2 \\
25 &= c^2 \\
\sqrt{25} &= \sqrt{c^2} \\
5 &= c
\end{aligned}
$$

Solve for b.



$$
\begin{aligned}
a^2 + b^2 &= c^2 \\
6^2 + b^2 &= 10^2 \\
36 + b^2 &= 100 \\
-36 \quad &\quad - 36 \\
b^2 &= 64 \\
\sqrt{b^2} &= \sqrt{64} \\
b &= 8
\end{aligned}
$$

Solve for a.



$$
\begin{aligned}
a^2 + b^2 &= c^2 \\
a^2 + 12^2 &= 15^2 \\
a^2 + 144 &= 225 \\
-144 &\ - 144 \\
a^2 &= 81 \\
\sqrt{a^2} &= \sqrt{81} \\
a &= 9
\end{aligned}
$$