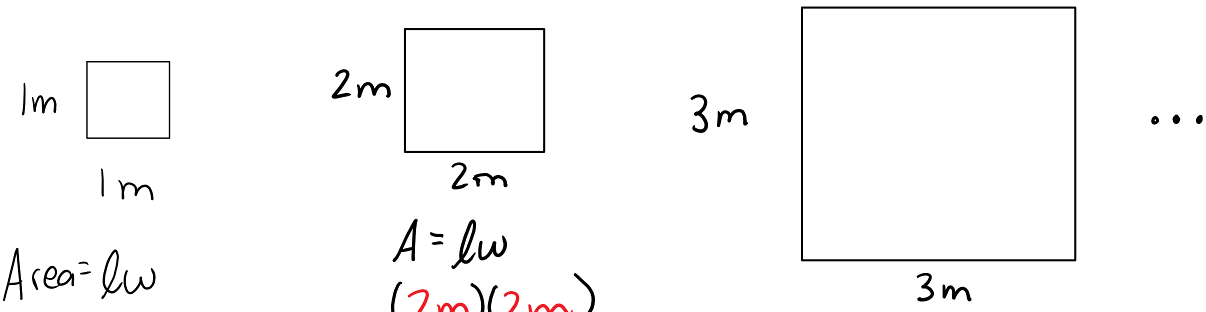
3.2 - Perfect Squares & Cubes

September 11, 2019 8:31 AM



Area $= lw$
$= (1m)(1m)$
$= 1m^2$

$A = lw$
$(2m)(2m)$
$= 4m^2$

$A = lw = (3m)(3m) = 9m^2$

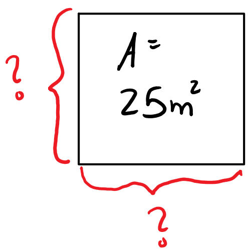
Any whole number that can be represented by the area of a square is called a "perfect square" and the lengths of the square's sides are called the "square root".

Square Root $\sqrt{\ } = \sqrt[2]{\ }$

Ex: $\sqrt{25} = ?$

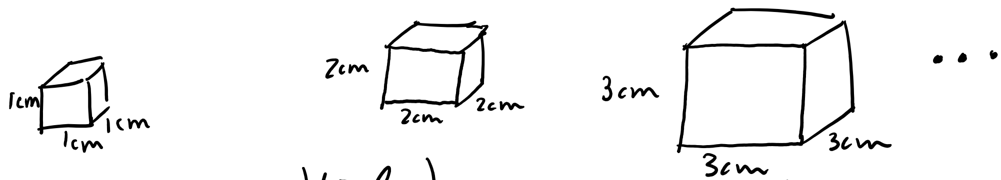
Because $5m \times 5m = 25m^2$,

$\sqrt{25} = 5$



Generally, $\sqrt[k]{n}$ → "Radical"

n : Radicand
K : Index



Volume $= lwh$
$= (1cm)(1cm)(1cm)$
$= 1cm^3$

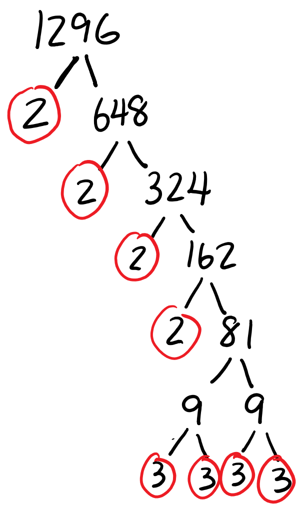
$V = lwh$
$= (2cm)(2cm)(2cm)$
$= 8cm^3$

$V = lwh$
$= (3cm)(3cm)(3cm)$
$= 27cm^3$

Any whole number that can be represented by the volume of a cube is called a "perfect cube" and the side length is the "cube root": 2> $\sqrt[3]{\ }$

Ex: $\sqrt{1296} = ?$

Let's use prime factorization:



Notice how we have equal pairs of factors.

4 2's

4 3's

Because the index is 2, make 2 equal groups:

$1296 =$

$(2 \cdot 2 \cdot 3 \cdot 3)(2 \cdot 2 \cdot 3 \cdot 3)$

$= (36)(36)$

$\therefore \sqrt{1296} = 36$

- OR -

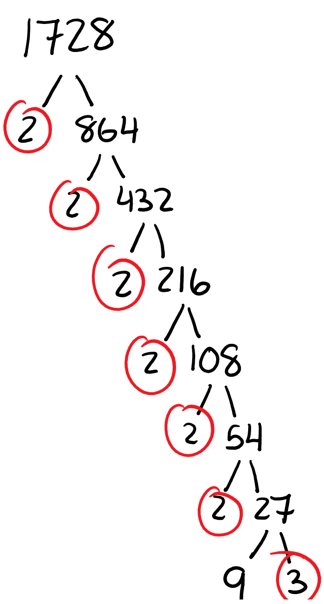
Because the index is 2, take out pairs of identical factors.

$1296 = (2 \times 2) \times (2 \times 2) \times (3 \times 3) \times (3 \times 3)$

$2 \times 2 \times 3 \times 3$

$= 36$

Ex: $\sqrt[3]{1728}$



Because our index is now 3, we take out triples of identical factors:

$1728 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (3 \times 3 \times 3)$

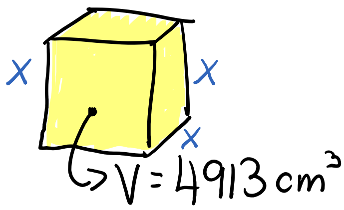
$2 \times 2 \times 3$

$= 12$

$\therefore \sqrt[3]{1728} = 12$

27 → 9, (3); 9 → (3), (3)

Ex: A cube has a volume of $4913\ cm^3$. What is the surface area?



The cube root of the volume will give us the side lengths:

$\sqrt[3]{}$

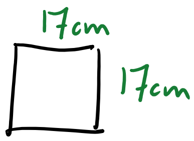
4913 → (17), 289; 289 → (17), (17)

The index is 3, so take out triples:

$4913 = 17 \times 17 \times 17$ → 17

$\sqrt[3]{4913} = 17\ cm$

one cube face:



$$\text{Area} = lw$$
$$= (17\ cm)(17\ cm)$$
$$= 289\ cm^2$$

Six faces in a cube, so

$$6 \times 289\ cm^2$$
$$= 1734\ cm^2$$

HW: Pg. 146
#3-8, 17*