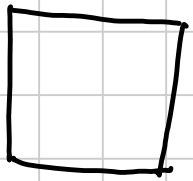
Express as a power.

$4 \times 4 \times 4 \times 4 = 4^4 \rightarrow 16^2 \rightarrow (4^2)^2 = 256$

$\times 2 (4^2) = \boxed{32}$

Find the side length

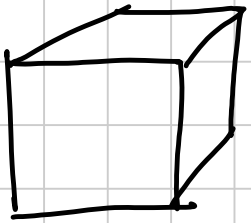


$A = 64\ cm^2$

$A = s \times s$

$8 \times 8 = 64$

$\therefore$ side length $= 8cm$



$V = 64\ cm^3$

$V = s \times s \times s$ $\quad s = $ side

$= 4 \times 4 \times 4$

$\therefore$ side length $= 4cm$

$\sqrt{64} = 8$

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

2.2 Expressing Numbers as Powers

Power shows a repeated multiplication

$2 \times 2 \times 2 \times 2 \times 2 = 2^5$

$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$ $\quad \frac{\text{top} \times \text{top}}{\text{bottom} \times \text{bottom}} = \frac{1 \times 1 \times 1}{2 \times 2 \times 2} = \frac{1^3}{2^3}$

$\left(\frac{1}{2}\right)^3 = \frac{1}{8}$

* In a fraction an exponent outside brackets distributes to numerator & denominator

$\left(\frac{2}{5}\right)^3 = \frac{2^3}{5^3} = \frac{8}{125}$

Negative Numbers...

$(-3)^2 = -3 \times -3 = +9$

$-3^2 = -(3 \times 3) = -9$

- brackets make a difference

$(-3)^3 = -3 \times -3 \times -3 = -27$

($-3 \times -3 = +9$, then $+9 \times -3 = -27$)

$-3^3 = -3 \times 3 \times 3 = -27$

- Even / odd # exponent
  - → Even exponents ( ) positive product
  - → Odd exponents negative product

$(-3)^4 = -3 \times -3 \times -3 \times -3 = +81$

($-3 \times -3 = +9$, $-3 \times -3 = +9$, then $+9 \times +9 = +81$)

$-3^4 = -3 \times 3 \times 3 \times 3 = -81$

Zero Exponents

$4^4 = 4 \times 4 \times 4 \times 4 = 256$ → $256 \div 4$

$4^3 = 4 \times 4 \times 4 = 64$ → $64 \div 4$

$4^2 = 4 \times 4 = 16$ → $16 \div 4$

$4^1 = 4 = 4$ → $4 \div 4$

$4^0 = = 1$

Any non-zero number with a zero exponent = 1

2.3 Expressing a Number Many Ways.

$40 = 36 + 4$

$40 = 6^2 + 2^2$

$54 = 25 + 25 + 4$ ← express using powers

$5^2 + 5^2 + 2^2$

$7^2 + 2^2 + 4^0$

$49 + 4 + 1$

$6^2 + 4^2 + 1^2 + 1^2$

$36 + 16 + 1 + 1$

$3^2 + 3^2 + 3^2 + 3^2 + 3^2 + 3^2$

$6(3^2)$

What about letters

$a \times a \times a = a^3$

Pg 56 # 1-5 (a, c, e...) 10, 11, 17, 20, 21

HW Check Tomorrow either pg 52 or 56