NBT. 2 Powers of 10

Goal: I will be able to explain patterns of product using whole numbers, decimals, and powers of 10 when $\times$ and $\div$.

Vocab

product : an answer to a multiplication problem
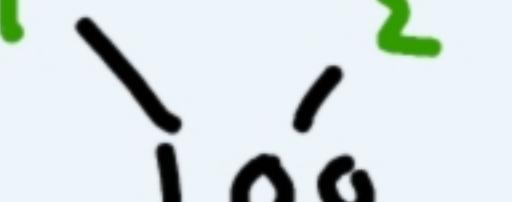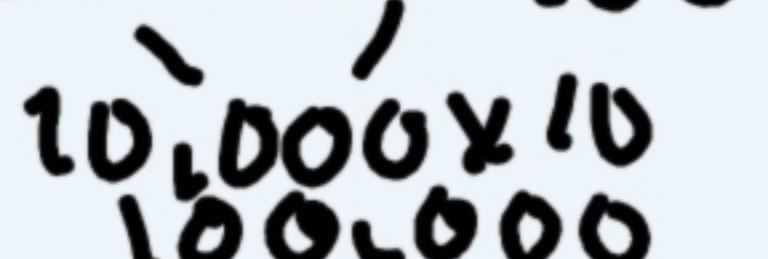
We say or read this as:

Ten to the 5th power

10^5

5 — Exponent
Tells me how many times to multiply the Base Number times it's self

Base Number

$10 \times 10 \times 10 \times 10 \times 10$

1   2   3   4   5

100 × 100 × 10

20,000 × 10

1,000,000

Powers of 10

10^3 → 3 zeros → $10 \times 10 \times 10$ → 1,000

means: multiply 10 by itself 3 times

equals

Say: Ten to the 3rd power

10^2 → 2 zeros 10×10 → 100

Ten to the 2nd power

10^1 → 10 → 10

10^0 → no zeros 1

Examples

① What is the <u>value</u> of 10^6?
<u>Worth</u>

$10 \times 10 \times 10 \times 10 \times 10 \times 10$ $\longrightarrow$ 1,000,000

value

problem to find my value

$100 \times 100 \times 100$
$10,000 \times 100$
$1,000,000$

② What does ten to the seventh power mean?

10^7

Expanded Form with Powers of 10

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4th grade : $300 + 20 + 4$

In between : $(3 \times 100) + (2 \times 10) + (4 \times 1)$ no zeros

5th grade : $(3 \times 10^2) + (2 \times 10^1) + (4 \times 10^0)$

Examples

① $(5 \times 10^3) + (3 \times 10^1) + (6 \times 10^0)$

in between: $(5 \times 1000) + (3 \times 10) + (6 \times 1)$

4th gr : $5000 + 30 + 6$

standard : $5,036$

② $4,670$

4th gr: $4000 + 600 + 70$

in between: $(4 \times 1000) + (6 \times 100) + (7 \times 10)$

5th gr: $(4 \times 10^3) + (6 \times 10^2) + (7 \times 10^1)$

Decimals and Problems with Powers of 10

Key #1: multiply by power of 10
    value increases
    decimals move to the right based on exponent →

    example: $7 \times 10^{\boxed{3}} = 7,000.$

$$7.000$$

Key #2: divide by power of 10
    value decrease
    decimal moves to left based on exponent
    example: $70 \div 10^{\boxed{1}} = 7$