2.2 Powers and Ten and the Zero Exponent

Exponent	Power	Repeated Multiplication	Standard Form
5	2^5	$2\times2\times2\times2\times2$	32
4	2^4	$2\times2\times2\times2$	16
3	2^3	$2\times2\times2$	8
2	2^2	2×2	4
1	2^1	2	2
0	2^0		1

÷2 ÷2 ÷2 ÷2

Reflect and Share

- Compare your tables and patterns with those of other pairs of students.
- What do you think is the value of a power with exponent 0?
- Use a calculator to check your answer from different integer bases.

Zero Exponent Law

A power with an integer base, other than 0, and an exponent 0 is equal to 1

$n^0 = 1, \quad n \neq 0$

Example (1): Evaluate each expression.

a) 4^0

1

b) -4^0

$= -(4^0)$

$= -(1)$

$= -1$

c) $(-4)^0$

$= 1$

Example (2): Write each number using powers of ten.

a) 3752

$= 3000 + 700 + 50 + 2$

$= (3 \times 1000) + (7 \times 100) + (5 \times 10) + (2 \times 1)$

$= (3 \times 10^3) + (7 \times 10^2) + (5 \times 10) + (2 \times 10^0)$

b) 12073

$= 10000 + 2000 + 70 + 3$

$= (1 \times 10000) + (2 \times 1000) + (7 \times 10) + (3 \times 1)$

$= (1 \times 10^4) + (2 \times 10^3) + (7 \times 10) + (3 \times 10^0)$

Example (3): Write each number in standard form.

a) $(5 \times 10^4) + (1 \times 10^3) + (5 \times 10^2) + (7 \times 10) + (4 \times 10^0)$

$= (5 \times 10000) + (1 \times 1000) + (5 \times 100) + (7 \times 10) + (4 \times 1)$

$= 50\,000 + 1000 + 500 + 70 + 4$

$= 51\,574$

b) $(3 \times 10^7) + (1 \times 10^5) + (2 \times 10^3) + (8 \times 10) + (9 \times 10^0)$

$= (3 \times 10\,000\,000) + (1 \times 100\,000) + (2 \times 1000) + (8 \times 10) + (9 \times 1)$

$= 30\,000\,000 + 100\,000 + 2000 + 80 + 9$

$= 30102089$