Lesson 2.2: Powers of Ten and the Zero Exponent

1. Evaluate each power.

a) 4^0

$= 1$

b) 23^0

$= 1$

c) $(-6)^0$

$= 1$

d) 1^0

$= 1$

e) -1^0

$= -(1)^0$

$= -(1) = -1$

f) $(-1)^0$

$= 1$

2. Write each number as a power of 10.

a) 10 000

10^4

b) 1 000 000

10^6

c) one billion

10^9

d) ten

$10^1 = 10$

e) 1

10^0

3. Use powers of 10 to write each number.

a) 700 000 000 000

$= 7 \times 10^{11}$

b) 7000

$= 7 \times 10^3$

c) 77 077

$= (7 \times 10\,000) + (7 \times 1000) + (7 \times 10) + (7 \times 1)$

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

d) 7 000 007

$= (7 \times 1\,000\,000) + (7 \times 1)$

$= (7 \times 10^6) + (7 \times 10^0)$

4. Write each number in standard form.

a) (8×10^5)

$= (8 \times 100\,000)$

$= 800\,000$

b) $(9 \times 10^7) + (9 \times 10^6) + (5 \times 10^5)$

$= (9 \times 10\,000\,000) + (9 \times 1\,000\,000) + (5 \times 100\,000)$

$= 90\,000\,000 + 9\,000\,000 + 500\,000$

$= 99\,500\,000$

c) $(2 \times 10^3) + (2 \times 10^2) + (6 \times 10^0)$

$= (2 \times 1000) + (2 \times 100) + (6 \times 1)$

$= (2\,000) + 200 + 6$

$= 2\,206$

d) $(5 \times 10^5) + (4 \times 10^8) + (8 \times 10^0) + (3 \times 10^4)$

$= (4 \times 100\,000\,000) + (5 \times 100\,000) + (3 \times 10\,000) + (8 \times 1)$

$= 400\,000\,000 + 500\,000 + 30\,000 + 8$

$= 400\,530\,008$

5. Write these numbers in standard form, and then order them from least to greatest.

✓ i) fifty-five hundred

5 500

ii) 50 500

least to greatest

i, v, ii, iv, vi, iii

iii) $(5 \times 10^6) + (5 \times 10^0)$

$= 5\,000\,000 + 5$

$= 5\,000\,005$

iv) five hundred thousand

500 000

✓ v) 5×10^4

50 000

vi) 500 500

6. **a)** Complete this table for a base of 10.

Exponent	Power	Standard Form
6	10^6	1000000
5	10^5	100000
4	10^4	10 000
3	10^3	1 000
2	10^2	100
1	10^1	10
0	10^0	1

÷10
÷10
÷10
÷10
÷10
÷10

b) Use patterns to describe why the power with an exponent of 0 is equal to 1.