Patterns with Powers of Ten

Patterns with Powers of Ten: Apply, Compare, and Design

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

$10^2 = 100$ and $10^3 = 1000$. Multiplication by 10^k makes each digit worth 10^k times as much; division makes it worth that fraction. For example, $0.47 \times 100 = 47$ and $47 \div 1000 = 0.047$.

Worked example

Find 3.26×10^2 and check by division.

1. $10^2 = 10 \times 10 = 100$.
2. $3.26 \times 100 = 326$.
3. $326 \div 100 = 3.26$.
Answer: 326.

Practice Problems

Show your thinking.

1. A lab has 100 tubes with 0.27 L each. Is 20 L enough to fill them?

2. Choose multiplication or division by 1000 to change 4.5 km into meters. Give the result.

3. Design a three-step multiply-by-10 pattern ending at 720. Give all four terms.

4. A packet has 1000 identical sheets with total mass 8.4 kg. Find one sheet's mass in kilograms.

5. A display must change 0.061 to 61 in one operation using a power of ten. State the operation.

6. Two machines take 9.6: A divides by 100, B multiplies by 10. How many times as great is B's output?

7. A child writes $0.4 \times 10^2 = 0.400$. Give the correct total for 100 portions of 0.4 m.

8. A counter starts at 5500 and divides by 10 each turn. After how many turns is it 5.5?

Answer Key

1. No; 27 L are needed, 7 L more.
2. Multiply: 4500 m.
3. $0.72, 7.2, 72, 720$.
4. 0.0084 kg.
5. Multiply by 10^3.
6. 1000 times.
7. 40 m.
8. 3 turns.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. $100 \times 0.27 = 27$ L.
2. $27 - 20 = 7$ L, so the supply is short.

Problem 2

1. 1 km is 1000 m, so a kilometer count becomes 1000 times as many meters.
2. $4.5 \times 1000 = 4500$ m; $4500 \div 1000 = 4.5$ km.

Problem 3

1. Work backward: $720 \div 1000 = 0.72$.
2. $0.72 \times 10 = 7.2$, $7.2 \times 10 = 72$, and $72 \times 10 = 720$.

Problem 4

1. Equal mass per sheet is $8.4 \div 1000$.
2. $8.4 \div 1000 = 0.0084$ kg; $1000 \times 0.0084 = 8.4$ kg.

Problem 5

1. $61 \div 0.061 = 1000$.
2. $1000 = 10^3$ and $0.061 \times 1000 = 61$.

Problem 6

1. A outputs $9.6 \div 100 = 0.096$; B outputs $9.6 \times 10 = 96$.
2. $96 \div 0.096 = 1000$.

Problem 7

1. $10^2 = 100$, so the total is $0.4 \times 100 = 40$ m.
2. $0.400 = 0.4$, only one portion; $40 \div 100 = 0.4$ checks the total.

Problem 8

1. $5500 \div 10 = 550$ and $550 \div 10 = 55$.
2. $55 \div 10 = 5.5$; three divisions give division by $10^3 = 1000$.

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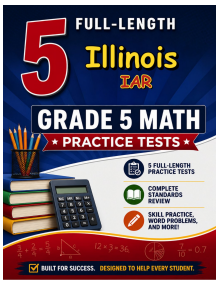

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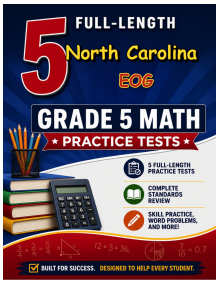

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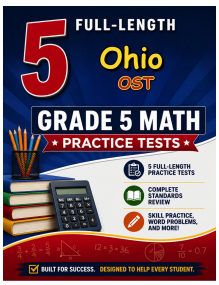

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