

Scientific Notation for Huge and Tiny Numbers

Grade 8 math · Test Answer Key · Standards: 8.EE.A.3, 8.EE.A.4

Use the scoring line beneath each solution. A coefficient outside 1 to 10 loses the normalization point only, so the arithmetic earns credit even when the final shift is missing.

Standards: 8.EE.A.3, 8.EE.A.4 · **Level:** Grade 8

Question 1 Write in scientific notation (3 points)

- a. Left 7 places: 7.2×10^7 .
- b. Right 6 places: 4.6×10^{-6} .
- c. Left 5 places: 9.03×10^5 .

(a) 7.2×10^7 (b) 4.6×10^{-6} (c) 9.03×10^5

Scoring: 1 point per part.

Question 2 Standard form (2 points)

- a. Three places left: 0.00507.
- b. Six places right: 1,800,000.

(a) 0.00507 (b) 1,800,000

Scoring: 1 point per part.

Question 3 Products and quotients (3 points)

- a. $6 \cdot 5 = 30$ and $4 + 3 = 7$, so $30 \times 10^7 = 3 \times 10^8$.
- b. $7.2 \div 9 = 0.8$ and $8 - 3 = 5$, so $0.8 \times 10^5 = 8 \times 10^4$.

(a) 3×10^8 (b) 8×10^4

Scoring: (a) 1 point for 30×10^7 , 1 point for normalizing. (b) 1 point.

Question 4 Order by size (2 points)

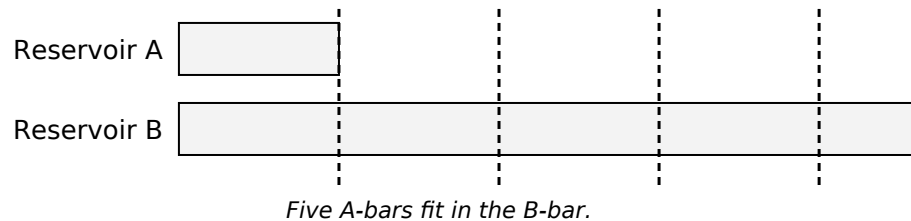
In decimals: 0.00025, 0.00009, 0.0013, 0.0006. Compare exponents: -5 is the smallest, then -4 ($2.5 < 6$), then -3 .

9×10^{-5} , 2.5×10^{-4} , 6×10^{-4} , 1.3×10^{-3}

Scoring: 2 points for the correct order, 1 point if only one pair is swapped.

Question 5 Two reservoirs (3 points)

- a. $(2 \times 10^7) \div (4 \times 10^6)$.
- b. $2 \div 4 = 0.5$ and $7 - 6 = 1$, so $0.5 \times 10^1 = 5$.
- c. Reservoir B holds 5 times as much.



(a) $(2 \times 10^7) \div (4 \times 10^6)$ (b) 5 (c) 5 times

Scoring: 1 point per part.

Question 6 Addition and calculators (3 points)

- (a) $4.5 \times 10^4 = 0.45 \times 10^5$. Then $8.1 + 0.45 = 8.55$, giving 8.55×10^5 .
- (b) $6.4\text{E}-5$ means $6.4 \times 10^{-5} = 0.000064$.

(a) 8.55×10^5 (b) 0.000064

Scoring: (a) 1 point for matching exponents, 1 point for the sum. (b) 1 point.

Question 7 Pollen grain (2 points)

$2.5 \times 10^{-5} \text{ m} = 25 \times 10^{-6} \text{ m} = 25 \text{ micrometers}$. In millimeters it would be 0.025, and in meters 0.000025, so micrometers give the simplest number.

25 micrometers

Scoring: 1 point for the unit, 1 point for 25.

Question 8 Decimal point journey (2 points)

The point moves 4 places to the right, giving coefficient 9.3. Since the original number is less than 1, the exponent is negative: 9.3×10^{-4} .

9.3×10^{-4}

Scoring: 1 point for the number, 1 point for the explanation.