

# Operations with Scientific Notation

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 18

## Quick Review and Helpful Hints

In scientific notation a number is  $a \times 10^n$  with  $1 \leq a < 10$ . To *multiply*, multiply the front numbers and *add* the exponents. To *divide*, divide the fronts and *subtract* the exponents.

▶ **Example:** Multiply  $(2 \times 10^3)(3 \times 10^2)$ . **Work:** Multiply the fronts:  $2 \times 3 = 6$ . Add the exponents:  $3 + 2 = 5$ . ★ **Answer:**  $6 \times 10^5$

$$(a \times 10^m)(b \times 10^n) = ab \times 10^{m+n}$$

Multiply fronts, add exponents.

### Practice Problems

Simplify (give the answer in scientific notation).

- |  |       |  |       |
|--|-------|--|-------|
| 1. $(2 \times 10^3)(3 \times 10^2)$      | _____ | 8. $(3 \times 10^2)(3 \times 10^2)$        | _____ |
| 2. $(4 \times 10^2)(2 \times 10^3)$      | _____ | 9. $(1 \times 10^3)(7 \times 10^2)$        | _____ |
| 3. $\frac{6 \times 10^5}{2 \times 10^2}$ | _____ | 10. $\frac{6 \times 10^8}{2 \times 10^3}$  | _____ |
| 4. $(2 \times 10^4)(4 \times 10^1)$      | _____ | 11. $(2 \times 10^2)(2 \times 10^2)$       | _____ |
| 5. $\frac{9 \times 10^6}{3 \times 10^2}$ | _____ | 12. $(4 \times 10^3)(2 \times 10^2)$       | _____ |
| 6. $(5 \times 10^2)(1 \times 10^3)$      | _____ | 13. $\frac{9 \times 10^4}{3 \times 10^1}$  | _____ |
| 7. $\frac{8 \times 10^4}{4 \times 10^2}$ | _____ | 14. Write $5 \times 10^3$ in standard form | _____ |

### Word Problems

15. Multiply  $(3 \times 10^4)(2 \times 10^2)$ . \_\_\_\_\_
16. Divide  $(8 \times 10^6)$  by  $(2 \times 10^2)$ . \_\_\_\_\_
17. Multiply  $(2 \times 10^3)(4 \times 10^3)$ . \_\_\_\_\_
18. A warehouse record lists  $6 \times 10^5$  sheets of paper for the year. Write that quantity as a standard number. \_\_\_\_\_



## Answer Keys

- |                    |                     |                     |
|--------------------|---------------------|---------------------|
| 1. $6 \times 10^5$ | 7. $2 \times 10^2$  | 13. $3 \times 10^3$ |
| 2. $8 \times 10^5$ | 8. $9 \times 10^4$  | 14. 5000            |
| 3. $3 \times 10^3$ | 9. $7 \times 10^5$  | 15. $6 \times 10^6$ |
| 4. $8 \times 10^5$ | 10. $3 \times 10^5$ | 16. $4 \times 10^4$ |
| 5. $3 \times 10^4$ | 11. $4 \times 10^4$ | 17. $8 \times 10^6$ |
| 6. $5 \times 10^5$ | 12. $8 \times 10^5$ | 18. 600000          |

### Step-by-Step Explanations

1. Start by naming the process: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $2 \times 3 = 6$ ,  $3 + 2 = 5$ :  $6 \times 10^5$ . So the final answer is  $6 \times 10^5$ .
2. A good way to think about this is: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $4 \times 2 = 8$ ,  $2 + 3 = 5$ :  $8 \times 10^5$ . So the final answer is  $8 \times 10^5$ .
3. Step by step: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $6 \div 2 = 3$ ,  $5 - 2 = 3$ :  $3 \times 10^3$ . So the final answer is  $3 \times 10^3$ .
4. Take it one move at a time: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $2 \times 4 = 8$ ,  $4 + 1 = 5$ :  $8 \times 10^5$ . So the final answer is  $8 \times 10^5$ .
5. Start by naming the process: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $9 \div 3 = 3$ ,  $6 - 2 = 4$ :  $3 \times 10^4$ . So the final answer is  $3 \times 10^4$ .
6. A good way to think about this is: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $5 \times 1 = 5$ ,  $2 + 3 = 5$ :  $5 \times 10^5$ . So the final answer is  $5 \times 10^5$ .
7. Step by step: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $8 \div 4 = 2$ ,  $4 - 2 = 2$ :  $2 \times 10^2$ . So the final answer is  $2 \times 10^2$ .
8. Take it one move at a time: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $3 \times 3 = 9$ ,  $2 + 2 = 4$ :  $9 \times 10^4$ . So the final answer is  $9 \times 10^4$ .
9. Start by naming the process: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $1 \times 7 = 7$ ,  $3 + 2 = 5$ :  $7 \times 10^5$ . So the final answer is  $7 \times 10^5$ .

10. A good way to think about this is: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $6 \div 2 = 3$ ,  $8 - 3 = 5$ :  $3 \times 10^5$ . So the final answer is  $3 \times 10^5$ .
11. Step by step: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $2 \times 2 = 4$ ,  $2 + 2 = 4$ :  $4 \times 10^4$ . So the final answer is  $4 \times 10^4$ .
12. Take it one move at a time: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $4 \times 2 = 8$ ,  $3 + 2 = 5$ :  $8 \times 10^5$ . So the final answer is  $8 \times 10^5$ .
13. Start by naming the process: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $9 \div 3 = 3$ ,  $4 - 1 = 3$ :  $3 \times 10^3$ . So the final answer is  $3 \times 10^3$ .
14. A good way to think about this is: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is Move the point 3 right: 5000. So the final answer is 5000.
15. Step by step: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $3 \times 2 = 6$ ,  $4 + 2 = 6$ :  $6 \times 10^6$ . So the final answer is  $6 \times 10^6$ .
16. Take it one move at a time: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $8 \div 2 = 4$ ,  $6 - 2 = 4$ :  $4 \times 10^4$ . So the final answer is  $4 \times 10^4$ .
17. Start by naming the process: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is  $2 \times 4 = 8$ ,  $3 + 3 = 6$ :  $8 \times 10^6$ . So the final answer is  $8 \times 10^6$ .
18. A good way to think about this is: Handle the front numbers and the powers of ten separately, then rewrite the result in scientific notation if needed. The setup/work is Move the point 5 right: 600000. So the final answer is 600000.



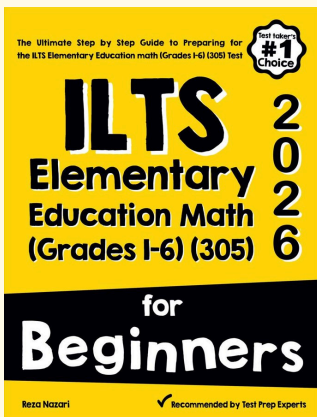
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