

# Scientific Notation

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 18

## Quick Review and Helpful Hints

Scientific notation writes a number as  $a \times 10^n$ , where  $1 \leq a < 10$ . A *positive* exponent means a large number (move the decimal point right when expanding); a *negative* exponent means a small number (move it left). The exponent equals the number of places the decimal point moves.

▷ **Example:** Write 4500 in scientific notation. **Work:** Move the decimal point so one nonzero digit stays in front: 4.5. The point moved 3 places left, so the exponent is +3. **★ Answer:**  $4.5 \times 10^3$



Each place is one power of 10.

## ◆ Practice Problems

Write in scientific notation, or expand to a standard number, as needed.

1. 3000

\_\_\_\_\_

8.  $9 \times 10^3$

\_\_\_\_\_

2. 52000

\_\_\_\_\_

9. 86000

\_\_\_\_\_

3. 0.006

\_\_\_\_\_

10.  $2.5 \times 10^{-3}$

\_\_\_\_\_

4.  $4.1 \times 10^2$

\_\_\_\_\_

11. 0.0801

\_\_\_\_\_

5.  $7 \times 10^{-2}$

\_\_\_\_\_

12.  $6.3 \times 10^5$

\_\_\_\_\_

6. 120000

\_\_\_\_\_

13. 700

\_\_\_\_\_

7. 0.00045

\_\_\_\_\_

14.  $1.5 \times 10^{-1}$

\_\_\_\_\_

## ◆ Word Problems

15. A bacterium is 0.000002 meter long. Write this in scientific notation.

\_\_\_\_\_

16. A distance is  $3.0 \times 10^5$  km. Write it as a standard number.

\_\_\_\_\_

17. A city has 8,400,000 people. Write this in scientific notation.

\_\_\_\_\_

18. A wavelength is  $5 \times 10^{-7}$  meter. Write it as a decimal.

\_\_\_\_\_



## Answer Keys

- |                       |                           |                          |
|-----------------------|---------------------------|--------------------------|
| 1. $3 \times 10^3$    | 7. $4.5 \times 10^{-4}$   | 13. $7 \times 10^2$      |
| 2. $5.2 \times 10^4$  | 8. 9000                   | 14. 0.15                 |
| 3. $6 \times 10^{-3}$ | 9. $8.6 \times 10^4$      | 15. $2 \times 10^{-6}$ m |
| 4. 410                | 10. 0.0025                | 16. 300000 km            |
| 5. 0.07               | 11. $8.01 \times 10^{-2}$ | 17. $8.4 \times 10^6$    |
| 6. $1.2 \times 10^5$  | 12. 630000                | 18. 0.0000005 m          |

### Step-by-Step Explanations

1. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Move the decimal so one nonzero digit is in front: 3. It moved 3 places left, so the exponent is +3:  $3 \times 10^3$ . So the final answer is  $3 \times 10^3$ .
2. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Place the point after the 5: 5.2. It moved 4 places left:  $5.2 \times 10^4$ . So the final answer is  $5.2 \times 10^4$ .
3. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Move the point right to get 6. It moved 3 places and the number is small, so the exponent is -3:  $6 \times 10^{-3}$ . So the final answer is  $6 \times 10^{-3}$ .
4. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A positive exponent means expand: move the point 2 places right, 4.1 → 410. So the final answer is 410.
5. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A negative exponent means a small number: move the point 2 places left, 7 → 0.07. So the final answer is 0.07.
6. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Put the point after the 1: 1.2. It moved 5 places left:  $1.2 \times 10^5$ . So the final answer is  $1.2 \times 10^5$ .
7. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Move the point right to get 4.5. It moved 4 places:  $4.5 \times 10^{-4}$ . So the final answer is  $4.5 \times 10^{-4}$ .
8. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Move the point 3 places right: 9 → 9000. So the final answer is 9000.
9. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Point after the 8: 8.6, moved 4 places left:  $8.6 \times 10^4$ . So the final answer is  $8.6 \times 10^4$ .
10. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Move the point 3 places left: 2.5 → 0.0025. So the final answer is 0.0025.
11. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Move the point right to 8.01, which is 2 places:  $8.01 \times 10^{-2}$ . So the final answer is  $8.01 \times 10^{-2}$ .
12. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Move the point 5 places right: 6.3 → 630000. So the final answer is 630000.
13. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Point after the 7: 7, moved 2 places left:  $7 \times 10^2$ . So the final answer is  $7 \times 10^2$ .
14. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Move the point 1 place left: 1.5 → 0.15. So the final answer is 0.15.
15. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Move the point right to 2, which is 6 places, and the number is small:  $0.000002 = 2 \times 10^{-6}$  m. So the final answer is  $2 \times 10^{-6}$  m.
16. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Expand by moving the point 5 places right: 3.0 → 300000 km. So the final answer is 300000 km.
17. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Point after the 8: 8.4, moved 6 places left:  $8.4 \times 10^6$ . So the final answer is  $8.4 \times 10^6$ .
18. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Move the point 7 places left: 5 → 0.0000005 m. So the final answer is 0.0000005 m.



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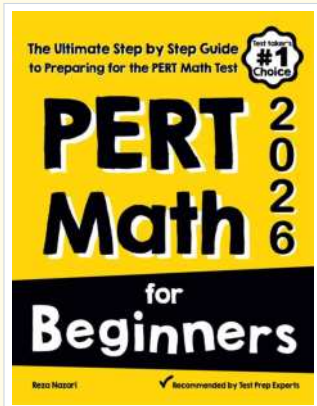
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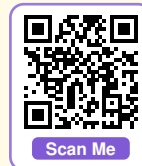
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