

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:** 4.5×10^3



Each place is one power of 10.

◆ Practice Problems

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

1. 3000

8. 9×10^3

2. 52000

9. 86000

3. 0.006

10. 2.5×10^{-3}

4. 4.1×10^2

11. 0.0801

5. 7×10^{-2}

12. 6.3×10^5

6. 120000

13. 700

7. 0.00045

14. 1.5×10^{-1}

◆ Word Problems

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

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

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

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



Answer Keys

- | | | |
|-----------------------|---------------------------|--------------------------|
| 1. 3×10^3 | 7. 4.5×10^{-4} | 13. 7×10^2 |
| 2. 5.2×10^4 | 8. 9000 | 14. 0.15 |
| 3. 6×10^{-3} | 9. 8.6×10^4 | 15. 2×10^{-6} m |
| 4. 410 | 10. 0.0025 | 16. 300000 km |
| 5. 0.07 | 11. 8.01×10^{-2} | 17. 8.4×10^6 |
| 6. 1.2×10^5 | 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: 3×10^3 . So the final answer is 3×10^3 .
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: 5.2×10^4 . So the final answer is 5.2×10^4 .
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: 6×10^{-3} . So the final answer is 6×10^{-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, $4.1 \rightarrow 410$. 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, $7 \rightarrow 0.07$. 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: 1.2×10^5 . So the final answer is 1.2×10^5 .
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: 4.5×10^{-4} . So the final answer is 4.5×10^{-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: $9 \rightarrow 9000$. 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: 8.6×10^4 . So the final answer is 8.6×10^4 .

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: $2.5 \rightarrow 0.0025$. 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: 8.01×10^{-2} . So the final answer is 8.01×10^{-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: $6.3 \rightarrow 630000$. 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: 7×10^2 . So the final answer is 7×10^2 .
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: $1.5 \rightarrow 0.15$. 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 2×10^{-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: $3.0 \rightarrow 300000$ 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: 8.4×10^6 . So the final answer is 8.4×10^6 .
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: $5 \rightarrow 0.0000005$ m. So the final answer is 0.0000005 m.



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