

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.

- | | |
|--|---|
| <p>1. 3000 _____</p> <p>2. 52000 _____</p> <p>3. 0.006 _____</p> <p>4. 4.1×10^2 _____</p> <p>5. 7×10^{-2} _____</p> <p>6. 120000 _____</p> <p>7. 0.00045 _____</p> | <p>8. 9×10^3 _____</p> <p>9. 86000 _____</p> <p>10. 2.5×10^{-3} _____</p> <p>11. 0.0801 _____</p> <p>12. 6.3×10^5 _____</p> <p>13. 700 _____</p> <p>14. 1.5×10^{-1} _____</p> |
|--|---|

◆ 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 → 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: 1.2×10^5 . 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 → 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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