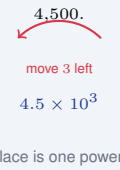
Scientific Notation

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 _____

2. 52000 _____

3. 0.006 _____

4. 4.1×10^2 _____

5. 7×10^{-2} _____

6. 120000 _____

7. 0.00045 _____

8. 9×10^3 _____

9. 86000 _____

10. 2.5×10^{-3} _____

11. 0.0801 _____

12. 6.3×10^5 _____

13. 700 _____

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, $4.1 \to 410$. 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, $7 \to 0.07$. 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: $9 \to 9000$. 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: $2.5 \to 0.0025$. 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: $6.3 \to 630000$. 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: $1.5 \to 0.15$. 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: $3.0 \to 300000$ 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: $5 \to 0.0000005$ m. So the final answer is 0.0000005 m.

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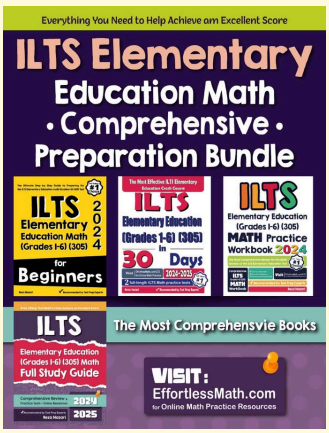

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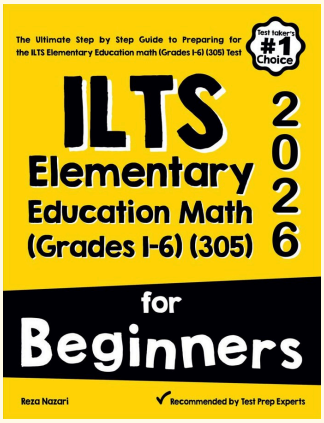

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