

Scientific Notation

STUDENT ACTIVITY

Very large and small numbers are generally represented in scientific notation. This activity introduces scientific notation and explores the relationship between multiplication and division using powers of 10.

Materials: TI-73 calculator

Explore: Multiplying and dividing by powers of 10:

Fill in the blank; check with the calculator:

1. $12345 = 12345 \times 10^{\text{---}} = 12345 \div 10^{\text{---}}$

2. $12345 = 1234.5 \times 10^{\text{---}} = 1234.5 \div 10^{\text{---}}$

3. $12345 = 123.45 \times 10^{\text{---}} = 123.45 \div 10^{\text{---}}$

4. $12345 = 1.2345 \times 10^{\text{---}} = 1.2345 \div 10^{\text{---}}$

5. $12345 = 0.0012345 \times 10^{\text{---}} = 0.0012345 \div 10^{\text{---}}$

Generalize:

6. Multiplying by 10^3 is the same as dividing by $10^{\text{---}}$

Check: $123 \times 10^3 = 123000$ $123 \div \text{---} = 123000$

7. Dividing by 10^4 is the same as multiplying by $10^{\text{---}}$

Check: $123 \div 10^4 = 0.0123$ $123 \times \text{---} = 0.0123$

8. Dividing by 10^5 is the same as multiplying by $10^{\text{---}}$

9. Dividing by 10^a is the same as multiplying by $10^{\text{---}}$

10. Multiplying by 10^b is the same as dividing by $10^{\text{---}}$

Scientific Notation:

Numbers are in scientific notation when a number is written as a **product** of a number between 1 and 10 and an integer power of 10.

11. 9.78×10^5 is in scientific notation. Explain why.

12. 97.8×10^4 is not in scientific notation. Explain why.

Practice:

Express without a power of 10:

13. $2.5625 \times 10^3 = \text{_____}$

14. $1.5 \times 10^3 = \text{_____}$

15. $3.67 \times 10^{-3} = \text{_____}$

Express in scientific notation:

16. $3458 = \text{_____} \times 10^3$

17. $0.00589 = \text{_____} \times 10^{-3}$

Put calculator in Sci Mode:

```
Normal Sci
float 0123456789
Degree Radian
Ab/c 1/2
Autosimp Mansimp
```

In this mode the calculator will automatically express ALL numbers in scientific notation.

18. Express in scientific notation:

1234 _____

19. Enter the same number in your calculator and hit enter. How does the calculator express this number in scientific notation; and how is this different than we write numbers in scientific notation?

Practice:

Express in scientific notation and then check them by entering them on your calculator:

20. 0.0796 = _____

21. 3.005 = _____

22. 94658.73 = _____

23. 5567.099 = _____

Put calculator in Normal Mode:

```
Normal Sci
Float 0123456789
Degree Radian
Hub/c 0/2
Autosimp Mansimp
```

Explore: The calculator automatically expresses very large or very small numbers in scientific notation when in normal mode.

Which number does the TI-73 convert to scientific notation? If it is converted, write the number as given in scientific notation:

24. $112233445566 =$ _____

25. $1234560 =$ _____

Generalize:

26. Continue to explore with numbers greater than 10 and generalize a rule for when the calculator will automatically express a large number in scientific notation:

Which number does the TI-73 convert to scientific notation? If it is converted, write the number as given in scientific notation:

27. $0.000012345 =$ _____

28. $0.00123456 =$ _____

Generalize:

29. Continue to explore with positive numbers less than 1 and generalize a rule for when the calculator will automatically express a small number in scientific notation:

30. What is the smallest number you can enter in your calculator in normal mode and have the calculator automatically express it in scientific notation with a positive power?

31. What is the largest number you can enter in your calculator in normal mode and have the calculator automatically express it in scientific notation with a negative power?
