

3.8 Dividing by Powers of Ten: Mental Math

Activity: Look for a Pattern

Examine the quotients.

$$365 \div 10 = 36.5 \quad 8970 \div 10 = 897$$

$$365 \div 100 = 3.65 \quad 8970 \div 100 = 89.7$$

$$365 \div 1000 = 0.365 \quad 8970 \div 1000 = 8.97$$

Inquire

1. Describe the pattern you see.
2. Which way does the decimal point appear to move when you divide by a power of ten?
3. Write a rule for dividing by powers of ten.

Some powers of ten can be written as decimals less than 1. Examples are 0.1, 0.01, and 0.001.

Use your calculator to find the quotients.

$$365 \div 0.1 = \quad 8970 \div 0.1 =$$

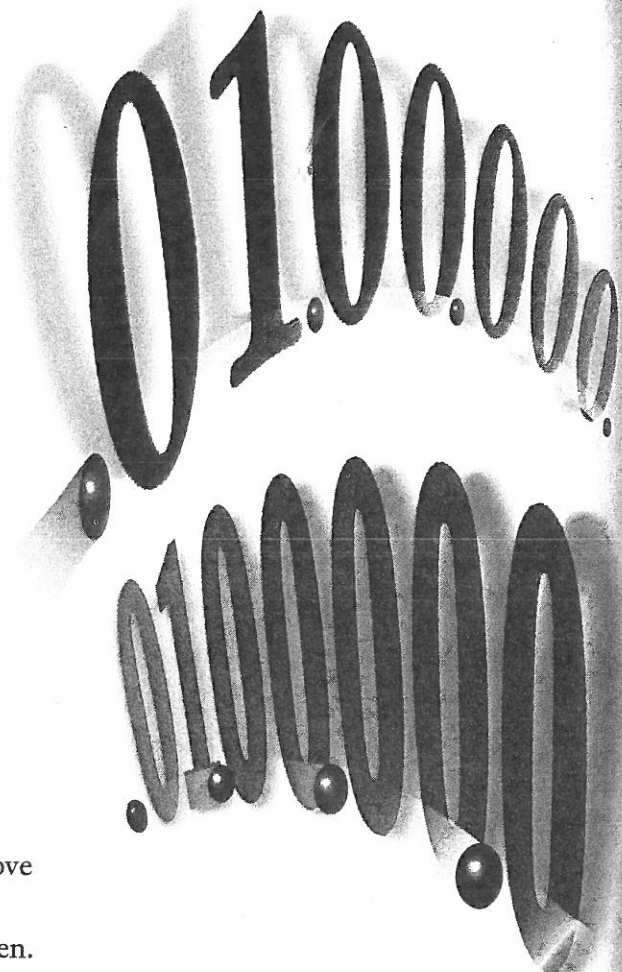
$$365 \div 0.01 = \quad 8970 \div 0.01 =$$

$$365 \div 0.001 = \quad 8970 \div 0.001 =$$

- Work with a classmate to describe the pattern.

Which way does the decimal point appear to move when you divide by a decimal power of ten?

- Write a rule for dividing by decimal powers of ten.



Practice

Divide by 10.

- choose 5 {
- | | | |
|----------|----------|----------|
| 1. 65 | 2. 243 | 3. 807 |
| 4. 2.5 | 5. 0.18 | 6. 13.2 |
| 7. 115.7 | 8. 2.653 | 9. 72.94 |

Divide by 100.

- choose 5 {
- | | | |
|-----------|------------|-----------|
| 10. 26 | 11. 571 | 12. 8429 |
| 13. 15.8 | 14. 73.9 | 15. 136.5 |
| 16. 6.737 | 17. 89.425 | 18. 0.856 |

Divide by 1000.

- | | | |
|-----------|-----------|-----------|
| 19. 75 | 20. 829 | 21. 1534 |
| 22. 20.83 | 23. 46.2 | 24. 91.06 |
| 25. 631.4 | 26. 789.6 | 27. 5392 |
- choose 5 }

Divide by 0.1.

- | | | |
|----------|-----------|-----------|
| 28. 53 | 29. 658 | 30. 746 |
| 31. 8.6 | 32. 9.2 | 33. 37.4 |
| 34. 22.5 | 35. 48.36 | 36. 158.9 |
- choose 5 }

Divide by 0.01.

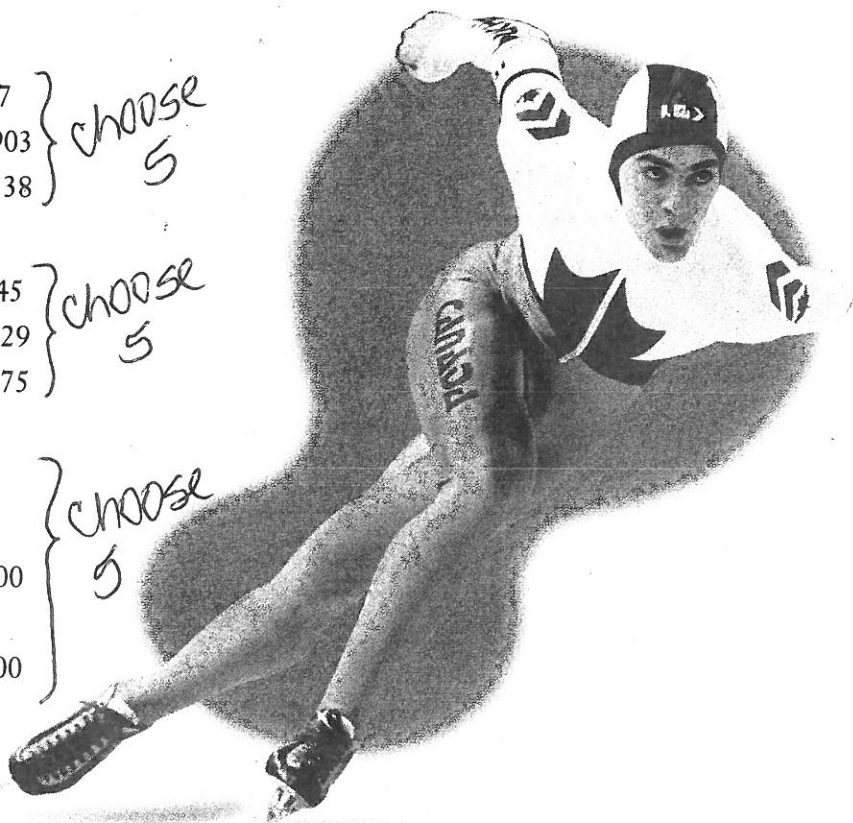
- | | | | |
|-----------|-----------|-----------|---------------|
| 37. 84 | 38. 392 | 39. 587 | } choose
5 |
| 40. 19.16 | 41. 38.52 | 42. 7.903 | |
| 43. 118.2 | 44. 506.8 | 45. 0.238 | |

Divide by 0.001.

- | | | | |
|-----------|-----------|-----------|---------------|
| 46. 29 | 47. 436 | 48. 9645 | } choose
5 |
| 49. 4.7 | 50. 8.06 | 51. 64.29 | |
| 52. 35.64 | 53. 731.5 | 54. 0.375 | |

Evaluate.

- | | | |
|--------------------------|-------------------------|---------------|
| 55. 28×0.01 | 56. 64×100 | } choose
5 |
| 57. 926×0.001 | 58. 0.54×0.1 | |
| 59. 12.05×10 | 60. 841.7×1000 | |
| 61. 2.63×0.01 | 62. 5.78×100 | |
| 63. 7.602×0.001 | 64. 18.09×1000 | |



Problems and Applications

65. Remi paid \$56.00 for 100 pencils. How much was each pencil?

66. A lacrosse team bought 1000 oatmeal cookies for \$350.00 and sold them for \$500.00. For each cookie, determine the following.

- a) the cost b) the selling price
c) the profit

68. Canadian Gaetan Boucher won an Olympic gold medal for speed skating in 1984. He won the 1000-m race in 75.8 s. About how long did it take him to skate the following distances?

- a) 1 m b) 10 m c) 100 m

67. Calculate.

- | | |
|----------------------|------------------------|
| a) 65×10 | b) 12.5×100 |
| $65 \div 0.1$ | $12.5 \div 0.01$ |
| c) 7.2×1000 | d) 46×0.1 |
| $7.2 \div 0.001$ | $46 \div 10$ |
| e) 812×0.01 | f) 3915×0.001 |
| $812 \div 100$ | $3915 \div 1000$ |

Make a statement about the results. Multiply and divide other numbers by powers of ten to check your statement.

PATTERN POWER

Find the pattern. Write the last four answers without multiplying.

- | | |
|--------------------------|--------------------|
| $2.5 \times 2.5 = 6.25$ | $6.5 \times 6.5 =$ |
| $3.5 \times 3.5 = 12.25$ | $7.5 \times 7.5 =$ |
| $4.5 \times 4.5 = 20.25$ | $8.5 \times 8.5 =$ |
| $5.5 \times 5.5 = 30.25$ | $9.5 \times 9.5 =$ |