

# Multiplying and Dividing by Powers of 10

## Lesson 6-1

DATE

TIME

### Multiplying by Powers of 10



1 When you multiply a number by a power of 10, do you expect the product to be greater than or less than the start number? Why? **Sample answer: It will be greater than the start number. Multiplying by a number greater than 1 gives a product greater than the start number.**

2 Use a calculator to complete the table. Look for patterns in how the decimal point moves. *Note:* You may need to place a zero in the tenths place to show the location of the decimal point for whole numbers. For example, write 453.0 instead of 453 to show the decimal point.

Start Number	× Power of 10	Result in Standard Notation	Movement of Decimal Point	
			Direction	Number of Places
4.53	× 10 <sup>1</sup>	45.3	Right	1
4.53	× 10 <sup>2</sup>	453.0	Right	2
4.53	× 10 <sup>3</sup>	4,530.0	Right	3
4.53	× 10 <sup>4</sup>	45,300.0	Right	4
4.53	× 10 <sup>5</sup>	453,000.0	Right	5
4.53	× 10 <sup>6</sup>	4,530,000.0	Right	6

3 a. Look at your results in the table above. Compare the power of 10 in each row to the movement of the decimal point. What do you notice? **Sample answer: The decimal point always moves to the right. The number of places it moves is the same as the exponent in the power of 10.**

b. Use the patterns you noticed to write a rule for multiplying any decimal by a power of 10. **Sample answer: To multiply a decimal by a power of 10, move the decimal point to the right. The exponent tells you how many places to move it. You may have to write extra zeros.**

4 If you *divided* a start number by a power of 10, would you expect the quotient to be greater than or less than the start number? Why? **Sample answer: It will be less than the start number. Dividing by a number greater than 1 gives a quotient less than the dividend.**

# Multiplying and Dividing by Powers of 10 (continued)

## Lesson 6-1

DATE

TIME

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### Dividing by Powers of 10

- 5 Use a calculator to complete the table. Look for patterns in how the decimal point moves.

Start Number	÷ Power of 10	Result in Standard Notation	Movement of Decimal Point	
			Direction	Number of Places
67.2	÷ $10^1$	6.72	Left	1
67.2	÷ $10^2$	0.672	Left	2
67.2	÷ $10^3$	0.0672	Left	3
67.2	÷ $10^4$	0.00672	Left	4
67.2	÷ $10^5$	0.000672	Left	5
67.2	÷ $10^6$	0.0000672	Left	6

- 6 a. Look at your results in the table above. Compare the power of 10 in each row to the movement of the decimal point. What do you notice? **Sample answer:** The decimal point always moves to the left. The number of places it moves is the same as the exponent in the power of 10.
- b. Use the patterns you noticed to write a rule for dividing any decimal by a power of 10. **Sample answer:** To divide a decimal by a power of 10, move the decimal point to the left. The exponent tells you how many places to move it. You might have to write extra zeros.

### Applying Rules for Multiplying and Dividing by Powers of 10

Use the rules you discovered to multiply and divide in Problems 7–12. Do not use a calculator.

- 7  $5.8 \times 10^2 =$  580
- 8  $2.8 \div 10^2 =$  0.028
- 9  $673.9 \div 10^2 =$  6.739
- 10  $23.7 \times 10^2 =$  2,370
- 11  $3.1 \times 10^4 =$  31,000
- 12  $49.2 \div 10^4 =$  0.00492

- 13 Explain the placement of the decimal point in your answer for Problem 7. **Sample answer:** The decimal point moved two places to the right because multiplying by  $10^2$  is like multiplying by 10 twice. Each time a number is multiplied by 10, the digits shift a place to the left and the decimal point shifts right.