a. $45 * 10 =$ 450

b. $45 * 10 * 10 =$ 4,500

c. $45 * 10 * 10 * 10 =$ 45,000

d. $45 * 10 * 10 * 10 * 10 =$ 450,000

2 Look at your answers to Problem 1.

a. What pattern do you notice in the number of zeros?

Sample answer: Every time I multiply by one more 10, there is one more zero in the answer.

b. What pattern do you notice in the value of the products?

Sample answer: Every time I multiply by one more 10 the product is 10 times as large.

c. Do you think the patterns will hold true no matter how many 10s are in the problem? Use what you know about place value to explain your answer.

Sample answer: The pattern will keep going. Every time I multiply by 10, I write one more zero. That means the product will be 10 times as much because all the digits move one place-value position to the left.

3 Solve.

a. $328 * 10^2 =$ 32,800

b. $328 * 10^5 =$ 32,800,000

c. $328 * 10^7 =$ 3,280,000,000

d. $328 * 10^4 =$ 3,280,000

e. $328 * 10^3 =$ 328,000

f. $328 * 10^1 =$ 3,280

4 Look at your answers to Problem 3.

a. What pattern do you notice in the number of zeros?

Sample answer: The number of zeros at the end of each answer is the same as the exponent.

b. Use the pattern to help you write a rule for how to multiply a whole number by a power of 10.

Sample answer: To multiply a whole number by a power of 10, first write the whole number. Then write the number of zeros shown by the exponent.

c. Use what you know about place value to explain why your rule will always work.

Sample answer: The exponent shows how many times you are multiplying by 10. Every time you multiply by 10, you just write one more zero because multiplying by 10 moves all the digits one place to the left.