

3.4

Multiplying by Numbers Greater than 1

YOU WILL NEED

- a calculator
- base ten blocks

GOAL

Multiply by decimals greater than 1.

LEARN ABOUT the Math

Max's mother is buying a rug to put in the entrance hall of their home. The area she wants to cover is 2.4 m long and 1.2 m wide.



How big a rug does Max's mother need to cover the hall?



Example 1

Multiplying decimals using base ten blocks

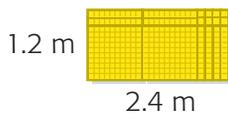
Determine the area of the rug that Max's mother needs.

Max's Solution



I decided to use base ten blocks to model a rectangle that is 2.4 m long and 1.2 m wide. A rod represents 1.0 m, so the length of a small cube represents 0.1 m. I put down rods and cubes to show the length and width of the rectangle.





$1.2\text{ m} \times 2.4\text{ m} = 2.88\text{ m}^2$
 The area of the rug that we need is 2.9 m^2 .

To model the rug, I filled in the rectangle. Each flat represents $1.00\text{ m} \times 1.00\text{ m} = 1.00\text{ m}^2$. Since 10 rods make a flat, each rod represents 0.10 m^2 . Since 100 small cubes make a flat, each small cube represents 0.01 m^2 .

There are 2 flats, 8 rods, and 8 small cubes.
 The area of the rug that we need is $2.00 + 0.80 + 0.08\text{ m}^2$.

Reflecting

- A. Why is the product of two decimals greater than 1 always greater than both factors?
- B. How is multiplying by a decimal greater than 1 the same as multiplying by a decimal less than 1?

WORK WITH the Math

Example 2 | Multiplying and dividing by 100

Julie uses 7.2 g of silver to make a small pin. Silver costs about \$0.18 for each gram. Calculate the cost of the silver in the pin to the nearest cent.

Solution

$$0.18 \times 7.2 \text{ is about } 0.2 \times 7 = 1.4$$

$$0.18 \times 100 = 18$$

$$18 \times 7.2 = 129.6$$

$$129.6 \div 100 = 1.296$$

The cost is \$1.30.
 This answer is reasonable because it is close to the estimate.

Estimate the amount in dollars.

Multiply 0.18 by 100 to get a whole number, so you can avoid having to multiply two decimals.

Multiply 18 by 7.2.

Divide by 100 to reverse the earlier multiplication by 100.

Example 3 | Placing a decimal point in a product

Max entered 6.42×13.5 on his calculator and got 8667.0. Is this result correct?

Solution

6.42×13.5 is about $6 \times 10 = 60$.

The decimal point could go in many places to get answers such as 0.8667, 8.667, 86.67, and 866.7. Estimating helps you determine the answer that is reasonable.

The product must be 86.67.

86.67 is closest to the estimate.

A Checking

- Place the decimal point correctly in each product.
 - $3.4 \times 2 = 680$
 - $26.50 \times 2.2 = 5830$
- Estimate and then calculate.
 - 4.5×3.6
 - 12.23×2.9

B Practising

- Place the decimal point correctly in each product.
 - $3.13 \times 1.2 = 3756$
 - $26.45 \times 2.162 = 571849$
 - $15.45 \times 3.2 = 4944$
 - $321.06 \times 11.3 = 3627978$
- Predict the order of these six products from greatest to least. Calculate to check your prediction.
 - 32.25×1.8
 - 2.2×0.03
 - 0.45×2.6
 - 3.67×1.01
 - 12.347×0.64
 - 0.35×10.19
- The decimal point is in the wrong place in each answer. Put it in the correct place, and explain the strategy you used.
 - $45.66 \times 12.2 = 5570.52$
 - $1.09 \times 30.65 = 334.085$
 - $0.78 \times 1.023 = 79.794$
 - $52.56 \times 11.25 = 5913.0$

Reading Strategy

What does the garden patch look like in your mind?



6. Replace each blank with a number so that the products are in order from least to greatest.
 - .4 × 5.■
 - .8 × 4.9
 - .562 × ■.12■
7. What is the area of a garden patch that is 3.26 m wide and 5.13 m long?
8. Suppose Annik works 7.5 h each week. After working for a year, she gets a raise from \$9.25 for each hour to \$9.50 for each hour. How much more money will she earn in a week?
9. Louise wants to integrate the Franco-Albertan flag into the flag for La Conférence de la Francophonie. Her flag will be 2.41 m long and 1.7 m wide. Determine the area of the flag.
10. The adult height of a man is about 1.19 times his height at age 12. The adult height of a woman is about 1.07 times her height at age 12. Miguel is 1.5 m tall, and Romona is 1.6 m tall. Both are 12 years old. Predict how tall they will be as adults.
11. One postage stamp costs \$1.85. How much does a book of 25 stamps cost?
12. Suppose that you have \$3.00 and jellybeans cost \$0.85 for each 100 g. Can you afford to buy 300 g of jellybeans?
13. A butcher sells ground beef for \$2.25 for each kilogram. How much will 3.4 kg of ground beef cost?
14. Suki is painting her bedroom ceiling. The ceiling is 4.2 m long and 3.9 m wide. Suki has one can of paint, which will cover 12 m². Does she have enough paint to put two coats on the ceiling? Explain.
15. The Hendersons spend about \$132.50 on food every week. There are 52 weeks in a year. How much do they spend on food every year?
16. Meagan says that, to multiply 1.3×1.3 , you can multiply 1×1 and 0.3×0.3 , and then add the products to get 1.09 for the answer. Do you agree? Explain.