1 Estimating Products

Goal **Estimate products of decimal tenths and money amounts using a variety of strategies.**

1. Estimate each product. Show your work.

   a) 3.6 × $29.55
   Suggested answer:
   4 x $30 = $120 or
   3 x $30 plus $\frac{2}{3}$ of $30
   = $90 + $20
   = $110

   b) 2.4 × $16.59
   Suggested answer:
   3 x $16 = $48 or
   2 x $16 plus $\frac{1}{2}$ of $16
   = $32 + $8
   = $40

   c) 4.3 × $18.86
   Suggested answer:
   4 x $20 = $80 or
   4 x $18 plus $\frac{1}{3}$ of $18
   = $72 + $6
   = $78

   d) 5.7 × $12.77
   Suggested answer:
   6 x $12 = $72 or
   5 x $12 plus $\frac{3}{4}$ of $12
   = $60 + $9
   = $69

   e) 6.6 × $24.41
   Suggested answer:
   7 x $25 = $175 or
   6 x $24 plus $\frac{2}{3}$ of $24
   = $144 + $16
   = $160

   f) 8.4 × $49.48
   Suggested answer:
   8 x $50 = $400 or
   8 x $50 plus $\frac{1}{2}$ of $50
   = $400 + $25
   = $425

> **At–Home Help**
>
> There are several ways to estimate the cost of an item.
>
> For example, to estimate the cost of 1.3 kg of salmon that costs $17.61 per kilogram, use one of these methods.
>
> 1 × $20 = $20 or
> 1 × $18 plus $\frac{1}{3}$ of $18
> = $18 + $6
> = $24
>
> Use rounding or numbers that are easier to work with.

2. Estimate each cost. Use a method that will give the answer closest to the actual cost.

   a) 1.2 kg at $16.88 per kilogram
   Suggested answer:
   1 x $17 = $17

   b) 0.6 kg at $21.77 per kilogram
   Suggested answer:
   $\frac{2}{3}$ of $21 = $14

   c) 1.8 kg at $18.45 per kilogram
   Suggested answer:
   2 x $18 = $36

   d) 4.3 kg at $29.10 per kilogram
   Suggested answer:
   4 x $30 plus $\frac{1}{3}$ of $30
   = $120 + $10
   = $130

   e) 5.4 kg at $31.74 per kilogram
   Suggested answer:
   5 x $32 plus $\frac{1}{2}$ of $32
   = $160 + $16
   = $176

   f) 8.7 kg at $39.25 per kilogram
   Suggested answer:
   8 x $40 plus $\frac{3}{4}$ of $40
   = $320 + $30
   = $350

2 Multiplying by 1000 and 10 000

Goal Multiply decimal tenths, hundredths, and thousandths by 1000 and 10 000.

1. Calculate.

a) $1000 \times 0.501 =$ _____501_____

b) $14.82 \times 1000 =$ _____14 820_____

c) $10\,000 \times 29.086 =$ _____290 860_____

d) $5.8 \times 10\,000 =$ _____58 000_____

e) $1000 \times 67.3 =$ _____67 300_____

f) $4.01 \times 1000 =$ _____4010_____

2. Determine the distance in metres.

a) 51.42 km $=$ _____51 420_____ m

b) 0.986 km $=$ _____986_____ m

c) 8.023 km $=$ _____8023_____ m

d) 18.7 km $=$ _____18 700_____ m

e) 30.002 km $=$ _____30 002_____ m

f) 84.06 km $=$ _____84 060_____ m

At–Home Help

To multiply a decimal tenth, hundredth, or thousandth by 1000, move all digits to the left three places. To multiply by 10 000, move all digits to the left four places. You can see the pattern by multiplying by 10, 100, 1000, or 10 000.

For example,
$$29.8 \times 10 = 298$$
$$29.8 \times 100 = 2980$$
$$29.8 \times 1000 = 29\,800$$
$$29.8 \times 10\,000 = 298\,000$$

3. Jamie rides 4.26 km on his bicycle each day. About how far does he ride in 3 years?

Suggested answer:
One year has about 300 days.
So 3 years have about 1000 days.
I estimate 4.26 km x 1000 = 4260 km.

4. Dana walks about 0.76 m in each step. How far could she travel if she takes 10 000 steps?

0.76 m x 10 000 = 7600 m

3 Multiplying Tenths by Whole Numbers

Goal **Multiply decimal tenths by whole numbers using models, drawings, and symbols.**

1. Multiply. Show your work.

    a) 14.3×5

    $$\begin{array}{r} {}^{2}{}^{1} \\ 1\,4.3 \\ \times \quad 5 \\ \hline 7\,1.5 \end{array}$$

    c) 20.7×3

    $$\begin{array}{r} {}^{2} \\ 2\,0.7 \\ \times \quad 3 \\ \hline 6\,2.1 \end{array}$$

    b) 2.8×6

    Suggested answer:

    $$\begin{array}{r} {}^{4} \\ 2\,8 \text{ tenths} \\ \times \; 6 \\ \hline 168 \text{ tenths} \\ = 16.8 \end{array}$$

    d) 82.4×9

    Suggested answer:

    $$\begin{array}{r} {}^{2}{}^{3} \\ 8\,2\,4 \text{ tenths} \\ \times \quad 9 \\ \hline 7\,4\,1\,6 \text{ tenths} \\ = 741.6 \end{array}$$

2. A fruit pie uses 1.3 kg of peaches, 50.5 g of ground almonds, and 2 packages of ricotta. Serina needs to make 4 pies for a family gathering.

    a) How much of each ingredient is needed?

    Suggested answer:

    peaches

    $$\begin{array}{r} {}^{1} \\ 1\,.\,3 \text{ kg} \\ \times \quad 4 \\ \hline 5\,.\,2 \text{ kg} \end{array}$$

    almonds

    $$\begin{array}{r} {}^{2} \\ 5\,0\,.\,5 \text{ g} \\ \times \qquad 4 \\ \hline 2\,0\,2\,.\,0 \text{ g} \end{array}$$

    ricotta

    $$\begin{array}{r} 2 \text{ packages} \\ \times\,4 \\ \hline 8 \text{ packages} \end{array}$$

    b) One kilogram of peaches costs $6. What is the total cost of the peaches needed?

    Suggested answer:

    $$\begin{array}{r} {}^{1} \\ 5.\,2 \\ \times \; 6 \\ \hline 31.2 \end{array}$$

    The total cost of the peaches is $31.20.

4 Multiplying by 0.1, 0.01, or 0.001

Goal   **Multiply by 0.1, 0.01, or 0.001 using mental math.**

1. Multiply.

   a) $245 \times 0.01 = $ ___2.45___

   b) $312 \times 0.1 = $ ___31.2___

   c) $405 \times 0.001 = $ ___0.405___

   d) $67 \times 0.01 = $ ___0.67___

   e) $89 \times 0.001 = $ ___0.089___

   f) $42 \times 0.1 = $ ___4.2___

   g) $540 \times 0.01 = $ ___5.4___

   h) $30 \times 0.001 = $ ___0.03___

At–Home Help
To multiply a whole number by 0.1, 0.01, or 0.001, move the digits to the right.
For example,
$298 \times 10\,000 = 2\,980\,000$
$298 \times 1000 = 298\,000$
$298 \times 100 = 29\,800$
$298 \times 10 = 2980$
$298 \times 1 = 298$
$298 \times 0.1 = 29.8$
$298 \times 0.01 = 2.98$
$298 \times 0.001 = 0.298$

2. Determine the missing measurement.

   a) $45 \text{ g} = $ ___0.045___ kg   **d)** $202 \text{ m} = $ ___0.202___ km

   b) $57 \text{ mm} = $ ___5.7___ cm   **e)** $368 \text{ g} = $ ___0.368___ kg

   c) $62 \text{ cm} = $ ___0.62___ m   **f)** $250 \text{ mm} = $ ___25___ cm

3. What is each measurement?

   a) a line of 804 cubes, each 0.01 m long, in metres
     8.04 m

   b) a line of 62 boxes, each 0.1 m wide, in metres
     6.2 m

   c) a 480 g bag of sunflower seeds, in kilograms
     0.48 kg

   d) a 22 g candy, in kilograms
     0.022 kg

5

Multiplying Multiples of Ten by Tenths

Goal **Multiply to calculate the decimal portion of a multiple of 10.**

1. Calculate. Show your work.

At–Home Help

To multiply a decimal tenth by a whole number, you can write the decimal tenth as a multiple of 10.

For example, $0.4 = 0.1 \times 4$
To multiply 0.4×320, multiply $0.1 \times 320 = 32$.
Then multiply $4 \times 32 = 128$.
$0.4 \times 320 = 128$

a) $0.3 \times 250 = \underline{\ 75\ }$
Suggested answer:
$0.1 \times 250 = 25$
$3 \times 25 = 75$

d) $0.6 \times 800 = \underline{\ 480\ }$
Suggested answer:
$0.1 \times 800 = 80$
$6 \times 80 = 480$

b) $0.1 \times 850 = \underline{\ 85\ }$
85

e) $0.5 \times 640 = \underline{\ 320\ }$
Suggested answer:
$0.1 \times 640 = 64$
$5 \times 64 = 320$

c) $0.4 \times 530 = \underline{\ 212\ }$
Suggested answer:
$0.1 \times 530 = 53$
$4 \times 53 = 212$

f) $0.8 \times 2650 = \underline{\ 2120\ }$
Suggested answer:
$0.1 \times 2650 = 265$
$8 \times 265 = 2120$

2. At Neil's family picnic, 10 people ate 0.6 of 6400 g of roast chicken and 0.5 of a 4500 mL container of potato salad.

a) How much roast chicken did Neil's family eat?
Suggested answer: $0.1 \times 6400 \text{ g} = 640 \text{ g}$
$6 \times 640 \text{ g} = 3840 \text{ g}$

b) How much potato salad did Neil's family eat?
Suggested answer: $0.1 \times 4500 \text{ mL} = 450 \text{ mL}$
$5 \times 450 \text{ mL} = 2250 \text{ mL}$

c) Each person ate the same amount of potato salad. How much potato salad did each person eat?
Suggested answer: $2250 \text{ mL} \div 10 = 225 \text{ mL}$

3. Students from two schools worked at a food bank. One school had 450 students. The other school had 360 students. Eight-tenths of the students in each school participated. How many more students participated from the school of 450 than the school of 360?   Suggested answer:

(school of 450) $0.1 \times 450 = 45$ (school of 360) $0.1 \times 360 = 36$
$8 \times 45 = 360$ $8 \times 36 = 288$
difference $= 360 - 288$
$= 72$ students

6

Communicate About Problem Solving

Goal **Explain how to solve problems involving decimal multiplication.**

1. Janice exercises for 360 min each week. She walks for 0.6 of the time, and rides her bicycle for the rest of the time.

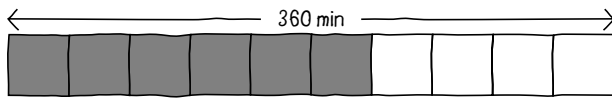**a)** For how many minutes does Janice walk?

Suggested answer:

Understand the Problem
I need to find out how many minutes Janice spends walking.

Make a Plan
I will model 0.6 using a rectangle. 0.6 is the same as $\frac{6}{10}$. So I divide the rectangle into 10 equal parts and shade 6 of them.

360 min

I will determine how many minutes are represented by each part. Then I will multiply that number by 6, because 6 parts are shaded.

Carry Out the Plan
Since 360 is divided into 10 parts, each part represents 360 ÷ 10 = 36 min.
6 x 36 min = 216 min
Janice walks for 216 min each week.

b) For how many minutes does Janice ride her bicycle?

Suggested answer:

Understand the Problem
I need to find how many minutes Janice rides her bicycle.

Make a Plan
I know that the total time Janice exercises is 360 min. Since she walks for 216 min, the rest of the time she rides her bicycle. So I need to subtract.

Carry Out the Plan
360 min – 216 min = 144 min
Janice rides her bicycle for 144 min.

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At-Home Help

When writing a solution to a problem, use the problem-solving model.
• Understand the Problem
• Make a Plan
• Carry Out the Plan
• Look Back

Make sure you communicate your thinking clearly. Use the Communication Checklist.

Communication Checklist
☑ Did you model the problem-solving process?
☑ Did you show all your steps?
☑ Did you use a model or diagram?
☑ Did you explain your thinking?
☑ Did you state your solution clearly?

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7 Choosing a Multiplication Method

Goal   **Justify the choice of a multiplication method.**

1. Multiply. Did you use mental math, pencil and paper, or a calculator?

a) 0.6×5

   3

   mental math

b) 1.8×9

   $\overset{7}{1}.8$

   $\underline{\times \quad 9}$

   1 6 .2

   pencil and paper

c) 0.52×4

   0 .5 2

   $\underline{\times \quad 4}$

   2 .0 8

   pencil and paper

d) 0.37×100

   37

   mental math

e) 2.9×4

   Suggested answer:

   $2 \times 4 = 8$

   $0.9 \times 4 = 3.6$

   $8 + 3.6 = 11.6$

   pencil and paper

f) 5.7×100

   570

   mental math

g) 0.04×100

   4

   mental math

h) 0.8×7

   5.6

   mental math

At-Home Help

If numbers are simple to multiply, you can use mental math. Multiplying by 0.001, 0.01, 0.1, 10, 100, and 1000 can be done mentally.

For example, $5.7 \times 100 = 570$.

If you can multiply numbers without a lot of partial products, use pencil and paper.

For example, $8.2 \times 6 = 49.2$.

If you have to use a lot of partial products, use a calculator.

For example,
$79.523 \times 91 = 7236.593$.

2. Explain why you chose the method you did for three parts in Question 1.

Suggested answer:
Part a): I used mental math because I know that 6 x 5 = 30. So 0.6 x 5 = 3.
Part b): I used pencil and paper because the numbers were too hard to multiply in my head.
Part e): I used pencil and paper because I had to keep track of the partial products. Then I
      added the partial products in my head.

Test Yourself Page 1

Circle the correct answer.

1. Which estimate would be closest to the actual product? 8.3 × 21.20

   A. 8 × 21

   B. 9 × 22

   C. 8 × 21 plus $\frac{1}{3}$ of 21

   D. 9 × 24 plus $\frac{1}{3}$ of 24

2. Which is the best estimate for 0.8 kg at $28.95 per kilogram?

   A. $16　　　　**B.** $18　　　　**C.** $29　　　　**D.** $32

3. What is the product of 1000 and 25.064?

   A. 250.64　　　**B.** 2506.4　　　**C.** 25 064　　　**D.** 250 640

4. What is the product of 0.891 and 1000?

   A. 8.91　　　　**B.** 89.1　　　　**C.** 891　　　　**D.** 8910

5. What is 5.007 km in metres?

   A. 50 007 m　　**B.** 50.07 m　　**C.** 500.7 m　　**D.** 5007 m

6. What is the product of 6.2 and 7?

   A. 42.2　　　　**B.** 43.4　　　　**C.** 44.4　　　　**D.** 42.9

7. What is the product of 503 and 0.01?

   A. 0.503　　　**B.** 5.03　　　　**C.** 50.3　　　　**D.** 503

8. What is the product of 0.1 and 827?

   A. 8270　　　　**B.** 827　　　　**C.** 8.27　　　　**D.** 82.7

9. One muffin has a mass of 0.025 kg. What is the mass in grams?

   A. 250 g　　　**B.** 0.25 g　　　**C.** 2.5 g　　　**D.** 25 g

10. What is the product of 0.4 and 3260?

    A. 652　　　　**B.** 978　　　　**C.** 1304　　　　**D.** 1448

Test Yourself Page 2

11. A library has 5460 books. Three-tenths of the books are mysteries. How many mystery books are there?

A. 546 books   **B.** 1638 books   **C.** 1820 books   **D.** 2730 books

12. Jason wants to multiply 0.6 by 920. He wrote

$$0.1 \times 920 = \boxed{}$$

$$\boxed{} \times 92 = \boxed{}$$

What are the missing numbers?

A. 92, 6, 552   **B.** 9.2, 6, 55.2   **C.** 92, 60, 5520   **D.** 92, 60, 552

13. Lina saved $240 planting trees. She spent 0.4 of that amount on a new jacket. How much did she spend on the jacket?

A. $60   **B.** $96   **C.** $120   **D.** $9.60

14. Which product is greatest?

A. 1000×0.6 **B.** 1000×0.105 **C.** 1000×0.92 **D.** 1000×0.033

15. Mitch bought 0.6 kg of grapes.
One kilogram cost $3.00 on sale.
The regular price was $4.00 per kilogram.
How much did Mitch save?

A. $1.80   **C.** $2.40

B. $0.80   **D.** $0.60

$ 3.00