

Estimating Products and Quotients



Quick Review

- Here are 2 strategies you can use to estimate 5.81×7 .

• **Front-end estimation**

Write 5.81 as 5.

Multiply: $5 \times 7 = 35$

This is an underestimate because 5 is less than 5.81.

• **Decimal benchmarks**

Since 5.81 is closer to 6 than to 5, write 5.81 as 6.

Multiply: $6 \times 7 = 42$

This is an overestimate because 6 is greater than 5.81.

- Here are 2 strategies you can use to estimate $284.76 \div 5$.

• **Front-end estimation**

Write 284.76 as 200.

Divide: $200 \div 5 = 40$

This is an underestimate because 200 is less than 284.76.

• **Compatible numbers**

Since 284.76 is close to 300,

divide: $300 \div 5 = 60$

This is an overestimate because 300 is greater than 284.76.

Try These

1. Estimate each product. Show your work.

a) 5.23×7 _____ b) 25.783×4 _____

c) 9.96×4 _____ d) 6.7×7 _____

2. Estimate each quotient. Show your work.

a) $15.9 \div 8$ _____ b) $18.12 \div 2$ _____

c) $42.035 \div 6$ _____ d) $159.4 \div 8$ _____

3. Estimate the area of a 3.68-cm-by-8-cm rectangle. _____

4. Estimate the side length of a square with perimeter:

a) 24.8 m _____ b) 29.0 m _____

Practice

1. Estimate each product or quotient.

a) 5.76×5

b) 29.945×3

c) 16.04×9

d) $15.4 \div 3$

e) $31.95 \div 8$

f) $158.02 \div 2$

2. Tell if each estimate in question 1 is an overestimate or an underestimate.

a) _____

b) _____

c) _____

d) _____

e) _____

f) _____

3. A jogger's heart pumps about 14.25 L of blood per minute.

Estimate the volume of blood pumped in 8 min. _____

4. Calvin sponsored Magda \$4.75 for every kilometre she ran.

Magda ran 9 km. About how much did Calvin pay Magda? _____

5. Six friends equally shared the cost of a \$23.59 pizza.

About how much did each person pay? _____

6. The table shows the masses of some Canadian coins.

Estimate the combined mass of:

a) 8 pennies _____ b) 9 nickels _____

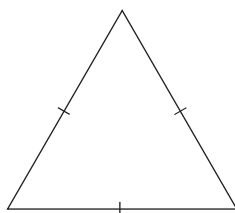
c) 7 dimes _____

Coin	Mass (g)
Penny	2.35
Nickel	3.95
Dime	1.75

Stretch Your Thinking

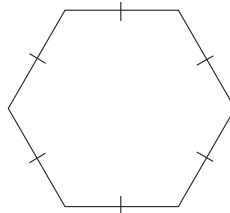
Estimate the perimeter of each regular polygon.

a)



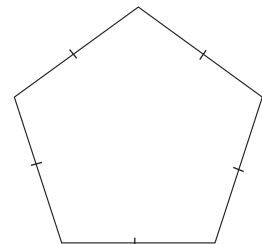
6.37 m

b)



4.587 cm

c)



7.8 m

Multiplying Decimals by a Whole Number



Quick Review

You can use what you know about multiplying whole numbers to multiply a decimal by a whole number.

Multiply: 2.936×4

- First estimate.

Since 2.936 is closer to 3 than to 2, write 2.936 as 3.

Multiply: $3 \times 4 = 12$

So, 2.936×4 is about 12.

- Record the numbers without the decimal point.

Multiply as you would with whole numbers.

- Use the estimate to place the decimal point in the product.

11.744 is close to 12, so

2.936×4 is 11.744.

$$\begin{array}{r}
 2936 \\
 \times 4 \\
 \hline
 24 \\
 120 \\
 3600 \\
 8000 \\
 \hline
 11744
 \end{array}$$



Try These

Multiply.

1. a)
$$\begin{array}{r}
 5.18 \\
 \times 5 \\
 \hline
 \end{array}$$

b)
$$\begin{array}{r}
 1.734 \\
 \times 8 \\
 \hline
 \end{array}$$

c)
$$\begin{array}{r}
 0.143 \\
 \times 4 \\
 \hline
 \end{array}$$

d)
$$\begin{array}{r}
 9.431 \\
 \times 2 \\
 \hline
 \end{array}$$

Practice

1. Use paper and pencil to find each product.

Record the products on the lines.

Then use the letters next to the products to solve this riddle.

Why did the jellybean
go to school?

$0.396 \times 5 = \underline{\hspace{2cm}} \text{ (S)}$

$1.637 \times 3 = \underline{\hspace{2cm}} \text{ (A)}$

$0.148 \times 5 = \underline{\hspace{2cm}} \text{ (O)}$

$1.004 \times 7 = \underline{\hspace{2cm}} \text{ (T)}$

$0.176 \times 4 = \underline{\hspace{2cm}} \text{ (B)}$

$8.145 \times 6 = \underline{\hspace{2cm}} \text{ (C)}$

$2.534 \times 2 = \underline{\hspace{2cm}} \text{ (D)}$

$0.941 \times 9 = \underline{\hspace{2cm}} \text{ (W)}$

$1.935 \times 4 = \underline{\hspace{2cm}} \text{ (M)}$

$2.123 \times 4 = \underline{\hspace{2cm}} \text{ (N)}$

$0.132 \times 2 = \underline{\hspace{2cm}} \text{ (E)}$

$4.113 \times 2 = \underline{\hspace{2cm}} \text{ (R)}$

$3.005 \times 3 = \underline{\hspace{2cm}} \text{ (I)}$

$1.254 \times 3 = \underline{\hspace{2cm}} \text{ (U)}$

$0.524 \times 6 = \underline{\hspace{2cm}} \text{ (H)}$

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0.704 0.264 48.87 4.911 3.762 1.98 0.264

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1.98 3.144 0.264

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8.469 4.911 8.492 7.028 0.264 5.068

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7.028 0.74

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0.704 0.264

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4.911 1.98 7.74 4.911 8.226 7.028 9.015 0.264

Stretch Your Thinking

What whole number would you multiply 6.374 by to get the product 25.496? _____

Multiplying a Decimal Less than 1 by a Whole Number



Quick Review

When you multiply a decimal less than 1 by a whole number, the product is less than the whole number.

- To multiply 0.0295 by 7, multiply the whole numbers: 295×7

$$\begin{array}{r} 295 \\ \times 7 \\ \hline 35 \end{array}$$

Estimate to place the decimal point:

0.0295 is close to 0.03, or 3 hundredths.

3 hundredths multiplied by 7 is 21 hundredths.

21 hundredths are close to 20 hundredths, or 2 tenths.

Place the decimal point so the product is close to 2 tenths: 0.2065

$$\begin{array}{r} 630 \\ 1400 \\ \hline 2065 \end{array}$$

So, $0.0295 \times 7 = 0.2065$

Try These

1. Multiply.

- a) $0.7 \times 5 =$ _____ b) $0.25 \times 3 =$ _____ c) $0.12 \times 5 =$ _____

2. Multiply as you would whole numbers. Estimate to place the decimal point.

- a) 0.467×8 b) 0.086×9 c) 0.7634×7

3. Multiply.

- a) 0.7×4 _____ b) 0.35×6 _____
 0.07×4 _____ 0.035×6 _____
 0.007×4 _____ 0.0035×6 _____

Practice

Play this game with a partner.

You will need 2 colours of counters, paper, and pencils.

- Take turns to choose one number from each column in the Number Box.
- Multiply the numbers. Cover the product on the game board with a counter.
- The first player to cover 5 products in a row, column, or diagonal wins.

Number Box	
2	0.032
3	0.148
4	0.675
5	0.009
6	0.253

0.192	0.506	1.012	0.027	0.128
0.592	2.025	0.296	2.7	0.036
3.375	0.064	4.05	0.444	1.35
0.16	0.74	0.018	0.759	0.045
0.888	1.265	0.054	0.096	1.518

Stretch Your Thinking

The product of a single-digit whole number and a decimal less than 1 is 0.24.

Find the factors.

Give as many answers as you can.

Dividing Decimals by a Whole Number



Quick Review

Here is one way to divide a decimal by a whole number.

Divide: $7.938 \div 2$

► Record the numbers without the decimal point.

Divide as you would with whole numbers.

► Estimate to place the decimal point.

7.938 is close to 8 .

$8 \div 2$ is 4 .

The answer must be a little less than 4 .

So, $7.938 \div 2 = 3.969$

► Check by multiplying:

$3.969 \times 2 = 7.938$

So, the answer is correct.

$$\begin{array}{r}
 3969 \\
 2 \overline{) 7938} \\
 \underline{- 6} \\
 19 \\
 \underline{- 18} \\
 13 \\
 \underline{- 12} \\
 18 \\
 \underline{- 18} \\
 0
 \end{array}$$

Try These

1. Divide.

a) $0.924 \div 3$

b) $5.138 \div 2$

c) $3.045 \div 5$

d) $7.896 \div 4$

Practice

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1. Divide.

a) $5.335 \div 5$

b) $6.148 \div 4$

c) $0.315 \div 7$

d) $4.738 \div 2$

2. Multiply to check each answer in question 1.

3. Renee paid \$12.96 for 6 bags of chips.

How much did each bag cost? _____

4. Asmaa paid \$9.96 for 3 pairs of socks.

Jagdeep paid \$14.75 for 5 pairs of socks.

Which person got the better deal? Explain.

Stretch Your Thinking

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What whole number would you divide 2.049 by to get the quotient 0.683? _____

Dividing Decimals



Quick Review

- Divide: $9.784 \div 5$

Estimate first: Write 9.784 as 10.

$$10 \div 5 = 2$$

So, $9.784 \div 5$ is a little less than 2.

Divide.

Use short division.

$$\begin{array}{r} 1\ 9\ 5\ 6\ 8 \\ 5 \overline{) 9^4.7^2\ 8^3\ 4^4\ 0} \end{array}$$

Sometimes you need to write zeros in the dividend so you can continue to divide until the remainder is 0.

Write the quotient to the nearest thousandth: $9.784 \div 5$ is about 1.957.

- Divide: $18.4 \div 3$

Divide as whole numbers. Use short division. Write zeros in the dividend.

$$\begin{array}{r} 6\ 1\ 3\ 3\ 3 \\ 3 \overline{) 18\ 4^1\ 0^1\ 0^1\ 0^1} \end{array}$$

Sometimes you never get a remainder of zero.

Estimate to place the decimal point.

18.4 is close to 18.

$$18 \div 3 \text{ is } 6.$$

$$\text{So, } 18.4 \div 3 = 6.1333 \dots$$

The dots indicate that the decimal places go on forever.

Try These

1. Divide until the remainder is zero.

a) $4 \overline{) 6.374}$

b) $2 \overline{) 49.67}$

c) $5 \overline{) 0.473}$

d) $2 \overline{) 29.77}$

e) $5 \overline{) 4.573}$

f) $8 \overline{) 0.124}$

Practice

1. Divide until the remainder is zero.

a)
$$\begin{array}{r} \\ 6 \overline{) 4.275} \end{array}$$

b)
$$\begin{array}{r} \\ 8 \overline{) 45} \end{array}$$

c)
$$\begin{array}{r} \\ 5 \overline{) 234} \end{array}$$

d)
$$\begin{array}{r} \\ 2 \overline{) 0.007} \end{array}$$

e)
$$\begin{array}{r} \\ 2 \overline{) 0.5} \end{array}$$

f)
$$\begin{array}{r} \\ 4 \overline{) 27} \end{array}$$

2. Divide.

a)
$$\begin{array}{r} \\ 3 \overline{) 7.37} \end{array}$$

b)
$$\begin{array}{r} \\ 9 \overline{) 8.4} \end{array}$$

c)
$$\begin{array}{r} \\ 3 \overline{) 2.14} \end{array}$$

3. Four students buy a box of popsicles for \$4.29 and a bag of pretzels for \$3.97. How much should each person contribute to the total cost?

4. Nataliya jogged 1.367 km in 6 min.

About how far did she jog each minute?

Give your answer in as many different units as you can.

5. Twelve friends shared 8 small pizzas equally.

How many pizzas did each person get?

Stretch Your Thinking

Write a story problem you can solve by dividing 11 by 7.

Dividing a Decimal Less than 1 by a Whole Number



Quick Review

Divide: $0.086 \div 5$

► Estimate.

0.086 is close to 0.085.

0.085 is 85 thousandths.

Eighty-five thousandths divided by 5 is 17 thousandths.

So, $0.086 \div 5$ is about 0.017.

► Calculate.

$$\begin{array}{r}
 00172 \\
 5 \overline{) 0.0860} \\
 \underline{- 5} \\
 36 \\
 \underline{- 35} \\
 10 \\
 \underline{- 10} \\
 0
 \end{array}$$

So, $0.086 \div 5 = 0.0172$

Since 0.0172 is close to the estimate, 0.017, the answer is reasonable.

Try These

1. Divide.

a)

$$2 \overline{) 0.0370}$$

b)

$$4 \overline{) 0.36}$$

c)

$$5 \overline{) 0.00740}$$

d)

$$3 \overline{) 0.369}$$

Practice

1. Use paper and pencil to find each quotient.

Record the quotients on the lines.

Then use the letters next to the quotients to solve this riddle.

Why did the bottle
insist on being at the front
of the shelf?

$0.072 \div 8 = \underline{\hspace{2cm}} \text{ (I)}$

$0.056 \div 7 = \underline{\hspace{2cm}} \text{ (U)}$

$0.0024 \div 4 = \underline{\hspace{2cm}} \text{ (W)}$

$0.198 \div 9 = \underline{\hspace{2cm}} \text{ (N)}$

$0.375 \div 5 = \underline{\hspace{2cm}} \text{ (T)}$

$0.128 \div 8 = \underline{\hspace{2cm}} \text{ (E)}$

$0.054 \div 9 = \underline{\hspace{2cm}} \text{ (S)}$

$0.04 \div 8 = \underline{\hspace{2cm}} \text{ (R)}$

$0.015 \div 6 = \underline{\hspace{2cm}} \text{ (L)}$

$0.049 \div 7 = \underline{\hspace{2cm}} \text{ (C)}$

$0.039 \div 6 = \underline{\hspace{2cm}} \text{ (O)}$

$0.108 \div 3 = \underline{\hspace{2cm}} \text{ (B)}$

$0.0016 \div 4 = \underline{\hspace{2cm}} \text{ (A)}$

$0.169 \div 2 = \underline{\hspace{2cm}} \text{ (F)}$

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0.036 0.016 0.007 0.0004 0.008 0.006 0.016

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0.009 0.075

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0.0006 0.0004 0.006

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0.0004

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0.0025 0.009 0.075 0.005 0.016

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0.022 0.0065 0.075

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0.0004

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0.0845 0.0065 0.0025 0.0025 0.0065 0.0006 0.016 0.005

Stretch Your Thinking

What whole number would you divide 0.0764 by to get the quotient 0.01528? _____