

Day 2 Answer Keys

Tuesday, March 17, 2020 1:19 PM



Day 2

MGSE5.N

Lesson 16

Multiply Fractions in Word Problems

Name: _____

Prerequisite: Multiply Fractions with Models

Study the example problem showing three ways to model multiplying fractions. Then solve problems 1–6.

Example

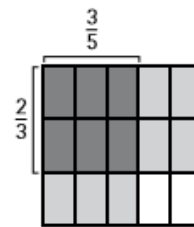
What is $\frac{2}{3} \times \frac{3}{5}$?

You can find $\frac{2}{3} \times \frac{3}{5}$ using different models.

A number line



An area model



An equation

$$\frac{2}{3} \times \frac{3}{5} = \frac{2 \times 3}{3 \times 5} = \frac{6}{15}$$

- 1 Look at the example showing models of $\frac{2}{3} \times \frac{3}{5}$. How are the models alike? How are the models different?

one shows a numberline and the other is an illustration of the two fractions over lapping. They both show the answer $\frac{2}{5}$ which is $\frac{6}{15}$ simplified.

- 2 Write the product for $\frac{2}{3} \times \frac{3}{5}$ shown by each model in the example.

number line $\frac{2}{5}$ area model $\frac{6}{15}$ equation $\frac{6}{15} = \frac{2}{5}$



Solve.

- 3 Write the missing numbers that show that $\frac{2}{5}$ and $\frac{6}{15}$ are equivalent fractions.

$$\frac{2 \times \boxed{3}}{5 \times \boxed{3}} = \frac{6}{15}$$

- 4 Explain how the numbers you wrote in problem 3 show that $\frac{2}{5}$ and $\frac{6}{15}$ are equivalent.

When multiplying by $\frac{3}{3}$ which is 1 whole, the numbers change but have the same value overall.

- 5 What is $\frac{2}{3} \times \frac{3}{8}$?

Show your work.

simplify

$$\frac{2 \times 3}{3 \times 8} = \frac{6}{24} = \frac{1}{4}$$

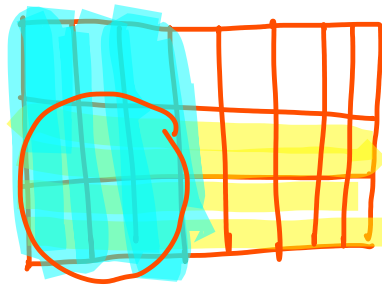
Solution:

$$\frac{1}{4}$$

- 6 Check your answer to problem 5 by modeling $\frac{2}{3} \times \frac{3}{8}$ a different way.

Show your work.

$$\frac{1}{4} = \frac{6}{24}$$



Solution:

Lesson 16

Name: _____

Solve Word Problems with Fractions

Study the example problem showing one way to solve a word problem with fractions. Then solve problems 1–5.

Example

Vicky's favorite beach towel is green and white and has a fish design. The green part covers $\frac{5}{8}$ of the towel. A fish design is drawn on $\frac{3}{5}$ of that. What part of the towel has a fish design on it?

You can draw a picture.

Show a towel with $\frac{5}{8}$ shaded green.



Draw fish on $\frac{3}{5}$ of the green part.



3 of the 8 parts of the towel have fish drawn on them, so $\frac{3}{8}$ of the towel has a fish design on it.

- 1 You can also write an equation to solve the example problem. Write the numbers to complete the equation showing what part of the towel has the fish design.

$\frac{3}{5}$ of $\frac{5}{8}$ means $\frac{3}{5} \times \frac{5}{8}$.

$$\frac{3}{5} \times \frac{5}{8} = \frac{3}{5} \times \frac{5}{8} = \frac{15}{40} \div 5 = \frac{3}{8}$$

Simplify

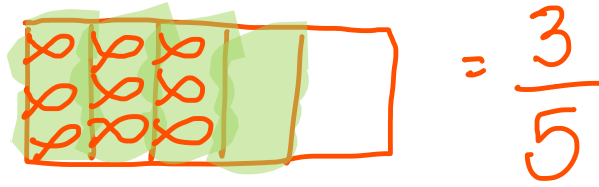
- 2 Is your answer to problem 1 the same as the answer, $\frac{3}{8}$, shown in the example problem? Explain.

yes. I got $\frac{15}{40}$ which simplifies to $\frac{3}{8}$ which is the same

**Solve.**

- 3 Suppose the green part of Vicky's towel covers $\frac{4}{5}$ of

the towel and the fish design is drawn on $\frac{3}{4}$ of that.
Draw a picture to find the part of the towel that has
the fish design on it. Then write the answer.



Solution: _____

- 4 Write an equation to show the answer to problem 3.

Solution: $\frac{3}{4}$ of $\frac{4}{5} = \frac{3 \cancel{4} \rightarrow 4}{4 \cancel{4} \rightarrow 5} = \frac{12 \div 4}{20 \div 4} = \frac{3}{5}$ (simplify)

- 5 At noon Ada and Kent had $\frac{3}{8}$ gallon of lemonade left at their lemonade stand. The next customer bought $\frac{1}{3}$ of the remaining lemonade. How much lemonade did the customer buy?

Show your work.

$\frac{1}{3}$ of $\frac{3}{8} = \frac{1 \cancel{3} \rightarrow 3}{3 \cancel{3} \rightarrow 8} = \frac{3 \div 3}{24 \div 3} = \frac{1}{8}$ (simplify)

Solution: $\frac{1}{8}$

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Lesson 16

Name: _____

Multiply Mixed Numbers in Word Problems

Study the example problem showing one way to solve a word problem with a mixed number. Then solve problems 1–4.

Example

Mr. Urrego is painting his deck to get it ready for the

summer. He's painted an area that is $3\frac{1}{5}$ -meters long and $\frac{2}{3}$ -meter wide. How many square meters of deck are painted?

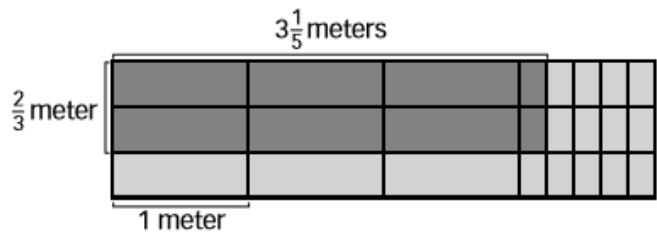
You can use an area model.

The larger sections of the area model are $\frac{1}{3} \times 1 = \frac{1}{3}$ square meter.

The smaller sections of the area model are $\frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$ square meter.

The model shows the number of square meters painted is:

$$\frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{15} = \frac{6}{3} + \frac{2}{15} = 2 + \frac{2}{15} = 2\frac{2}{15}$$



- 1 Write the missing numbers to complete the multiplication equation showing how much of the deck is painted.

Multiply the length and width of the painted area:

$$3\frac{1}{5} \times \frac{2}{3} = 3 \times \frac{2}{3} + \frac{1}{5} \times \frac{2}{3} = \frac{6}{3} + \frac{2}{15} = 2\frac{2}{15}$$

$2\frac{2}{15}$ square meters

- 2 Look at the worked-out solutions in the example and problem 1. Which method do you prefer to solve the problem? Explain why.

Neither- I like making mixed #'s into improper fractions.



Solve.

- 3 To multiply a mixed number you can also write it first as a fraction and then multiply. Write the missing numbers to show this way of multiplying to find how much of the deck is painted.

Here's the equation you've already used to solve the problem.

$$3\frac{1}{5} \times \frac{2}{3} = 3 \times \frac{2}{3} + \frac{1}{5} \times \frac{2}{3} = \frac{6}{3} + \frac{2}{15} = 2\frac{2}{15}$$

$2\frac{2}{15}$ square meters

Now here is a new way to multiply.

Here is a new way to multiply.

Write $3\frac{1}{5}$ as a fraction. Multiply using $\frac{16}{5}$ as a factor.

$$3\frac{1}{5} = \boxed{3} + \frac{\boxed{1}}{\boxed{5}}$$

$$= \frac{\boxed{15}}{5} + \frac{\boxed{1}}{5}$$

$$= \frac{\boxed{16}}{5}$$

"Make it MAD"

$$\frac{16}{5} \times \frac{2}{3} = \frac{\boxed{16} \times \boxed{2}}{\boxed{5} \times 3}$$

$$= \frac{\boxed{32}}{15}$$

$$= 2\frac{\boxed{2}}{15}$$

$2\frac{2}{5}$ square meters

$$\begin{array}{r} 16 \\ \times 2 \\ \hline 32 \end{array}$$

- 4 The multipurpose room at the Cortez School is being set up for the annual book sale. Graphic novels will be displayed in an area $1\frac{1}{4}$ -yards long and $\frac{3}{4}$ -yard wide. Will the graphic novels be displayed in an area greater than or less than 1 square yard?

Show your work.

Less than because you are multiplying by a fraction.

Solution: $1\frac{1}{4} \times \frac{3}{4} = \frac{5}{4} \times \frac{3}{4} = \frac{15}{16}$



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Lesson 16

Name: _____

Multiply Fractions in Word Problems

Solve the problems.

- 1 Tell whether each equation showing a mixed number written as a fraction is *True* or *False*

- a. $1\frac{3}{4} = \frac{7}{4}$ True False
- b. $4\frac{2}{5} = \frac{22}{5}$ True False
- c. $3\frac{2}{3} = \frac{11}{2}$ True False
- d. $2\frac{7}{10} = \frac{27}{10}$ True False

How do you know what the denominator is when you write a mixed number as a fraction?



- 2 Camilla's class played soccer for $\frac{2}{3}$ hour. She played for $\frac{3}{4}$ of the game. How much time did Camilla play?

What equation can I write to solve this?

- A $\frac{5}{15}$ hour C $\frac{5}{8}$ hour
 B $\frac{6}{15}$ hour D $\frac{6}{8}$ hour

Will chose **A** as the correct answer. How did he get that answer?

$$\frac{3}{5} \text{ of } \frac{2}{3} = \frac{3}{5} \times \frac{2}{3} = \frac{6 \div 3}{15 \div 3} = \frac{2}{5}$$

He added the numerator instead of multiplying.

I write to solve this problem?



- 3 How many minutes are in $\frac{2}{3}$ hour? How many minutes are in $\frac{3}{5}$ of that time?

$$\frac{2}{3} = \frac{40}{60} \qquad \frac{3}{5} = \frac{36}{60}$$

Solution: $40 \text{ min} = \frac{2}{3} \text{ hour}$ $36 \text{ min} = \frac{3}{5} \text{ hour}$

How many minutes are in an hour?



Solve.

- 4 Caleb has $2\frac{1}{5}$ yards of rope. He uses $\frac{3}{4}$ of the rope to make a dog leash. Which expression can be used to represent $\frac{3}{4}$ of $2\frac{1}{5}$? Circle the letter for all that apply.

A $\frac{3}{4} \times 2 \times \frac{1}{5}$

C $\frac{3}{4} \times 2 + \frac{3}{4} \times \frac{1}{5}$

B $\frac{3}{4} \times \frac{11}{5}$

D $\frac{3}{4} \times \frac{3}{4} + \frac{1}{5}$

What are other ways to write the mixed number $2\frac{1}{5}$?



- 5 Dante and 2 classmates are making a poster to advertise a Bike-to-School Day event. It is $1\frac{1}{2}$ -yards long and $\frac{3}{4}$ -yard wide. How large a writing area does that give them?

Show your work.

$$1\frac{1}{2} \times \frac{3}{4} = \frac{3}{2} \times \frac{3}{4} = \frac{9}{8} = 1\frac{1}{8}$$

What model can I use to help understand this problem?



1 1 . 2

Solution: 1 $\frac{3}{5}$ miles

6 Manny hiked $6\frac{2}{5}$ miles along a mountain trail. He stopped to climb a lookout tower $\frac{1}{4}$ of the way along his hike. How many miles did Manny hike before he stopped to climb the lookout tower?

Did Manny hike more or less than 1 mile before stopping to climb the tower?

Show your work.

$$\frac{1}{4} \times 6\frac{2}{5} = \frac{1}{4} \times \frac{32}{5} = \frac{32}{20} = 1\frac{12}{20}$$

$$1\frac{12}{20} = 1\frac{3}{5}$$

Solution: 1 $\frac{3}{5}$ miles



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Day 2
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Lesson 16 Introduction

MGSE5.NF.6

Multiply Fractions in Word Problems

Use What You Know

Now that you have learned how to multiply fractions, take a look at this problem.

Grayson lives $\frac{4}{5}$ mile from the park. He has already walked $\frac{3}{4}$ of the way to the park. How far has Grayson walked?

- a. You can draw a model to help you solve the problem. Locate a point on the number line below to show what fraction of a mile Grayson lives from the park.



- b. Label the point to show the distance to the park.
- c. Shade the segment that shows one fourth of the distance to the park. One fourth of the distance to the park is $\frac{1}{5}$ mile. Label this distance.

- d. Two fourths of the distance to the park is $\frac{3}{5}$ mile.
- e. Three fourths of the distance to the park is $\frac{3}{5}$ mile.
- f. Explain how you can use the model to show how far Grayson has already walked.

$$\frac{3}{4} \times \frac{4}{5} = \frac{12}{20} = \frac{3}{5}$$

Find Out More

Consider the problem from the previous page. The distance you need to find is a fraction of a fraction: $\frac{3}{4}$ of $\frac{4}{5}$ mile. On the previous page you used a model to find this distance. You can also use an equation.

Finding $\frac{3}{4}$ of a number is the same as multiplying the number by $\frac{3}{4}$.

$$\frac{3}{4} \text{ of } \frac{4}{5} \text{ means } \frac{3}{4} \times \frac{4}{5}.$$

To multiply two fractions, multiply the numerators to get the numerator of the product, and multiply the denominators to get the denominator of the product.

$$\frac{3}{4} \times \frac{4}{5} = \frac{3 \times 4}{4 \times 5} = \frac{12}{20}$$

The fraction $\frac{12}{20}$ is equivalent to $\frac{3}{5}$. To find equivalent fractions, multiply or divide the numerator and the denominator of the fraction by the same number.

$$\frac{12}{20} = \frac{12 \div 4}{20 \div 4} = \frac{3}{5}$$

Grayson has walked $\frac{3}{5}$ mile.

The product, $\frac{3}{5}$, is less than $\frac{4}{5}$, so it is reasonable. When you multiply $\frac{4}{5}$ by a factor less than 1, the product should be less than $\frac{4}{5}$.

Reflect

- 1 Which method, *drawing a model* or *writing an equation*, made more sense to you for solving this problem? Why?


solving this problem: why:

writing an equation &

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Lesson 16 Multiply Fractions in Word Problems

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Lesson 16  Modeled and Guided Instruction

Learn About

Multiplying Fractions in Word Problems

Read the problem below. Then explore different ways to understand how to find a fraction of a fraction.

Brandon's mother left $\frac{3}{4}$ of a pizza on the counter. If Brandon eats $\frac{2}{3}$ of it, how much of the whole pizza did Brandon eat?

 **Picture It** You can draw a picture to help you understand the problem.

Show $\frac{3}{4}$ of a pizza.



Since Brandon eats $\frac{2}{3}$ of what is left, outline 2 of the 3 pieces that are left. You can see from the outlined parts how much of the whole pizza Brandon ate.



 **Model It** You can write an equation to help you understand the problem.

You need to find a fraction of a fraction: $\frac{2}{3}$ of $\frac{3}{4}$ of a pizza.

$\frac{2}{3}$ of $\frac{3}{4}$ means $\frac{2}{3} \times \frac{3}{4}$.

$$\frac{2}{3} \times \frac{3}{4} = \frac{2 \times 3}{3 \times 4}$$

Connect It Now you will solve the problem from the previous page using both strategies.

2 Look at *Picture It*. Why did you outline 2 of the 3 parts of the pizza?

3 How much of the whole pizza did Brandon eat? Explain your reasoning.

4 Look at *Model It*. How do you know that you should multiply $\frac{2}{3} \times \frac{3}{4}$?

5 What is $\frac{2 \times 3}{3 \times 4}$? _____

Is this product the same as your answer to problem 3? Explain.

6 What strategies can you use to solve a word problem that involves multiplying fractions? _____

Try It Use what you just learned about finding products of fractions to solve these problems. Show your work on a separate sheet of paper.

7 Lewis walked $\frac{9}{10}$ of a mile. His friend walked $\frac{2}{5}$ of the way with him. How many miles did Lewis's friend walk with him? _____

8 Jamie worked $\frac{5}{6}$ hour filing papers for her mother. She listened to music for $\frac{2}{5}$ of the time she spent filing. How much time did Jamie spend listening to music?

Lesson 16 Modeled and Guided Instruction

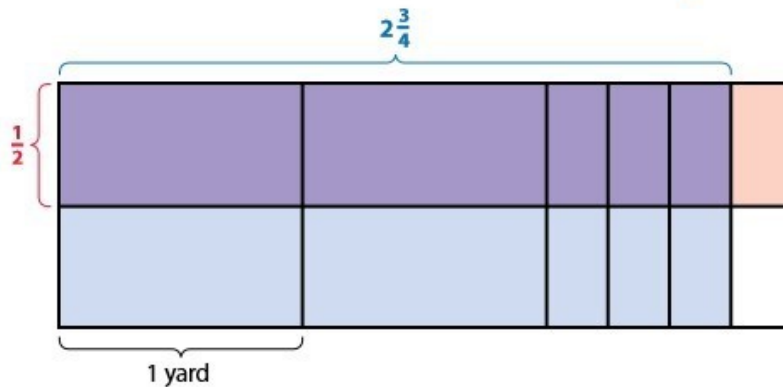
Learn About **Multiplying Mixed Numbers in Word Problems**

Read the problem below. Then explore different ways to understand multiplying fractions and mixed numbers.

Janie has $2\frac{3}{4}$ yards of yellow ribbon. She uses $\frac{1}{2}$ of the ribbon to decorate bookmarks for her cousins. How many yards of ribbon did Janie use for the bookmarks?

Picture It You can use an area model to help you understand the problem.

The purple shaded region of the area model shows **half** of $2\frac{3}{4}$.



Model It You can write an equation to help you understand the problem.

You can write $2\frac{3}{4}$ as a fraction.

$$\begin{aligned} 2\frac{3}{4} &= 2 + \frac{3}{4} \\ &= \frac{8}{4} + \frac{3}{4} \\ &= \frac{11}{4} \end{aligned}$$

You need to find a fraction of a fraction: $\frac{1}{2}$ of $\frac{11}{4}$ yards of ribbon.

$\frac{1}{2}$ of $\frac{11}{4}$ means $\frac{1}{2} \times \frac{11}{4}$.

$$\frac{1}{2} \times \frac{11}{4} = \frac{1 \times 11}{2 \times 4}$$

Connect It Now you will solve the problem from the previous page comparing the two strategies.

9 Does Janie use more or less than $2\frac{3}{4}$ yards of ribbon for the bookmarks? Explain.

10 How many yards of ribbon did Janie use? _____ Explain how you can use the picture to answer the question. _____

11 How do you know that you should multiply to solve the problem? _____

12 How can you multiply $2\frac{3}{4}$ by $\frac{1}{2}$? _____

13 What is $\frac{1}{2} \times 2$? _____ What is $\frac{1}{2} \times \frac{3}{4}$? _____

Add the two products. _____ + _____ = _____

Is this result the same as your answer to problem 10? _____

14 Suppose Janie had $2\frac{1}{4}$ yards of ribbon and used $\frac{1}{2}$ of the ribbon for bookmarks. Explain how you could find how many yards of ribbon she used. _____

Try It Use what you just learned about multiplying fractions and mixed numbers to solve this problem. Show your work on a separate sheet of paper.

15 Izzy has $3\frac{1}{2}$ yards of rope. She uses $\frac{3}{5}$ of the rope to attach a tire swing to a tree in the yard. How many yards of rope does Izzy use for the tire swing? _____

Study the example below. Then solve problems 16–18.

Example

Chris is $4\frac{1}{4}$ feet tall. His mom is $1\frac{1}{2}$ times as tall as Chris. How tall is Chris's mom?

Look at how you can solve this problem using an equation.

$$4\frac{1}{4} \times 1 = 4\frac{1}{4}$$

$$4\frac{1}{4} \times \frac{1}{2} = \left(4 \times \frac{1}{2}\right) + \left(\frac{1}{4} \times \frac{1}{2}\right) = 2 + \frac{1}{8}$$

$$4\frac{1}{4} + 2 + \frac{1}{8} = 6\frac{1}{4} + \frac{1}{8} = 6\frac{2}{8} + \frac{1}{8} = 6\frac{3}{8}$$

Solution $6\frac{3}{8}$ feet



The student wrote and solved an equation to solve the problem.

Pair/Share

How does the product compare to $4\frac{1}{4}$ feet?

- 16** Josh exercises at the gym $3\frac{3}{4}$ hours a week. He spends $\frac{2}{5}$ of his time at the gym lifting weights. How many hours a week does Josh spend lifting weights at the gym?

Show your work.



How do I know what operation to use to solve this problem?

Pair/Share

What is a reasonable estimate for the number of hours Josh lifts weights each week?

Solution _____

- 17** A field is in the shape of a rectangle $\frac{5}{6}$ mile long and $\frac{3}{4}$ mile wide. What is the area of the field?

Show your work.



What model can I use to help understand this problem?

Solution _____

Pair/Share
Can you solve this problem in another way?

- 18** Ari had $\frac{3}{4}$ of a bag of popcorn. His friends ate $\frac{1}{2}$ of his popcorn. What fraction of the whole bag of popcorn did Ari's friends eat? Circle the letter of the correct answer.

- A $\frac{1}{4}$
B $\frac{3}{8}$
C $\frac{5}{4}$
D $\frac{3}{2}$

Kayla chose **A** as the correct answer. How did she get that answer?



What equation can I write to solve this problem?

Pair/Share
Does Kayla's answer make sense?

Lesson 16 Independent Practice

Practice **Multiplying Fractions in Word Problems**

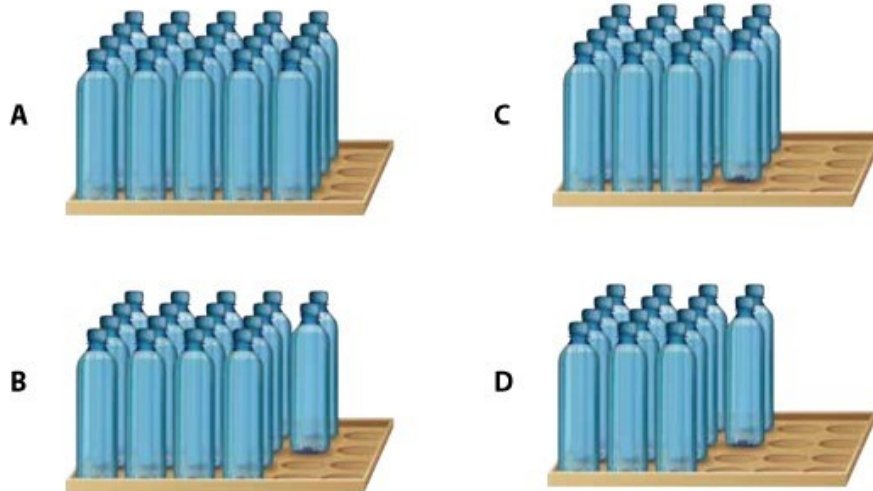
Solve the problems.

- 1** On Sunday, Kristen bought a carton of 24 bottles of water.



- On Monday, Kristen drank $\frac{1}{6}$ of the bottles in the carton.
- On Tuesday, Kristen drank $\frac{1}{4}$ of the bottles that remained in the carton after Monday.

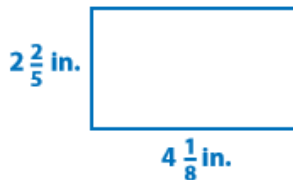
Which picture represents the number of bottles of water remaining in the carton after Kristen drank her water on Tuesday?



- 2** Milo's pancake recipe makes 9 servings. It calls for $\frac{3}{4}$ cup milk. Milo wants to make 6 servings. How much milk will he need?

Answer _____ cup

- 3** Look at the rectangle below.



What is the area of the rectangle? _____ or _____ square inches

- 4** Lily designed the letters of her name on the computer and printed them on paper. The table below shows the width and height of the printed letters.

Letter	Width	Height
L	$2\frac{1}{2}$ in.	4 in.

I	$1\frac{3}{4}$ in.	4 in.
Y	$1\frac{2}{3}$ in.	4 in.

She used a copier to change the size of the letters to $\frac{3}{4}$ of the original size. Make a table to show the new dimensions of each letter.

Show your work.



Self Check Go back and see what you can check off on the Self Check on page 93.