

Lesson 8-4

Thursday, January 2, 2020 1:37 PM

Name

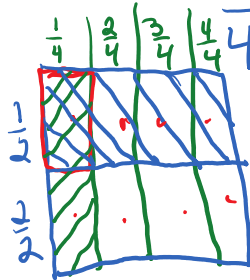
MB 475



Solve & Share

The art teacher gave each student half of a sheet of paper. Then she asked the students to color one fourth of their pieces of paper. What part of the original sheet did the students color? Solve this problem any way you choose.

Model with Math
You can draw a picture to represent the problem.



Lesson 8-4

Use Models to Multiply Two Fractions

I can ...

use models to multiply two fractions.

Content Standard 5.NF.B.4a
Mathematical Practices MP.2, MP.4, MP.6

$$\frac{1}{4} \text{ of } \frac{1}{2} = p$$

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

$\frac{1}{8}$ of the original paper

Look Back! **MP.2 Reasoning** Should your answer be less than or greater than 1? How do you know?

Less than 1. When you multiply two fractions the product is always less than either fraction!



How Can You Use a Model to Multiply Fractions?

There was $\frac{1}{4}$ of a pan of lasagna left. Tom ate $\frac{1}{3}$ of this amount. What fraction of a whole pan of lasagna did he eat?



Find $\frac{1}{3}$ of $\frac{1}{4}$ to solve the problem.

B One Way

Divide one whole into fourths.
Divide $\frac{1}{4}$ into 3 equal parts.
Divide the other $\frac{1}{4}$ s into 3 equal parts.

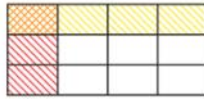


12 parts make one whole, so one part is $\frac{1}{12}$.

$$\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$$

C Another Way

Shade 1 of the 3 rows yellow to represent $\frac{1}{3}$.
Shade 1 of the 4 columns red to represent $\frac{1}{4}$.
The orange overlap shows the product.



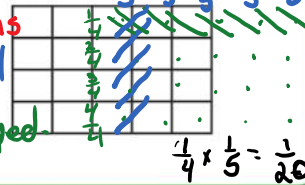
1 out of 12 parts are shaded orange.

$$\frac{1}{3} \times \frac{1}{4} = \frac{1 \times 1}{3 \times 4} = \frac{1}{12}$$

Tom ate $\frac{1}{12}$ of the pan of lasagna.

Convince Me! © MP.4 Model with Math Find $\frac{1}{4} \times \frac{1}{5}$ using the area model. Explain your work.

Shade 1 out of 5 columns down. Shade 1 out of 4 rows across. 1 out of 20 squares is overlapped.



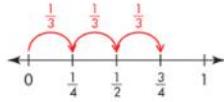
$$\frac{1}{4} \times \frac{1}{5} = \frac{1}{20}$$

$$= \frac{1}{20}$$

Another Example

Find $\frac{2}{3} \times \frac{3}{4}$ using a number line.

$\frac{1}{3}$ means 1 of 3 equal parts, so $\frac{1}{3}$ of $\frac{3}{4}$ is $\frac{1}{4}$.
 $\frac{2}{3}$ means 2 of 3 equal parts, so $\frac{2}{3}$ of $\frac{3}{4}$ is 2 times $\frac{1}{4}$.
 $\frac{2}{3} \times \frac{3}{4} = \frac{2}{4}$ or $\frac{1}{2}$



Guided Practice

Do You Understand?

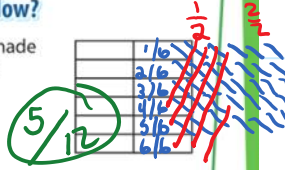
- Tina has $\frac{1}{2}$ of a pan of cornbread leftover from a dinner party. She eats $\frac{1}{2}$ of the leftover part the next night. How much of the whole pan does she eat? Write an equation to model your work.

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

- In the example on page 476, find the fraction of a whole pan of lasagna that Tom ate if he started with $\frac{7}{8}$ of a pan.

Do You Know How?

- Find $\frac{5}{6} \times \frac{1}{2}$. Shade the model to help solve.



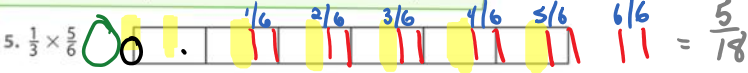
- Find $\frac{3}{4}$ of $\frac{4}{9}$.

$$\frac{3}{4} \times \frac{4}{9} = \frac{12}{36} \div 2 = \frac{1}{3}$$

$$\frac{18}{14} \times \frac{4}{9} = \frac{1}{3}$$

Independent Practice

In 5-6, find each product. Shade the model to help solve.



In 7-14, find each product. Use models to help.

7. $\frac{7}{8} \times \frac{1}{2}$ 8. $\frac{2}{5} \times \frac{1}{12}$ 9. $\frac{5}{7}$ of $\frac{7}{9}$ 10. $\frac{1}{2} \times \frac{3}{4}$

11. $\frac{1}{4} \times \frac{7}{8}$ 12. $\frac{5}{10}$ of $\frac{9}{10}$ 13. $\frac{45}{60} \div \frac{16}{48} = \frac{3}{4}$ 14. $\frac{1}{3}$ of $\frac{3}{7}$

*For another example, see Set C on page 514.

$$\frac{18}{26} \times \frac{3}{18} = \frac{3}{4}$$

Complete
6, 11, 12, 20, 22

Math Practices and Problem Solving

15. **MP.2 Reasoning** Will \$50 be enough to buy 6 cans of paint? Explain.



16. A scientist had $\frac{3}{4}$ of a bottle of a solution. She used $\frac{1}{6}$ of the solution in an experiment. How much of the bottle did she use?

17. **Algebra** What value of n makes the equation $\frac{2}{3} \times n = \frac{4}{3}$ true?

18. Write an expression that shows 10^4 .

19. A plumber charges \$45 for the first hour and \$30 for each additional hour. How much does he charge if it takes him 4 hours to make a repair?

20. **Higher Order Thinking** If $\frac{7}{8}$ is multiplied by $\frac{4}{5}$, will the product be greater than either of the two factors? Explain.

No. When the factors are fractions, the product is less than either factor.

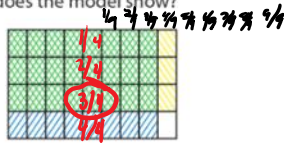
21. In the voting for City Council Precinct 5, only $\frac{1}{2}$ of all eligible voters cast votes. What fraction of all eligible voters voted for Shelley? Morgan? Who received the most votes?

Candidate	Fraction of Votes Received
Shelley	$\frac{3}{10}$
Morgan	$\frac{5}{8}$

Common Core Assessment

22. Majid made the model to show multiplying a fraction by a fraction. Which multiplication sentence does the model show?

- A $\frac{3}{4} \times \frac{3}{8} = \frac{1}{24}$
- B $\frac{3}{4} \times \frac{1}{8} = \frac{1}{24}$
- C $\frac{3}{4} \times \frac{3}{9} = \frac{1}{4}$
- D $\frac{3}{9} \times \frac{8}{9} = \frac{8}{27}$



$$\frac{3}{4} \times \frac{8}{9} = \frac{24}{36} \div 12 = \frac{2}{3}$$