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Multiplying Fractions and Whole Numbers

5.NF.4.a, b

The word *of* here means "multiply."

LESSON

 $\frac{3}{4}$ of 12 means $\frac{3}{4} \times 12$.

You can use multiplication to find fractions of whole numbers.

Milena has 20 sheets of fancy paper. She uses $\frac{3}{5}$ of the sheets for a scrapbook. How many sheets of fancy paper does she use?

To find the number of sheets Milena uses in her project, find $\frac{3}{5}$ of 20.

You can use a model to find the answer.

Draw squares for 20 sheets of paper. Divide them into 5 equal groups.



Then shade the squares in 3 of the 5 groups.

Count the number of shaded sheets. There are 12. That means that $\frac{3}{5}$ of 20 is 12.

- So, Milena uses 12 sheets of fancy paper.

You can also use an equation to find a fraction of a whole number.

Use an equation to find the number of sheets Milena uses.

 $\frac{3}{5}$ of 20 translates to $\frac{3}{5}$ × 20. Multiply the numerator and the whole number. Then divide the product by the denominator.

$$\frac{3}{5} \times 20 = \frac{3 \times 20}{5} = \frac{60}{5} = 12$$

Milena uses 12 sheets of fancy paper.

The general rule for multiplying a whole number by a fraction is

$$\frac{a}{b} \times c = \frac{a \times c}{b}$$

where $c \neq 0$

Multiplying a fraction by a whole number works the same way. Just reverse the factors.

$$3 \times \frac{2}{7} = \frac{3 \times 2}{7} = \frac{6}{7}$$

You can cancel common factors as a shortcurt.

$$\frac{3}{5} \times 20 = \frac{3}{5} \times 20^{4} = 1$$

3 × 4 = 12

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Read each problem. Circle the letter of the best answer.

SAMPLE Rosa has 32 grapes. She eats $\frac{3}{8}$ of them now and saves the rest for later. Which expression will help Rosa find the number of grapes she saves for later?

A $\frac{3}{8} + 32$ **B** $32 \div \frac{3}{8}$ **C** $32 - \frac{3}{8}$ **D** $\frac{3}{8} \times 32$ The correct answer is D. This question asks you to find how many grapes Rosa saves for later. To do that, you need to subtract a number from 32. That number is equal to $\frac{3}{8}$ of 32. So, you need to find $\frac{3}{8}$ of 32. This can be found with a multiplication expression, $\frac{3}{8} \times 32$.

1 A collecting jar holds 45 insects. $\frac{4}{5}$ of the insects are purple. The rest are blue. How many insects in the jar are blue?

С

D

D

9

1

54

129

- **A** 41
- **B** 36
- **2** What is $\frac{2}{9}$ of 63?

Α

B 14

3 There were 400 people at a concert. Half of them wore vellow T-shirts, $\frac{2}{10}$ wore gray T-shirts, and the rest wore orange T-shirts. How many people wore gray T-shirts?



4 Jiehae read 75 pages in a book. $\frac{1}{3}$ of the pages discussed birds, and $\frac{1}{5}$ discussed reptiles. The remaining pages discussed mammals. How many pages discussed reptiles or mammals?

A 15	С	40
B 25	D	50
2		

What is $\frac{3}{11}$ of 99?

 A
 9
 C
 27

 B
 18
 D
 39

6 On a menu, $\frac{1}{10}$ of the 60 dishes are chicken, $\frac{1}{6}$ are beef, $\frac{1}{3}$ are pork, and the rest are vegetarian. If Sergei doesn't like beef or pork, how many dishes can he choose from on this menu?

Α	30		С	10

B 24 **D** 6

Multiplying and Dividing Fractions



Read each problem. Write your answer.

Answer

SAMPLE A science class counted 20 bird nests in the park. $\frac{2}{5}$ of the nests had eggs, and $\frac{3}{10}$ of the nests had chicks. The rest of the nests were empty. How many nests were empty?

Find the number of nests with eggs: $\frac{2}{\sqrt{5}} \times 20^4 = 8$ nests with eggs.

Find the number of nests with chicks: $\frac{3}{10} \times 20^2 = 6$ nests with chicks.

Add to find how many nests with eggs or chicks: 8 + 6 = 14. Now, subtract to find the number of empty nests: 20 - 14 = 6 empty nests. There were 6 empty nests.

7 There are 32 bottles on a shelf. Hamilton replaces $\frac{3}{8}$ of the bottles with cans. How many bottles did Hamilton replace?

Answer

8 What is $\frac{5}{6}$ of 72? Show your work.

Answer

9 There are 100 senators in the United States Senate. At least $\frac{2}{3}$ of them must vote ves in order to ratify, or approve, a treaty. What is the least number of yes votes needed to ratify a treaty? Round to the nearest whole number.

Answer



Read the problem. Write your answer to each part.





Multiplying and Dividing Fractions

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