Goals: To understand the meaning of a fraction with regards to multiplication.

* What does it mean to divide with fractions?
* Illustrating division with fractions
* Important Fact: Division with fractions is the same as multiplication with the divisors reciprocal

# What does it mean to divide with fractions?

Recall, that division is repeated subtraction, that in the division problem

24 is call the dividend

6 is called the divisor

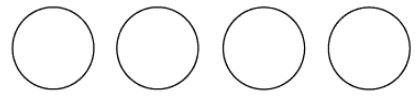
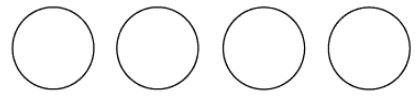
4 is called the quotient

And the problem is asking the question, “How many 6’s are in 24?”

So then what does it mean when we see the division problem

Division has not changed, it still means the same thing: “**How** many are there in **10** **whole things**?”

Lets draw a picture of what this question is asking.

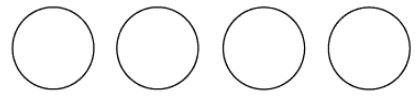


Show all the and then just count how many there are. How many are there?

Ex: Fill in the blanks to complete the sentence describing the fundamental question that the division problem is asking.

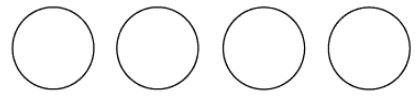
1. For , then **use the picture** to determine the quotient of .

\_\_\_\_\_\_\_ many \_\_\_\_\_\_\_\_ are there in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_­­­­­\_\_\_\_\_\_\_\_\_?

 Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. For , then **use the picture** to determine the quotient of .

\_\_\_\_\_\_\_ many \_\_\_\_\_\_\_\_ are there in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_­­­­­\_\_\_\_\_\_\_\_\_?

 Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Definition: Let be any non-zero numbers. We say the **reciprocal** of the fraction is the fraction.

Fact: The product of every non-zero fraction and its reciprocal is always 1.

Example: Find the reciprocal of the following fractions and what is the product of the fraction and its reciprocal?

1. Reciprocal: \_\_\_\_\_\_\_, Product: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Reciprocal: \_\_\_\_\_\_\_, Product: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Reciprocal: \_\_\_\_\_\_\_, Product: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

We have noticed that in the problem dividing by is the same as multiplying by 2

2 is called the reciprocal of

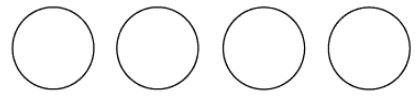
\_\_\_\_\_\_, also \_\_\_\_\_\_, & \_\_\_\_\_\_,

What does it look like then to divide a fraction by a fraction?

Example:

1. For , then **use the picture** to determine the quotient of .

\_\_\_\_\_\_\_ many \_\_\_\_\_\_\_\_ are there in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_­­­­­\_\_\_\_\_\_\_\_\_?

 Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. For , then **use the picture** to determine the quotient of .

\_\_\_\_\_\_\_ many \_\_\_\_\_\_\_\_ are there in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_­­­­­\_\_\_\_\_\_\_\_\_?

Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

What we have noticed in our division problems is not a coincidence, it is just yet another way in which we can interpret division with fractions.

Example:

# Important Fact:

Let be non-zero numbers.

When dividing with fractions, , it is the same as multiplication by the divisors reciprocal.

Example: Divide the two numbers. Reduce your answer.

1. b) c)

Notice, again, before you multiply, it is best to divide out all the “magic one’s” FIRST.

1. e) f)

Challenge problem. Let be a specific but unspecified non zero number (we call this a constant)