

# Division Is Multiplication By A Fraction.

## Table of Contents

Teaching Plan Overview and Summary.....	<a href="#">page 2</a>
Division Is Multiplication By A Fraction .....	<a href="#">page 3</a>

### Differentiate and Assess

Not every student will be ready to investigate this concept at this Level and so we will need to differentiate to ensure every student is learning at their leading edge. Select the Differentiate button on this screen.

### Integrate

Every mathematical concept is integrally related to other mathematical concepts. Teaching and learning related concepts simultaneously develops deep relational understanding. Select the Integrate button on this screen.

### Intervene

Some students may not yet be ready to investigate this concept at any Level, and so we will need to provide some intervention. Select the Intervention button on this screen.

# DIVISION IS MULTIPLICATION BY A FRACTION.

## EXPLICIT TEACHING PLAN OVERVIEW PAGE

THIS PAGE IS A SUMMARY OF THE EXPLICIT TEACHING PLAN, INCLUDING STRATEGIC QUESTIONS, AND DESCRIBING THE SEQUENCE WHICH WILL OCCUR OVER MULTIPLE LESSONS.

RESOURCES: PLAYING CARDS, PENCIL, PAPER

### WHAT COULD WE DO?

Children:

- review dividing as finding a fraction, for example,  
 $56 \div 4 = \frac{1}{4}$  of 56 =
- review the distributive property for multiplication, for example,

$$4 \times 74 = 70 \times 4 + 4 \times 4 = 280 + 16 = 296$$

- investigate the relationship between the distributive property for multiplication, and dividing using multiples that we know, for example,

$$56 \div 4 = 14$$

$$40 \div 4 = 10$$

$$16 \div 4 = 4$$

$$10 + 4 = 14$$

- Identify that because we are making 56 a quarter times as big as it was, we are multiplying by a quarter, for example,  $\frac{1}{4} \times 56 =$  and  $56 \times \frac{1}{4} =$

### WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?

Children:

- ask one another questions about division being multiplication by a fraction, for example:
  - How do we see division multiplicatively?
  - When we divide by a number greater than 1, do we make a number, a number of times smaller, a fraction as big?
  - How does division using multiples that we know, look like multiplication using the distributive property?
  - How do we see multiplication multiplicatively?
  - When we multiply by a number greater than 1, do we make a number a number of times larger?
  - When we multiply 74 by 4, did it become 4 times as big as it was?
  - When we divide by 4, do we make the number 4 times smaller, or a quarter times as big as it was?
- Are we multiplying by a fraction when we divide?
- Can our fraction and our number commute?

# DIVISION IS MULTIPLICATION BY A FRACTION.


## EXPLICIT TEACHING PLAN

FULL EXPLICIT TEACHING PLAN, EMBEDDING DEEP RELATIONAL UNDERSTANDING, METALANGUAGE, AND QUESTIONS THAT MAY BE USED OVER MULTIPLE LESSONS.

### WHAT COULD WE DO?

Children think about, talk and listen to a friend about, then have the opportunity to share what they already know.

Point to the word 'of' in the number sentence, for example,

$$\frac{1}{4} \text{ of } 56 =$$


Display, for example,

$$\begin{array}{l} 56 \div 4 = \\ \swarrow \quad \searrow \\ 40 + 16 \end{array}$$

$$\begin{array}{l} \frac{1}{4} \text{ of } 56 = \\ \swarrow \quad \searrow \\ 40 + 16 \end{array}$$

Record, for example,

### WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?

- ▶ Today brings an investigation about division.
- ▶ What do you know about division?
- ▶ Talk about division with a friend.
- ▶ Is anyone ready to share what they are thinking about division?
  
- ▶ We've investigated division, and we found that when we divide by a number greater than 1, we make the number a number of times smaller.
- ▶ We found that when we divide we are finding a fraction.
- ▶ Today we're going to take our investigation of division's relationship to fractions further.
- ▶ When we've recorded our division as a fraction, we used the word 'of'.
- ▶ But we know that we have symbols for everything in mathematics.
- ▶ Do you think we have a symbol for the word 'of' in this number sentence?
- ▶ Let's start by looking closely at the way we used multiples we know to divide.
  
- ▶ Have you ever considered that this looks very much like the distributive property?

$40 \div 4 = 10$

$\frac{1}{4} \text{ of } 40 = 10$

$16 \div 4 = 4$

$\frac{1}{4} \text{ of } 16 = 4$

$10 + 4 = 14$

Display multiplication using the distributive property, for example,

$$\begin{array}{l} 4 \times 74 = \\ \swarrow \quad \searrow \\ 70 \div 4 \end{array} \quad \begin{array}{l} 70 \times 4 = 7 \times 10 \times 4 = 28 \times 10 = 280 \\ 4 \times 4 = 16 \\ 280 + 16 = 296 \end{array}$$

Point to the word 'of' in the number sentence, for example,

$\frac{1}{4} \text{ of } 56 = 14$

Point to the symbol for multiplication in the number sentence, for example,

$\frac{1}{4} \text{ of } 56 = \quad 4 \times 74 =$

- ▶ We've investigated the distributive property for multiplication.
- ▶ And we found that we could distribute multiplication over addition.
- ▶ We could partition the numbers, then multiply the parts, then add the products.
- ▶ So why does division using multiples that we know, look exactly like multiplication using the distributive property?
- ▶ Could division also be distributive?
- ▶ Or could we actually be multiplying when we divide? Let's investigate!

- ▶ Let's look at the word in this number sentence, a quarter 'of' 56.

- ▶ And let's look at the symbol for multiplication in this number sentence, 4 times 74.

Record, for example,  $4 \times$  makes a number 4 times as big

Record, for example,  $\div 4$  makes a number  $\frac{1}{4}$ times as big

Record, for example,

$$\frac{1}{4} \text{ of } 56 = \quad \frac{1}{4} \times 56 =$$

Record, for example,  $12 \div 2 = 6$  and  $\frac{1}{2}$  of  $12 = 6$

Record, for example,  $12 \div 2 = 6$  and  $\frac{1}{2}$  of  $12 = 6$   
 $\frac{1}{2} \times 12 = 6$

Record, for example, division is multiplication by a fraction

- ▶ We've investigated seeing multiplication multiplicatively.
- ▶ When we multiply by 4, we make the number 4 times as big as it was.
- ▶ So when we multiply 74 by 4, it becomes 4 times as big as it was.
  
- ▶ We've investigated seeing division multiplicatively.
- ▶ When we divide by 4, we make the number 4 times smaller, or a quarter times as big as it was.
  
- ▶ So when we divide by 4, could we multiplying by a quarter?
- ▶ Are we making 56 a quarter times as big as it was?
- ▶ Could we record our fractions number sentence using the multiplication symbol?
- ▶ Could we be multiplying by a fraction when we divide?
  
- ▶ Let's investigate if we are multiplying by a fraction when we divide with a simpler number sentence.
- ▶ Here our number sentence says half of 12 equals 6.
- ▶ Have we multiplied 12 by a half?
- ▶ Have we made 12 a half times as big as it was?
- ▶ Have we made 12 half as big?
- ▶ If we multiply 12 by 2, would we be making 12, 2 times as big?
- ▶ If we divide 12 by 2, would we be making 12, half as big?
- ▶ If we divide 12 by 2, would we be making 12, a half times as big?
- ▶ Is 6, a half times as big as 12?

Record,  $12 \times \frac{1}{2} = 6$

- ▶ Are we multiplying by a fraction when we divide?
- ▶ We know that multiplication is commutative – the numbers we multiply can swap places.
- ▶ If we are multiplying by a fraction when we divide, the numbers should be able to commute.
- ▶ Let's check if the numbers can commute when we multiply by a fraction.
- ▶ Let's record our number sentence as 12 times a half
- ▶ If we had 12 halves, would we have 6?
- ▶ Are we making a half, 12 times as big?
  
- ▶ When we multiply by a number greater than 1, do we make the number a number of times larger?
- ▶ When we multiply by a fraction, do we make the number a number of times smaller?
- ▶ When we multiply by 1, does the number stay the same size?
- ▶ When we multiply by zero, do we have zero?