Role of the Vinculum as Meaning Divided By.

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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.

ROLE OF THE VINCULUM AS MEANING DIVIDED BY.

EXPLICIT TEACHING PLAN OVERVIEW PAGE

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

RESOURCES:PLAYING CARDS, PENCIL, PAPER

WHAT COULD WE DO?	WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?
Children: • record a fraction, for example, • review the meaning of the denominator as the number we divided by, for example, $\frac{1}{3}$ • review the numerator as the number of parts we are concerned with, for example, $\frac{1}{3}$ • investigate the meaning of the numerator as also meaning the number we start with • investigate the meaning of the vinculum as meaning divided by, for example, a third means we start with 1, and divide it into 3 parts. On both sides of the equals sign we have a 1 and a 3. The equals sign means equality. So the vinculum must mean divided by, for example, $\frac{1}{3} = 1 \div 3$ • investigate the meaning of the vinculum in a non-unit fraction, for example, **1 ÷ 3 = $\frac{1}{3}$ 1 ÷ 3 = $\frac{1}{3}$ so 2 ÷ 3 = $\frac{2}{3}$** and **as 2 divided into 3 parts**.	Children: • ask one another questions about the meaning of the vinculum, for example: ▸ What is a vinculum? ▸ What does the denominator tell us? ▸ What does the numerator tell us? ▸ How can we see the numerator as the number that we started with? ▸ When we have one-third, how many did we start with? ▸ What number did we divide by? ▸ On both sides of the equals sign, do we have a 1 and a 3? ▸ What does the equals sign mean? ▸ If the equals sign means equality, what must the vinculum mean? ▸ How can we explain the meaning of the vinculum in a non-unit fraction?

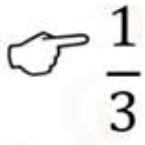
ROLE OF THE VINCULUM AS MEANING DIVIDED BY.

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?	WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?
Children think about, talk and listen to a friend about, then have the opportunity to share what they already know.	► Today brings an investigation about fractions. ► What do you know about fractions? ► Talk about fractions with a friend. ► Is anyone ready to share what they are thinking about fractions?
Record, for example, 'A fraction is a part'.	► We've investigated fractions. ► And we found that when we have a fraction of something, we don't have the whole thing. We just have part of it. ► So we found that a fraction is a part. ► In Mathematics, we love to measure things! ► So when we measure the part, we call it a fraction!
	► The earliest people that we know used fractions were the Egyptians almost 4 thousand years ago! ► The Rhind papyrus tells us that the Egyptians needed to divide up bread and water into parts to share. ► They used fractions but they didn't record them in the way do today.

Display, for example,  Record, for example, $\frac{1}{3}$ Point to the denominator in the fraction, for example, $\frac{1}{3}$ Point to the numerator in the fraction, for example, $\frac{1}{3}$ Point to the denominator in the fraction, for example, $\frac{1}{3}$	► They used a symbol that looked a little like this. ► The number of lines under the symbol tells us the number of parts they divided their bread or water into. ► This fraction is one-third because it has three lines. ► As other civilisations used fractions, they created new ways to record them, until finally the fraction symbol looked like the one we still use today. ► Can you see how it looks a little like the Egyptians' symbol? ► And instead of three lines to represent the number of parts the whole was divided into, we have the denominator '3'. ► We've investigated the denominator. ► And we found that the denominator tells us the number we have divided by. ► Instead of the oval shape to represent the whole, we have the numerator 1. ► We've investigated the numerator. ► And we found that the numerator tells us the number of parts we are concerned with. ► So in the fraction one-third, we have divided by 3 and we have 1 of the parts. ► Maths is all about seeing things in more than 1 way! ► Today we're going to investigate another way we can see the numerator and denominator. ► Let's start with the denominator. ► The denominator is telling us how many we divided by. ► So if the denominator is 3, we have divided by 3.

Point to the numerator in the fraction, for example, 	► But what number are we dividing by 3? ► What if the numerator could tell us that? ► What if, as well as telling us the number of parts that we are concerned about, the numerator was also telling us the number of parts in the whole? ► If the numerator is 1, could it be telling us that the whole is 1? ► That would mean in one-third we have 1 in the whole.
Point to the vinculum, for example, Record, for example, vinculum 	► Which brings us to the vinculum. ► The vinculum is the line between the numerator and the denominator.
Record, for example, $\frac{1}{3}$ Record, for example, $\frac{1}{3} = 1$ Record, for example, $\frac{1}{3} = 1 \div 3$	► If the numerator tells us we have 1 in the whole, and the denominator tells us we have divided that 1 into 3 parts, can we record this in a number sentence? ► Let's record the fraction one-third. ► Could we record that the numerator tells us we have 1? ► And could we record that the denominator tells us that we divided by 3?
	► Let's investigate the number sentence, one-third equals one divided by three. ► We know that the equals sign means equality, that both sides of the equal sign are equal.

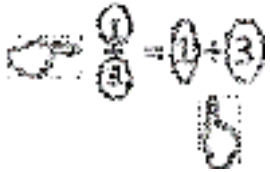
Circle the 1 on both sides of the equals sign, for example,

$\frac{1}{3} = 1 \div 3$

Circle the 3 on both sides of the equals sign, for example,

$\frac{1}{3} = 1 \div 3$

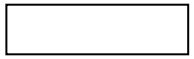
Point to the division sign on the left side of the equals sign and the vinculum on the right side of the equals sign, for example,



Record, for example, vinculum means divided by

Record, for example, $\frac{1}{3}$ means 1 divided by 3

Display a strip of paper, for example,



Record, for example, 1

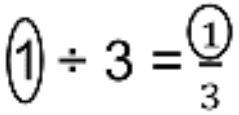
Divide the strip of paper into thirds as you describe starting with 1 and dividing by 3, for example,

Record, for example, 1 ÷ 3

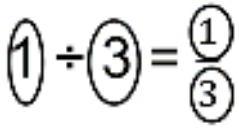
- Do we have a 1 on both sides?
- Let's circle the 1 on both sides.
- Do we have a 3 on both sides?
- Let's circle the 3 on both sides.
- On one side we have a division sign, and on the other side we have a vinculum.
- So if we know that both sides of the equals sign are the same, what must the vinculum mean?
- Must the vinculum mean divided by?
- Do you think one-third means 1 divided by 3, which is a third!
- Let's investigate dividing 1 strip of paper by 3 to make one-third.
- Here we have one strip of paper.
- Let's record that we are starting with 1.
- Let's divide 1 strip by 3.
- And are we dividing 1 strip into 3 equal parts? Are we dividing 1 strip by 3?
- Let's record that we divided 1 by 3.
- What fraction did we make when we divided 1 strip by 3?
- Did we make a third?
- Let's record that we made a third.

Record, for example, $1 \div 3 = \frac{1}{3}$

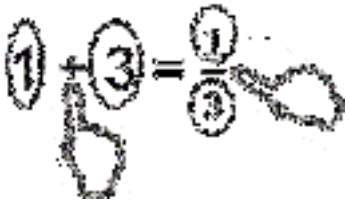
Circle the 1 and the 3 on both sides of the equals sign, for example,



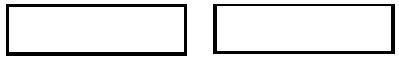
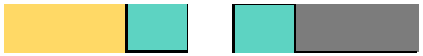
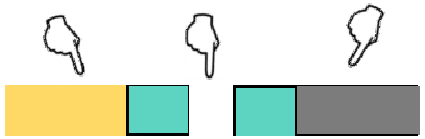
Circle the 3 on both sides of the equals sign, for example,



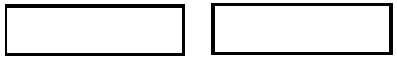
Point to the division sign on the left side of the equals sign and the vinculum on the right side of the equals sign, for example,



- Let's look at our number sentence.
- What does the equals sign mean?
- Does it mean both sides are equal?
- Both sides of this equal sign has a 1.
- And both sides of the equals sign has a 3.
- The only difference between what's on each side of the equals sign is the left side has a vinculum and the right side has a division sign.
- What must the vinculum mean?
- Must the vinculum mean divided by?
- Does one-third mean 1 divided by 3?
- Does the numerator tell us how many we started with?
- Does the vinculum tell us we divided?
- And does the denominator tell us the number we divided by?
- Does one-third mean we started with 1 and divided by 3?
- How does understanding that the vinculum means divided by, help us to

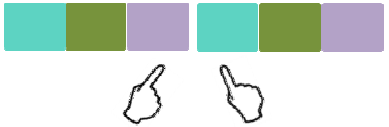
Record, for example, $\frac{2}{3}$ Record, for example, 2 Record, for example, 2 ÷ 3 = Display 2 strips of paper, for example,  Divide the 2 strips into 3 equal parts, for example,  Point to the 3 equal parts, for example, 	divide? ► Let's look at a non-unit fraction ► In this fraction, the numerator is telling us that the whole is 2. ► How many parts have we divided 2 into? ► Is the denominator is telling us that we divided the whole into 3 parts? ► So we have recorded the fraction as a number sentence, 2 divided by 3. ► How can we work out what 2 divided by 3 equals? ► If we divide 2 by 3 will we get a whole number? ► If we divide a smaller number by a larger number, will we get a whole number or will we get a fraction? Let's investigate! ► Here we have 2 strips. ► Could we divide these 2 strips of paper into 3 parts? ► We have 1 equal part here, another equal part here and another equal part here. That makes 3 equal parts. ► What fraction do we have? ► Do we have two-thirds? ► Is 2 divided by 3, two-thirds? ► Is two-thirds, 2 divided by 3? ► Is there another way we can think about 2 divided by 3? ► Here we have 2 strips again.

Display 2 strips of paper, for example,



Divide each strip into 3 equal parts, for example,

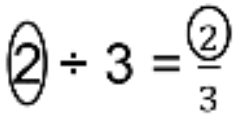
Point to the 1 divided by 3 = one-third on each strip, for example,



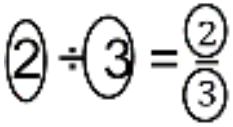
Record, for example, $2 \div 3 = \frac{2}{3}$

Point to the 2, the division sign and the 3 on the left side of the equals sign, and the 2, the vinculum and the 3 on the right side of the equals sign.

Circle the 2 on both sides of the equals sign, for example,



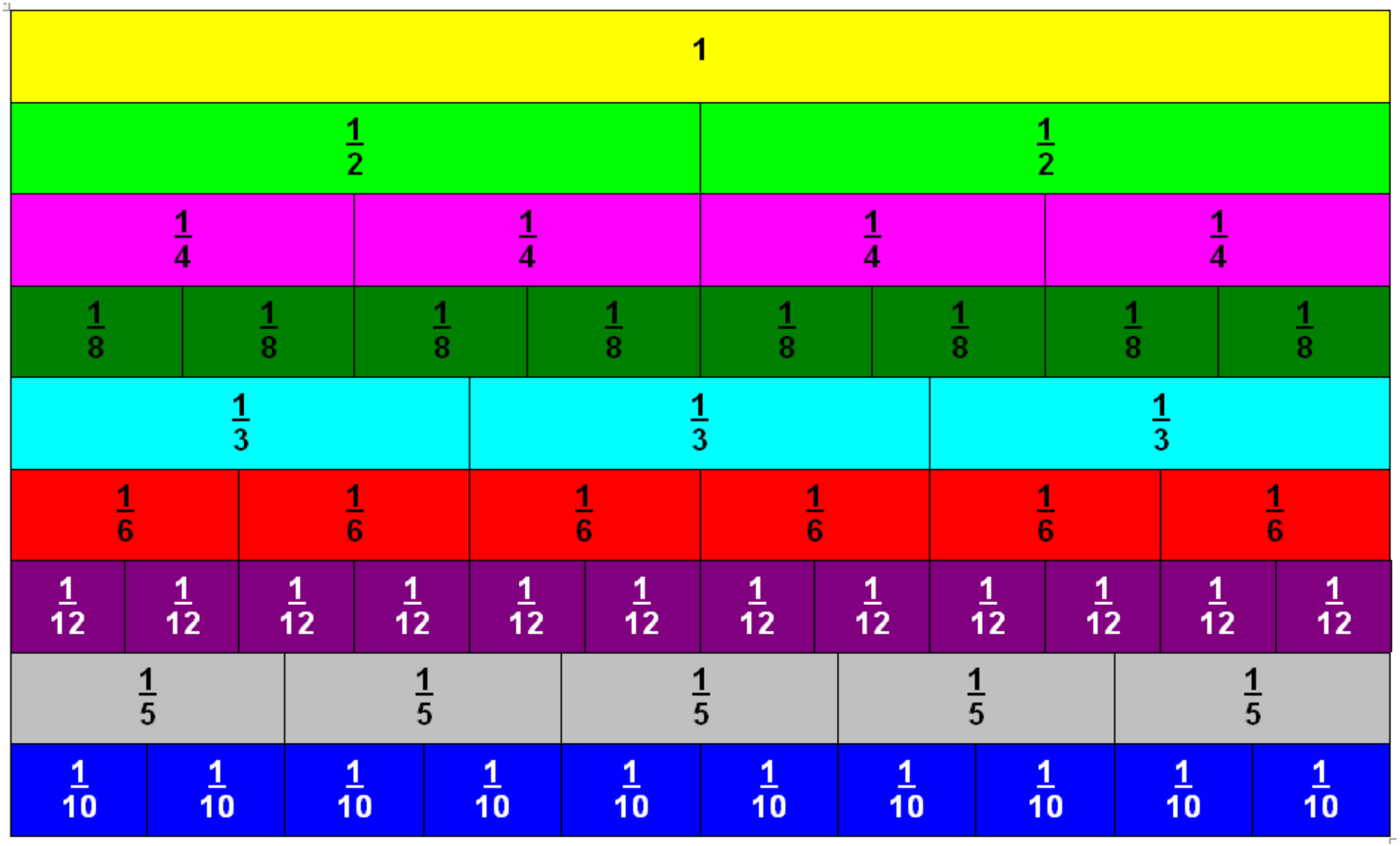
Circle the 3 on both sides of the equals sign, for example,



- What if we cut each strip into 3 equal parts?
- So this strip is 1 divided by 3 which is one-third.
- And this strip is also 1 divided by 3 which is also one-third.
- So 2 divided by must be two-thirds!
- Let's look closely at the number sentence.
- It says 2 divided by 3 = two-thirds
- The vinculum means divided by, so do both sides of the equals sign actually say '2 divided by 3?'
- Let's look again at the number sentence. What does the equals sign mean?
- Does it mean both sides are equal?
- We have a 2 on both sides
- We have a 3 on both sides
- On one side we have a division sign, and on the other side we have a vinculum.

Point to the division sign on the left side of the equals sign and the vinculum on the right side of the equals sign, for example, 	► What does the vinculum mean? ► Does the vinculum mean divided by?

Children apply this understanding of the meaning of the vinculum to investigate dividing remainders to create fractions.


1
1/2 1/2
1/4 1/4 1/4 1/4
1/8 1/8 1/8 1/8 1/8 1/8 1/8 1/8
1/3 1/3 1/3
1/6 1/6 1/6 1/6 1/6 1/6
1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12
1/5 1/5 1/5 1/5 1/5
1/10 1/10 1/10 1/10 1/10 1/10 1/10 1/10 1/10 1/10

$\frac{1}{2}$	$\frac{2}{2}$	$\frac{1}{3}$	$\frac{2}{3}$
$\frac{3}{3}$	$\frac{1}{4}$	$\frac{2}{4}$	$\frac{3}{4}$
$\frac{4}{4}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$
$\frac{4}{5}$	$\frac{5}{5}$	$\frac{1}{6}$	$\frac{2}{6}$

$\frac{3}{6}$	$\frac{4}{6}$	$\frac{5}{6}$	$\frac{6}{6}$
$\frac{1}{8}$	$\frac{2}{8}$	$\frac{3}{8}$	$\frac{4}{8}$
$\frac{5}{8}$	$\frac{6}{8}$	$\frac{7}{8}$	$\frac{8}{8}$
$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$	$\frac{4}{10}$

$\frac{5}{10}$	$\frac{6}{10}$	$\frac{7}{10}$	$\frac{8}{10}$
$\frac{9}{10}$	$\frac{10}{10}$	$\frac{1}{12}$	$\frac{2}{12}$
$\frac{3}{12}$	$\frac{4}{12}$	$\frac{5}{12}$	$\frac{6}{12}$
$\frac{7}{12}$	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{10}{12}$
$\frac{11}{12}$	$\frac{12}{12}$	0	1