

Multiplicative Place Value of Numbers to Hundredths.

Table of Contents

Teaching Plan Overview and Summary.....	page 2
Place Value to hundredths by dividing a tenth by 10	page 3
Describing 10, 1, and tenths as hundredths.....	page 7
Standard and non-standard place value of numbers with hundredths	page 9

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.

MULTIPLICATIVE PLACE VALUE OF NUMBERS TO HUNDREDTHS.

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, CONNECTING BLOCKS, PENCIL, PAPER

WHAT COULD WE DO?

Children:

- record a multiplicative place value chart
- divide a tenth by 10 to get hundredths, for example,

- describe a tenth, 1 and 10 as hundredths, for example,

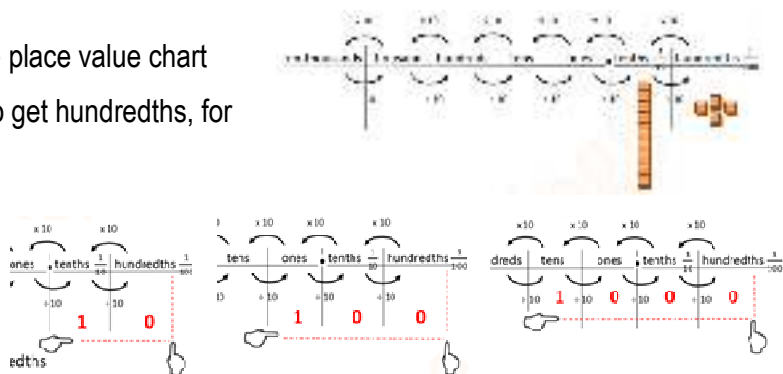
- describe numbers to hundredths using standard and non-standard place value, for example,

$$0.14 = 1 \text{ tenth} + 4 \text{ hundredths.}$$

$$0.14 = \frac{1}{10} + \frac{4}{100}$$

$$0.14 = 14 \text{ hundredths}$$

$$0.14 = \frac{14}{100}$$



$$1.14 = 1 \text{ ten} + 1 \text{ ten} + 4 \text{ hundredths}$$

$$2.24 = 2 \text{ tens} + \frac{2}{10} + \frac{4}{100}$$

$$1.24 = 1 \text{ ten} + 2 \text{ tenths} + 4 \text{ hundredths}$$

$$1.24 = \frac{12}{10} + \frac{4}{100}$$

$$1.24 = 124 \text{ hundredths}$$

$$1.24 = \frac{124}{100}$$

$$2.24 = 2 \text{ tens} + 2 \text{ tenths} + 4 \text{ hundredths}$$

$$2.24 = \frac{22}{10} + \frac{4}{100}$$

WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?

Children:

- ask one another questions about multiplicative, standard and non-standard place value to tenths, for example:
 - ▶ What is multiplicative place value?
 - ▶ What do we divide by to get the value of the column on the right?
 - ▶ If we divided a tenth by 10, what fraction do we get?
 - ▶ What is the value of the column to the right of the tenths column? Why?
 - ▶ How can we describe a tenth, 1 and 10 as hundredths?
 - ▶ How can we describe numbers with hundredths using standard place value?
 - ▶ How can we describe numbers with hundredths using non-standard place value?

MULTIPLICATIVE PLACE VALUE OF NUMBERS TO HUNDREDTHS.

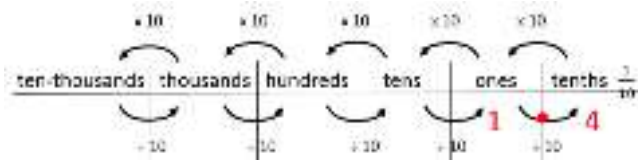
EXPLICIT TEACHING PLAN

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

WHAT COULD WE DO?

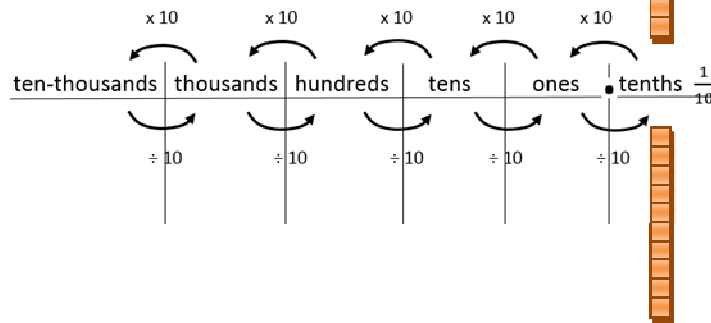
Children think about, talk and listen to a friend about, then have the opportunity to share what they already know.

Display a multiplicative place value chart to tenths, with a number with ones and tenths recorded in it, for example,



Select a tower constructed from 10 connecting blocks, for example,

Place the tower in the tenths column, for example,



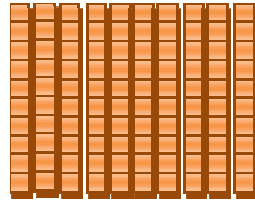
WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?

- ▶ Today brings an investigation about place value.
- ▶ What do you know about place value?
- ▶ Talk about place value with a friend.
- ▶ Is anyone ready to share what they are thinking about place value?

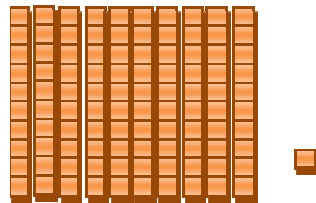
- ▶ We've investigated place value to tenths.

- ▶ **Today we're going to investigate another value in our multiplicative place value chart!**
- ▶ Could we give this tower any value that we wanted to?
- ▶ We could give this tower any value we want to. After all, it's our tower!
- ▶ Let's give this tower a value of a tenth.
- ▶ Now that we've given the tower the value of a tenth, let's place it in our tenths column.
- ▶ How many tenths do we have?
- ▶ Do we just have 1 tenth?
- ▶ Is the tower worth 1 tenth?
- ▶ Is the tower's value, 1 tenth?

Collect 10 tenths from 10 children to demonstrate what 1 would look like, for example,



Hold up one block next to the one, for example,



Move the block along the towers in the one to allow children to work out that we will need 100 blocks to make one.

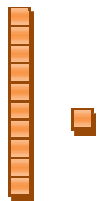
Record, for example, $\frac{1}{100}$

- ▶ Let's place the tower in the tenths column.
- ▶ If the tower's value is one-tenth, what would 1 look like?
- ▶ Would 1 look like 10 of these towers?
- ▶ Would 1 be 10 times larger than one-tenth?
- ▶ Do we multiply a tenth by 10 to get 1?
- ▶ Would 1 look like this?

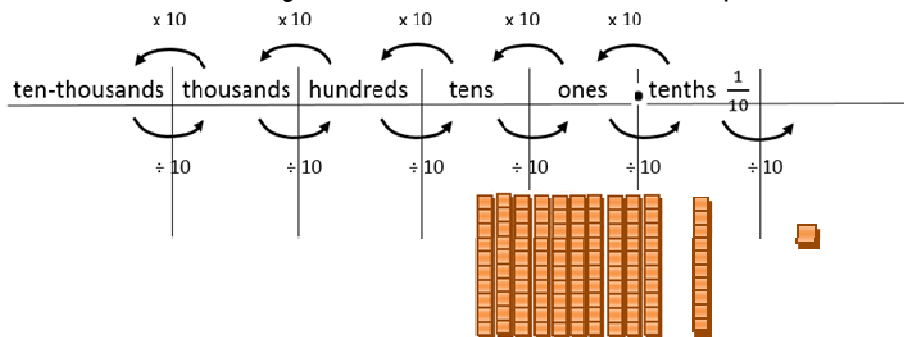
- ▶ So the tower has a value of a tenth
- ▶ Which means that 10 tenths would be one.

- ▶ What will be the value of one block?
- ▶ How many of these blocks will we need to make 1?
- ▶ We will need 10 to make each tower.
- ▶ And 10 towers is 1.
- ▶ Will we need 100 of these blocks to make 1?
- ▶ If we need 100 of these blocks to make 1, does that mean that one block is one-hundredth as big as 1?
- ▶ Is one block one-hundredth of 1?
- ▶ What does the denominator in a fraction tell us?
- ▶ Does the denominator tell us what number we have divided by?
- ▶ How are fractions named?
- ▶ Are fractions named by their relationship to 1?
- ▶ So if this block is one-hundredth as big as one, is this block one hundredth?
- ▶ Is the block one tenth as long as one tower?

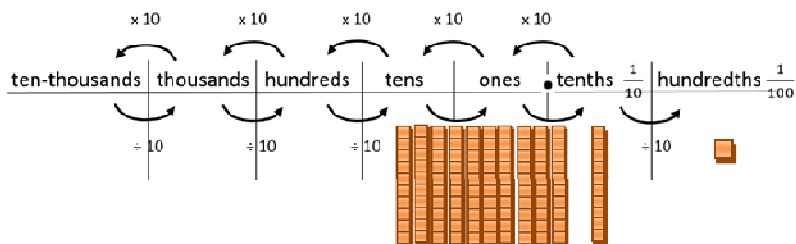
Hold up one block next to the tenth, for example,



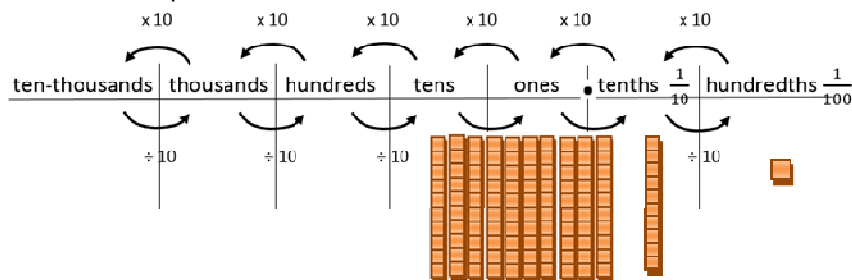
Place the tower in the tenths column. Record an arrow between the tenths column and the column to the right, and record $\div 10$ under it for example,



Record hundredths in the column to the right of the tenths column, for example,



Record an arrow from the hundredths column to the tenths column and record $\times 10$ above it, for example,



- ▶ If we divide one tower by 10, will we have 1 block?
- ▶ And the tower is a tenth.
- ▶ So we divided the tenth by 10 and got this block.

- ▶ What fraction of one is this block?
- ▶ Is this block one-hundredth of one?
- ▶ Is the value of this block one-hundredth?
- ▶ So when we divide a tenth by 10, do we get one-hundredth?

- ▶ If we have 10 hundredths will we have a tenth?
- ▶ If we multiply one hundredth by 10, will we have a tenth?
- ▶ Let's record that we are multiplying our hundredths by 10 to get a tenth.

▶ **We've investigated seeing place values in more than one way.**

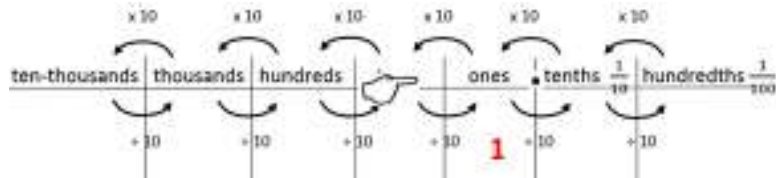
Record, for example, $1 = 1$ one

$$1 = 10 \text{ tenths}$$

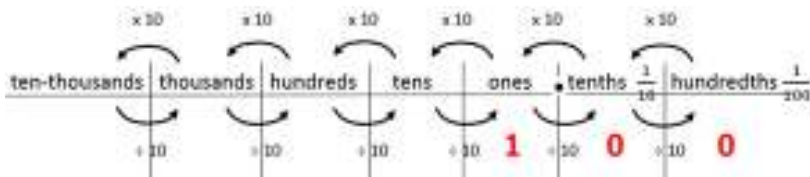
Record, for example, $10 = 1$ ten

$$10 = 10 \text{ ones}$$

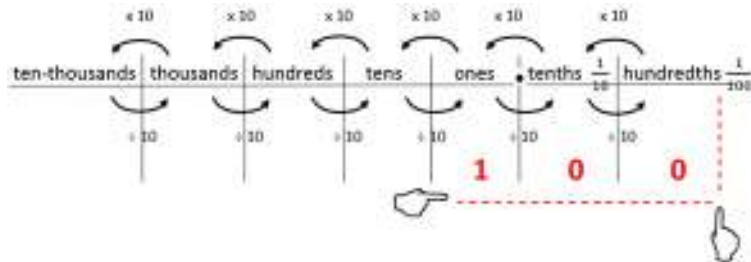
Display the place value chart, pointing to the 1 and the ones, for example,



Record a zero in the hundredths column, for example,



Run your finger along the 1 in the ones column and the 0 in the tenths and the hundredths columns, then up to the word 'hundredths' to demonstrate that the place value chart says 100 hundredths, for example,



- ▶ We found that 1 can be seen in 2 ways.
- ▶ We can see 1 as 1 one and as 10 tenths.
- ▶ We found that 10 can be seen in 3 ways.
- ▶ We can see 10 as 1 ten, as 10 ones and as 100 tenths.
- ▶ Now that we have extended multiplicative place value to hundredths, do you think 1 can be seen in another way?
- ▶ Let's investigate!

- ▶ How many hundredths do we have?
- ▶ Do we have zero tenths?
- ▶ Do we have zero hundredths?
- ▶ Let's place a zero in the tenths and the hundredths columns.
- ▶ If we read across the columns, then up, can we see that 1 is 100 hundredths?
- ▶ Could we describe 1 as 100 hundredths?
- ▶ Can you see the 100 hundredths in 1?
- ▶ Does place value show us that 1 one is 100 hundredths?
- ▶ Let's record 100 hundredths as a fraction.

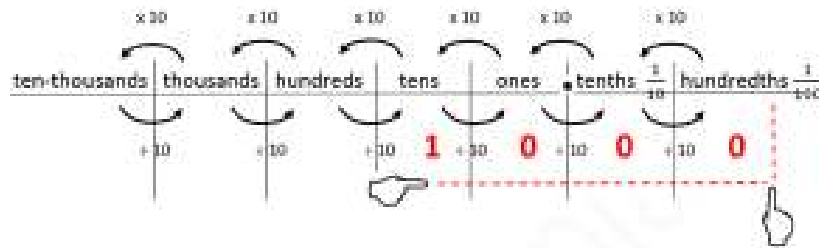
Record, for example, $1 = 1$ one

$1 = 10$ tenths

$1 = 100$ hundredths

Record, for example, $1 = \frac{100}{100}$

Record 10 in the place value chart, and zeros in the ones, tenths and hundredths columns, and run your finger along the 1 in the tens column and the 0s in the ones, tenths and hundredths columns, then up to the word 'hundredths' to demonstrate that the place value chart says 100 hundredths, for example,



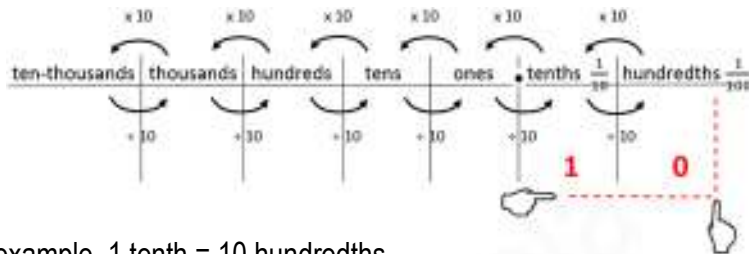
Record, for example, $10 = 1000$ hundredths

- ▶ What do we know about fractions with the same numerator and denominator?
- ▶ Are fractions with the same numerator and denominator equal to 1?
- ▶ If we have 100 hundredths, do we have 1?

- ▶ How many ways can you see 1?
- ▶ Can you see 1 as 1 one?
- ▶ Can you see 1 as 10 tenths?
- ▶ Can you see 1 as 100 hundredths?
- ▶ Can you see 1 in 3 ways?

- ▶ **Now that we've extended multiplicative place value to include hundredths, can we see 10 in another way?**
- ▶ Do we have zero ones?
- ▶ Do we have zero tenths?
- ▶ Do we have zero hundredths?
- ▶ Let's place a zero in the tenths and the hundredths columns.
- ▶ If we read across the columns, then up, can we see that 10 is 1000 hundredths?
- ▶ Could we describe 10 as 1000 hundredths?
- ▶ Can you see the 1000 hundredths in 10?
- ▶ Does place value show us that 1 ten is 1000 hundredths?
- ▶ How many ways can you see 10?
- ▶ Can you see 10 as 1 ten?
- ▶ Can you see 10 as 10 ones?
- ▶ Can you see 10 as 100 tenths?

Record 1 tenth in the place value chart and zero in the hundredths column, and run your finger along the 1 in the tenths column and the 0s in the hundredths columns, then up to the word 'hundredths' to demonstrate that the place value chart says 10 tenths, for example,



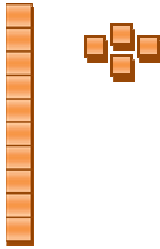
Record, for example, 1 tenth = 10 hundredths

Record, for example, $\frac{1}{10} = \frac{10}{100}$

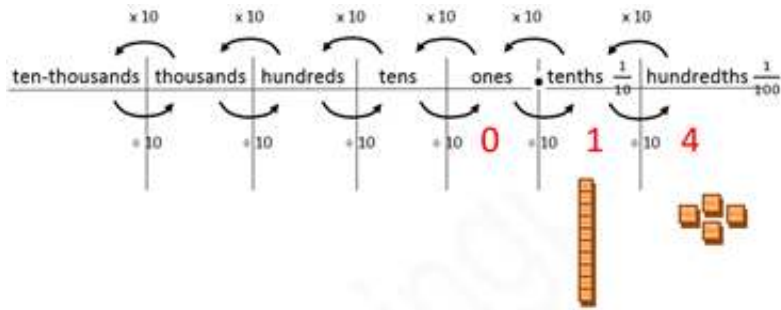
- ▶ Can we see 10 as 1000 hundredths?
- ▶ Can you see 10 in 4 ways?

- ▶ **Now that we've extended multiplicative place value to include hundredths, can we see a tenth in another way?**
- ▶ Do we have zero hundredths?
- ▶ Let's place a zero in the hundredths column.
- ▶ If we read across the columns, then up, can we see that 1 tenth is 10 hundredths?
- ▶ Could we describe 1 tenth as 10 hundredths?
- ▶ Could we record our tenths and hundredths using the fraction symbol?
- ▶ Can you see the 10 hundredths in 1 tenth?
- ▶ Does place value show us that 1 tenth is 10 hundredths?
- ▶ Let's record 1 tenth and 10 hundredths as a fraction.
- ▶ Are 1 tenth and 10 hundredths equivalent fractions?
- ▶ Do 1 tenth and 10 hundredths have the same relationship between the numerator and denominator?
- ▶ Is 1 a tenth of 10, and is 10 a tenth of 100?
- ▶ How many ways can you see 1 tenth?
- ▶ Can you see 1 tenth as 1 tenth?
- ▶ Can you see 1 tenth as 10 hundredths?
- ▶ Can you see 1 tenth in 2 ways?

Select 14 blocks and group them into towers of 10, for example,



Record zero ones and 1 tenth and 4 hundredths in the place value chart, for example,



Record zero ones and 1 tenth and 4 hundredths without the place value chart, for example,

0 1 4

Record a decimal point after the ones column, for example, 0.1 4

▶ **Let's select 14 blocks and group them using place values.**

- ▶ Let's give the tower the value of a tenth.
- ▶ What will be the value of 1 block?
- ▶ Will the value of 1 block be 1 hundredth?
- ▶ How many hundredths do we have?
- ▶ Do we have 4 hundredths?
- ▶ How many ones?
- ▶ Are there zero ones?
- ▶ Let's record zero in the ones column.
- ▶ How many tenths?
- ▶ Is there 1 tenth?
- ▶ Let's record 1 in the tenths column.
- ▶ How many hundredths?
- ▶ Are there 4 hundredths?
- ▶ Let's record 4 in the hundredths column.

▶ Let's record zero ones and 1 tenth and 4 hundredths without the place value chart.

▶ Hmm, we need a mark to show where the ones column is.

▶ What mark do we use?

▶ Do we use a decimal point?

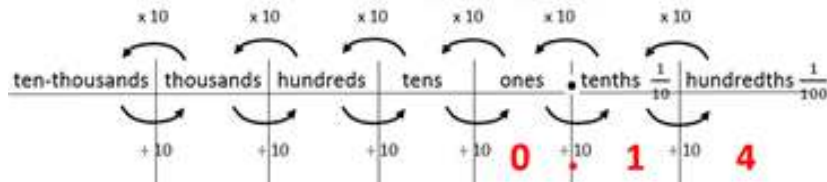
▶ Let's put a decimal point after the ones column.

Point to the zero in the ones column, for example,



Erase the zero in the ones column, for example, .14

Display the place value chart, for example,



Record, for example, $0.14 = 1 \text{ tenth} + 4 \text{ hundredths}$.

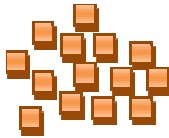
Record, for example, $0.14 = \frac{1}{10} + \frac{4}{100}$

- ▶ Let's read our number.
- ▶ Zero point one four.
- ▶ We can't say zero point 14, because 14 means 1 ten and 4 ones, and we have 1 tenth and 4 hundredths.
- ▶ So we just read fractions as single-digit numbers.
- ▶ Why do we have a zero in the ones column?
- ▶ If we have a zero in the ones column, how many ones do we have?
- ▶ Do we have zero ones?
- ▶ If we don't have a zero in the ones column, how many ones do we have?
- ▶ Do we still have zero ones?
- ▶ So the zero doesn't change the value of the number.
- ▶ If we have no ones, we can place a zero in the ones column, just to make sure we notice the decimal point!

- ▶ How could we describe 0.14 using standard place value?

- ▶ Could describe 0.14 as 1 tenth and 4 hundredths?
- ▶ Can you see the 1 tenth in the place value chart?
- ▶ Can you see the 4 hundredths in the place value chart?
- ▶ So we could describe 1.4 using standard place value as 1 tenth and 4 hundredths.
- ▶ Could we record our 1 tenth and 4 hundredths using the fraction symbol so everyone can read it?

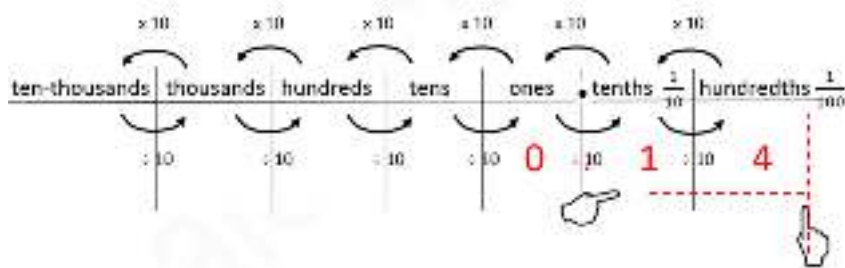
Children break the tenth into 10 hundredths, for example,



Record, for example, $0.14 = 14$ hundredths

Record, for example, $0.14 = \frac{14}{100}$

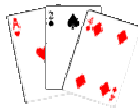
Display the place value chart, running your finger along the 1 in the tenths column and the 4 in the hundredths column, then up to the word 'hundredths' to demonstrate that the place value chart says 14 hundredths, for example,



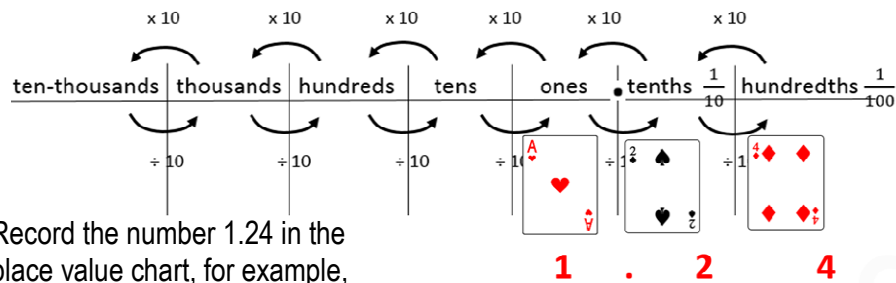
- ▶ Let's read our number sentence - one point four equals one tenth and four-hundredths.
- ▶ So we've described 0.14 using standard place value.
- ▶ How could we describe 0.14 using non-standard place value?
- ▶ Let's break the tenth into 10 hundredths.
- ▶ How could we describe 0.14 now?
- ▶ How many hundredths do we have?
- ▶ Do we have 14 hundredths?
- ▶ Could we describe 0.14 using non-standard place value as 14 hundredths?
- ▶ Could we record our 14 hundredths using the fraction symbol so everyone can read it?
- ▶ Let's read our number sentence - zero point one four equals fourteen-hundredths.
- ▶ We've investigated how we can read across the place value chart to read numbers using non-standard place value.
- ▶ Can you see the 14 hundredths in the place value chart?

▶ **Let's use cards to investigate how we can describe three-digit**

Select 3 cards to make a three-digit number of ones, tenths and hundredths, for example,



Place the cards in a place value chart, for example,

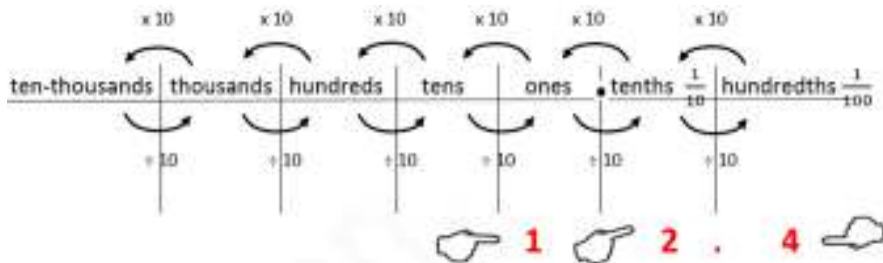


Record the number 1.24 in the place value chart, for example,

Record, for example, $1.24 = 1 \text{ one} + 2 \text{ tenths} + 4 \text{ hundredths}$

Record, for example, $1.24 = 1 \text{ one} + \frac{2}{10} + \frac{4}{100}$

Point to the 1 one, the 2 tenths and the 4 hundredths, for example,



numbers of ones, tenths and hundredths.

▶ When we make a three-digit number with cards, we overlap the cards, like this.

▶ Let's place our numbers in a place value chart.

▶ Let's record 1.24 in a place value chart.

▶ How could we describe 1.24 using standard place value?

▶ Could we describe 1.24 as 1 one plus 2 tenths plus 4 hundredths?

▶ Could we record the 2 tenths and the 4 hundredths using the fraction symbols so everyone can read it?

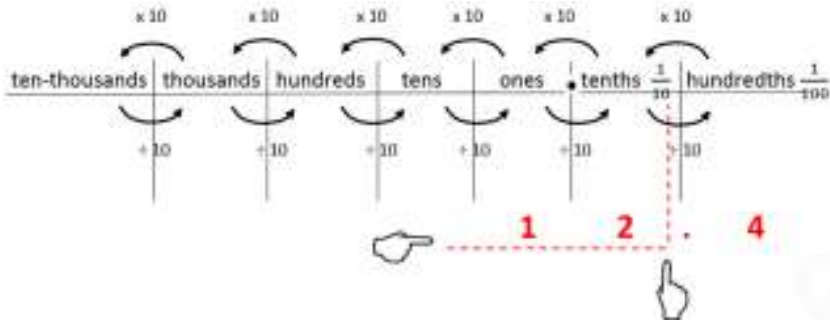
▶ Can you see the 1 one?

▶ Can you see the 2 tenths?

▶ Can you see the 4 hundredths?

▶ How could we describe 1.24 using non-standard place value?

Display the place value chart, running your finger along the 1 in the ones column and the 2 in the tenths column, then up to the word 'tenths' to demonstrate that the place value chart says 12 tenths, for example,



Record, for example, $1.24 = 12 \text{ tenths} + 4 \text{ hundredths}$

$$1.24 = \frac{12}{10} + \frac{4}{10}$$

Children investigate improper fractions in Year 5. Children could record tenths as improper fractions when they demonstrate their understanding.

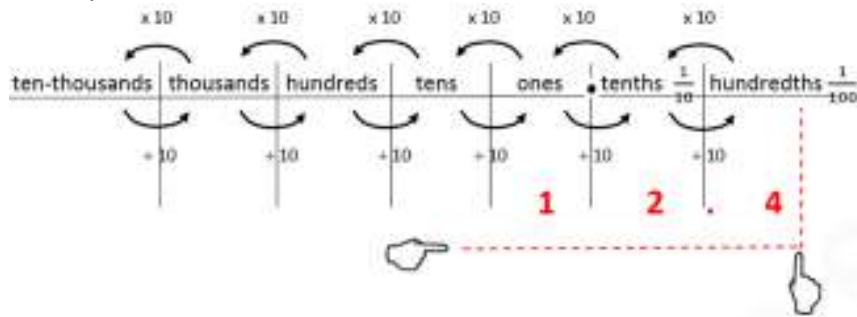
Display the place value chart, running your finger along the 1 in the ones column

- ▶ Could we read across columns on the place value chart?
- ▶ Do we have 12 tenths?
- ▶ Do we have 4 hundredths?

- ▶ Could we describe 1.24 as 12 tenths and 4 hundredths?
- ▶ Could we record the 12 tenths and 4 hundredths using the fraction symbol so everyone can read it?
- ▶ Can you see anything a little strange about our fraction 12 tenths?
- ▶ Is the numerator larger than the denominator?
- ▶ When the numerator is larger than the denominator, do we have more than one?
- ▶ Is 12 tenths more than 1?
- ▶ Is 12 tenths, 1 and 2 tenths?

- ▶ How could we describe 1.24 as just hundredths?

and the 2 in the tenths column, and the 4 in the hundredths column, then up to the word 'hundredths' to demonstrate that the place value chart says 124 hundredths, for example,



Record, for example, $1.24 = 124$ hundredths

$$1.24 = \frac{124}{100}$$

Children investigate improper fractions in Year 5. Children could record tenths as improper fractions when they demonstrate their understanding.

- ▶ How many hundredths?
- ▶ Are there 124 hundredths?

- ▶ Could we describe 1.24 as 124 hundredths?
- ▶ Can you see the 124 hundredths?
- ▶ Can you see anything a little strange about our fraction 124 hundredths?
- ▶ Is the numerator larger than the denominator?
- ▶ When the numerator is larger than the denominator, do we have more than one?
- ▶ Is 124 hundredths more than 1?
- ▶ Is 124 hundredths, 1 and 24 hundredths?

- ▶ How could we describe 1.24 using non-standard place value, without reading across columns?

Record, for example, $1.24 = 5 \text{ tenths} + 74 \text{ hundredths}$

$$1.24 = \frac{5}{10} + \frac{74}{100}$$

Children investigate improper fractions in Year 5. Children could record tenths as improper fractions when they demonstrate their understanding.

- ▶ What if we only saw 5 tenths?
- ▶ How many hundredths would there be?
- ▶ Would there be 7 more tenths?
- ▶ How many hundredths is 7 tenths?
- ▶ Is 7 tenths, 70 hundredths?
- ▶ Would we have 70 hundredths plus the 4 hundredths?
- ▶ Would we have 74 hundredths?
- ▶ Could we describe 1.24 using non-standard place value, without reading across columns, as 5 tenths and 74 hundredths?