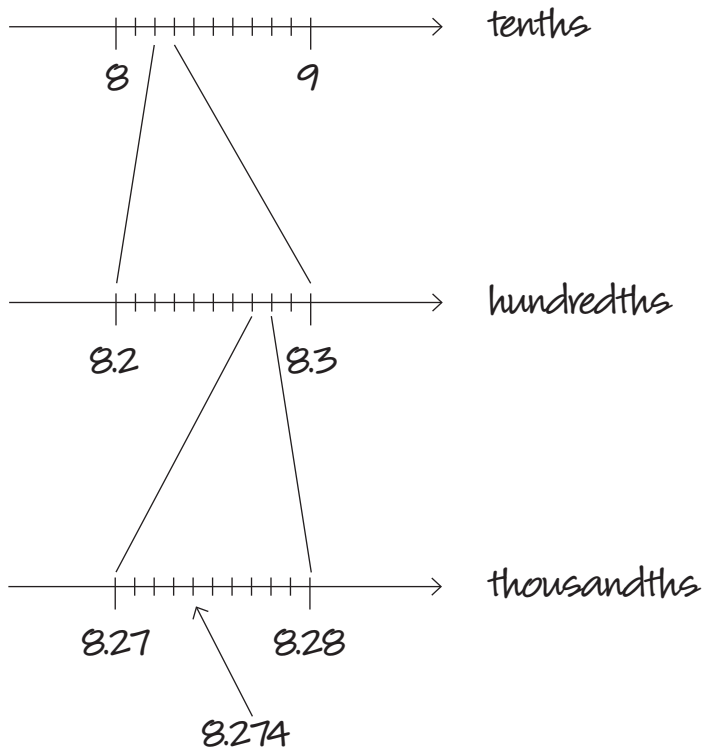


What to bring to class:
Ask students to bring PM
4A and 5A.

9.1 Decimals

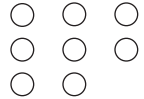

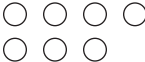

Decimals represent points on the number line by repeatedly subdividing intervals into tenths, hundredths, etc.

Ex Find 8.274



This is just place value!

I. Introduction

	1's	tenths	hundredths	thousandths
chip				

↑ separates units from $\frac{1}{10}$'s, etc.

Expanded form:

$$8.274 = 8 \times 1 + 2 \times \left(\frac{1}{10}\right) + 7 \times \left(\frac{1}{100}\right) + 4 \times \frac{1}{1000}$$

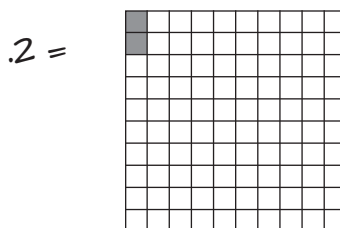
dollars dimes pennies
 ↙ ↘ ↙ ↘
 denominations!

Taught by: · number line (meter sticks, balance scales...)

· "Hundreds square" used but

(i) 2 dimensional

(ii) kids make error:



(iii) what about thousandths?

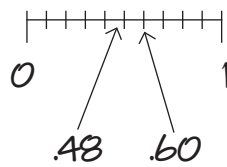
· Chip models

Notation:

3.14	$3,14$	$3 \cdot 14$
⏟	⏟	⏟
U.S.	some European Countries	Singapore

Decimals are easy to compare by: $.48 \underline{\quad} .6$

• Locating on number line



• Making "equal lengths"

$.60$

$.48$

• Convert to like fractions

$$.6 = \frac{6}{10} = \frac{60}{100} \quad .48 = \frac{48}{100}$$

operations - Same as for whole numbers but keep track of the decimal point.

II. Addition & Subtraction

Ex 1

$$\begin{array}{r} 1 \\ 3.62 \\ + 1.8 \\ \hline 5.42 \end{array}$$

1's	tenths	hundredths
○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○

Ex 2 [Students do 1 min.]

$$\begin{array}{r} 11.1700 \\ - 2.8613 \\ \hline \end{array}$$

Chip Model:

• Align Place Values!

• Append 0's until same length

III. 1-digit Multiplication [Students do 1 min.]

Ex 3

$$\begin{array}{r} 1 \\ 1.24 \\ \times 3 \\ \hline 3.72 \end{array}$$

1's	$\frac{1}{10}$'s	$\frac{1}{100}$'s
○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○

IV. Place Value

Principle: "multiplying by 10 means shift the decimal point to the right."

Why?

(.)	(.01)	$\times 10$	(1)	(.1)
(.)	(.01)		(1)	(.1)
(.)			(1)	

$.32 \times 10 = 3.2$

$.367 \xrightarrow{\times 10} 3.67$ $\xleftarrow{\div 10}$	because	$\frac{367}{1000} \xrightarrow{\times 10} \frac{367}{100}$ $\xleftarrow{\div 10}$
$.367 \xrightarrow{\times 100} 36.7$ $\xleftarrow{\div 100}$	because	$\frac{367}{1000} \xrightarrow{\times 100} \frac{367}{10}$ $\xleftarrow{\div 100}$

Hence: multiply by 10, 100, 1000, ... \longleftrightarrow move decimal 1, 2, 3, ... places to the right
 divide by 10, 100, 1000, ... \longleftrightarrow move decimal 1, 2, 3, ... place to the left

V. Multi digit Multiplication & Division

1st reg. algorithm!

Ex 4 $1.02 \times 3.4 = \frac{102}{100} \times \frac{34}{10} = \frac{102 \times 34}{1000} = \frac{3468}{1000}$

2 1 \longrightarrow 3

$= 3.468$

2nd Shift decimal pt!

$$\begin{array}{r} 1.02 \\ \times 3.4 \\ \hline 408 \\ 3060 \\ \hline 3468 \end{array}$$

1st Do reg. algorithm
2nd Shift decimal

Ex 5 [Students do]

$$\begin{array}{r} .02 \\ \times .041 \\ \hline \end{array}$$

For division, use compensation method from mental math!

$$\begin{array}{r} \times 10 \quad \times 10 \quad \times 10 \quad \times 10 \\ 162.8 \div .037 = 1628 \div .37 \end{array}$$

$$\begin{array}{r} \times 10 \quad \times 10 \\ = 16280 \div 3.7 \end{array}$$

$$= 162800 \div 37 \leftarrow \text{whole \# division!}$$

- or -

$$162.800 \div .037 = 162800 \div 37$$

② shift 3 ① shift 3



We can do this because of equivalence of fractions:

$$\begin{aligned} 162.8 \div .037 &= \frac{162.8 \times 10}{.037 \times 10} = \frac{1628 \times 10}{.37 \times 10} = \frac{16280 \times 10}{3.7 \times 10} \\ &= \frac{162800}{37} = 162800 \div 37 \end{aligned}$$

Ex 6 [Students do] Find the value of $.81 \div 3.9$ to 2 decimal places.

$$3.9 \overline{) .81} \longrightarrow \begin{array}{r} 6 \quad .207 \\ 39 \overline{) 8.1} \\ \underline{-78} \\ .30 \\ \underline{-0} \\ 300 \\ \underline{-273} \\ 27 \end{array}$$

$$\boxed{.81 \div 3.9 \approx .21}$$

HW Read section 9.1 Do HW set 37