Fractions are AMAZING Numbers

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Agenda

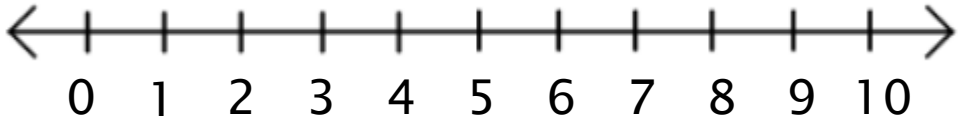
Today we will explore:

- Student understanding and misunderstandings with fractions;
- The meaning of a “fraction” and several ways fractions build numerical reasoning;
- How “unit factions” build the foundation for all work with fractions throughout elementary, middle and high school;
- Ways to increase computational fluency when working with fractions

Norms

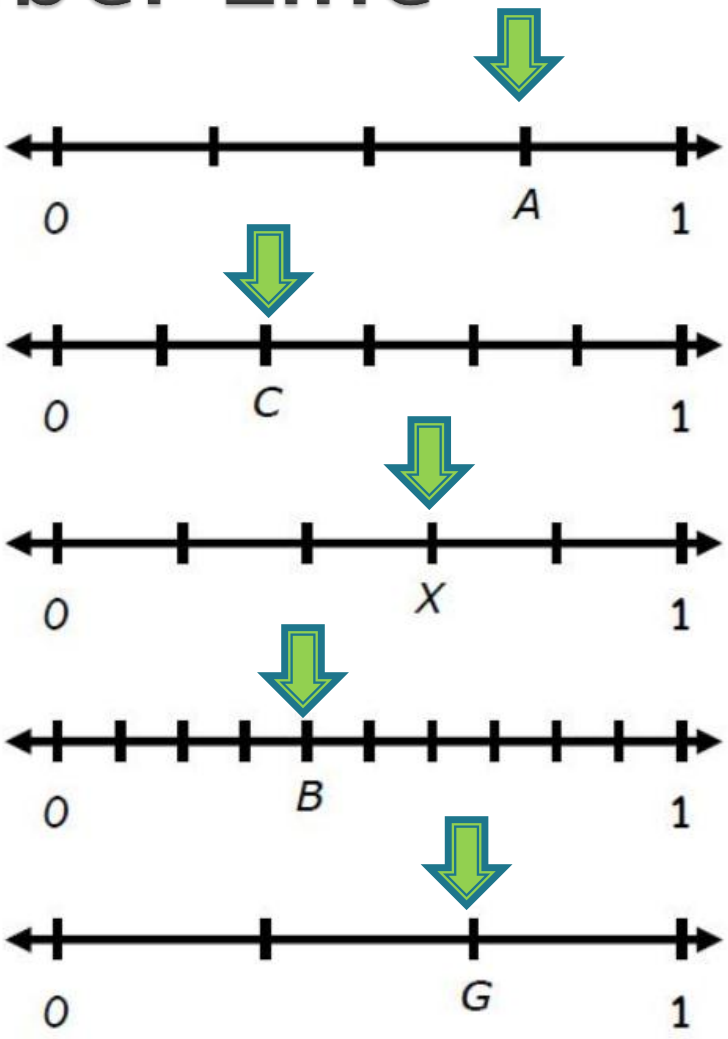
- Be present.
- Be respectful.
- Place all phones on vibrate.
- Keep side conversations to a minimum.
- Challenge ideas not people.
- Others ?

The Number Line



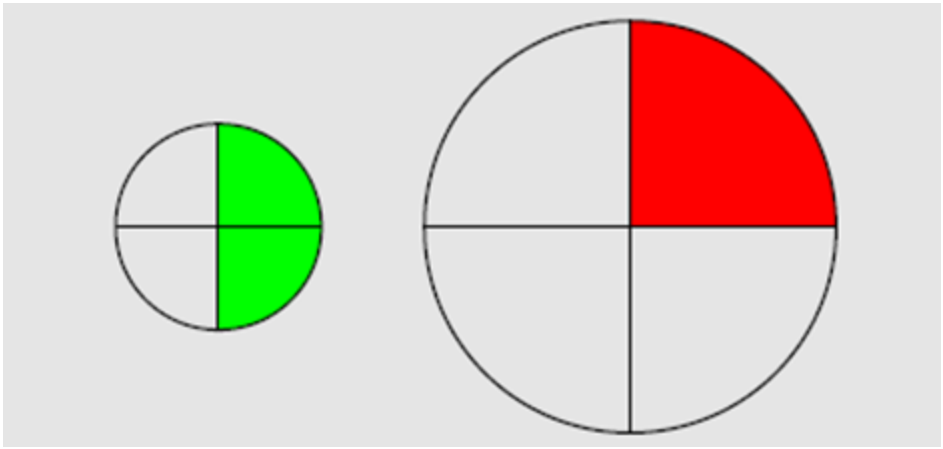
Could there be another number between 0 and 1?

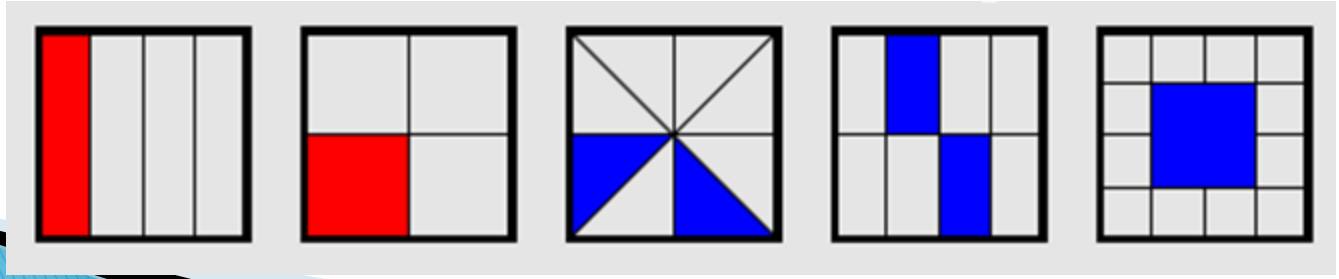
The Number Line



Fractions – Understandings and Misunderstandings

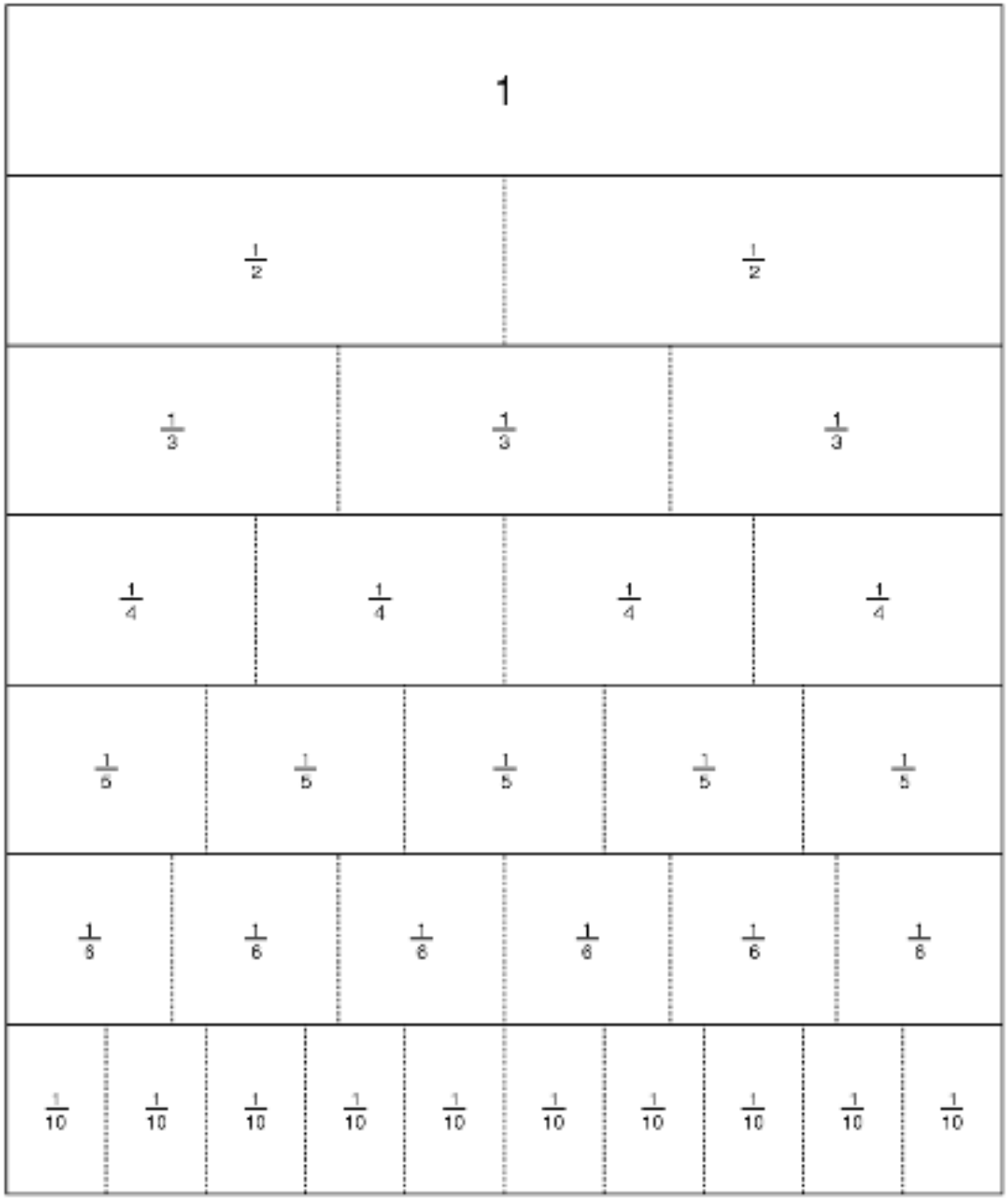
- What do your students clearly understand about fractions?
- What do your students struggle with when it comes to fractions?





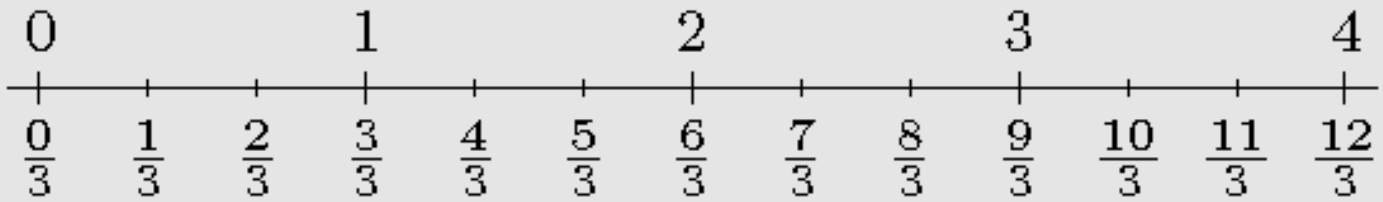
Unit Fractions

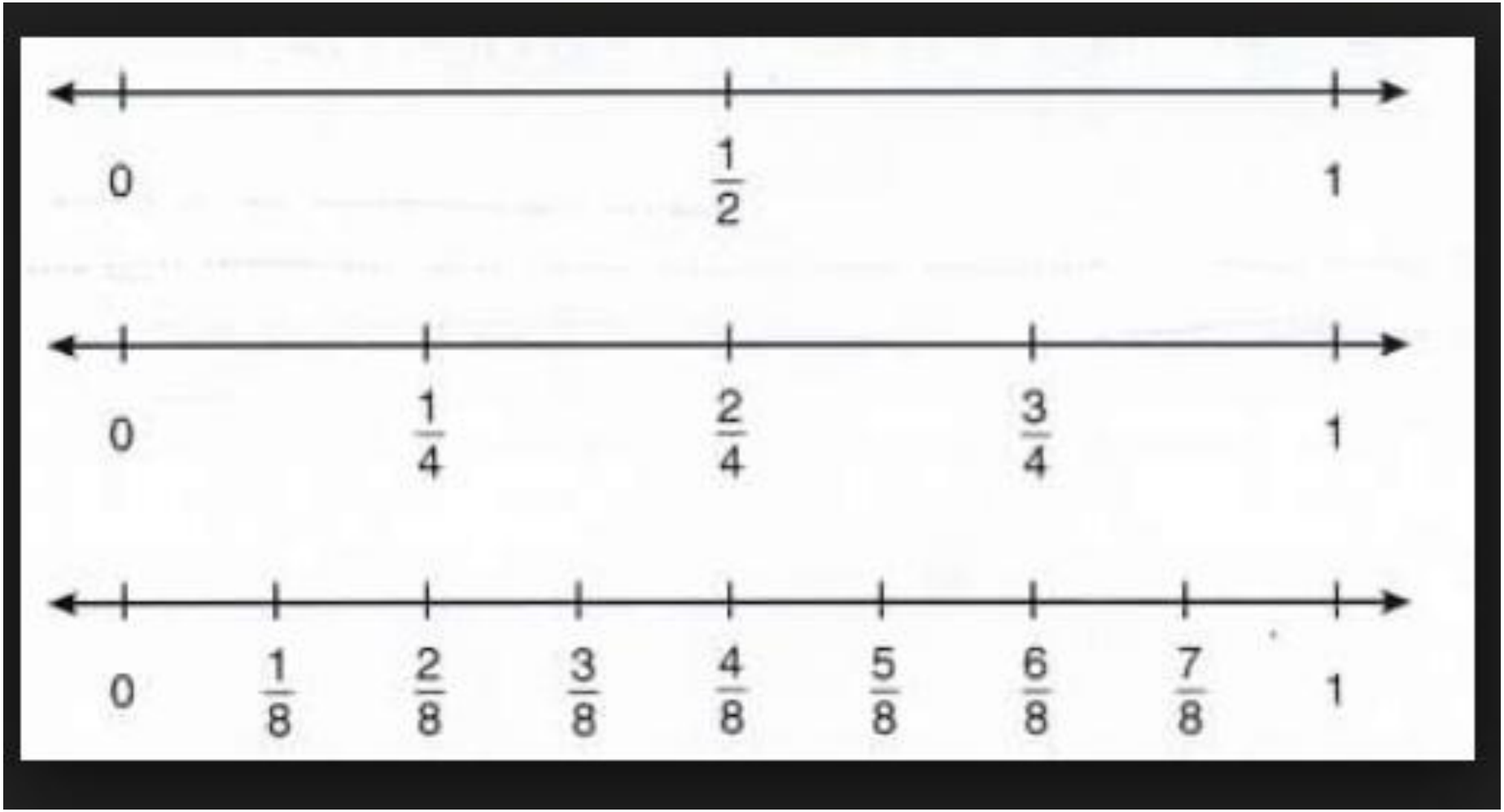
$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$


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

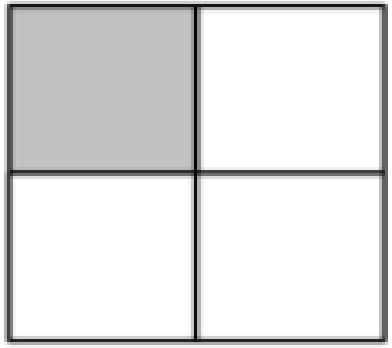
Skip Counting

The number line marked off in thirds

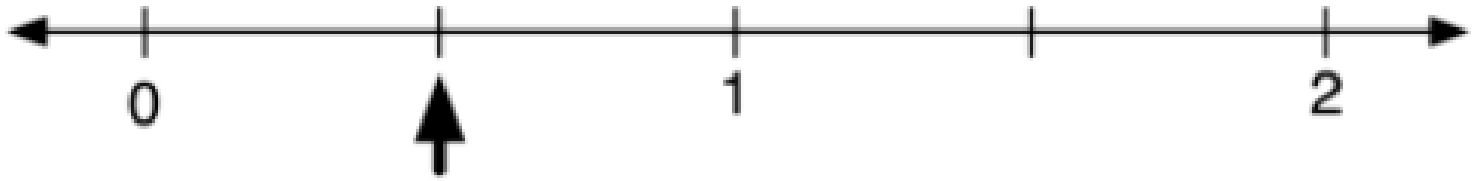



0
1/2
1
0
1/4
2/4
3/4
1
0
1/8
2/8
3/8
4/8
5/8
6/8
7/8
1

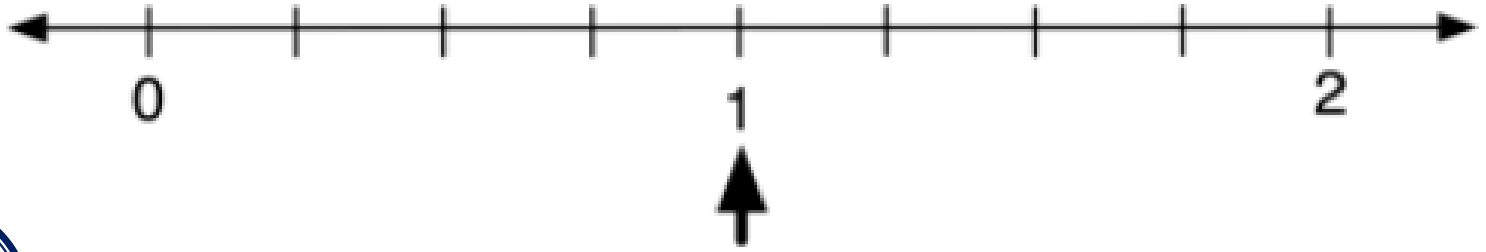
Some fraction of the larger square is shaded. Which number line shows the same amount?



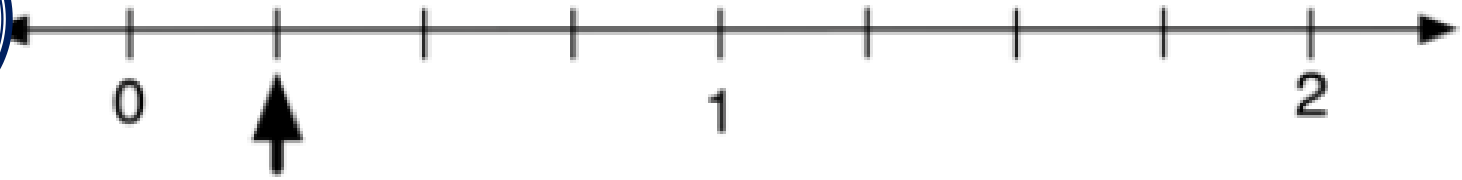
A

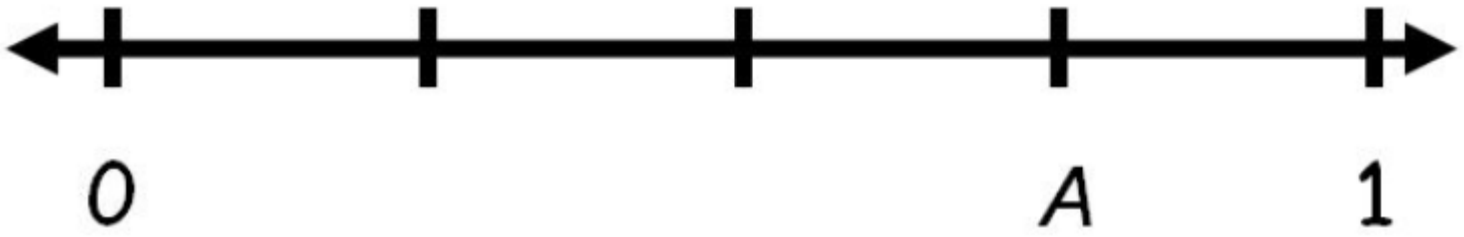


B



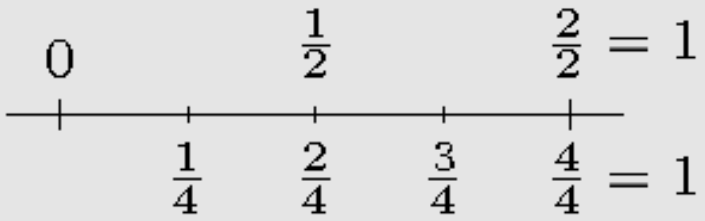
C

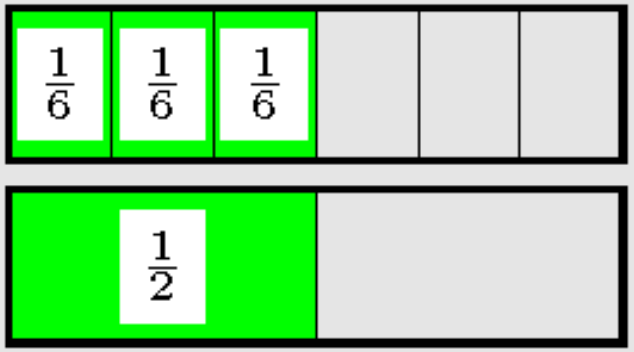


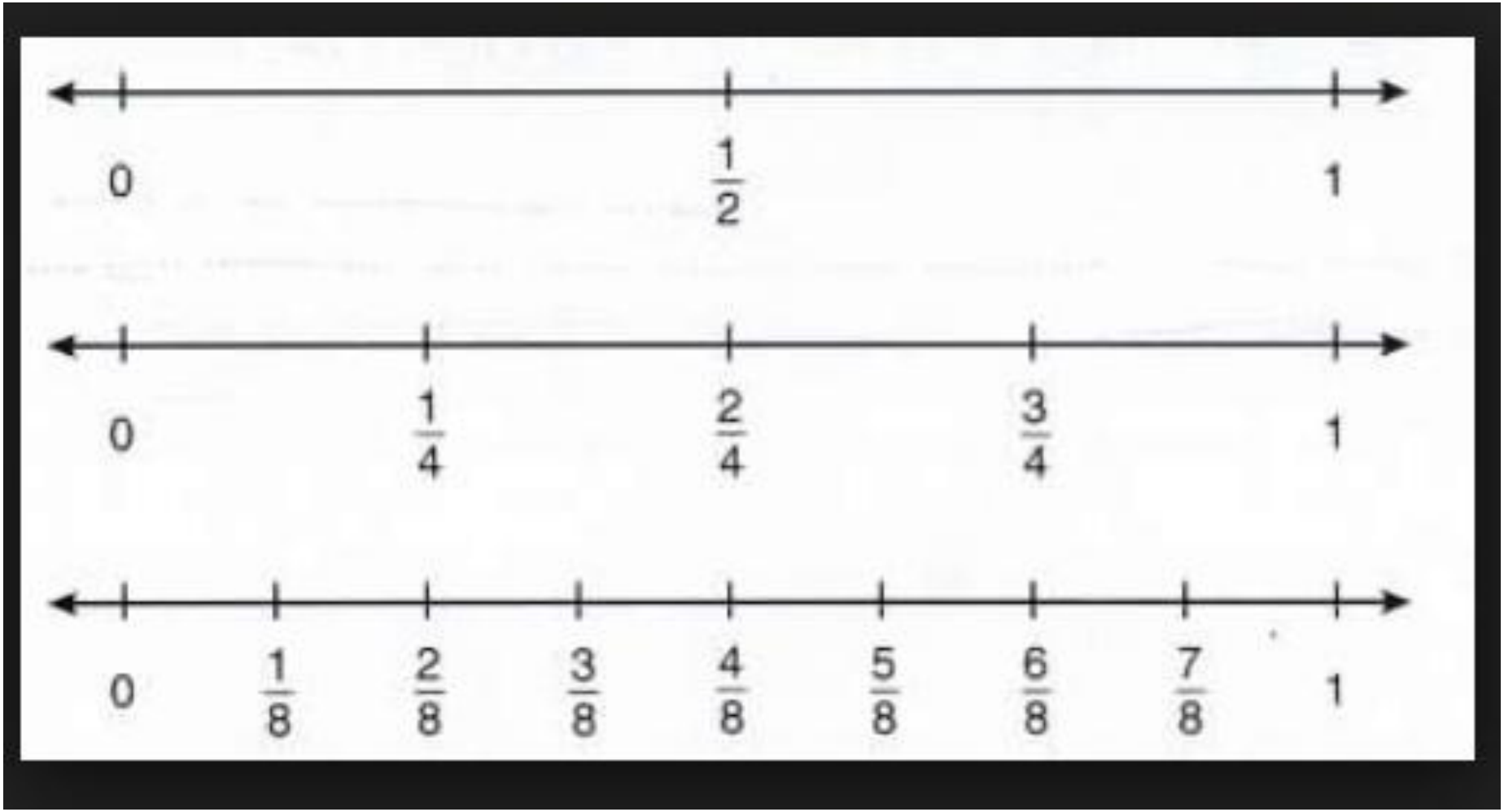

0
A
1

Equivalence

Using the number line and fraction strips to see fraction equivalence

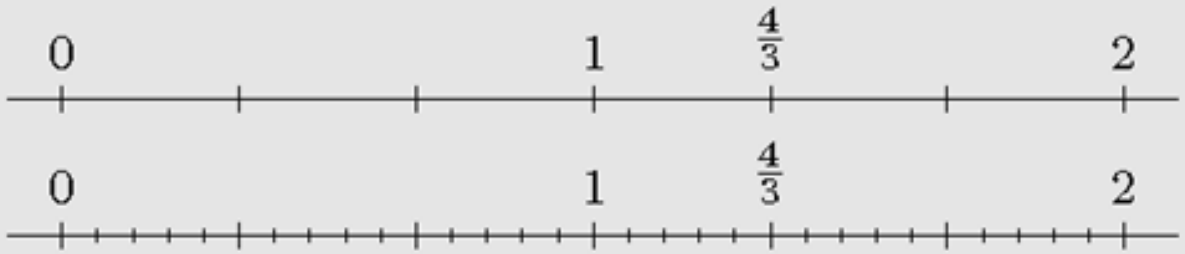





0
1/2
1
0
1/4
2/4
3/4
1
0
1/8
2/8
3/8
4/8
5/8
6/8
7/8
1

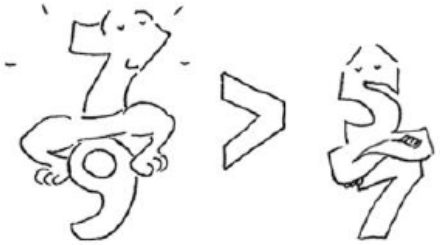
Equivalence

Using the number line to show that $\frac{4}{3} = \frac{5\times4}{5\times3}$



$\frac{4}{3}$ is 4 parts when each part is $\frac{1}{3}$, and we want to see that this is also 5×4 parts when each part is $\frac{1}{5\times3}$. Divide each of the intervals of length $\frac{1}{3}$ into 5 parts of equal length. There are 5×3 parts of equal length in the unit interval, and $\frac{4}{3}$ is 5×4 of these. Therefore $\frac{4}{3} = \frac{5\times4}{5\times3} = \frac{20}{15}$.

Fraction Feud



NAME_____

Use fraction bars to model these fractions. Insert the symbols <, >, or = to compare their sizes.

1. $\frac{3}{8} \square \frac{3}{6}$

How do you know which fraction is greater?

_____

_____

2. $\frac{1}{4} \square \frac{3}{12}$

What do you notice about these fractions?

_____

_____

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

4. Place these fractions in order from least to greatest: $\frac{3}{5}$ $\frac{2}{8}$ $\frac{2}{10}$

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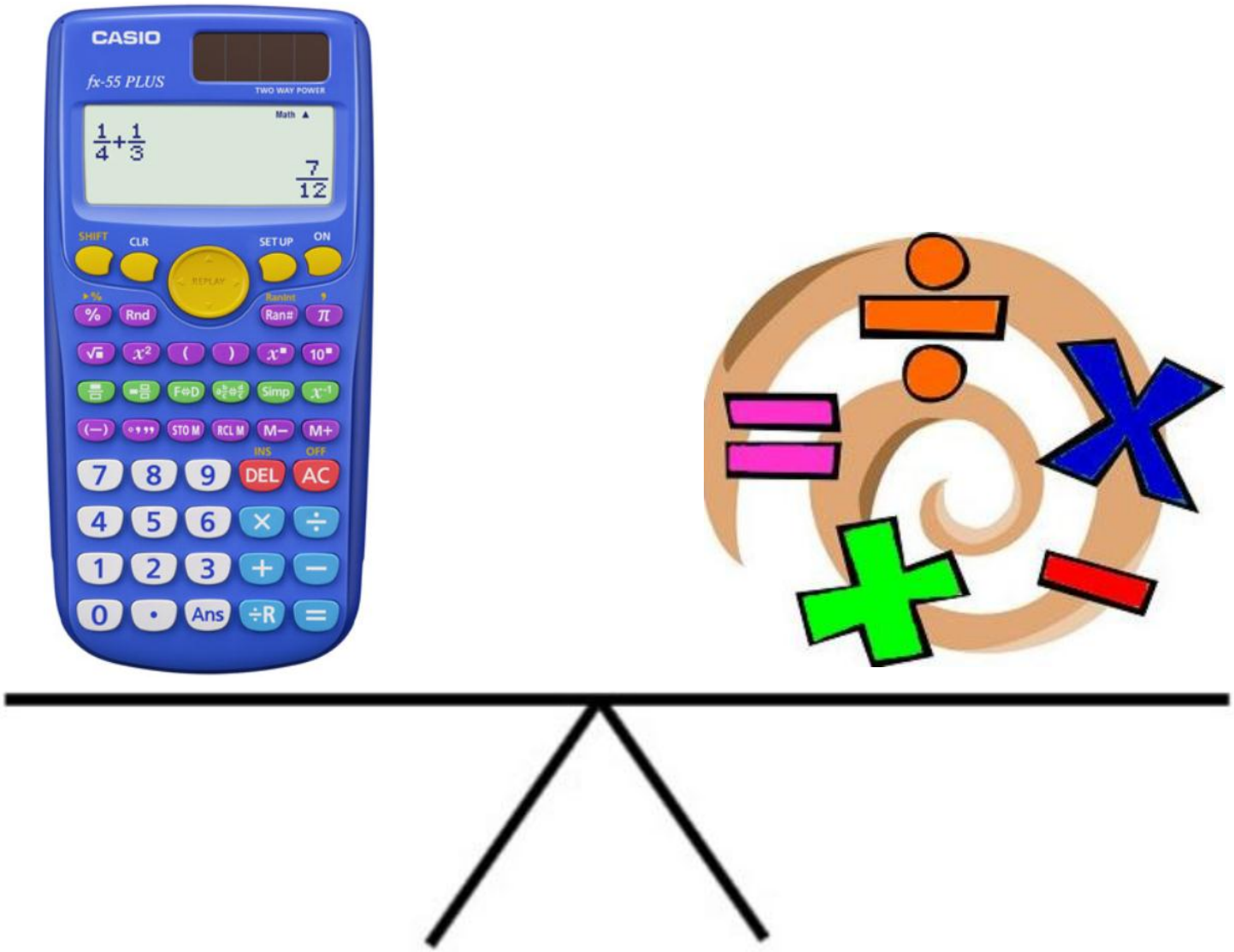
5. Challenge! Compare these numbers: $2\frac{1}{4}$ $\square$ $3\frac{1}{8}$

Do you need fraction bars to solve this problem? Why or why not?


fx-55 PLUS Emulator
CASIO
Math
SHIFT
CLR
SET UP
ON
REPLAY
RanInt
Ran#
Rnd
F⇔D
Simp
STO M
RCL M
M−
M+
INS
OFF
DEL
AC
Ans


CASIO
fx-55 PLUS
TWO WAY POWER
Math
1/4+1/3
7/12
SHIFT
CLR
SET UP
ON
REPLAY
%
Rnd
RanInt
Ran#
π
√
x²
(
)
x■
10■
F⇔D
Simp
x⁻¹
(−)
STO M
RCL M
M−
M+
INS
OFF
7
8
9
DEL
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÷
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2
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0
•
Ans
÷R
=

Calculator Reset

- Press CLR
- Select 3 (All)

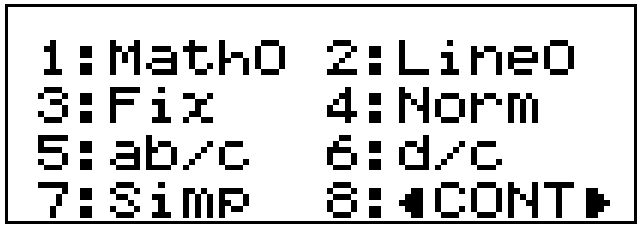
```
Clear?
1:Setup 2:Memory
3:All
```

- Press = (Yes)

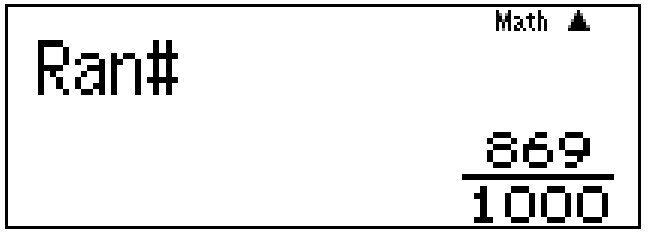
```
Reset All?

[=]    :Yes
[AC]   :Cancel
```

Random Fractions

- Press SETUP
- Select 1 (Math0)

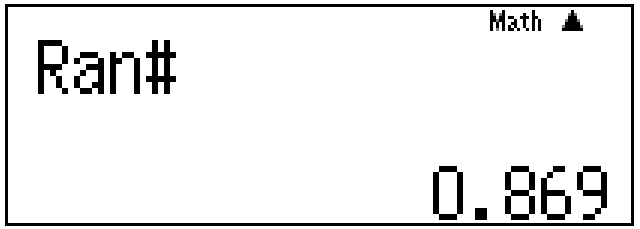


- Press Ran# =



To change to decimal:

- Press F↔D



Missing Numerator
Missing Denominator

Math ▲

$$\frac{1}{\square}+\frac{\square}{4}$$

Math ▲

$$\frac{\square}{8}-\frac{3}{\square}$$

Fraction Game

- Use the RanInt command to generate four different single digit numbers. RanInt(1,9)

- Record the numbers on a piece of paper

- Use those numbers to create:
  - Two fractions that have the largest sum
  - Two fractions that have the greatest difference
  - Two fractions that have the largest product

Math

$\frac{\square}{\square}+\frac{\square}{\square}$ $\frac{\square}{\square}-\frac{\square}{\square}$ $\frac{\square}{\square}\times\frac{\square}{\square}$

$$0+\frac{1}{2}+\frac{2}{2}=$$

$$0+\frac{1}{3}+\frac{2}{3}+\frac{3}{3}=$$

$$0+\frac{1}{4}+\frac{2}{4}+\frac{3}{4}+\frac{4}{4}=$$

$$0+\frac{1}{5}+\frac{2}{5}+\frac{3}{5}+\frac{4}{5}+\frac{5}{5}=$$

$$0+\frac{1}{6}+\frac{2}{6}+\frac{3}{6}+\frac{4}{6}+\frac{5}{6}+\frac{6}{6}=$$

$$0+\frac{1}{9}+\frac{2}{9}+\cdots+\frac{9}{9}=$$

Solve for the sum of the fractional units $\frac{0}{n}\ to \frac{n}{n}$.

Discussion $\frac{0}{n}\ to \frac{n}{n}$

- What happens when the denominator is an even number above 20?
- What happens when the denominator is an odd number above 20?
- What is the pattern?
- How can you describe a way to find the sum of any set of fractions from $\frac{0}{n}\ to \frac{n}{n}$?

Debrief

- What are the expected student understandings and misunderstandings with these problems/activities?
- What other ways could you take these problems and expand on them for student learning?

Closure

- Name three things you learned today.
- Ask two questions you still would like answers to.
- Name one thing you are going to immediately implement in your classroom as a result of your learning today.

Thank You!

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Research

- Bill McCallum's Website
  http://ime.math.arizona.edu/progressions/
- Common Core Mathematics in the PLC at Work – Kanold, Larson, Fennell, Adams, Dixon, Kobett, Wray (2012).
- Illustrative Mathematics Project
  http://www.illustrativemathematics.org/standards/k8
- Casio Education
  http://www.casioeducation.com/educators
- Common Core Standards for Mathematics
  http://www.corestandards.org/
- Fraction Feud

http://www.nctm.org/classroom-resources/lessons/Fraction-Feud_-Comparing-and-Ordering-Fractions/