Unit #: Lesson # : Fractions, Percentages and Decimals (Integrating T-GEM & Learning For Use)
60 – 90 minutes

Grade 7 students are expected to develop a strong grasp of fraction concepts and understand the relationships between fractions, percentages and decimals.

Math Learning Goals

- compare and order positive fractions, positive decimals (to thousandths) and whole numbers by using
  - benchmarks
  - place value
  - equivalent fractions and/or decimals
- demonstrate an understanding of percent (limited to whole numbers) concretely, pictorially, and symbolically

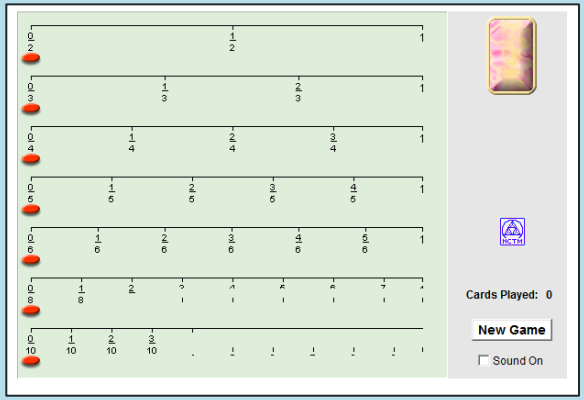
Materials

- Computer
- Internet access
- Think Board (individual)
- Dry erase pens
- pencils

GENERATE / MOTIVATE

Ask students to compile information and generate relationships

- Students can refresh their understanding of fraction relationships between common/proper fractions using the Illuminations **Fraction Game**



- Using number lines (my students usually use dry erase markers on their desks for something like this), students plot benchmark fractions. E.g. halves, thirds, quarters, fifths, eights, tenths
- While working in pairs, ask students to predict where other fractions (within a set, values less than 1) fall on their number line
  - Students can pair/share their results with a partner explaining their reasoning using math vocabulary and proof of relationships through bench marks or equivalent/simplified fraction comparisons
- **Ask students to share, compare, explain to each other and to the teacher when asked about their thinking**

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EVALUATE / CONSTRUCT KNOWLEDGE	**Evaluate relationship in light of new information - What if you weren't asked to compare a fraction to another fraction? What if you needed to compare a decimal to a fraction? How would you place this new value on your number line? Students attempt to evaluate the relationship.** ● With a partner, predict where 0.4 might go on your number line. Explain your thinking. Back up your prediction with your knowledge of decimals and fractions. Document their group prediction and reasoning to be reflected on later. ○ Additional curiosity and motivation can be generated through reminders of the parts of one place value positions - tenths and hundredths in this case. Can we make direct comparisons between thirds, fourths, halves, etc. and tenths or hundredths? Why? Why not? How can we compare these accurately? ● Ask students to add benchmark decimals to their number lines (0.1, 0.2, 0.4, 0.5, 0.8, 0.25, 0.75, 0.33, 0.67) ● pair/share how the fractions relate to the benchmark decimals ● Ask them to re-evaluate their prediction of 0.4 to see if it still holds true. With their partners students consider any conflicting information that is present
MODIFY / REFINE KNOWLEDGE	**Students are asked to summarize the relationship between fractions and decimals on a number line to reflect their knowledge of both.** ● Students reflect on their predictions of decimal placement and record their understanding of the relationship between fractions and decimals ● Students are then asked to use this information to pinpoint other decimal values in a set (all under 1)

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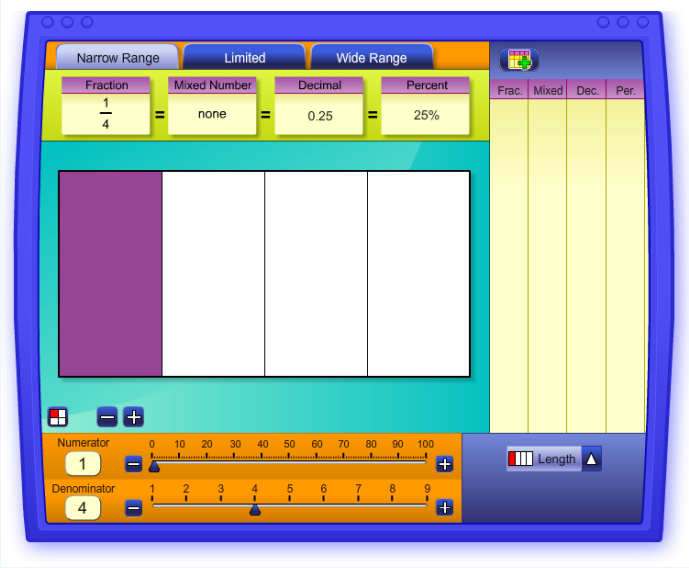
GENERATE / MOTIVATE

Once students can articulate the base relationships between fractions and between fractions and decimals (establishing/activating prior knowledge), they can proceed with next cycle.

- Using the benchmarks (decimals and fractions), students are led through 5-10 minute activity to piece together pictorial and symbolic relationships leading into the Illuminations activity. Bring everyone together regarding strategies for comparing decimal place value to fraction denominations



It's not only fractions and decimals that can be compared directly, it can also be percent. So how does percent relate to fractions and decimals?

- Students are introduced to the **Fraction Models** game.
- Students are asked to input fractions less than one only to begin with. Record the data collected in each column/area - fraction, improper fraction, decimal percent (student data chart in Google docs would work well here so both partners has continuous access to it)

What patterns emerge? What can you say about their relationship in general? Can you devise a theory about their relationship that can be applied to any situation where one value is being asked to be compared to the other two?

EVALUATE / CONSTRUCT KNOWLEDGE

Evaluate information about new comparison. Look for patterns to help explain relationships between all three.

- Now what about improper fractions? How can we compare them to decimals and percentage? Do we need to look at these differently or can we apply the same understandings from the previous activities to this new situation?
- Students collect new data using improper fractions to document their progress through the activity.

Do new patterns emerge or does the data support previous findings?

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MODIFY / REFINE KNOWLEDGE

Students are asked to summarize the relationship between fractions, decimals and percent in relation to both proper and improper fraction values.

- **Students reflect on their understanding of the relationships between fractions, decimals and percent, documenting a transformation or reinforcement in conceptualization.**
  - **Using the pair/share model, students explain how these relationships affect ordering and comparing to gain more insight into different perspectives**
- **Using this information, students are asked to apply their understanding to defend predicted placements of various values on a number line and in comparison to each other.**
  - **Students are given sets of mixed values to predict, and then check, how they relate to each other or where they are located on a number line (which will be student-generated based on the values seen).**

Students are asked to apply their skills within another game simulation that could provoke a lot of reflective opportunities - Memory.

In this instance, fractions and percent pairs are scattered and hidden on the online game board requiring students to find the values to match them up and ultimately win the game.