Rich Mathematical Task – Grade *4* – *Taco Tuesday*

Task Overview/Description/Purpose:

- In this task, students will determine the distance of a mix of fractions and decimal locations from their home, picking two distances that seem reasonable and justifying why.
- The purpose of this task is for students to represent and use benchmarks to compare fractions and decimals in a real world context.

Standards Alignment: Strand – *Number and Number Sense*

Primary SOL: 4.3cd The student will

c) compare and order decimals; and

d) given a model, write the decimal and fraction equivalents.

Related SOLs (within or across grade levels/courses): 3.2, 4.2, 5.2

Learning Intention(s):

- **Content** - I am learning to compare a set of fractions and decimals using benchmarks and other representations.
- **Language** - I am learning to use language that describes the place value or distance of a set of decimals and fractions.
- **Social** - I am learning to listen and respond to my peers' mathematical thinking.

Success Criteria (Evidence of Student Learning):

- I can identify the value or distance of a set of decimals and fractions using place value and various representations (number line, benchmarks, fraction-decimal equivalence, etc.)
- I can explain the relationship of equivalent fractions and decimals.
- I can represent the value or distance of my decimal and fraction choices using at least one representation and can justify my reasoning to my peers.
- I can give and accept specific feedback to move my thinking forward.

Mathematics Process Goals

Problem Solving	• Students will determine the decimal and or fractional (value) distance from home to make two restaurant choices. • Students will compare the decimals and fractions using at least one strategy.
Communication and Reasoning	• Students will communicate their thinking process for determining two different restaurant distances (values) to their peers. • Students will justify their solution process in an organized and coherent matter. • Students will use appropriate mathematical language, including equivalent/equal to, ones, or whole, tenths, hundredths, thousandths, decimal, fraction, greater than, less than, etc.
Connections and Representations	• Students will use an appropriate representation to compare the fractions and decimals and will justify their choice. • Students will describe connections between their representations and the representations of their peers. • Students will connect and/or extend thinking to other mathematical ideas such as relating whole numbers to decimals and fractions.

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Task Pre-Planning

Approximate Length/Time Frame: 60 minutes

Grouping of Students: Groups can consist of 2 to 4 students. Teacher should look for opportunities for students to be math leaders and choose student groups that encourage collaboration and perseverance.

Materials and Technology:

- fraction bars
- Virtual Implementation Google Slides - Single Student
- Virtual Implementation Google Slides - Group
- Fraction and Decimal Bars (optional)
- Money Strips (optional)
- Interactive Number Line (optional)
- Play money (optional)
- copy of task
- blank and/or grid paper
- pencil

Vocabulary:

- whole
- ones place
- tenths
- hundredths
- thousandths
- equal
- equivalent
- greater than
- less than
- decimal
- fraction

Anticipate Responses: See the Planning for Mathematical Discourse Chart (columns 1-3).

Task Implementation (Before) 10 – 15 minutes

Task Launch:

- The teacher will display a gas price billboard as a Notice and Wonder routine. The teacher will give students 1-2 minutes to jot down what they notice and wonder about the billboard.
- Some important ideas to listen for to support the context of problem are:
  - Use place value language (ones, tenths, hundredths)
  - Identifying equivalent fractions and decimals (possible response: .9 =9/10)
  - Discussion of value (Supreme Unleaded is a greater price than Regular Unleaded)
  - Connecting decimals to money
- Next, ask students to share all the details they noticed. Record and post students' ideas.
- Then ask students to share all the ideas they wondered about. Record and post students' ideas.
- The teacher will read the task aloud to students alongside the Learning Intentions and Success Criteria. Be sure to review expectations for collaborative work before dismissing into groups. Support materials and manipulatives should be accessible for student use.
- The teacher will ask questions to make sure the task is understood: "What are we trying to figure out?" "What do you already know that can help you get started?" Allow students to turn and talk.
- Post Word Wall cards and anchor charts related to fractions and decimals. This may assist students with vocabulary used in written and oral communication.

Task Implementation (During) 20 – 30 minutes

Directions for Supporting Implementation of the Task

- Monitor – The teacher will observe students as they work on task and ask assessing or advancing questions as necessary (see *Planning for Mathematical Discourse Chart*).
- Select – Teacher will decide which strategies will be highlighted (after student task implementation) that will advance mathematical ideas and support student learning.

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Task Implementation (During) 20 – 30 minutes

- Sequence – The teacher will decide the order in which student ideas will be highlighted (after student task implementation). One suggestion is to look for one common misconception and two correct responses using different strategies to share.
- Connect – The teacher will consider ways to facilitate connections between different student representations.
    - As teacher is monitoring, teacher will look strategies that are being used and record on *Planning for Mathematical Discourse Chart*.
    - The teacher should use questions to assess or advance student thinking.
    - Students should be encouraged to explore different strategies for solving and evaluate effectiveness.

Suggestions for Additional Student Support

May include, among others:

- Sentence frames for supporting student-to-student discourse:
    - My strategy was similar to _____'s strategy because _____.
    - I know that ____ is greater (or farther away) than _____ because_____.
    - I know that _____ (fraction) is equivalent to _____ (decimal) because_____.
    - First I am going to _____. Next I will _____. I will know I have represented the decimal/fraction distance because _____.
- Fraction bars, play money and/or Virtual manipulatives can be used to represent fractions and decimal distances.
- Word Wall cards and anchor charts can be posted to support vocabulary in written and verbal communication.

Task Implementation (After) *20 minutes*

Connecting Student Responses (From Anticipating Student Response Chart) and Closure of the Task:

- Based on the actual student responses, sequence and select particular students to present their mathematical work during class discussion. Some possible big mathematical ideas to highlight could include:
    - a common misconception;
    - trajectory of sophistication in student ideas (i.e. concrete to abstract)
    - different solutions with reasoning
    - different representation of same solution
- Connect student responses and connect the responses to the key mathematical ideas to bring closure to the task. Possible questions to connect student strategies:
    - How are these strategies alike? How are they different?
    - How do these connect to our Learning Intentions?
    - Why is this important?
- Consider ways to ensure that each student will have an equitable opportunity to share his/her thinking during task discussion, such as a gallery walk to allow feedback on all strategies.
- Close the lesson by returning to success criteria. Have students reflect on their progress related to the criteria.

Teacher Reflection About Student Learning:

- Teacher will use the *Planning for Mathematical Discourse Chart* (anticipated student solutions) to monitor which students are using specific strategies. This will include: possible misconceptions, learning trajectories and sophistication of student ideas, and multiple solution pathways. Next steps based on this information could include:
    - Informing sequence of tasks. What will come next in instruction to further student thinking in determining value and ordering of fractions and decimals?

Teacher Reflection About Student Learning:
○ Informing small groups based on misconceptions that are not addressed in sharing. • After task implementation, the teacher will use the Rich Mathematical Task Rubric criteria to assess where students are in their mathematical understanding and use of the process goals. This could be a focus on one category. Next steps based on this information could include: ○ Informing small groups based on where students are in engagement in the process goal(s).

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Planning for Mathematical Discourse

Mathematical Task: Taco Tuesday Content Standard(s): SOL4.3cd

Teacher Completes Prior to Task Implementation			**Teacher Completes During Task Implementation**	
Anticipated Student Response/Strategy *Provide examples of possible correct student responses along with examples of student errors/misconceptions*	**Assessing Questions** *Teacher questioning that allows student to explain and clarify thinking*	**Advancing Questions** *Teacher questioning that moves thinking forward*	**List of Students Providing Response** *Who? Which students used this strategy?*	**Discussion Order - sequencing student responses** ○ *Based on the actual student responses, sequence and select particular students to present their mathematical work during class discussion* ○ *Connect different students' responses and connect the responses to the key mathematical ideas* ○ *Consider ways to ensure that each student will have an equitable opportunity to share his/her thinking during task discussion*
Anticipated Student Response: **Common misconception* Student assumes that 2.05 mi. is greater than 2.5 mi. because it has more digits.	• I see that you have determined that 2.05 mi is greater than 2.5 mi. • What is the value of the 0 in 2.05 miles? What is the value of the 5 in 2.05 miles? How do you read 2.05? How does that sound different than how you would read 2.5? Why do you think that is?	• Can you create a place value chart for decimals? Does the chart help you see the value of 2.05 and 2.5? Why or why not? • Could you use money or decimal manipulatives to represent 2.05 and 2.5?	Student A	
Anticipated Student Response: Student is unable to start the problem.	• Tell me what you are thinking. • Create a decimal place value chart. • Can you use the place value chart to represent 1.501? • Consider 2.5 and 1.501. Which is greater? How do you know? • Can you represent those two decimals with a	• How can you use what you know about 1.501 to help you with 2.5? How are they alike/different?	Student B	

Teacher Completes Prior to Task Implementation			**Teacher Completes During Task Implementation**	
Anticipated Student Response/Strategy *Provide examples of possible correct student responses along with examples of student errors/misconceptions*	**Assessing Questions** *Teacher questioning that allows student to explain and clarify thinking*	**Advancing Questions** *Teacher questioning that moves thinking forward*	**List of Students Providing Response** *Who? Which students used this strategy?*	**Discussion Order - sequencing student responses** ○ *Based on the actual student responses, sequence and select particular students to present their mathematical work during class discussion* ○ *Connect different students' responses and connect the responses to the key mathematical ideas* ○ *Consider ways to ensure that each student will have an equitable opportunity to share his/her thinking during task discussion*
	picture/money/ decimal blocks?			
Anticipated Student Response: Student uses the columns of notebook paper to compare the decimals but doesn't understand the decimal equivalent for the fraction $1\frac{4}{10}$	• Tell me about your representation for $1\frac{4}{10}$ (if any). • Tell me what you know about $1\frac{4}{10}$. Can you tell me what it is greater than? Less than?	• How can you use fraction blocks to represent $1\frac{4}{10}$? • What does your representation show you? What decimal/s is it greater than? Less than?	Student C	
Anticipated Student Response: Student easily represents a set of decimals and fraction in one way (number line, place value chart, money, etc.) and appears to need a challenge.	• Tell me about your representation. • Is there another way you could represent these decimals and fraction in addition to (number line, money, place value chart)?	• Can you use determine some distances in decimals or fractions that would fall between Salsa Taco (2.05 mi.) and Nacho Taco (2.5mi.)?	Student D	

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NAME _____ DATE _____

Taco Tuesday

Tonight is Taco Tuesday at the restaurants listed below. Meals at each restaurant are half price. This is such a great deal that the Smith Family wants to go to two of the restaurants, eating dinner at one and dessert at another.

Listed below are the restaurants and their distance from the Smith Family home.

- Fiesta Taco (1.501 mi.)
- Nacho Taco (2.5 mi.)
- Taco Den ($1\frac{4}{10}$ mi.)
- Salsa Taco (2.05 mi.)

Which two restaurants do you think they should choose based on the distance from their home? Explain your thinking using pictures, numbers and words.

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Rich Mathematical Task Rubric

	Advanced	Proficient	Developing	Emerging
Mathematical Understanding	Proficient Plus: • Uses relationships among mathematical concepts or makes mathematical generalizations	• Demonstrates an understanding of concepts and skills associated with task • Applies mathematical concepts and skills which lead to a valid and correct solution	• Demonstrates a partial understanding of concepts and skills associated with task • Applies mathematical concepts and skills which lead to an incomplete or incorrect solution	• Demonstrates no understanding of concepts and skills associated with task • Applies limited mathematical concepts and skills in an attempt to find a solution or provides no solution
Problem Solving	Proficient Plus: • Problem solving strategy is well developed or efficient	• Problem solving strategy displays an understanding of the underlying mathematical concept • Produces a solution relevant to the problem and confirms the reasonableness of the solution	• Problem solving strategy displays a limited understanding of the underlying mathematical concept • Produces a solution relevant to the problem but does not confirm the reasonableness of the solution	• A problem solving strategy is not evident • Does not produce a solution that is relevant to the problem
Communication and Reasoning	Proficient Plus: • Reasoning or justification is comprehensive • Consistently uses precise mathematical language to communicate thinking	• Demonstrates reasoning and/or justifies solution steps • Supports arguments and claims with evidence • Uses mathematical language to communicate thinking	• Reasoning or justification of solution steps is limited or contains misconceptions • Provides limited or inconsistent evidence to support arguments and claims • Uses limited mathematical language to partially communicate thinking	• Provides no correct reasoning or justification • Does not provide evidence to support arguments and claims • Uses no mathematical language to communicate thinking
Representations and Connections	Proficient Plus: • Uses representations to analyze relationships and extend thinking • Uses mathematical connections to extend the solution to other mathematics or to deepen understanding	• Uses a representation or multiple representations, with accurate labels, to explore and model the problem • Makes a mathematical connection that is relevant to the context of the problem	• Uses an incomplete or limited representation to model the problem • Makes a partial mathematical connection or the connection is not relevant to the context of the problem	• Uses no representation or uses a representation that does not model the problem • Makes no mathematical connections