COASTMETRO

ELEMENTARY MATH PROJECT

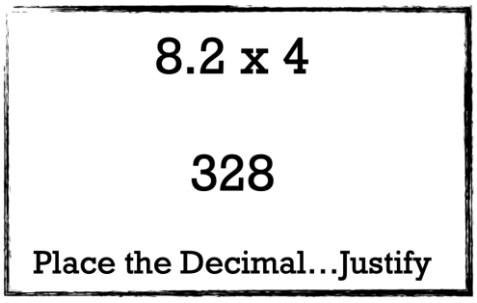
Grade 6

Key Number Concept 4: Fractions and Decimals

Sample Week at a Glance

Conceptual understanding of decimals requires students to connect decimals to whole numbers and fractions. Prior to this week, students engaged in tasks that had them reviewing how to read decimals as fractions and how to represent them using visuals (eg. shading parts of a 100^{th}-grid) to understand parts of a whole; reinforcing that decimals and fractions are different ways of representing the same value. These learning experiences particularly focused on students representing decimals concretely (using materials such as Base 10 Blocks), pictorially, and symbolically and making connections between these representations. Students reviewed and practiced various strategies for estimating the sum and difference of decimals as a means of using number sense to determine the reasonableness of an answer. Key vocabulary terms have been displaced on an anchor chart that will be circled back to this week: decimal point, place value, product, quotient, divisor, dividend, factor, etc.

Monday	To access students' prior knowledge of adding and subtracting decimals, try an instructional routine such as, *Would you Rather,* or invite students to participate in an open-ended task that encourages extended responses and could expect them to reason and justify. The following, *Would you Rather*, prompt allows students to demonstrate their competencies and knowledge of place value, decimals, properties of operations, equivalence (when using an identified time frame), etc.; while practicing flexible strategies.  While sharing ideas as a class, be sure to notice and name the relevant key ideas, while extending and elaborating using language and processes/strategies. Because decimals can be found in many places in our daily lives, creating an open-ended mathematical question based on student interest could also generate prior knowledge while acquiring and building background knowledge. Example of an open-ended question: Identify a personal hobby/interest/passion. List items that you use when engaged in that hobby/interest/passion. You have been given $350 to spend on items that will help you either improve your skills in your hobby/interest/passion or provide more opportunity for you to participate in it. Use as much money as possible to purchase specific goods/services. Provide proof of cost (pictures of items online with their associated cost). Let's say that taxes are included in the cost of the goods/services. You must buy doubles/multiples of at least one item. Show your thinking in pictorial and symbolic form. Justify your purchase decisions.

Tuesday	Estimating the Product of a Decimal and a Whole Number Estimating is an important competency for students when working with decimals to be able to judge and determine the reasonableness of their solutions. John Van de Walle suggests that instruction on computation with decimals must start with estimating. If students can accurately estimate products and quotients, they are more likely to correctly place the decimal point when determining products and quotients in a variety of ways or refine solutions after recalculating. State, “The digits in the product of the two numbers are shown below in the multiplication question. Without multiplying, decide where the decimal point should go.”  This activity can be implemented like a Number Talk. Ask the students to share what they think the answer is and record the range of responses. In sharing their strategies, students may then share their “proof” or justification of a solution by saying, “I think it is ____ because _____.” During class discussion, extend and elaborate thinking by reinforcing that we can ignore the decimals at first. Find the product of the two factors without the decimals, and then estimate where the decimal point should go. You might show all the possible places the decimal could go and then narrow down for reasonableness. 82 x4 328 To estimate, find the product of the whole numbers and determine where the decimal point should go based on reasoning. Since the product of 8 and 4 is 32, the product of 8.2x4 should be close to 32, as well. 8x4=32

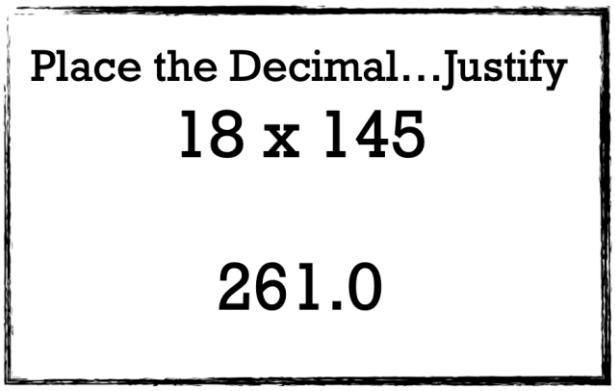
So, 8.2 x 4= 32.8

Note other strategies students used and compare to the strategy above. Some of the strategies that may be demonstrated: front-end estimating, using decimal benchmarks, or compatible numbers. Try to notice and name them during the discussion. Why do they work, or not work? What are other things we should consider when estimating products?

Extension: Is our estimate of 32 an overestimate, or underestimate? How do you know? Why is it important to know if an estimate is an over/underestimate?

Applying what we know:

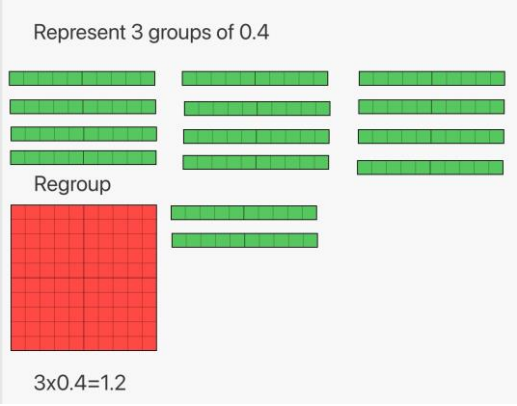
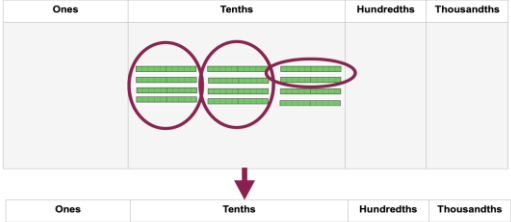
1. How would you estimate 6.23 x 5? Is your estimate and overestimate, or an underestimate? How do you know?
2.

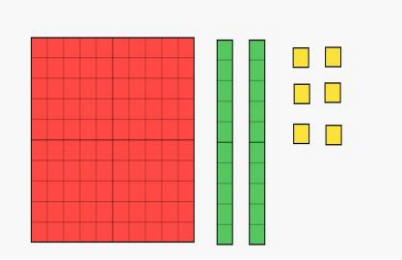


Here, students are placing the decimal in the factors, rather than in the product. It is possible to have more than one correct response. Ask students what solutions they came up with and record their responses. 1.8x145 and 18x14.5, both satisfy the solution. Ensure various strategies have been discussed.

Closing Discussion:

Why might it be helpful for us to estimate the answer to a math question before using a strategy to find the exact answer? Where could you use estimation of products in daily life?

Wednesday	Determining the Product of a Decimal and a Whole Number Marian Small's *Open Question* with an extension: Choose a two-digit number that does not end in zero. Explain how you would use mental math to multiply it by 6. Then, show in as many visual ways as you can how to check your answer. Have students share their strategies and thinking. Pay particular attention to naming them and identifying the specific steps in each. Additionally, add or reinforce the language that is to be practiced. Students may demonstrate understanding of combining numbers, repeated addition, standard algorithm, and other ways to multiply whole numbers. Students may use number lines, an array, base-ten blocks, 10^{th}/100^{th} grids, etc. to represent their thinking visually. This discussion is also an opportunity to reinforce and elaborate key concepts that can be built on when multiplying decimals by whole numbers. Extend Thinking: How can the strategies we used to multiply the whole numbers in the previous activity help us to multiply 3 x 0.4? Record student thinking and focus on importance of practicing multiple strategies to determine solutions and to determine connections between the concrete, pictorial and symbolic representations. Possible strategies and representations: Using Base-Ten Blocks  Using a Place Value Mat and Base-Ten Blocks 

Thursday	Estimating the Quotient of a Decimal and a Whole Number, Determining the Quotient of a Decimal and a Whole Number Show in as many ways as you can how to divide 126 by 3. You can use pictures, symbols, and materials. Have students share their strategies and thinking. Pay particular attention to naming them and identifying the specific steps in each. Additionally, add or reinforce the language that is to be practiced, specifically for the parts of the question (dividend, divisor, quotient). Students may demonstrate understanding of decomposing, repeated subtraction, standard algorithm, and other ways to divide decimals by whole numbers. Students may use number lines, base-ten blocks, 10^{th}/100^{th} grids, area models, etc. to represent their thinking visually. This discussion is also an opportunity to reinforce and elaborate key concepts that can be built on when dividing decimals by whole numbers. Students may demonstrate their understanding of the relationship between multiplication and division (multiplication is the inverse operation of division) to show their thinking. Extend Thinking: How can the strategies we used to divide the whole numbers in the previous activity help us to divide 1.26 by 3? Record student thinking and focus on importance of practicing multiple strategies to determine solutions and to determine connections between the concrete, pictorial and symbolic representations. Possible strategies and representations: Using Base-Ten Blocks How might we share 1.26 equally into three groups?  Start by representing 1.26 with base-ten blocks Notice that it will be difficult to split the red block up into physical parts, so what can we do? Represent the whole as 10 tenths!

Friday	Decimals in the Real World To make meaningful connections to decimals in context, invite students to participate in an open-ended task, like a numeracy task. This one, created by Peter Liljedahl, provides many entry points into the problem and allows for various solutions, while requiring justification.

THE CLASS PET

Your class wants a class pet. Look at the details of those available and design a budget for each pet. Remember you must take care of all their needs and some of their wants (extras) so that the pet will be healthy and happy. Based on your work, the PAC will decide how much money they will give your class. Show all the work you've done to make your decision. Then answer the question, " Which pet do you think the PAC will agree to give you the money for?" and explain why.

	Hamster  **$ 11.95**	**Beta Fish**  **$5.00**	Hermit Crab  **$ 7.49** (includes the shell it wears only)
Needs:			
	Food: $4.50/ pkg (Your class will need 6 packages each year)	Food: $2.00 / container (Your class will need 5 containers a year)	Food: $ 5.00 / box (Your class must will need 10 packages)
	Basic Cage: $20.00	Aquarium: $25.00	Habitat $ 11.99
	Bedding: $9.00/ bag (Your class will need 3 bags each year)	Water Treatment: $5.00/ bottle (You will need 2 bottles)	Shells Stage 1: $3.00/1 Stage 2: $ 5.99/ 2 Stage 3: $ $7.00/ 1
		Living Plants: $10	Deodorant $ 10.00
		Pebbles: $3.00	Spray bottle: $2.00
Extras:			
	Exercise ball:$9.95	Plastic Plants: $3.50	Toys: $10.00
	Treats $ 6.50		Shells: (refer to above costs)
	Vitamins $4.50	Posts: $5.00	
	Deluxe Cage: $39.50	Castle: $10.00	
	Deluxe Chlorophyll Bedding: $1.00 extra/ bag	Pirate Ship: $17.50	
	Chew toys (for teeth) $6.00	Coloured Pebbles: $5.00	
	Hideaway: $6.50	Large Rocks: $0.50, $1.50, $4.00	
Important Info:			
	It is not possible to have two hamsters in one cage, they will fight each other.	It is not possible to have two beta fish in one cage, they will fight each other.	The hermit crab will need at least 2 shells at all stages of its growth. It grows in three stages.

liljedahl, P. (2010) *Hamster beta fish - peter liljedahl*, *Numeracy Tasks*. liljedahl. Available at: https://peterliljedahl.com/wp-content/uploads/NT-The-Class-Pet.pdf (Accessed: March 3, 2023).

Students can use a variety of strategies to represent thinking. To ensure there is some pictorial representation, suggest that students use either number lines, base-ten blocks, 100^{th}/10^{th} grids, etc. to show some of their thinking. Students would benefit from a supporting graphic organizer, place value mats, etc.

	Alternatively, create a plan and design project for a school context; such as a school garden, a beach/park clean-up, etc. that requires students to estimate, measure, use multiplication and division of decimals by a whole number.

This week is about applying various strategies to multiply and divide decimals. After this week and throughout the year, students should have regular practice using what they have learned when working with money in Financial Literacy and when working with shapes and measurement.
Additionally, it is recommended that further exploration of the connection between fractions and decimals be explored where students may move flexibly and fluidly between them when using various strategies to perform operations with decimals.