MathLinks

GRADE 7 TASKS
Number Sense

EXPLORING REPEATING DECIMALS

Number sense – repeating decimals

I. Explore elevenths.

1. Use long division to find the decimal representations for $\frac{1}{11}$, $\frac{2}{11}$, and $\frac{3}{11}$.
   Hint: divide out to more than 4 places in the quotients.

2. Based on your work in problem 1, predict the decimal expansions for $\frac{4}{11}$, $\frac{5}{11}$, $\frac{6}{11}$, … $\frac{9}{11}$.

3. Explain how your work in problem 1 lead to your predictions in problem 2.

4. Use a calculator to check your predictions.

II. Explore sevenths.

5. Use long division to find the decimal representations for $\frac{1}{7}$, $\frac{2}{7}$, $\frac{3}{7}$ and $\frac{4}{7}$.
   Hint: divide out to more than 6 places in the quotients.

6. Based on your work in problem 5, predict the decimal representations for $\frac{5}{7}$ and $\frac{6}{7}$.

7. Explain how your work in problem 5 led to your predictions in problem 6.

8. Use a calculator to check your predictions.

9. Explain why these fractions for sevenths can have NO MORE THAN 6 digits in their decimal representations.

III. Explore twelfths.

10. Use long division to find the decimal representations for $\frac{1}{12}$, $\frac{2}{12}$, $\frac{3}{12}$, and $\frac{4}{12}$. Hint: divide until you are reasonably certain about the decimal patterns.

11. Without finding the decimal representations of the fractions $\frac{5}{12}$, $\frac{6}{12}$, $\frac{7}{12}$, … $\frac{11}{12}$, predict which will repeat in nonzero digits and which repeat in zeros (terminate). Support each prediction with something you learned by doing the work in problem 10.

THE CONSTRUCTION PROJECT

Number sense – distance and absolute value

David and Georgia are working on a construction project. They are digging a hole to reach a broken pipe that is 20 feet below ground level. (For this location, ground level has an elevation of 0 relative to sea level.)

David is standing at the bottom of a hole that he has dug and is filling a bucket with dirt. The bottom of the hole is 5 feet below the surface of the earth.

Georgia is standing on a platform 15 feet above the surface of the earth, and is using a pulley system to pull up the buckets that David is filling.

1. Draw a picture to represent this scenario.

2. Determine if the following statements are true or false. Support your answers with words and at least one relevant mathematical statement (equations or inequalities).

   a. The distance from Georgia to David is greater than the distance from the surface of the earth to the broken pipe.

   b. The distance from Georgia to the surface of the earth is the same as the distance from David to the broken pipe.

   c. After David digs down 5 more feet, he will be the same distance below the surface of the earth as Georgia is above the surface of the earth.

   d. After David digs down 5 more feet, he will be equidistant from the broken pipe and the surface of the earth.

3. Write one more statement about David's and Georgia's project to challenge classmates to determine whether it is true or false.

DIVISION AND THE COUNTER MODEL

Integer division with visuals

We used the counter model to explain the meaning of integer addition, subtraction, and multiplication, and to establish rules for these operations. This task challenges you to explore how the counter model illustrates division of integers.

1. Use the concept of grouping and the counter model to investigate the four cases for integer division. Some are done for you.

	Numbers	Grouping Concept	Use Counter Model	Can the case be modeled with counters?
Case 1	6 ÷ 2 = 3	a. Divide 6 into 2 equal groups	+ + + + + +	YES
		b. Divide 6 into groups of 2 (2 positives)	+ + + + + +	
Case 2	-6 ÷ 2 = -3	c. Divide -6 into 2 equal groups	– – – – – –	
		d. Divide -6 into groups of 2 (2 positives)	– – – – – –	NO
Case 3	-6 ÷ (-2) = 3	e. Divide -6 into -2 equal groups	– – – – – –	
		f. Divide -6 into groups of -2 (2 negatives)	– – – – – –	YES
Case 4	6 ÷ (-2) = -3	g. Divide 6 into -2 equal groups	+ + + + + +	
		h. Divide 6 into groups of -2 (2 negatives)	+ + + + + +	

2. Both parts of case _____ above cannot be performed using the counter model in the grouping context described above. Therefore, which integer division rule **cannot** be established using the counter model?

_____ ÷ _____ = _____

3. Is the integer division rule (+) ÷ (–) = (–) still true? _____

GEOMETRIC DESIGNS

Measurement; area; fractions; percent

This task requires you to use some rational number, measurement, and geometry concepts you've learned in the past. Choose the appropriate tools that you will need to effectively complete this problem.

1. Use a blank $8\frac{1}{2}$ inch $\times$ 11 inch piece of paper.

   a. Create four non-overlapping sections so that

      - A rectangle is 25% of the area of the paper,
      - A different rectangle is $\frac{3}{8}$ of the area of the paper,
      - A triangle is $\frac{1}{8}$ of the area of the paper, and
      - The last section includes the remainder of the area of the paper.

   b. Within each section, clearly label the relevant dimensions. Choose measurement tools appropriately.

   c. Compute each area to prove that your four sections were constructed correctly.

2. Use a different blank piece of paper (any size of your choice).

   a. Create another design that includes at least four different non-rectangular sections.

   b. Within each section, clearly label the relevant dimensions.

   c. Compute each area to prove that your sections total the area of the entire sheet of paper.

   d. Describe the sections using fractions, decimals, or percents.

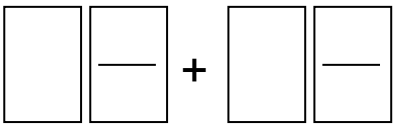
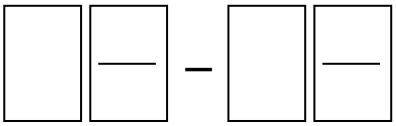
Lightly color the sections on your papers to create mosaics if desired.

TARGET PRACTICE

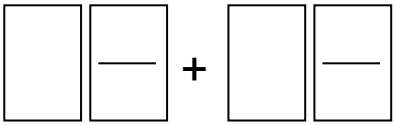
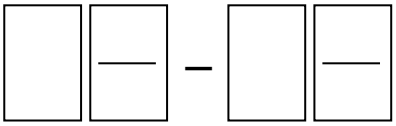
fractions

For each problem, find a sum or difference that meets the criteria. You may use the natural numbers 1-9 **no more than once each** for each problem in the spaces provided.

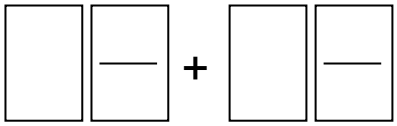
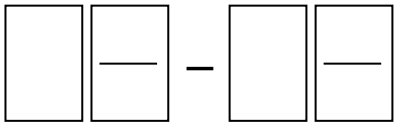
Make the greatest value you can.

1.	2.
	

Make the least value you can.

3.	4.
	

Make the value as close to zero as you can.

5.	6.
	

7. Choose three different expressions above. Explain why your expressions fit the descriptions better than other possible expressions.

CREATE A GAME, PUZZLE, OR ACTIVITY

Fraction, decimal, percent

Design a game, puzzle, or activity with the mathematical goal of practicing rational number operations. Include fraction, decimal, and percent practice if you can.

1. Give your game, puzzle, or activity a name.

2. List parts that are needed (game board, cards, dice, game pieces, etc.).

3. Clearly describe the rules in writing.

4. Have at least one other person read the rules. Then discuss the rules. Revise anything that does not seem clear.

5. Create the game, puzzle, or activity.

6. Play your game (or do your puzzle or activity) with one other person or a group of people.

FITNESS PLAN FOR ZYG AND ZOE

Fractions, money, estimation, modeling real life situations

Zyg and Zoe are trying a new fitness routine that requires strict dietary guidelines. Their daily breakfast includes a protein shake that comes in a large can. Zyg and Zoe each plan to drink different amounts of shake.

- Zyg will drink $\frac{3}{4}$ of a can of each day.

- Zoe will drink $\frac{1}{2}$ of a can each day.

- Protein shakes cost $5.00 for three cans.

- Protein shakes are sold in 3-can packs.

- If not consumed within two days, an open can of shake goes bad and must be thrown away.

1. If Zyg and Zoe can commit to a full 90-day program, how much does it cost for a 90-day supply of shakes for the both of them? Show all your work.

2. Zyg and Zoe decide that their schedules do not permit them to follow this routine for 90 consecutive days. They decide to try it only for the months of February, April, and July. Find the cost of protein shakes for both of them for each of these months. This year February has 29 days. Show all work.

3. What do you notice about your answers?