Foundations of Algebra

Week # 1

Quiz 1

FOUNDATIONS OF ALGEBRA

1. Sketch a diagram to show that this equation is true.

$3 \cdot 4 = 4 \cdot 3$

2. Rewrite this expression using appropriate conventions.

$(a + a + a + a) \div 5$

3. Find the value of the expression $3x$ for the following values of x:

a. $x = 5$

b. $x = 10$

4. Consider this statement: $a + 1$ is odd.

Is this statement *always true, sometimes true,* or *never true*?

Justify your answer with definitions, number properties, and/or diagrams.

Quiz 2

FOUNDATIONS OF ALGEBRA

1. Identify the number property that justifies each equation.

   a. $(10a)58 = 58(10a)$

   b. $58(10a) = (58 \cdot 10)a$

   c. $x + 10 = 10 + x$

   d. $14 + (10 + x) = (14 + 10) + x$

   e. $23(n + 2) = 23n + 46$

2. Using only numbers, and not variables, write your own equation that illustrates the Distributive Property.

Your equation should show that you are "distributing" multiplication over addition instead of adding what is inside the parentheses first.

FOUNDATIONS OF ALGEBRA

Quiz 3

FOUNDATIONS OF ALGEBRA

Dwayne is going to make tomato sauce. He is at the store shopping for tomatoes.

The price of one can of tomatoes is $0.50. He wants to know how much he will spend on tomatoes, but he is not sure how many cans he will buy.

The two quantities that vary in relation to each other in this situation are:

- The number of cans n of tomatoes Dwayne buys.

- The total cost c of the cans of tomatoes.

1. Sketch a diagram that shows the relationship between the quantities in this situation. Label your diagram with the variables assigned above.

2. Make a table that shows the cost for 1 can, 2 cans, 3 cans, and 10 cans of tomatoes. Label the first column of your table with the variables assigned above, and be sure that it is clear in your table which values go together.

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Quiz 3 continued

3. Use the pairs of values in your table from Problem 2 to graph four points that represent the relationship between the quantities in this situation.
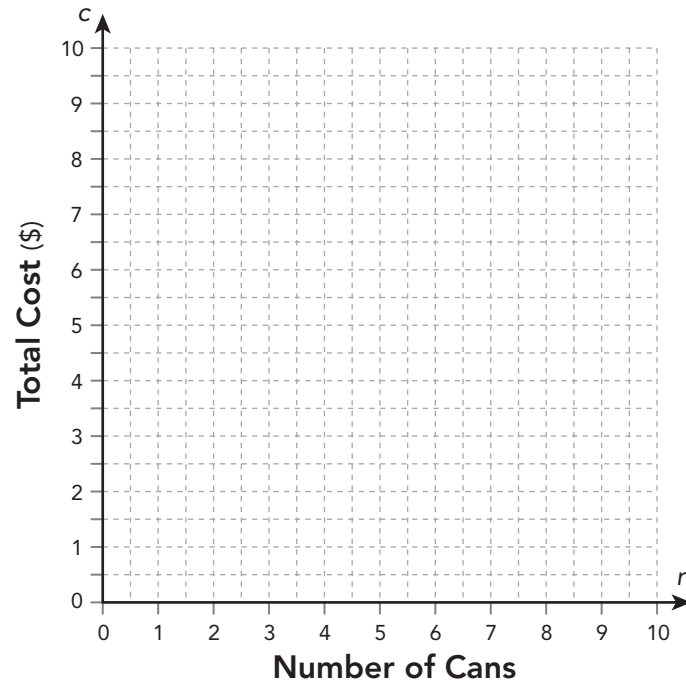
4. Graph one more point that represents a possible pair of values for the quantities in this situation.

5. It would not make sense for either of the quantities in this situation to have values that are negative numbers. Say how this is shown on the graph.

6. It makes sense for one of the quantities in this situation to have some values that are not whole numbers.

    a. Which quantity has some values that are not whole numbers?

    b. Which quantity has only whole-number values?

    c. Say how your answers for parts (a) and (b) are shown on the graph.

FOUNDATIONS OF ALGEBRA

End-of-Unit Assessment

FOUNDATIONS OF ALGEBRA

SHORT ANSWER

1. Use conventions to translate each of the following verbal descriptions into mathematical expressions.

    a. the quantity *a* plus three, divided by six

    b. *a* divided by six, plus three

    c. six multiplied by the quantity *a* plus three

2. Find the value of the following expressions when $n = 4$.

    a. $n + 2$ **b.** $\frac{n}{2}$ **c.** $2n$ **d.** $2n + 2$ **e.** $2(n + 1)$

3. Two of the expressions in Problem 2 have the same value when $n = 4$.

    a. Which two are they?

    b. Write an equation which states that these two expressions are equal.

    c. Find the value of these two expressions when $n = 5$.

    d. Find the value of these two expressions when $n = 10$.

    e. The equation you wrote in part (b) states that these two expressions will have the same value for any value of *n*. Which number property justifies this statement?

    f. Illustrate the equation you wrote in part (b) using area models.

End-of-Unit Assessment continued

4. For each equation, write the name of the number property that justifies it.

   a. $n + 0 = n$

   b. $x \cdot \frac{1}{x} = 1$

   c. $5(a + b) = 5a + 5b$

   d. $3 \cdot x \cdot 12 = 3 \cdot 12 \cdot x$

   e. $(a + 5) + 10 = a + (5 + 10)$

5. Rosa is making a picture frame. She knows the height will be 6 inches, but has not decided on the base length b. She needs to know the area A within frames with different bases.

> ## Example
>
> If the base is 4 inches, the area within the frame will be 24 square inches.
>
> If the base is 5 inches, the area within the frame will be 30 square inches.
>
> If the base is 6 inches, the area within the frame will be 36 square inches.

   a. Sketch a diagram to represent this situation.

   b. How many square inches does the area within the frame increase with each inch added to the base?

FOUNDATIONS OF ALGEBRA

End-of-Unit Assessment continued _____

    c. Identify the two quantities that vary in relation to each other in this situation, and assign variables to these quantities.

    d. Make a table that includes four possible pairs of values. Be sure that your first column has the variables you assigned to each quantity, and that you clearly show which values in your table correspond to each other.

    e. Would values that are not whole make sense in this situation for either quantity?

    f. Would negative values for either quantity make sense in this situation?

    g. Write a formula to represent the relationship between the quantities in this situation, using the given values and the variables you assigned.

End-of-Unit Assessment continued _____

h. Complete the graph below to represent the relationship between the quantities in this situation. Be sure that you label the axes and that your graph reflects your answers to parts (e) and (f).
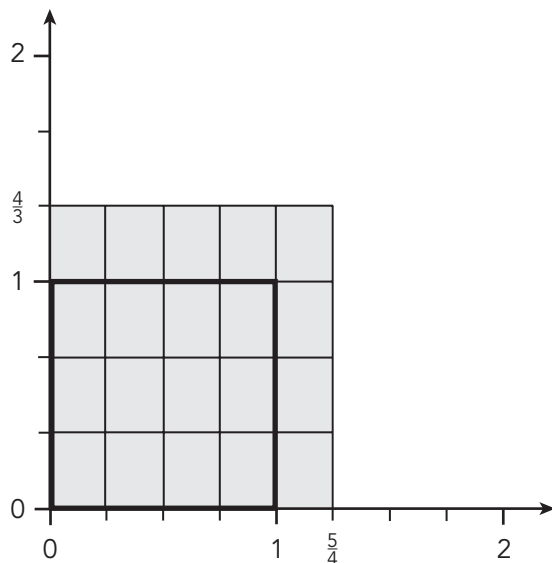
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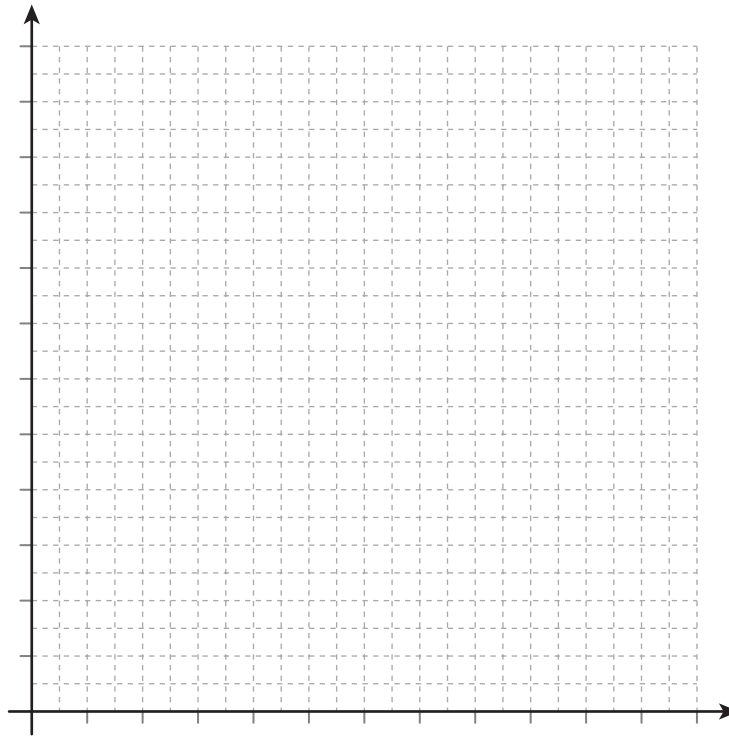
Quiz 1

OPERATIONS WITH FRACTIONS

1. Write both the addition sentence and the multiplication sentence that are represented by this diagram.
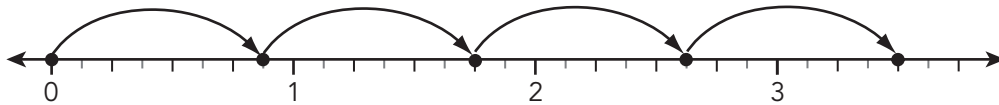
2. Write the two multiplication sentences that are represented by this diagram.

Quiz 1 continued

3. Calculate $\frac{3}{4} + \frac{5}{4}$. Write your answer in simplest form.

4. Calculate $\frac{1}{15} + \frac{1}{51}$ by finding a common denominator. Write your answer in simplest form.

5. Write $\frac{a}{b} + \frac{c}{d}$ as a single fraction.

6. Calculate $2\frac{1}{2} \cdot 3\frac{1}{4}$.

OPERATIONS WITH FRACTIONS

Quiz 2

OPERATIONS WITH FRACTIONS

Calculate. Write your answers in simplest form.

1. $\frac{2}{3} - \frac{1}{6}$

2. $\frac{10}{11} - \frac{5}{18}$

3. $\frac{3}{8} \div \frac{5}{6}$

4. $\frac{3}{8} \div \frac{6}{5}$

5. $\frac{5}{6} \div \frac{3}{8} \cdot \frac{0}{2}$

6. $\frac{5}{3} \cdot \frac{1}{2} \div \frac{5}{2}$

7. $1\frac{1}{2} + \frac{3}{4} - 1\frac{1}{3}$

OPERATIONS WITH FRACTIONS

End-of-Unit Assessment

OPERATIONS WITH FRACTIONS

SHORT ANSWER

1. Calculate. Write your answers in simplest form.

a. $\frac{5}{8} + 6$

b. $6 - \frac{5}{8}$

c. $2 \cdot \frac{3}{8}$

d. $\frac{36}{8} \div 9$

2. Calculate. Write your answers in simplest form.

a. $\frac{3}{4} + \frac{1}{6}$

b. $\frac{3}{4} - \frac{1}{6}$

c. $\frac{3}{4} \cdot \frac{1}{6}$

d. $\frac{3}{4} \div \frac{1}{6}$

End-of-Unit Assessment continued

3. a. Sketch a diagram that represents the calculation $\frac{5}{3} \cdot \frac{7}{4}$.

b. Explain how the numerator and the denominator of your answer are represented on the diagram you sketched.

4. Does each pair of expressions below have the same value? Say why.

a. $\left(\frac{2}{5} - \frac{1}{3}\right) - \frac{5}{6}$ and $\frac{2}{5} - \left(\frac{1}{3} - \frac{5}{6}\right)$

b. $\frac{5}{6} \cdot \left(\frac{1}{3} + \frac{2}{5}\right)$ and $\frac{5}{6} \cdot \frac{1}{3} + \frac{5}{6} \cdot \frac{2}{5}$

c. $\frac{3}{4} \cdot \frac{4}{5}$ and $\frac{3}{4} \div \frac{5}{4}$

d. $\frac{4}{5} \div \frac{3}{4}$ and $\frac{3}{4} \div \frac{4}{5}$

5. Mark and label these numbers on the number line given below.

$$\frac{3}{2} \quad \frac{3}{4} \quad \frac{3}{6} \quad \frac{3}{8} \quad \frac{3}{10}$$