MATH 5e: Class Work 6

Topics: Fractions and decimals. More word problems

- Arithmetic rules involving the division of fractions

Write the divisions of $a \div b$ in fraction form as $\frac{a}{b}$. Then the rules are:

Multiplication $\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$ Division $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$

Addition/subtraction: $\frac{a+b}{c} = \frac{a}{c} + \frac{b}{c}$ $\frac{a-b}{c} = \frac{a}{c} - \frac{b}{c}$

Reciprocal of a number a, $r(a)$, is a number that, when multiplied by a gives 1.

$$a \times r(a) = 1$$

- Solving equations using rules with fractions

Example: multiply by the reciprocal on both sides

$$\frac{5}{7}x = 15$$

$$x = 15 \times \frac{7}{5} = \frac{15 \times 7}{5} = 21$$

- Quantities denoted with fractions

Rate: In math and science, a rate is a quantity or amount measured in relation to another quantity or amount. It is usually presented as a fraction. Rates are used in many everyday situations, such as calculating how fast someone is driving or the interest rate on a savings account.

Example: 60 mi/1h - speed is a rate of distance and time

3 hours to deliver 180 newspapers – rate is 180newspapares/3h

Unit rate: is a rate with a denominator of one.

Example: 60 notebooks cost $30 - the unit rate is $0.50/per notebook

Ratio: a ratio is the quotient of two quantities of the same type, such as volume and volume.

Example: the bottle is ¾ full - ratio of the volume of the bottle to the volume of the water

P r o b l e m s

1. A messenger was sent from one city to another that is many kilometers away. He can travel 40 km in one day. Another messenger was set a day after. He can travel 45 kilometers in one day. After how many days will the second messenger overtake the first one. Hint: create an equation where the unknown is the number of days.

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2. Operations with decimals (review)

   a) Receipt: item price Find the total
   Crisps 0.02
   Orange 1.52
   Milk 0.88

   b) 17.142 + 51.505
   c) 0.86 + 7.2

3. Convert fractions to decimals by making the denominator 10, 100, 1000 ….

   Example: $\frac{3}{2} = \frac{3}{2} \times \frac{5}{5} = \frac{3 \cdot 5}{2 \cdot 5} = \frac{15}{10} = 1.5$

   a) What part of the dollar is 25c?

   b) $\frac{14}{35} =$

   c) $\frac{2}{5} =$

   d) 75% =

   e) How much is 30% of 200?

4. Find the reciprocal of the following numbers: $r(3)$; $r\left(\frac{1}{8}\right)$; $r\,(0.02)$

5. Solve the equations by multiplying by the reciprocal fraction.

   a) $\frac{2}{11}x = \frac{11}{2}$ b) $\frac{3}{5}x = \frac{11}{55}$ c) $\frac{3}{2}(x+1) = 6 - x$

6. Word problems with fractions (rate problems)

   A. A hot water tap fills the bath in 5 minutes. The cold water tap fills the bath in 3 minutes. With both taps open, how long will it take to fill the bath?

   B. A painter can paint a house in 12 hours, while his coworker can paint the same house in 8 hours. If they work together, how long will it take them to paint the house?

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7. Create equations to solve the following word problems.

   A. The books on mathematics are 4 times more expensive than the books on English. Mary can buy 3 books on mathematics and have 4 dollars left, or 10 books on English and have 10 dollars left. What is the price of the book on Mathematics? And on English?

   B. The watermelon is three times as expensive as the honeydew. John can buy 2 watermelons and have 7 dollars left or 4 honeydews and have 13 dollars left. How much does the honeydew cost? And how much is the watermelon?

8. If time: simplify the expressions

   a) $\frac{2}{3}x + \frac{4}{3}(1 + x) =$

   b) $2.5x - 1.5(4 - x) =$

   c) $2\left(x - \frac{2}{3}\right) - \left(x + \frac{1}{2}\right) =$