Math 5e, Fall 2025 Homework 6

Homework #6 is due November 2

Instructions: Some problems are from class; others are new. Please try to solve all problems, do your best, and show your work. Write on separate sheets of paper, not between the lines of this handout!

1. Find the reciprocal (inverse) element for the following numbers. Remember that *r(a)* is defined such that: $a \cdot r(a) = 1$, for example $r\left(\frac{2}{9}\right) = \frac{9}{2}$.

   (a) $r\left(\frac{13}{7}\right)$ (b) $r\left(\frac{1}{7}\right)$ (c) $r(3)$(d) $r\left(1\frac{6}{7}\right)$

   (e) $r\left(3\frac{1}{5}\right)$ (f) $r(0.1)$ (g) $r(1.1)$ (g) $r\left(\frac{a}{b}\right)$

2. Simplify the expressions. Use the distributive property to open brackets and the commutative law for multiplication (*ab* = *ba*) to recognize similar terms:

   (a) $3a(b + ac) - c(3a^2 - 2) + 2ab =$
   (b) $2a(2a + 3) + 3(2a + 3) =$

3. Captain John, a pirate, can drink a barrel of rum in 14 days. If he drinks the barrel together with Pirate Bill, they will finish the barrel in 10 days. How long would it take Bill to drink the barrel of rum alone?

4. A truck can cover the distance between two cities in 10 hours. A fast car, which goes 10 miles per hour faster than the truck, can cover the same distance in 8 hours. What is the distance between the two cities? *[Hint: if the speed of the truck is x mph, then the distance is equal to 10x miles. On the other hand, ...]*

5. Susan comes to the store to buy oil and vinegar for the salad dressing for a huge party. A bottle of oil is four times as expensive as a bottle of vinegar. If Susan buys 2 bottles of oil and 3 bottles of vinegar, she will have $ 8 left. If she buys 4 bottles of oil and 2 bottles of vinegar, she will need 6 extra dollars. How much money will she have left if she buys 1 bottle of oil and 1 bottle of vinegar?

6. Yesterday, Peter came to the store, gave the cashier 11 dollars for 3 pounds of grapes, and received some change. Today, Peter went to the same store again, gave the cashier $ 15 for 5 pounds of grapes, and received change. How much does a pound of grapes cost if the change he received yesterday and today is the same?

7. If Alice comes to the store with 27 dollars and buys 4 jumping ropes, she will have the same amount of money left as if she comes to the store with 42 dollars and buys 7 jumping ropes. What is the price of the jumping rope?

8. Simplify the expressions (last problem in our Classwork)

a) $\frac{2}{3}x + \frac{4}{3}(1 + x) =$ b) $2.5x - 1.5(4 - x) =$ c) $2\left(x - \frac{2}{3}\right) - \left(x + \frac{1}{2}\right) =$

9. (Optional) Solve the following puzzle (different letters stand for different digits):

   THIS
   + IS
   EASY