

**Directions:** You can use a calculator but show all work to earn full credit (no cell phones, please). Good luck!

1. (12 points) Consider the following scenario: *Mateo rewards himself with three bite-sized candies every time he gets a hit in baseball.* Which concept—ratio, proportion, rate, or percent—is best captured in the following statements? Use each concept only once. In the space provided below each statement, give a reason to support your answer (as appropriate).

proportion If Mateo eats 3 candies per hit, how many candies will he eat if he gets 4 hits?  
equivalent ratios; setting one ratio equal to another

ratio For every hit, Mateo eats 3 candies.  
comparing two numbers from different sets

rate Mateo eats 3 candies per hit.  
a ratio involving two different units

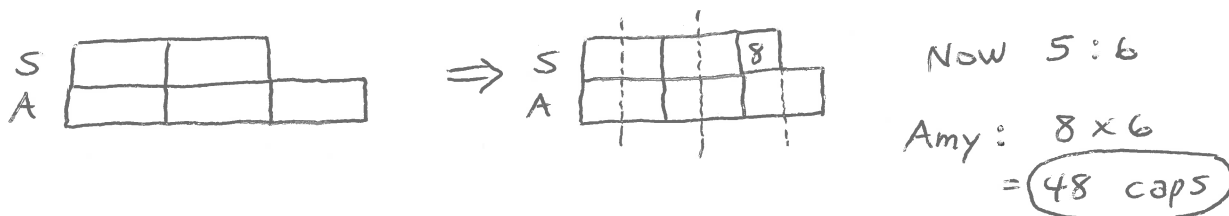
percent Of 9 pieces of candy, what part of the candy will Mateo have eaten after one hit?  
comparing part of the candy w/ the whole (9 pieces) — can be interpreted as percent

2. (8 points) Explain the (probable) source of error in the mathematical statement  $0.45 + 0.3 = 0.48$ . Then correct the reasoning so that it is mathematically valid.

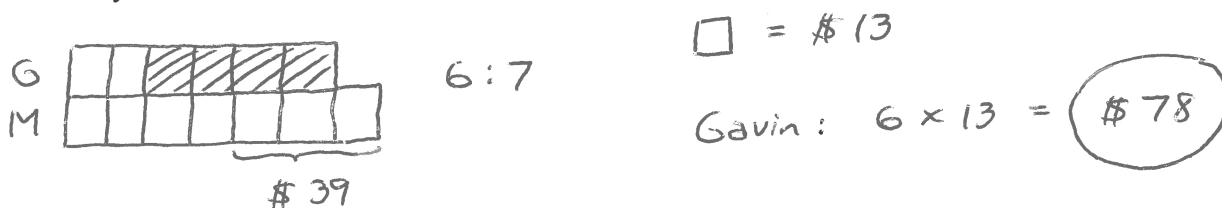
The person is probably using whole number reasoning strategies ( $45 + 3 = 48$ ). S/he missed the importance of place value. We can see four tenths and three tenths so the answer is at least seven tenths (so not 0.48 because this has only four tenths).  $0.45 + 0.3 = 0.75$ .

3. Use a tape diagram to solve the problems below. For full credit, it should be evident how the answer to the problem can be obtained from the tape diagram.

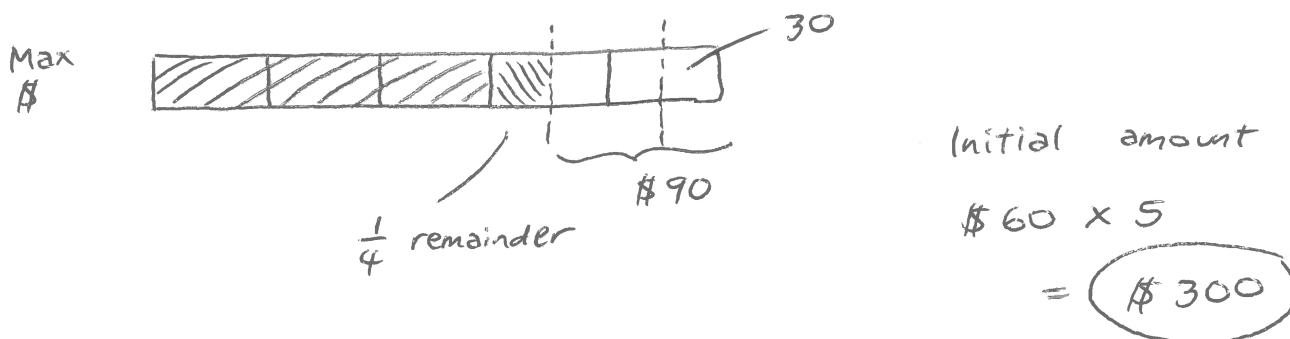
(a) (8 points) Sana and Amy collect bottle caps. The ratio of the number of bottle caps Sana has to the number Amy has is 2:3. The ratio became 5:6 when Sana added 8 more bottle caps to her collection. How many bottle caps does Amy have?



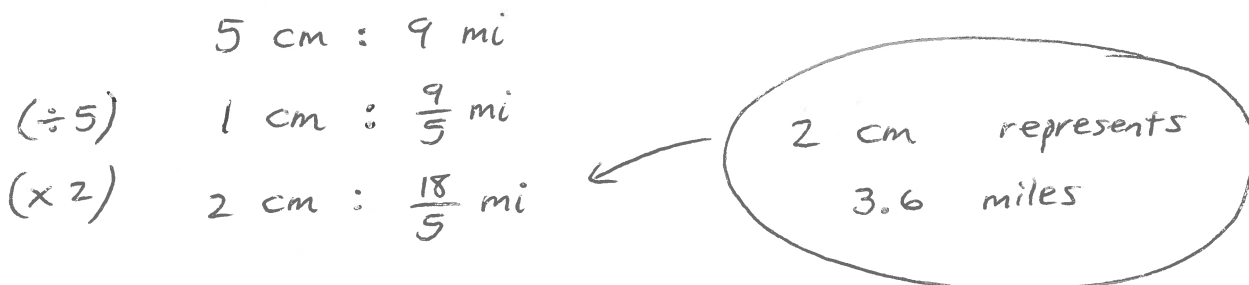
(b) (8 points) The ratio of Gavin's money to Manuel's was 6:7. After Gavin spent two-thirds of his money and Manuel spent \$39, Manuel had twice as much money as Gavin. How much money did Gavin have at first?



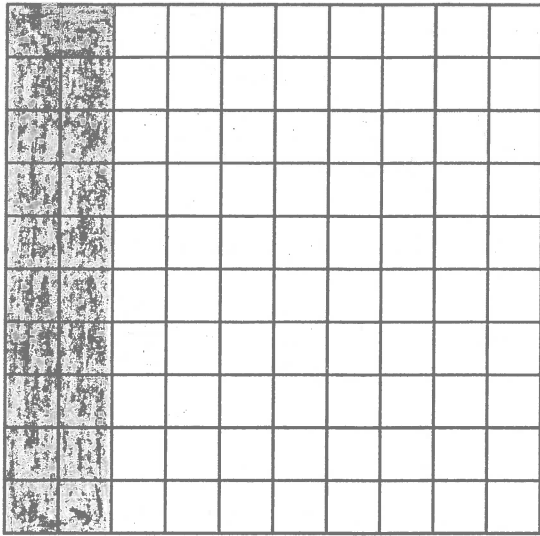
(c) (8 points) Max spent  $\frac{3}{5}$  of his money in a shop and  $\frac{1}{4}$  of the remainder in another shop. If he had \$90 left, how much did he have initially?



4. (10 points) On a certain map, the scale indicates that 5 centimeters represents an actual distance of 9 miles. Suppose the distance between two cities on this map measures 2 centimeters. Using any method, find the actual distance between these two cities.



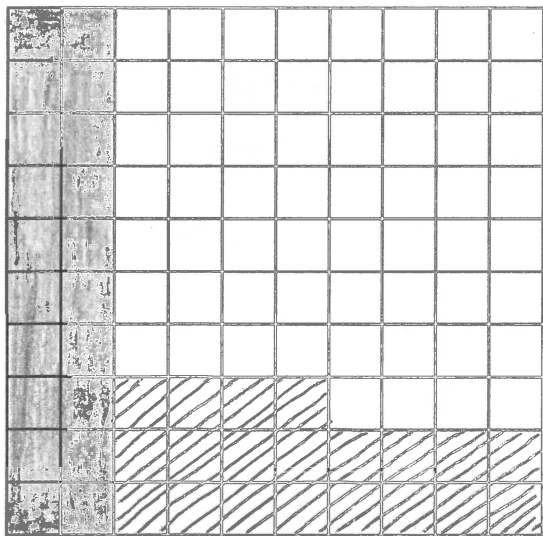
5. (12 points) Using the decimal grid, show the decimal equivalent and percent represented by the fraction  $\frac{1}{5}$ . Explain how the decimal and percent can be inferred from the decimal grid.



In the hundredths grid, twenty squares are shaded. Thus  $\frac{1}{5} = \frac{20}{100}$  ← This is twenty hundredths or 0.20. Since percent means per hundred, we have 20%.

✓  
5 of these fit in the unit

6. (12 points) Mike is so happy to find his favorite shoes at DSW. When he arrives, he sees a sign in the window that says ALL SHOES 20% OFF. Mike also has a one-time 25% off coupon. The nice person at the register says his coupon will apply after the storewide discount. What is Mike's actual discount? Show all of your thinking and use the decimal grid.



Actual discount  
(20 squares + 20 squares)

40% discount

Check:  $56 + 4 = 60$   
Squares not shaded  
so Mike will pay 60% the original price.

✓  
20% off

↑  
25% off coupon

7. (10 points) Think of this problem:

36 is what percent of 80?

Devise two solutions (independent of one another) to solve the above problem.

①

36 is almost half of 80.

40		40
36	4	40

9 45      11 45

So 36 represents 9 out of 20  $\Rightarrow \frac{9}{20} = \frac{9 \times 5}{20 \times 5} = \frac{45}{100}$   
45%

②

$$\frac{36}{80} = ??\%$$

$\frac{36}{80}$  is equivalent to  $\frac{9}{20}$

Since  $\frac{36 \div 4}{80 \div 4} = \frac{9}{20}$ . So if

we have 36 shaded squares out of 80 & 9 shaded squares out of 20, this gives 45 shaded squares out of 100.

45%

8. Clark Elementary School has decided to buy a new copying machine. A selling point of the new machine is that it experiences about 2 paper jams per 1000 copies. After 6 months, 42,164 copies had been made and there were 96 paper jams.

(a) (4 points) Is the advertising consistent? Why/why not?

$$\frac{96}{42164} = \frac{x}{1000}$$

$$\rightarrow x \approx 2.3 \text{ (actual value)}$$

( $x = 2$  as advertised)

About 2.3 jams per 1000 copies. This is closer to 2 than 3 so yes, it's consistent.

(b) (4 points) Represent the advertised paper jam rate as a ratio, a fraction, a decimal, and a percent.

1 in every 500 copies will jam (ratio)

$\frac{1}{500}$  of the copies will jam (fraction)

0.2% or one-fifth of 1% of the copies will jam (percent)

(c) (4 points) How do you think the manufacturer determined the figure "2 paper jams per 1000 copies?"

They divided the total # of jams by the total # of copies. Let's hope they used many different machines (same models) w/ a variety of ages (some old, some new).