

## The Algebra Symposium: Units, Pizza, Salad, ...

Thanks to John Baldwin for the following problems.

1. I went to Pompeii and bought the same number of salads and small pizzas. Salads cost two dollars each and pizzas cost six dollars each. I spent \$40 all together. Assuming that the equation  $2S + 6P = 40$  is correct. Then

$$2S + 6P = 40.$$

Since  $S = P$ , I can write

$$2P + 6P = 40.$$

So

$$8P = 40.$$

The last equation says 8 pizzas is equal to \$40 so each pizza costs \$5.

What is wrong with the above reasoning? Be as detailed as possible. How would you try to help a student who made this mistake.

### Old Proportion Problems

Here are some problems taken from an arithmetic book published in 1892 and reissued in 1895, 1911, and 1920.

#### Simple Proportion

2. If the interest upon a sum of money for 9 months is 318.69, what will be the interest for 11  $\frac{1}{2}$  months?
3. If 15 men can do a piece of work in 36 days, in how many days can they perform the same work with the assistance of 9 men more?
4. If a garrison of 200 men has provisions for 8 months, how many men must leave at the end of 5 months that the provisions remaining may last the rest 8 months longer?

#### Compound Proportions

5. If 11 men build 45 rods of wall in 6 days of 10 hours each, how many men will be required to build 81 rods of wall in 12 days of 11 hours each?
6. (oral exercise) If 7 men can dig 32 rods of ditch in 1 day, how many men will be required to dig 92 rods in  $\frac{3}{4}$  day.

The last problem is arcane at best but what does it mean? Rods of fence built is directly proportional to number of men and number of days and number of hours per day. Part b) can be expressed as the number of men is directly proportional to the length of ditch and inversely proportional to the number of days taken.