4/15

1-3 Word Problems

I. Percentages

A. What is 30% of 45?

$\frac{\text{is}}{\text{of}} = \frac{\%}{100}$

So lets use this formula to do this problem

$$\frac{x}{45} = \frac{30}{100}$$

to solve for x we cross multiply

$$\frac{100x}{100} = \frac{1350}{100}$$

$$\boxed{x = 13.5}$$

B. 432 is what per cent of 1600?

$\frac{\text{is}}{\text{of}} = \frac{\%}{100}$

$$\frac{432}{1600} = \frac{x}{100}$$

$$\frac{43200}{1600} = \frac{1600x}{1600} \Rightarrow \boxed{x = 27}$$

C. 70 is 40 % of what number?

$\frac{\text{is}}{\text{of}} = \frac{\%}{100}$

$$\frac{70}{x} = \frac{40}{100}$$

$$\frac{7000}{40} = \frac{40x}{40}$$

$$\boxed{x = 175}$$

II. Finance

Ex 1: A family has annual loan payments equaling 32% of their annual income. During the year their loan payments total $15,125.50. What is their annual income?

1) Rewrite all of the info from the question as a statement.

$15,125.50 is 32% of their annual income.

$\frac{\text{is}}{\text{of}} = \frac{\%}{100}$

$$\frac{15,125.50}{x} = \frac{32}{100}$$

$$\frac{1,512,550}{32} = \frac{32x}{32}$$

$$\boxed{x = \$47,267.19}$$

III. Figuring a Course Grade

Ex: To get an A in a course, you must have an average of at least 90 on four tests of 100 points each. The scores on your first three tests were 87, 92, and 84. What must you score on the fourth test to get an A for the course?

$$\text{Average} = \frac{\text{Test 1} + \text{Test 2} + \text{Test 3} + \text{Test 4}}{4}$$

We want the Average = 90. So let's plug in to the equation

$$90 = \frac{87 + 92 + 84 + x}{4}$$

we put an x for test 4 since we do not know that grade yet.

$$90 \cdot 4 = \frac{263 + x}{4} \cdot 4$$

$$360 = 263 + x$$

$$-263 \quad -263$$

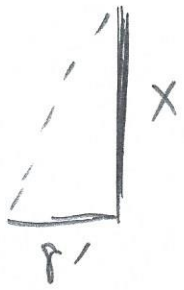
$$\boxed{x = 97}$$

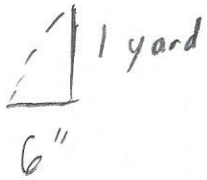
So to get an A in the course the student would need to get a 97 on the fourth test.

IV. Measuring Distances

Ex: There is a flag pole in front of your school that casts an 8 foot shadow. A yard stick when stood up like a pole casts a 6 inch shadow. How tall is the flag pole?

Let's draw a picture.





These are similar triangles so we can use the formula

$$\frac{\text{object 1}}{\text{shadow 1}} = \frac{\text{object 2}}{\text{shadow 2}}$$

but to plug into the formula object 1 and shadow 1 need to have the same units of measurement. The same with object 2 and shadow 2.

1 yard = 3 ft and 1 ft = 12 inches

So $3 \times 12 = 36$

So 3 ft = 36 inches

So we can plug in now

$$\frac{x\ \cancel{ft}}{8\ \cancel{ft}} = \frac{36\ \cancel{in}}{6\ in}$$

$$\frac{x}{8} = \frac{36}{6}$$

$$\frac{6x}{6} = \frac{288}{6}$$

$$x = 48$$

So the flagpole is 48 ft tall.