

## Session 3.3

Mr. Hernandez: josehdz@cs.stanford.edu

## Recap of last time

1. If humans who are 6 feet tall need 9 pounds of food, then how much food does a 10 foot giant need?

$$\frac{\text{height}}{\text{food}} = \frac{6}{9} \stackrel{\div 3}{=} \frac{2}{3} \stackrel{\times 5}{=} \frac{10}{15}$$

2. If Abraham can beat 3 Pokemon gyms in 45 minutes, how much time does he need to beat all 8 Pokemon gyms and reach the elite four?

$$\frac{\text{gyms}}{\text{minutes}} = \frac{3}{45} \stackrel{\div 3}{=} \frac{1}{15} \stackrel{\times 8}{=} \frac{8}{120}$$

## Main problems

1. Assortment of warm-up problems

- (a) When Gustavo makes rice, he uses 6 cup of water for 15 cups of rice. How much rice does he need if he uses 10 cups of rice?
- (b) Suppose Joaquin fixes 4 watches in 3 hours.
- How long does it take to fix 8 watches? 10 watches? 11 watches?
  - In a 40 hour work week, how many watches can Joaquin fix?
- (c) Suppose Emmanuel can run 3 miles in 18 minutes, Erick can run 4 miles in 20 minutes, and Miguel can run 5 miles in 22 minutes. In a relay race where each person runs 2 miles, how long does it take the team of three?

2. Complete the following estimation problems:

- (a) In Chicago, there are 12 McDonald's in 5 square miles. How many McDonald's would there probably be in 25 square miles? What about 100 square miles?
- (b) If 9 out of 10 American adults have completed high school, then how high school graduates would you expect in a room full of 80 people?
- (c) If 2 out of 3 high school graduates have gone to college, how many of the high school graduates above (from the room of 80 people) would you expect attended college?
- (d) Consider 200,000 gallons of air. There is an expected amount of elements in the air. How much of each element is there if the composition is:
- Nitrogen with 75%
  - Oxygen with 20%
  - Argon with 0.8%
  - Carbon dioxide with 0.04%
- (e) If 15% of Americans suffer from diabetes, and the US population is 300 million, then how many Americans have diabetes?

- (f) If one diabetes doctor can treat 50 patients with diabetes, then how many diabetes doctors should the US have?
- (g) Suppose we tag 80 buffalo and then release them back into the wild. If we fly a helicopter over their grasslands and 10 out of 100 buffalo we see are tagged, what would you estimate as the size of the buffalo population?
- (h) Suppose we tag 80 buffalo and then release them back into the wild in March. Later on, in June, we tag 80 new buffalo and release them again. If we fly a helicopter over their grasslands and 20 out of 100 buffalo we see are tagged, what would you estimate as the size of the buffalo population?

## Extra problems

1. Problems from 2010 AMC 8