

## Session 2.3

Mr. Hernandez: josehdz@cs.stanford.edu

## Recap of last time

1. Ratios are things we have already seen before

(a) Convert the ratio into **equivalent fractions** to solve

$$3 : 5 \text{ as } 9 : \underline{\quad} \implies \frac{3}{5} = \frac{9}{?} \implies \frac{3}{3} * \frac{3}{5} = \frac{9}{\boxed{15}}$$

(b) Use cross multiplication (introduce a variable)

$$3 : 5 \text{ as } 9 : x \implies \frac{3}{5} = \frac{9}{x} \implies 3 * x = 9 * 5 \implies x = 9 * 5 \div 3 = \boxed{15}$$

2. Memorize a couple of standard fractions

(a)  $\frac{1}{2} = 0.5$

(c)  $\frac{1}{3} = 0.\bar{3}$

(e)  $\frac{1}{9} = 0.\bar{1}$

(b)  $\frac{1}{8} = 0.125$

(d)  $\frac{1}{6} = 0.1\bar{6}$

(f)  $\frac{1}{11} = 0.0\bar{9}$

## Main problems

1. Convert the following decimals into fractions and simplify them

(a) 0.625

(b)  $0.\bar{18}$

2. Do the following word ratio problems.

(a) Suppose Javier is 6' tall and casts a 9' shadow. How long is the shadow of a 10' lamp post? If he casts an 12' shadow, how long would the lamp post's shadow be?

(b) The ratio of the weight of Sebastian's cat to the weight of Annes cat is 5:7. Sebastian's cat weighs 20 kg. How much more does Annes cat weigh?

(c) Darrion mixed 3 pints of yellow paint with 4 pints of green paint to make a nifty new color. He used 27 pints of yellow paint. How many pints of green paint will he need?

3. Complete the following rate problems:

(a) If we can print 150 newspapers in 2 hours, we can print  $\underline{\quad}$  newspapers/hour?

(b) If we can print 150 newspapers in 2 hours, how many papers can we print in 6 hours? What about 3 hours?

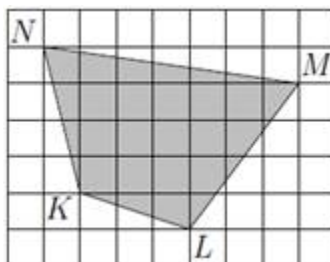
(c) If we can print 150 newspapers in 2 hours, how long does it take to print 1000 newspapers?

(d) If Diego bakes 3 cakes in 5 hours, how many full cakes can Diego bake in 20 hours? What about 13 hours?

- (e) If Daniel writes 2 essays in 9 hours, and his English class requires only 5 essays the whole semester, how many hours does he spend on English homework (essays)?
- (f) If Ben can bake 3 cakes in 5 hours and Mauricio can bake 4 cakes in 5 hours, then, as a team, Ben and Mauricio bake   ? cakes/hour?
- (g) If Thewfic can wash 2 loads of laundry in 3 hours and David can wash 5 loads in 3 hours, then as a team, how many loads can David and Thewfic do in 15 hours? What is the ratio between Thewfic's productivity and David's productivity?
- (h) If Dominic solves 11 problems/hour and Jonathan solves 7 problems/hour, then, as a team, Dominic and Jonathan solve   ? problems/hour
- (i) If Leo constructs 2 chairs/hour and Sergio constructs 3 chairs/hour and Max constructs 5 chairs/hour, then, as a team, Leo and Sergio and Max construct   ? chairs/hour.
- (j) If Amir designs 2 algorithms/hour and Ian designs 3 algorithms/hour, how many algorithms can they design in a work session that lasts 3 hours? How long does it take them to design 11 algorithms?

## Extra problems

- In a group of kangaroos, the two lightest kangaroos weigh 25% of the total weight of the group. The three heaviest kangaroos weigh 60% of the total weight. How many kangaroos are in the group?
- In a school, there are lockers 1–100 that all start off closed. Jose gets bored and decides to flip the state of the lockers (if open, close it, and if closed, open it) in the following way. Starting at 2, Jose flips the state of lockers 2, 4, 6, ..., and then flips 3, 6, 9, ..., and so on all the way until 100. Which locker numbers are closed when Jose finishes?
- Assume that  $\frac{1111}{101} = 11$  is true. What is the value of  $\frac{3333}{101} + \frac{6666}{303}$ ?
- Let  $S$  be the number of squares among the integers from 1 to  $2013^6$ . Let  $Q$  be the number of cubes among the same integers. Then
  - $S = Q$
  - $2 * S = 3 * Q$
  - $3 * S = 2 * Q$
  - $S = 2013 * Q$
  - $S * 3 = Q * 2$
- The diagram shows a shaded quadrilateral KLMN drawn on a grid. Each cell of the grid has sides of length 2 cm. What is the area of KLMN?



- A class of students had a test. If each boy had gotten 3 points more on the test, then the average result of the class would have been 1.2 points higher. What percentage of the class are girls?