

# Word Problem Examples

Nov. 13<sup>th</sup>

Try them first - then check the answers at bottom of page.

- ① At the Central Perk coffeehouse in Manhattan, Rachel serves  $c$  cups of coffee and  $d$  desserts per hour. The coffee costs  $\$a$  per cup, and the desserts cost  $\$b$  each. She averages a tip of  $k$  cents per dollar of the customers' bills (excluding taxes). In addition, she makes a fixed wage of  $\$f$  per hour. Consider  $c, d, a, b, k,$  and  $f$  as constants. Express Rachel's earnings as a function of  $h$ , the number of hours she works.

- ② Sam Wright plays the role of Sebastian the crab in the Disney film "The Little Mermaid." He spent  $H$  hours working on the production.  $P$  percent of this time was spent on the taping;  $\frac{1}{n}$  was spent on rehearsal and the rest on dubbing and looping. Sam was paid  $D$  dollars per hour for each of the  $H$  hours spent on the production.

- (a) If Disney had changed the contract so that they paid for taping, dubbing, and looping but not rehearsal, how much would Sam's pay have been?
- (b) If Disney were paying for taping only, and Sam wanted to earn the same thing he would have in under the original contract, how much would he need to charge per hour?

Answers: (1) Rachel serves  $c \cdot a + d \cdot b$  dollars worth of coffee and dessert per hour. Since she makes  $k$  cents per dollar served, then she makes  $k(c \cdot a + d \cdot b)$  cents in tips per hour, or  $\frac{k}{100}(c \cdot a + d \cdot b)$  dollars per hour.

She also makes  $f$  dollars per hour from her fixed wage, for a total of  $f + \frac{k}{100}(c \cdot a + d \cdot b)$  dollars per hour, or  $h \cdot (f + \frac{k}{100}(c \cdot a + d \cdot b))$  total earnings for  $h$  hours worked.

- (2) (a) Since  $\frac{1}{n}$  of Sam's time was spent on rehearsing, then  $1 - \frac{1}{n}$  was spent on everything else. Thus if he wasn't paid for rehearsing, then instead of being paid  $D \cdot H$  dollars ( $D$  dollars per hour for  $H$  hours), he would have been paid  $(1 - \frac{1}{n}) D \cdot H$

- (b) If Sam were paid for taping only, then instead of making  $D \cdot H$  dollars, Sam would have made  $(\frac{P}{100}) \cdot D \cdot H$ .  $(\frac{P}{100})$  is the fraction spent on taping - recall  $P$  is in percent, so  $P/100$  is the decimal equivalent. To make  $(\frac{P}{100}) \cdot D \cdot H$  equal to the original  $D \cdot H$  amount, Sam would have to be paid  $(\frac{100}{P}) D$  dollars per hour instead of  $D$  dollars per hour. (since then he'd make  $\frac{P}{100} [\frac{100}{P} D] H = D \cdot H$  dollars)