MATH 5: HANDOUT 7
FRACTIONS AND DECIMALS. MORE WORD PROBLEMS

PUZZLES

1. Divide a number by one more than itself. The result is 1/5. Divide a second number by one more than itself. The result is 1/5th the number. Multiply these two numbers - what is the product?

2. If each bat eats eight hundred bugs per hour for five hours per night, how many bugs would a colony of fifty bats eat in a week?

TODAY'S MATERIAL

Sets. *Sets* are collections of similar elements. In mathematics, we usually talk about sets of numbers. The main sets are:

- $\mathbb{N}$: Set of natural numbers, i.e. $1, 2, 3, \ldots$;
  Operations: $+, \times$.
- $\mathbb{Z}$: Set of integer numbers, i.e. $\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots$;
  Operations: $+, -, \times$.
- $\mathbb{Q}$: Set of rational numbers, i.e. numbers that can be written as a fraction
  Operations: $+, -, \times, \div$.

Fractions and Decimals. We also talked about how to convert fractions to decimals (see the long division on the right, where we attempt to convert $\frac{2}{7}$ into a decimal. We keep doing long division until the remainder repeats. Every fraction can be converted to a decimal which will either be finite, or it will be infinite, but there will be a sequence of numbers which constantly repeats itself.

$$\begin{array}{r} 0.2857142 \\ 7 \overline{)\,2.0000000} \\ \underline{1.4} \\ 60 \\ \underline{56} \\ 40 \\ \underline{35} \\ 50 \\ \underline{49} \\ 10 \\ \underline{7} \\ 30 \\ \underline{28} \\ 20 \end{array}$$

$$\frac{2}{7} = 0.285714285714\cdots = 0.\overline{285714}.$$

We also introduced the *reciprocal*. For a number a, a reciprocal $r(a)$ is such a number that $a \times r(a) = 1$. For example, $r(\frac{3}{8}) = \frac{8}{3}$, because $\frac{3}{8} \times \frac{8}{3} = 1$.