Section 9.3

Solving Multi-Step Inequalities

Day 3 - Modeling and Word Problems

Learning Targets:

1. Translate English phrases into linear inequalities.

2. Model different real-world scenarios using linear inequalities.

3. Solve problems by modeling them using linear inequalities.

Examples:

Translate each of the following into a linear inequality:

1) The sum of twice a number and 17 is no more than 5 times the number diminished by 8.

$2x + 17 \leq 5x - 8$

2) When the difference of a number and 8 is divided by 3, the result is at least 4 times the number.

$\frac{x-8}{3} \geq 4x$

3) Three times the sum of a number and 10 cannot exceed the product of the number and -6.

$3(x+10) \leq -6x$

Example #1: Model and solve the following problem

Ethan can download music from Site A for a flat rate of $29 per month plus $0.80 per download. He can download music from Site B for $17 per month plus $1.19 per download. How many downloads make Site A the better deal? $\Rightarrow$ \$A < \$B

a) Choose a variable and state what it is representing

Let d = # of downloads

b) Model the situation with a linear inequality:

$$29 + 0.80d < 17 + 1.19d$$

c) Solve the inequality: $29 + 0.8d < 17 + 1.19d$

$-1.19d \qquad -1.19d$

$29 - 0.39d < 17$

$-29 \qquad -29$

$\frac{-0.39d}{-0.39} < \frac{-12}{-0.39}$ $\quad d > 30.76\ldots$

d) Answer the problem in a sentence

Ethan would have to download at least 31 songs in order to make Site A the better deal.

Example #2: Model and solve the following problem

Molly has a business making candles. Her business costs are $200 plus $0.70 per candle made. She charges her customers $3.50 for each candle. If she sells all of the candles she makes, how many candles sold would allow her to make a profit? → sell $ > cost $

let c = # of candles

$3.50c > 200 + 0.70c$

$-0.70c \qquad -0.70c$

$\frac{2.80c}{2.80} > \frac{200}{2.80}$

$c > 71.42\ldots$

Molly would need to sell a minimum of 72 candles to make a profit.

Example #3: Model and solve the following problem

Danny started his own computer repair business. He offers his customers two payment options. Option A has a base fee of $40 plus $8 per hour. Option B has no base fee but costs $15 per hour. How many hours does a repair job have to take in order for Option B to be less expensive?

$\$B < \$A$

Let h = # of hours

$$15h < 40 + 8h$$

$$-8h \qquad -8h$$

$$\frac{7h}{7} < \frac{40}{7}$$

$$h < 5.714\ldots$$

The job needs to be less than 6 hours in order for Option B to be less expensive.

Check your understanding:

Pg. 365-367 #8, 9, 12, 13, 15

Handout:

Translating Phrases: #1 - 10