Lesson 14: Solving Inequalities

Student Outcomes:

- Students solve word problems leading to inequalities that compare px + q and r, where p, q, and r are specific rational numbers.
- Students interpret the solutions in the context of the problem.

Bell Work: Shaggy earned $7.55 per hour plus an additional $100 in tips waiting tables on Saturday. He earned at least $160 in all. Write an inequality and find the minimum number of hours, to the nearest hour, that Shaggy worked on Saturday.

$$7.55h + 100 \geq 160$$

$$7.55h + 100 - 100 \geq 160 - 100$$

$$7.55h \geq 60$$

$$\left(\frac{1}{7.55}\right)(7.55h) \geq \left(\frac{1}{7.55}\right)(60)$$

$$h \geq 7.9$$

If Shaggy earned at least $160, he would have worked at least 8 hours.

Notes:

Example 3: Deals with percents x/100

Opening Exercise:

The annual County Carnival is being held this summer and will last $5\frac{1}{2}$ days. Use this information and the other given information to answer each problem.

You are the owner of the biggest and newest roller coaster called the Gentle Giant. The roller coaster costs $6 to ride. The operator of the ride must pay $200 per day for the ride rental and $65 per day for a safety inspection. If you want to make a profit of at least $1,000 each day, what is the minimum number of people that must ride the roller coaster?

Write an inequality that can be used to find the minimum number of people, p, which must ride the roller coaster each day to make the daily profit.

$$6p - 200 - 65 \geq 1000$$

Solve the inequality.

$$6p - 200 - 65 \geq 1000$$

$$6p - 265 \geq 1000$$

$$6p - 265 + 265 \geq 1000 + 265$$

$$6p + 0 \geq 1265$$

$$\left(\frac{1}{6}\right)(6p) \geq \left(\frac{1}{6}\right)(1265)$$

$$p \geq 210\frac{5}{6}$$

Interpret the solution.

There needs to be a minimum of 211 people to ride the roller coaster every day to make a daily profit of at least $1,000.

Example 1: (s94)

A youth summer camp has budgeted \$2,000 for the campers to attend the carnival. The cost for each camper is \$17.95, which includes general admission to the carnival and two meals. The youth summer camp must also pay \$250 for the chaperones to attend the carnival and \$350 for transportation to and from the carnival. What is the greatest number of campers who can attend the carnival if the camp must stay within its budgeted amount?

Let c represent the number of campers to attend the carnival.

17.95c + 250 + 350 ≤ 2000

17.95 + 600 ≤ 2000

17.95c + 600 – 600 ≤ 2000 - 600

17.95c ≤ 1400

$$\left(\frac{1}{17.95}\right)(17.95c) \leq \left(\frac{1}{17.95}\right)(1400)$$

c ≤ 77.99

In order for the camp to stay in budget, the greatest number of campers who can attend the carnival is 77 campers.

Example 2:

The carnival owner pays the owner of an exotic animal exhibit \$650 for the entire time the exhibit is displayed. The owner of the exhibit has no other expenses except for a daily insurance cost. If the owner of the animal exhibit wants to make more than \$500 in profits for the $5\frac{1}{2}$ days, what is the greatest daily insurance rate he can afford to pay?

Let *i* represent the daily insurance cost.

650 – 5.5i > 500

-5.5i + 650 – 650 > 500 - 650

-5.5i + 0 > -150

$$\left(\frac{1}{-5.5}\right)(-5.5i) > \left(\frac{1}{-5.5}\right)(-150)$$

i < 27.27

The maximum daily cost the owner can pay for insurance is $27.27.

Example 3: (s94)

Several vendors at the carnival sell products and advertise their businesses. Shane works for a recreational company that sells ATVs, dirt bikes, snowmobiles, and motorcycles. His boss paid him $500 for working all of the days at the carnival plus 5% commission on all of the sales made at the carnival. What was the minimum amount of sales Shane needed to make if he earned more than $1,500?

Let s represent the sales, in dollars, made during the carnival.

$$500 + \frac{5}{100}s > 1{,}500$$

$$\frac{5}{100}s + 500 > 1{,}500$$

$$\frac{5}{100s} + 500 \ - 500 > 1{,}500 \ - 500$$

$$\frac{5}{100}s + 0 > 1000$$

$$\left(\frac{100}{5}\right)\left(\frac{5}{100}s\right) > \left(\frac{100}{5}\right)(1{,}000)$$

s > 20,000

The sales had to be more than \$20,000 for Shane to earn more than \$1,500.

Closing:

What did all of the situations that required an inequality to solve have in common?

How is a solution of an inequality interpreted?

Problem Set
(s.95)