Unit 5, Lesson 14

Solving Problems with Rational Numbers

Let's use all four operations with signed numbers to solve problems.

14.1 Which Three Go Together: Equations

Which three go together? Why do they go together?

A

$$\frac{1}{2}x = -50$$

B

$$x + 90 = -100$$

C

$$-60t = 30$$

D

$$-0.01 = -0.001x$$

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14.2 Scoring Margins

The scoring margin tells how many points a sports team wins a game by.

1. Here are the scoring margins for one football team for the season.

   55 1 56 52 23 4 -3 24 -1 6 34 22

   a. How many games did the team lose? How can you tell?

   b. What was their average scoring margin for the season?

2. Here are the scoring margins for another football team for the season.

   26 8 -29 3 -4 -32 -14 -14 -6 3 24 -22

   What was this team's average scoring margin for the season?

3. Which team's average scoring margin was higher? How much higher?

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14.3 Solar Power

A family has solar panels on their roof to help generate electricity.

1. Calculate the family's net consumption of electricity for each of these days:

   a. One cloudy day, the family uses 32.4 kWh of electricity, and their solar panels generate 9.2 kWh.

   b. One sunny day, the family uses 36.1 kWh of electricity, and their solar panels generate 45.7 kWh.

2. When the solar panels generate more electricity than the family can use, their energy company gives them a credit for the extra electricity that goes back to the power grid. Here is their electricity bill for one month:

Amount used:	520.0 kWh	$83.20
Amount generated:	-143.5 kWh	-$11.48
Amount due:		$71.72

   a. How much does the family have to pay for each kWh of electricity that they use?

   b. How much credit does the family receive for each kWh that they generate?

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3. The family adds a backup battery to their solar panel system. Here is their energy usage for a new month. Calculate their amount due to the energy company this month.

Amount used:	164.5 kWh	
Amount generated:	-203.0 kWh	
Amount due:		

Are you ready for more?

While most rooms in any building are all at the same level of air pressure, hospitals make use of "positive pressure rooms" and "negative pressure rooms." What do you think it means to have negative pressure in this setting? What could be some uses of these rooms?

Lesson 14 Summary

We can apply the rules for arithmetic with rational numbers to solve problems.

In general, $a - b = a + \text{-}b$.

If $a - b = x$, then $x + b = a$. We can add $\text{-}b$ to both sides of this second equation to get that $x = a + \text{-}b$.

Remember: The *distance* between two numbers is independent of the order, while the *difference* depends on the order.

And when multiplying or dividing:

- A positive number multiplied or divided by a negative number always has a negative result.
- A negative number multiplied or divided by a positive number always has a negative result.
- A negative number multiplied or divided by a negative number always has a positive result.

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