Lesson 9: Using If-Then Moves in Solving Equations

Classwork

Opening Exercise

Heather practices soccer and piano. Each day she practices piano for 2 hours. After 5 days, she practiced both piano and soccer for a total of 20 hours. Assuming that she practiced soccer the same amount of time each day, how many hours per day, h, did Heather practice soccer?

Over 5 days, Jake practices piano for a total of 2 hours. Jake practices soccer for the same amount of time each day. If he practiced piano and soccer for a total of 20 hours, how many hours, h, per day did Jake practice soccer?

Example 1

Fred and Sam are a team in the local 138.2 mile bike-run-athon. Fred will compete in the bike race, and Sam will compete in the run. Fred bikes at an average speed of 8 miles per hour and Sam runs at an average speed of 4 miles per hour. The bike race begins at 6:00 a.m., followed by the run. Sam predicts he will finish the run at 2:33 a.m. the next morning.

    a.   How many hours will it take them to complete the entire bike-run-athon?

    b.   If t is how long it takes Fred to complete the bike race, in hours, write an expression to find Fred's total distance.

    c.   Write an expression, in terms of t to express Sam's time.

    d.   Write an expression, in terms of t, that represents Sam's total distance.

    e.   Write and solve an equation using the total distance both Fred and Sam will travel.

f.   How far will Fred bike, and how much time will it take him to complete his leg of the race?

g.   How far will Sam run, and how much time will it take him to complete his leg of the race?

Total Time (hours)	Fred's Time (hours)	Sam's Time (hours)
10	6	
15	12	
20	8	
18.35	8	
20.55	t	

Example 2

Shelby is seven times as old as Bonnie. If in 5 years, the sum of Bonnie and Shelby's ages is 98, find Bonnie's present age. Use an algebraic approach.

Problem Set

1. A company buys a digital scanner for $12,000. The value of the scanner is $12,000\left(1 - \frac{n}{5}\right)$ after n years. The company has budgeted to replace the scanner when the trade-in value is $2,400. After how many years should the company plan to replace the machine in order to receive this trade-in value?

2. Michael is 17 years older than John. In 4 years, the sum of their ages will be 49. Find Michael's present age.

3. Brady rode his bike 70 miles in 4 hours. He rode at an average speed of 17 mph for t hours and at an average rate of speed of 22 mph for the rest of the time. How long did Brady ride at the slower speed? Use the variable t to represent the time, in hours, Brady rode at 17 mph.

4. Caitlan went to the store to buy school clothes. She had a store credit from a previous return in the amount of $39.58. If she bought 4 of the same style shirt in different colors and spent a total of $52.22 after the store credit was taken off her total, what was the price of each shirt she bought? Write and solve an equation with integer coefficients.

5. A young boy is growing at a rate of 3.5 cm per month. He is currently 90 cm tall. At that rate, in how many months will the boy grow to a height of 132 cm?

6. The sum of a number, $\frac{1}{6}$ of that number, $2\frac{1}{2}$ of that number, and 7 is $12\frac{1}{2}$. Find the number.

7. The sum of two numbers is 33 and their difference is 2. Find the numbers.

8. Aiden refills three token machines in an arcade. He puts twice the number of tokens in machine A as in machine B, and in machine C, he puts $\frac{3}{4}$ what he put in machine A. The three machines took a total of 18,324 tokens. How many did each machine take?

9. Paulie ordered 250 pens and 250 pencils to sell for a theatre club fundraiser. The pens cost 11 cents more than the pencils. If Paulie's total order costs $42.50, find the cost of each pen and pencil.

10. A family left their house in two cars at the same time. One car traveled an average of 7 miles per hour faster than the other. When the first car arrived at the destination after $5\frac{1}{2}$ hours of driving, both cars had driven a total of 599.5 miles. If the second car continues at the same average speed, how much time, to the nearest minute, will it take before the second car arrives?

11. Emily counts the triangles and parallelograms in an art piece and determines that altogether, there are 42 triangles and parallelograms. If there are 150 total sides, how many triangles and parallelograms are there?

12. Stefan is three years younger than his sister Katie. The sum of Stefan's age 3 years ago and $\frac{2}{3}$ of Katie's age at that time is 12. How old is Katie now?

13. Lucas bought a certain weight of oats for his horse at a unit price of $0.20 per pound. The total cost of the oats left him with $1. He wanted to buy the same weight of enriched oats instead, but at $0.30 per pound, he would have been $2 short of the total amount due. How much money did Lucas have to buy oats?