

MODEL & DISCUSS

Joshua is going kayaking with a group during one of his vacation days. In his vacation planning, he budgeted \$50 for a kayak rental.

KAYAK RENTALS



Rental Rates	
	Per hour
single kayak	\$15
single sea kayak	\$18
double kayak	\$25

A. How can Joshua determine the number of hours he can rent a kayak for himself? Describe two different options.

$\$15 + 15 + \dots \rightarrow 15(3) \rightarrow \45 single kayak
 $\$18 + \dots \rightarrow 18(2) \rightarrow \36 single sea kayak

B. Joshua found out that there is a \$25 nonrefundable equipment fee in addition to the hourly rates. How does this requirement change the mathematics of the situation?

$$\begin{array}{r} \$50 \\ -25 \text{ fee} \\ \hline \$25 \end{array}$$
 ...only 1 single kayak
 ...also 1 "sea"

C. **Look for Relationships** How do the processes you used for parts A and B differ? How are they the same? © MP.7

adding, multiplying, & subtracting
 ...

HABITS OF MIND

Make Sense and Persevere How did you determine which operations are needed to solve the problem? © MP.1



Order of Operations

PEMDAS
 PE → solving
 MD → solving
 AS → simplifying

*mult by LCD
 Combine like terms
 Undo operations

EXAMPLE 1 Try It! Solve Linear Equations

1. Solve the equation $4 + \frac{3x-1}{2} = 9$. Explain the reasons why you chose your solution method.

$$4 + \frac{3x-1}{2} = 9$$

$$8 + 3x - 1 = 18$$

$$7 + 3x = 18$$

$$3x = 11$$

$$x = \frac{11}{3}$$

OR

$$4 + \frac{3x-1}{2} = 9$$

$$\frac{3x-1}{2} = 5$$

$$3x-1 = 10$$

$$3x = 11$$

$$x = \frac{11}{3}$$

HABITS OF MIND

Communicate Precisely How can you check that the value of the variable makes the equation true? MP.6

substitute the value for x...

Consecutive...
 ex) {1, 2, 3, 4, 5...}
 {1, 3, 5, 7, 9...} odd integers
 +2 +2 +2 +2
 assign a variable...

EXAMPLE 2 Try It! Solve Consecutive Integer Problems

2. The sum of three consecutive odd integers is 57. What are the three integers?

Combine like terms

$$x + x + 2 + x + 4 = 57$$

$$3x + 6 = 57$$

$$3x = 51$$

$$x = 17$$

17, 19, 21

EXAMPLE 3 Try It! Use Linear Equations to Solve Mixture Problems

3. If the lab technician needs 25 liters of a 25% acid solution, how many liters of the 10% and the 30% acid solutions should she mix to get what she needs?

$$.15(25) = .10x + .30(25-x)$$

$$3.75 = .1x + 7.5 - .3x$$

$$-3.75 = -.2x$$

$$3.75 = .2x$$

$$18.75 = x$$

18.75 = x of 10% acid

$$25 - 18.75 = 6.25$$

6.25 of 30% acid

EXAMPLE 4  **Try It!** Use Linear Equations to Solve Problems

4. The same four friends buy tickets for two shows on consecutive nights. They use a coupon for \$5 off each ticket. They pay a total of \$416 for 8 tickets. Write and solve an equation to find the original price of the tickets.

**EXAMPLE 5**  **Try It!** Solve Work and Time Problems

5. LaTanya leaves her house at 12:30 P.M. and bikes at 12 mi/h to Marta's house. She stays at Marta's house for 90 min. Both girls walk back to LaTanya's house at 2.5 mi/h. They arrive at LaTanya's house at 3:30 P.M. How far is Marta's house from LaTanya's house?

**HABITS OF MIND**

Look for Relationships What patterns can you identify in the solutions for Examples 3, 4, and 5?  MP.7

Do You UNDERSTAND?

1. **ESSENTIAL QUESTION** How do you create equations and use them to solve problems?

2. **Reason** What is a first step to solving for x in the equation $9x - 7 = 10$? How would you check your solution? **MP.2**

3. **Use Structure** For an equation with fractions, why is it helpful to multiply both sides of the equation by the LCD? **MP.7**

4. **Error Analysis** Venetta knows that $1 \text{ mi} \approx 1.6 \text{ km}$. To convert 5 mi/h to km/h , she multiplies 5 mi/h by $\frac{1 \text{ mi}}{1.6 \text{ km}}$. What error does Venetta make? **MP.3**

Do You KNOW HOW?

Solve each equation.

5. $4b + 14 = 22$

$$\begin{array}{r} -14 \quad -14 \\ \hline 4b = 8 \\ \hline b = 2 \end{array}$$

6. $-6k - 3 = 39$

$$\begin{array}{r} +3 \quad +3 \\ \hline -6k = 42 \\ \hline k = -7 \end{array}$$

7. $15 - 2(3 - 2x) = 46$

$$\begin{array}{r} 15 - 6 + 4x = 46 \\ 9 + 4x = 46 \quad \text{undo ops} \\ -9 \quad -9 \\ \hline 4x = 37 \\ \hline x = \frac{37}{4} \end{array}$$

$$\begin{array}{r} 15 - 2(3 - 2x) = 46 \\ -15 \quad -15 \\ \hline -2(3 - 2x) = 31 \\ -2 \quad -2 \\ \hline (3 - 2x) = \frac{31}{-2} \quad \text{ugh...} \\ -3 \quad -3 \\ \hline -2x = -\frac{31}{2} \\ \hline x = \frac{31}{4} \end{array}$$

8. $8\left(\frac{2}{3}y - \frac{2}{5}\right) = 5$

$$\begin{array}{r} 16y - 6 = 75 \\ +6 \quad +6 \\ \hline 16y = 81 \\ \hline y = \frac{81}{16} \end{array}$$

9. **Mathematical Modeling** Terrence walks at a pace of 2 mi/h to the theater and watches a movie for 2 h and 15 min . He rides back home, taking the same route, on the bus that travels at a rate of 40 mi/h . The entire trip takes 3.5 h . How far along this route is Terrence's house from the theater? Explain.

PE
MD
AS