



Unit 1: Solving Linear Equations

Goal 2: Use problem solving processes and skills to solve real world problems.

Clearly show required work and follow direction to earn full credit!!!

For each problem, complete the 4 step problem solving process. (4 points per problem - 1 point for each step)

1. Define a variable expression for all unknowns
2. Write an equation for the situation
3. Find the solution and write your answer in a meaningful way
4. Check your solution with the facts from the problems

Demonstrate your skill at applying the 4-step problem solving process by solving the following word problems. Show all steps and work.

1. Bill is twice as old as Julie will be in four years. The sum of their ages is 20. How old is each of them now?

1. Let $j = \text{Julie's Age}$ and $2(j+4) = \text{Bill's age}$

2. $j + 2(j+4) = 20$

3. $3j + 8 = 20$

$3j = 12$

$j = 4$
Julie is 4 years old
 $2(j+4) = 16$ Bill is 16 years old

2. The quotient of two numbers is 4 and their difference is 39. What is the smaller number of the two?

1. Let $x = \text{the smaller number}$

$4x = \text{the larger number}$

2. $4x - x = 39$

3. $3x = 39$

$x = 13$
The smaller of the 2 numbers is 13

$4x = 52$

4. The sum of 4 and 16 is 20 ✓

In 4 years, Julie will be

8. Bill is 16, twice as old as that. ✓

4. The quotient of 52 and 13 is 4.

The difference of 52 and 13 is 39. ✓

3. Tiffany's Triumphs: Tiffany plays first board for her middle school chess team. Since she joined the team last year, she has won 27 of 51 tournament games. That's a winning percentage of about 53%. Winning a lot of matches in a row is pretty unlikely. Let's say that Tiffany gets hot and wins two out of every three games she plays. How many more games will Tiffany have to play before she has a winning percentage of 60%?



① Let $x = \text{the additional games Tiffany plays}$, $\frac{2}{3}x = \text{the games she wins out of those additional games.}$

② $\frac{27 + \frac{2}{3}x}{51 + x} = \frac{60}{100}$

④ $\frac{2}{3}$ of 54 is 36. So, if

③ Cross Multiply since cross products in any proportion are equal.

$2700 + \frac{200}{3}x = 3060 + 60x$

$66\frac{2}{3}x - 60x = 360$

$6\frac{2}{3}x = 360$

$\frac{20}{3}x = 360$

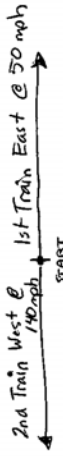
$x = 54$

Tiffany must play 54 more games ✓

Tiffany plays 54 more games, she'll have a total of $27 + 36$ wins = 63 wins and $51 + 54 = 105$ total games. That percent is $\frac{63}{105} \cdot 100 = 60\%$ ✓



4. Two trains started from the same point. At 11 p.m., the first train traveled East at the rate of 50 mph. At 9:00 a.m. the next morning, the second train traveled West at the rate of 140 mph. At what time were they 1260 miles apart?



① Let $t = \text{the time travelled by the 1st train}$

$t - 10 = \text{time travelled by the 2nd train}$

② $D_{\text{Total}} = D_{\text{1st Train}} + D_{\text{2nd train}}$

50

$1260 = 50t + 140(t - 10)$

③ $1260 = 50t + 140t - 1400$

$2660 = 190t$

$14 \text{ hours} = t$

9 a.m. + 14 hours = 1 p.m.

They were 1260 miles apart at 1 p.m.

4. Chuck

1st train travelled

$14 \text{ hours} \times 50 \text{ mph} = 700 \text{ miles}$

2nd train travelled

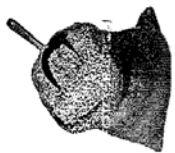
$4 \text{ hours} \times 140 \text{ mph} = 560 \text{ miles}$

$700 + 560 =$

1260 miles

part altogether ✓

5. Two grocery stores sell rice in bulk. The first charges \$.55 per pound. The second charges \$.75 per pound for up to 3 pounds and \$.40 per pound for anything over 3 pounds.



- A. For what number of pounds is the total cost at each store the same. (3 points)

① let $x =$ the total number of pounds purchased

② $.55x = .75(3) + .4(x-3)$

③ $.55x = 2.25 + .4x - 1.2$

$.15x = 1.05$

$x = 7$

Buying 7 pounds will make the cost the same at each store

- B. When is it better to buy from the first store? When is it better to buy from the second? (1 point)

Pounds	1st Store	2nd Store
6	3.30	3.45
7	3.85	3.85
8	4.40	4.25

Rice is cheaper at the first store for less than 7 pounds and cheaper at the second for more than 7 pounds.

6. Nina and Drew mow lawns. Together they work at most 10 hours each week. Drew always works 4 hours a week. If h represents the number of hours Nina works each week, which inequality describes the situation? Why? (2 points)

- a. $h+4 < 10$
 b. $h+4 \leq 10$
 c. $h+4 > 10$
 d. $h+4 \geq 10$

Answer: B

Why: The number of hours Nina and Drew work ($h+4$) is at most (or less than or equal to) 10 hours.



7. Washington Junior High School Student Association hopes to sell 500 yearbooks and make a profit of at least \$1200. Write, solve, and graph an inequality to find and demonstrate how much money they need to make on each book to realize their goal? (3 points)

let $x =$ profit on each book sold.

$$\frac{500x \geq 1200}{500} \quad \frac{500}{500}$$

$$x \geq \$2.40$$



They must make a profit of at least \$2.40 on each book sold.

8. One long distance company offers a plan such that each minute costs \$.10 and each call has a \$.10 service charge. Write and solve an inequality to find the maximum number of minutes you can talk for \$3.00. (3 points)



Let $x =$ the number of minutes you talk for.

$$.10 + .10x \leq 3.00$$

$$\frac{.10x \leq 2.90}{.10} \quad \frac{.10}{.10}$$

$$x \leq 29$$

The maximum number of minutes you can talk is 29 minutes