

Chapter 1

Section 1.2

Warm-up Problem A. Write an expression for the sentence of operations, or describe in an English sentence the sequence of operations that produces the algebraic expression.

- (a) Subtract 3 from t , double the result, then add 4.

$$2(t-3)+4$$

- (b) Subtract t from 3, double the result, then add 1.

$$2(3-t)+1$$

- (c) Add 5 to p , subtract this value from -3 , then half the result.

$$\frac{-3-(p+5)}{2}$$

- (d) Add 7 to p , halve this value, then subtract 3 from the result.

$$\left[\frac{7+p}{2}\right]-3$$

Warm-up Problem B. Translate each verbal sentence into an equation. Do not solve.

- (a) The quotient of twice a number and 3 is 8.

$$\frac{2x}{3} = 8 + \frac{y}{3} \leftarrow \text{remainder?}$$

- (b) The product of a number and the number decreased by 6 is 12.

$$x(x-6) = 12$$

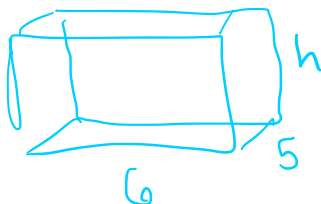
- (c) If 2 is subtracted from four times a number, the result is three more than six times the number.

$$4x-2 = 6x+3$$

Problem 1. Harry, Ron, and Hermione depart on the Hogwarts Express promptly at 11:00 am. They travel 603 miles and reach Hogwarts at 8:00 pm. How fast was the Hogwarts Express traveling? (Remember the formula $\text{distance} = \text{rate} \cdot \text{time}$.)

$$603 = 9x \quad x = \frac{603}{9}$$

Problem 2. My rectangular fish tank has a volume of 180 ft^3 . Its length is 6 ft and its width is 5 ft. Find its height.



$$30h = 180$$
$$h = \frac{180}{30}$$

Problem 3. At the end of 2018, there were 124 wolves in Yellowstone National Park, compared to 171 in 2007. What was the percent of decrease in the wolf population? (Round your answer to the nearest tenth.)

$$\frac{171 - 124}{171}$$

Problem 4. According to the U.S. Census, between 2000 and 2010, the population of Columbia grew from 120,563 to 129,272. What was the percent increase to the nearest tenth?

$$\frac{129,272 - 120,563}{120,563}$$

Problem 5. *The Lord of the Rings* and *The Hobbit* together have a total runtime of 1032 minutes. *The Hobbit* is 84 minutes shorter than *The Lord of the Rings*. How long is each movie?

$$\begin{aligned} H + L &= 1032 & \Rightarrow & 2L - 84 = 1032 \\ H &= L - 84 & & \\ & & 2L &= 1116 \\ & & L &= \frac{1116}{2} & H &= \frac{1116}{2} - 84 \end{aligned}$$

Problem 6. How many milliliters of water must be mixed with 21 L of a 32% sulfuric acid solution to obtain a 20% sulfuric acid solution?

or

$$(1 - .32) \cdot 21 + x = (1 - .2)x$$

↑
Better!

$$\frac{S}{21} = \frac{32}{100} \Rightarrow S = (.32)(21)$$

$$w = \frac{(.32)(21) - (.2)(21)}{0.2}$$

$$0.2w = (.32)(21) - (.2)(21)$$

$$\frac{(.32)(21)}{21 + w} = 0.2$$

Problem 7. How many liters of a 10% alcohol solution must be mixed with 25 L of a 50% solution to obtain a 40% solution?

$$(25)(.5) + X(.10) = .4$$

$$\frac{(25)(.5) - (.4)}{(.10)} = X$$

Problem 8. Peanuts sell for \$2 a pound and cashew nuts sell for \$4 a pound. How many pounds of peanuts must be mixed with 246 pounds of cashew nuts to get a mixture that can sell for \$2.50 a pound?

$$\frac{4(246) + 2P}{246 + P} = 2.5 \dots$$

Problem 9. Why is it impossible to mix candy worth \$4 per pound and candy worth \$5 per pound to obtain a final mixture of \$6 per pound?

$$\frac{4x + 5y}{x + y} = 6$$

$$10x + 11y = 0$$

↖ ↗

⇒

$$4x + 5y = 6x + 6y$$