I can write and solve an equation from a real-world situation

Writing Equations from Situations

Write an equation for each situation. If you can't, use multiple strategies to find the answer but leave space so we can write an equation.

Lopez spent $\frac{1}{3}$ of his vacation money for travel and $\frac{2}{5}$ of his vacation money for lodging. He spent $1100 for travel and lodging. What is the total amount of money he spent on vacation?

A music store sells a used guitar for $120. This is $25 more than $\frac{1}{3}$ the cost of a new guitar of the same brand. What is the cost of a new guitar?

The length of a rectangle is 6 in. more than its width. The perimeter of the rectangle is 24 in. What is the length of the rectangle?

Suppose a video store charges nonmembers $4 to rent each video. A store membership cost $21 and members pay only $2.50 to rent each video. For what number of videos is the cost the same?

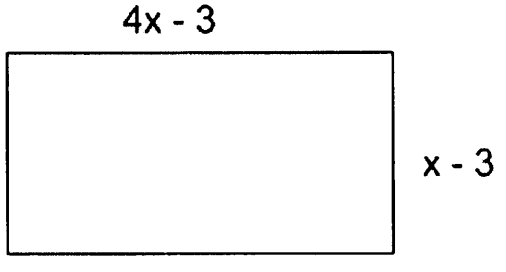
Three friends were born in consecutive years. The sum of their birth years is 5982. Find the year in which each person was born.

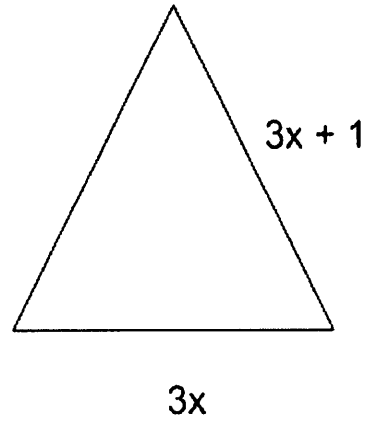
The sum of three consecutive odd integers is -87. What are the integers?

Joe has been offered two jobs. The first job at Sears pays him $15 per hour. The other job at Macys pays him $10 per hour but gave him an initial $100 signing bonus. Determine when it would be more worthwhile for Joe to take the Sears Job.

Hans needs to rent a moving truck. Suppose Company A charges a rate of $40 per day and Company B charges $60 fee plus $20 per day. For what number of days is the cost the same?

The perimeters of two gardens are equal. The measures of those gardens are shown below. One garden is a rectangle, the other is an isosceles triangle. Find the perimeters of the gardens.





The length of a rectangle is 4 centimeters longer than the width. The perimeter of the rectangle is 72 centimeters. Find the dimensions of the rectangle.

Andrea sells cell phones in Canada. She buys them in bulk for $200 a case (10 phones in a case) and must pay a sales tax of 7 ½ %. She is paid a base salary of $2,750 a month plus a 20% commission on her monthly sales. If she sells phones for $49.99, how many phones must she sell to afford her lifestyle of rent, food, fun and car and insurance totaling around $4,800 monthly.

Two friends go out to eat and order the same meal. They pay a 6% sales tax and a 20% tip on their meals. The total bill, including tax and tip, is $27.72. How much did each meal cost before tax and tip? (Assume that the friends pay a tip on the cost of the meals only.)

A company has 930 total employees. The company has three departments. There is a marketing department, an accounting department, and a human resources department. The number of employees in the accounting department is ten more than three times the number of employees in the human resources department. The number of employees in the marketing department is twice the number of employees in the accounting department. Determine how many employees are in each department.

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Writing Equations from Situations

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Lopez spent $\frac{1}{3}$ of his vacation money for travel and $\frac{2}{5}$ of his vacation money for lodging. He spent \$1100 for travel and lodging. What is the total amount of money he spent on vacation?

Let v = vacation \$

$\frac{1}{3} \cdot v + \frac{2}{5} \cdot v = 1100$

CD is 15

$\frac{5}{15} v + \frac{6}{15} \cdot v = 1100$

$\frac{15}{11} \cdot \frac{11}{15} v = \frac{100}{1100} \cdot \frac{15}{11}$

$v = \$1500$

Lopez spent \$1500 on vacation

A music store sells a used guitar for \$120. This is \$25 more than $\frac{1}{3}$ the cost of a new guitar of the same brand. What is the cost of a new guitar?

New Guiter Used Guiter

Let n = \$ of new guiter

$\frac{1}{3} n + 25 = 120$

$-25 \quad -25$

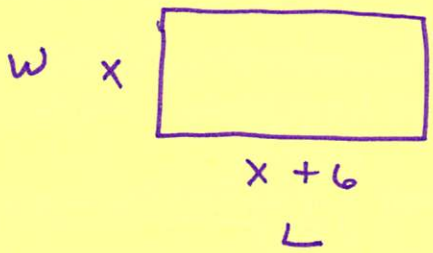
$3 \cdot \frac{1}{3} n = 95 \cdot 3$

$n = \$285$

New guiter costs \$285

The length of a rectangle is 6 in. more than its width. The perimeter of the rectangle is 24 in. What is the length of the rectangle?

$x + x + 6 + x + x + 6 = 24$



$4x + 12 = 24$

$-12 \quad -12$

$\frac{4x}{4} = \frac{12}{4}$

$x = 3$

Length = 3 + 6 = 9 in

Suppose a video store charges nonmembers $4 to rent each video. A store membership cost $21 and members pay only $2.50 to rent each video. For what number of videos is the cost the same?

Non-Members = Members

Let v = # of videos

$4 \cdot v = 21 + 2.50 \cdot v$

$-2.50v \quad -2.50v$

$\frac{1.50v}{1.50} = \frac{21}{1.50}$

$v = 14$

14 videos

Three friends were born in consecutive years. The sum of their birth years is 5982. Find the year in which each person was born.

$x + x+1 + x+2 = 5982$

Let x = Friend #1

Let $x+1$ = Friend #2

Let $x+2$ = Friend #3

$3x + 3 = 5982$

$-3 \quad -3$

$\frac{3x}{3} = \frac{5979}{3}$

$x = 1993$

$x \rightarrow 1993$

$x+1 \rightarrow 1994$

$x+2 \rightarrow 1995$

The sum of three consecutive odd integers is -87. What are the integers?

$x + x+2 + x+4 = -87$

Let x = 1st #

Let $x+2$ = 2nd #

Let $x+4$ = 3rd #

$3x + 6 = -87$

$-6 \quad -6$

$\frac{3x}{3} = \frac{-93}{3}$

$x = -31$

$x \rightarrow -31$

$x+2 \rightarrow -29$

$x+4 \rightarrow -27$

Joe has been offered two jobs. The first job at Sears pays him \$15 per hour. The other job at Macys pays him \$10 per hour but gave him an initial \$100 signing bonus. Determine when it would be more worthwhile for Joe to take the Sears Job.

Sears = Macys

Let h = # hours working

$15 \cdot h = 10 \cdot h + 100$

$-10h \quad -10h$

$\frac{5h}{5} = \frac{100}{5}$

$h = 20$

Joe should take the Sears job after 20 hours

Hans needs to rent a moving truck. Suppose Company A charges a rate of $40 per day and Company B charges $60 fee plus $20 per day. For what number of days is the cost the same?

A B

Let d = # days

$40 \cdot d = 60 + 20 \cdot d$

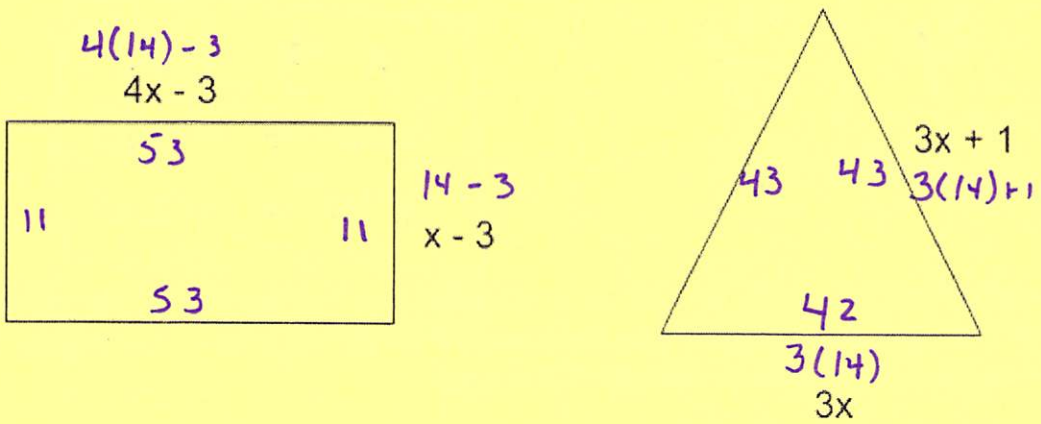
$-20d \quad -20d$

$\frac{20d}{20} = \frac{60}{20}$

$d = 3$

After 3 days the cost will be the same

The perimeters of two gardens are equal. The measures of those gardens are shown below. One garden is a rectangle, the other is an isosceles triangle. Find the perimeters of the gardens.



$x-3 + 4x-3 + x-3 + 4x-3 = 3x + 3x+1 + 3x+1$

$10x - 12 = 9x + 2$

$-9x \quad -9x$

$x - 12 = 2$

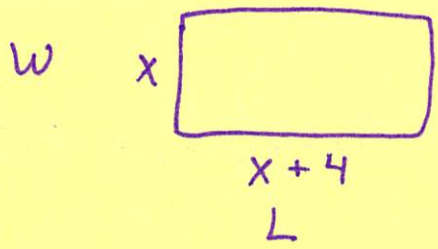
$+12 \quad +12$

$x = 14$

Perimeter of the gardens is 128

The length of a rectangle is 4 centimeters longer than the width. The perimeter of the rectangle is 72 centimeters. Find the dimensions of the rectangle.

$x + x+4 + x + x+4 = 72$



$4x + 8 = 72$

$-8 \quad -8$

$\frac{4x}{4} = \frac{64}{4}$

$x = 16$

Width = x = 16 cm

Length = $x+4$ = 20 cm

Andrea sells cell phones in Canada. She buys them in bulk for $200 a case (10 phones in a case) and must pay a sales tax of 7 ½ %. She is paid a base salary of $2,750 a month plus a ~~20~~ 50% commission on her monthly sales. If she sells phones for $49.99, how many phones must she sell to afford her lifestyle of rent, food, fun and car and insurance totaling around $4,800 monthly.

Let p = # of phones to sell

Expenses Profit

$-(20p + 0.075(20p)) + 2750 + 0.5(49.99p) = 4800$

$-20p - 1.5p + 2750 + 24.995p = 4800$

$3.495p + 2750 = 4800$

$-2750 \quad -2750$

$\frac{3.495p}{3.495} = \frac{2050}{3.495}$

$p = 586.5$

587 phones per month

Two friends go out to eat and order the same meal. They pay a 6% sales tax and a 20% tip on their meals. The total bill, including tax and tip, is $27.72. How much did each meal cost before tax and tip? (Assume that the friends pay a tip on the cost of the meals only.)

Let x = $ spent on a single meal

$$2 \cdot x + 0.06(2x) + 0.2(2x) = 27.72$$

$$2x + 0.12x + 0.4x = 27.72$$

$$\frac{2.42x}{2.42} = \frac{27.72}{2.42}$$

$$x = \$11.45$$

Each meal cost $11.45

A company has 930 total employees. The company has three departments. There is a marketing department, an accounting department, and a human resources department. The number of employees in the accounting department is ten more than three times the number of employees in the human resources department. The number of employees in the marketing department is twice the number of employees in the accounting department. Determine how many employees are in each department.

Accounting → $3x + 10$ (90)

Marketing → $2(3x + 10)$ (90)

HR → x

$$x + 3x + 10 + 2(3x + 10) = 930$$

$$x + 3x + 10 + 6x + 20 = 930$$

$$10x + 30 = 930$$
$$-30 \quad -30$$

$$\frac{10x}{10} = \frac{900}{10}$$

$$x = 90$$

Accounting = 280 people

Marketing = 560 people

HR = 90 people