Solving Word Problems with One Variable

For each word problem, first define the variable with a "let" statement. Then write an equation that models the situation, and then solve.

Eg. 1 Colin ordered 3 pizzas. If he paid $27.00 for the order including a delivery cost $1.50, how much was each pizza?

Let x be the cost of each pizza

$3x + 1.50 = 27$
$3x = 27 - 1.50$
$3x = 25.50$
$x = 8.50$

∴ Each pizza cost $8.50

Eg. 2 Five more than double a number is the same as ten less than triple the number.

Let x be the number.

$2x + 5 = 3x - 10$
$2x - 3x = -10 - 5$
$-x = -15$
$x = 15$

∴ The number is 15.

Eg. 3 A basketball player scores 28 points in a game. She scores 35% of the total team points. How many points does her team score in total?

Let x be the total points her team scores.

35% of $x = 28$
$.35x = 28$
$x = \frac{28}{.35} = 80$

∴ The team's total points is 80.

Eg. 4 Liam sells sandwiches at an arena. He earns $10.50 per hour plus $0.40 for each sandwich he sells. How many sandwiches does he need to sell during a 6-hour shift to earn $125?

Let x be the number of sandwiches he needs to sell.

$6(10.50) + 0.40x = 125$
$63 + 0.40x = 125$
$0.40x = 125 - 63$
$0.40x = 62$

$x = \frac{62}{0.40}$

$x = 155$

∴ He must sell 155 sandwiches.

Eg. 5 The Sun Spa charges annual dues of \$125 plus \$10 per hour to use the facilities. The Moon Spa charges annual dues of \$230 plus \$7 per hour to use the facilities. For what number of hours would the two spas charge the same total amount?

Let x represent the number of hours when the two spas charge the same.

$125 + 10x = 230 + 7x$

$10x - 7x = 230 - 125$

$\frac{3x}{3} = \frac{105}{3}$ $x = 35$

OR

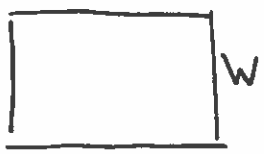
$125 - 230 = 7x - 10x$

$\frac{-105}{-3} = \frac{-3x}{-3}$

$x = 35$

∴ They charge the same amount for 35 hours.

Eg. 6 The perimeter of a rectangle is 58 cm. If the length is 5 cm longer than the width, find the rectangle's dimensions.



$P = 2(l + w)$

Let w be the width of the rectangle then the length is $w+5$

Perimeter: $2(w+5+w) = 58$

$2(2w+5) = 58$

$4w + 10 = 58$

$4w = 58 - 10$

$\frac{4w}{4} = \frac{48}{4}$ $w = 12$

$\therefore l = 12 + 5 = 17$

∴ The width is 12 cm and the length is 17 cm.

Eg. 7 One half of a certain even integer plus one fifth of the next consecutive even integer equals 48. Find the two integers.

Let x represent the first even interger, the next even interger is $x+2$

$\frac{1}{2}x + \frac{1}{5}(x+2) = 48$

Multiply both sides by 10:

$10\left[\frac{1}{2}x + \frac{1}{5}(x+2)\right] = 10(48)$

$5x + 2(x+2) = 480$

$5x + 2x + 4 = 480$

$7x + 4 = 480$

$7x = 480 - 4$

$7x = 476$

$x = \frac{476}{7}$

$x = 68$

$x + 2 = 70$

∴ The two even intergers are 68 and 70.