

2.4 Problem Solving

A. Strategy

1. Rewrite the problem—maybe with a picture—leaving out the useless information.
2. Let x = what you don't know. Then write down as many things as you know about x .

Note: If there are several things you don't know, choose the one you know the **least** about, to be x .

3. Use the list of items to convert the problem statement into an equation.
4. Solve the equation and check it.
5. Answer the original question!

B. Examples

Example 1: An online music supplier charges a \$ 6 flat fee for shipping and handling and \$ 12 per CD. If you have \$ 90, how many CD's can you buy?

Solution

1. \$ 6 =ship fee \$ 12 each CD \$ 90 total

2. Let x =the number of CD's to buy

Thus $12x$ =CD cost

Then $12x + 6$ =total cost

3. $12x + 6 = 90$

$$4. 12x = 84 \Rightarrow x = 7$$

$$(\text{Check: } 12(7) + 6 \stackrel{?}{=} 90 \Rightarrow 84 + 6 \stackrel{?}{=} 90 \quad \checkmark)$$

Ans 7 CD's

Example 2: The bus fare in a city is \$ 1.25. People who use public transportation have the option of purchasing a monthly coupon book for \$ 21.00. With the coupon book, the fare is reduced to \$.50. How many times in a month must the bus be used so that the total monthly cost without the coupon book is the same as the total monthly cost with the coupon book?

Solution

1. Bus Fare= \$ 1.25 [no coupon book]

Coupon Book= \$ 21.00 [per month]

Bus Fare with coupon book= \$.50.

2. Let x =number of times to ride the bus

Cost (no coupon)= \$ $1.25x$

Cost (coupon)= \$ $.50x + 21.00$

3. Want $1.25x = .50x + 21.00$

$$4. .75x = 21 \Rightarrow x = \frac{21}{.75} = 21 \cdot \frac{4}{3} = 28 \quad (\text{Check: } 1.25(28) \stackrel{?}{=} .50(28) + 21\checkmark)$$

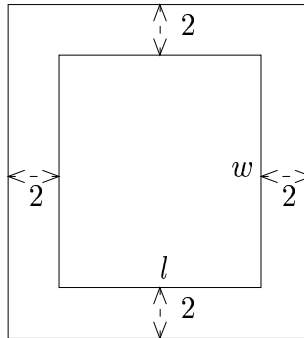
Ans 28 times

Unless you ride almost every day, you are wasting your money with the coupon book.

Example 3: A gardener has 96 feet of fencing to enclose a rectangular garden and a 2-foot wide surrounding border. If the length of the garden is 3 times its width, what are the dimensions?

Solution

1. 96 feet of fencing . . . Draw a picture



2. Let $x = w$

Then $l = 3x$

Now the perimeter of the garden is:

$$(w + 4) + (l + 4) + (w + 4) + (l + 4) = 2w + 2l + 16.$$

3. Thus $2(x) + 2(3x) + 16 = 96$

4. $2x + 6x + 16 = 96 \Rightarrow 8x + 16 = 96 \Rightarrow 8x = 80 \Rightarrow x = 10.$

5. Answer the question! Now $w = x = 10$ and $l = 3(10) = 30.$

Ans 10 feet by 30 feet