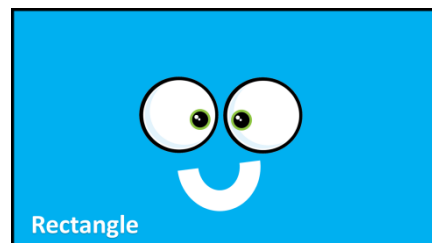

PERIMETER OF A RECTANGLE

□ INTRODUCTION

We need only a couple of things to review in order to work this chapter's problems.

First, recall that the ***perimeter*** of a rectangle — being that it's the distance all the way around the rectangle — consists of adding together the two lengths and the two widths:



If l is the length of a rectangle and w is its width, then its perimeter is given by the formula

$$P = 2l + 2w$$

Note that, using the Distributive Property, we can also write the perimeter as $P = 2(l + w)$.

Second, we need to be able to translate some English phrases and equalities to Algebra:

$$4 \text{ more than } x \Rightarrow x + 4$$

$$7 \text{ less than } w \Rightarrow w - 7$$

$$3 \text{ more than } 8 \text{ times } y \Rightarrow 8y + 3$$

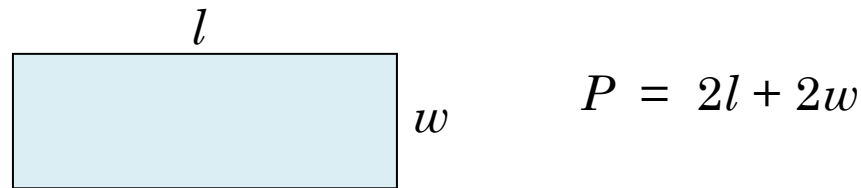
$$13 \text{ less than } 5 \text{ times } z \Rightarrow 5z - 13$$

$$\text{The length is 4 more than 6 times the width} \Rightarrow l = 6w + 4$$

$$\text{The width is 5 less than twice the length} \Rightarrow w = 2l - 5$$

EXAMPLE 1: The length of a rectangle is 4 less than 3 times its width. If the perimeter is 32, find the dimensions of the rectangle.

Solution: Ignoring details for a moment, we see that the problem is talking about the perimeter of a rectangle:



Since the length is 4 less than 3 times the width, we can write

$$l = 3w - 4$$

We also know that the perimeter is 32; that is, $P = 32$. Thus, the general formula

$$P = 2l + 2w$$

becomes

$$32 = 2 \boxed{(3w - 4)} + 2w \quad (\text{since } P = 32 \text{ and } l = 3w - 4)$$

$$\Rightarrow 32 = 6w - 8 + 2w \quad (\text{distribute})$$

$$\Rightarrow 32 = 8w - 8 \quad (\text{combine like terms})$$

$$\Rightarrow 40 = 8w \quad (\text{add 8 to each side})$$

$$\Rightarrow w = \mathbf{5} \quad (\text{divide each side by 8})$$

$$\begin{aligned}\Rightarrow \quad \text{length} &= 3w - 4 \\ &= 3(\mathbf{5}) - 4 \\ &= \mathbf{15} - 4 \\ &= \mathbf{11}\end{aligned}$$

Therefore, the dimensions of the rectangle are 11 by 5

Homework

1. The length of a rectangle is 30 more than 2 times the width. If the perimeter is 66, find the dimensions of the rectangle.
2. Find the dimensions of a rectangle with a perimeter of 44 if its length is 6 more than 3 times its width.
3. The width of a rectangle is 23 less than 2 times the length. If the perimeter is 62, find the dimensions of the rectangle.
4. The width of a rectangle is 18 less than 2 times the length. If the perimeter is 48, find the dimensions of the rectangle.
5. Find the dimensions of a rectangle with a perimeter of 42 if its width is 15 less than 2 times its length.
6. The width of a rectangle is 26 less than 3 times the length. Find the dimensions of the rectangle if its perimeter is 28.
7. The length of a rectangle is 539 less than 6 times its width. If the perimeter is 2254, find the dimensions of the rectangle.
8. The length of a rectangle is 30 more than 5 times the width. If the perimeter is 120, find the dimensions of the rectangle.

Solutions

- | | | | |
|-------------------|-------------------|----------------------|--------------------|
| 1. 32 by 1 | 2. 18 by 4 | 3. 18 by 13 | 4. 14 by 10 |
| 5. 12 by 9 | 6. 10 by 4 | 7. 889 by 238 | 8. 55 by 5 |

“They cannot
stop me. I will
get my
education,
if it is in the
home, school, or anyplace.”



Malala Yousafzai