
AREA OF A RECTANGLE

EXAMPLE:

The length of a rectangle is 6 less than 4 times its width. If the area is 18, find the dimensions of the rectangle.



Solution: Letting w represent the width of the rectangle, the length l must be $l = 4w - 6$. We'll start our solution with the formula for the area of a rectangle, $A = lw$, substitute the given area of 18 for A , and substitute the expression $4w - 6$ for l .

$$A = lw \quad (\text{Area} = \text{length} \times \text{width})$$

$$\Rightarrow 18 = (4w - 6)w \quad (\text{substitute } 18 \text{ for } A \text{ and } 4w - 6 \text{ for } l)$$

$$\Rightarrow 18 = w(4w - 6) \quad (\text{turn the factors around})$$

$$\Rightarrow 18 = 4w^2 - 6w \quad (\text{distribute . . . look, it's quadratic!})$$

$$\Rightarrow 0 = 4w^2 - 6w - 18 \quad (\text{bring all terms to same side})$$

$$\Rightarrow 4w^2 - 6w - 18 = 0 \quad (\text{turn it around for standard form})$$

$$\Rightarrow \frac{4w^2 - 6w - 18}{2} = \frac{0}{2} \quad (\text{divide each side by } 2)$$

$$\Rightarrow 2w^2 - 3w - 9 = 0$$

$$\Rightarrow (2w + 3)(w - 3) = 0$$

$$\Rightarrow 2w + 3 = 0 \quad \text{OR} \quad w - 3 = 0$$

$$\Rightarrow w = -\frac{3}{2} \quad \text{OR} \quad w = 3$$

We must discard the first solution (because a width cannot be negative) and thus take the width to be **3**. The length is found as follows:

$$l = 4w - 6 = 4(\mathbf{3}) - 6 = 12 - 6 = \mathbf{6}$$

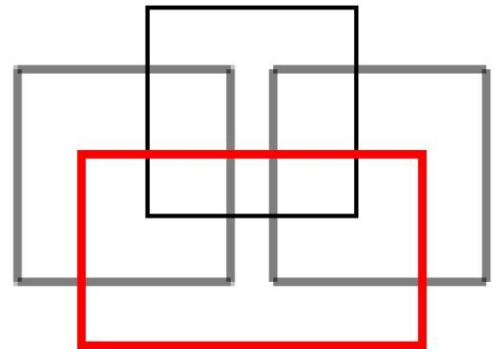
The dimensions of the rectangle are therefore

$$6 \times 3$$

Let's make sure these are the correct dimensions. First, is the length equal to 6 less than 4 times the width? $4w - 6 = 4(\mathbf{3}) - 6 = 6$, which is the length. Second, is the area of the rectangle 18? Of course: $6 \times 3 = 18$.

Homework

1. The length of a rectangle is 3 more than twice its width. If the area is 65, find the dimensions of the rectangle.
2. The length of a rectangle is 2 less than 10 times its width. If the area is 36, find the dimensions of the rectangle.
3. The length of a rectangle is 1 more than its width. If the area is 156, find the dimensions of the rectangle.
4. The length of a rectangle is 11 less than 3 times its width. If the area is 190, find the dimensions of the rectangle.
5. The length of a rectangle is 12 less than twice its width. If the area is 144, find the dimensions of the rectangle.



6. The length of a rectangle is 9 more than 10 times its width. If the area is 19, find the dimensions of the rectangle.

Solutions

1. 13×5

2. 18×2

3. 13×12

4. 19×10

5. 12×12

6. 19×1

*“Knowledge is the
eye of desire
and can become the
pilot of the soul.”*

WILL DURANT