

## STUDY GUIDE: Area & Perimeter with Rectangles



*Left: A square with side length  $l$ ; Right: a rectangle with side lengths  $l$  and  $w$ .*

**RECALL:** The definition of the terms *Perimeter* and *Area*.

- **Perimeter:** The total length of the outside border of a 2D shape or face, measured in *units*.
- **Area:** The measurable space **inside** of a 2D shape or face, measured in sq. units, or *units*<sup>2</sup> (read as “units squared”).

Knowing this, we have the following formulas for *area* and *perimeter*.

**Perimeter:** Since a rectangular prism has two  $l$ -length sides and two  $w$ -length sides, we can say its perimeter formula is:

1.  $P = l + l + w + w$
2.  $P = (2 \times l) + (2 \times w)$

And if we manipulate this a little, using *the distributive property*,

3.  $P = 2 \times (l + w)$

This gives us **three** choices for perimeter. The most straightforward formula is the first, but you will often see the second formula. However, in my opinion, the third formula is the fastest. **You must decide which is the best formula to use.** Also, since a **square** has **four equal sides**, or four  $l$  length, its perimeter is:

$$P_{\text{square}} = l + l + l + l = 4 \times l$$

**Area:** Think of area as “stretching” a length into the 2<sup>nd</sup> dimension to give it a width. You can also think of this as “stacking” lengths on top of each other.

As a result of “stretching” or “stacking” the length  $l$  over and over  $w$  times, we get the beautiful formula:

$$A = l \times w$$

*Example 1:* Find the perimeter and area of the following rectangle.



$$w = 1\frac{1}{4}$$

$$l = 5\frac{1}{3}$$

**Perimeter:** For the perimeter of this shape, we'll use  $P = 2 \times (l + w)$ .

$$P = 2 \times \left(5\frac{1}{3} + 1\frac{1}{4}\right)$$

$$P = 2 \times \left(5\frac{4}{12} + 1\frac{3}{12}\right)$$

$$P = 2 \times \left(6\frac{7}{12}\right)$$

Now this is where things get ✨ beautiful!!! ✨ Using distribution, I can distribute the 2 across terms being added in the parenthesis... but where is the addition? **Between the whole number component and fraction component!** We have two options to solve this problem as a result, one with distribution, and one without. Both are below:

Without Distribution (Improper Fractions):

$$P = 2 \times \left(\frac{16}{3} + \frac{5}{4}\right)$$

$$P = 2 \times \left(\frac{64}{12} + \frac{15}{12}\right)$$

$$P = 2 \times \left(\frac{79}{12}\right)$$

$$P = \frac{158}{12} \text{ OR } 13\frac{2}{12} \text{ OR } 13\frac{1}{6}$$

With Distribution:

$$P = 2 \times \left(6 + \frac{7}{12}\right)$$

$$P = (2 \times 6) + \left(2 \times \frac{7}{12}\right)$$

$$P = 12 + \frac{14}{12}$$

$$P = 13\frac{2}{12} \text{ OR } 13\frac{1}{6}$$



Name: \_\_\_\_\_ Date: \_\_\_\_\_ Section: 5\_\_

5. A rectangle with a length of  $2\frac{1}{4}$  m and a width of  $3\frac{3}{8}$  m.

6. A rectangle with a length of  $12\frac{4}{5}$  cm and a width of  $9\frac{1}{3}$  cm.

Find the **missing length**.

7. A rectangle has an area of  $18.75 \text{ u}^2$  and a length of  $1.5 \text{ u}$ . What is its width?

8. A rectangle has an area of  $24.42 \text{ u}^2$  and a width of  $3.3 \text{ u}$ . What is its length?

9. A rectangle has an area of  $\frac{1}{8} u^2$  and a length of  $\frac{1}{2} u$ . What is its width?

10. A rectangle has an area of  $\frac{1}{5} u^2$  and a width of  $\frac{1}{3} u$ . What is its length?

Find the **area and perimeter** of *each* rectangular prism below.

11.



$$w = 2\frac{1}{8}$$

$$l = 4\frac{2}{5}$$

12.



$$w = 5.8$$

$$l = 3.15$$

### Word Problems and Critical Thinking

13. Laura is painting a wall that is 15.5m long by 6.5m tall. The largest paint cans she can buy cover 35 square meters. If she bought enough paint to completely cover the wall (and cannot buy a “partial” paint can), how many cans did she buy?

14. A brand-new sign is being built to showcase the school’s achievements. A fancy frame is being created to make the sign look pretty. The sign is  $12\frac{3}{4}$ ft by  $8\frac{1}{4}$ ft, **but the frame must be a  $\frac{1}{2}$ ft longer on each side.** What is the length of the frame around the sign?

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Section: 5\_\_