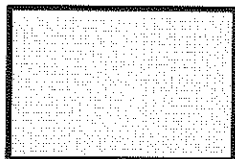


G3-M4-Lesson 11

1. The rectangles below have the same area. Move the parentheses to find the unknown side lengths. Then, solve.

a. 6 cm

4 cm



Area: $4 \times 6 = 24$

Area: 24 sq cm

I can multiply the side lengths to find the area.

b.

12 cm
2 cm



Area: $4 \times 6 = (2 \times 2) \times 6$
 $= 2 \times (2 \times 6)$
 $= 2 \times 12$
 $= 24$
 Area: 24 sq cm

I can move the parentheses to be around 2×6 . After I multiply 2×6 , I have new side lengths of 2 cm and 12 cm. I can label the side lengths on the rectangle. The area didn't change; it's still 24 sq cm.

2. Does Problem 1 show all the possible whole number side lengths for a rectangle with an area of 24 square centimeters? How do you know?

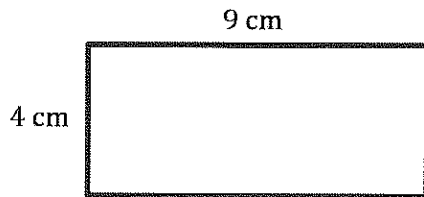
No, Problem 1 doesn't show all possible whole number side lengths. I check by trying to multiply each number 1 through 10 by another number to equal 24. If I can find numbers that make 24 when I multiply them, then I know those are possible side lengths.

I know $1 \times 24 = 24$. So 1 cm and 24 cm are possible side lengths. I already have a multiplication fact for 2, 2×12 . I know $3 \times 8 = 24$, which means $8 \times 3 = 24$. I already have a multiplication fact for 4, 4×6 . That also means that I have a fact for 6, $6 \times 4 = 24$. I know there's not a whole number that can be multiplied by 5, 7, 9, or 10 that equals 24. So besides the side lengths from Problem 1, other ones could be 1 cm and 24 cm or 8 cm and 3 cm.

I know that I can't have side lengths that are both two-digit numbers because when I multiply 2 two-digit numbers, the product is much larger than 24.

3.

- a. Find the area of the rectangle below.



$$\text{Area} = 4 \times 9$$

$$= 36$$

The area of the rectangle is 36 square centimeters.

- b. Marcus says a 2 cm by 18 cm rectangle has the same area as the rectangle in part (a). Place parentheses in the equation to find the related fact and solve. Is Marcus correct? Why or why not?

$$2 \times 18 = 2 \times (2 \times 9)$$

$$= (2 \times 2) \times 9$$

$$= 4 \times 9$$

$$= 36$$

Area: 36 sq cm

Yes, Marcus is correct because I can rewrite 18 as 2×9 . Then I can move the parentheses so they are around 2×2 . After I multiply 2×2 , I have 4 cm and 9 cm as side lengths, just like in part (a).

$$2 \times 18 = 4 \times 9 = 36$$

Even though the rectangles in parts (a) and (b) have different side lengths, the areas are the same. Rewriting 18 as 2×9 and moving the parentheses helps me to see that $2 \times 18 = 4 \times 9$.

- c. Use the expression
- 4×9
- to find different side lengths for a rectangle that has the same area as the rectangle in part (a). Show your equations using parentheses. Then, estimate to draw the rectangle and label the side lengths.

$$4 \times 9 = 4 \times (3 \times 3)$$

$$= (4 \times 3) \times 3$$

$$= 12 \times 3$$

$$= 36$$

Area: 36 sq cm

I can rewrite 9 as 3×3 . Then I can move the parentheses and multiply to find the new side lengths, 12 cm and 3 cm. I can estimate to draw the new rectangle. If I need to, I can use repeated addition, $12 + 12 + 12$, to double check that $12 \times 3 = 36$.

