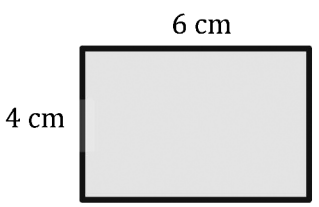
1. The rectangles below have the same area. Move the parentheses to find the unknown side lengths. Then, solve.

a.

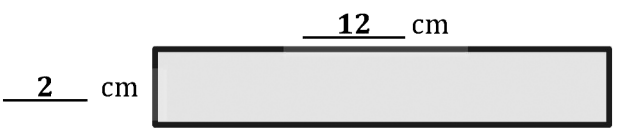


Area: $4 \times$ __6__ $=$ __24__

Area: __24__ sq cm

I can multiply the side lengths to find the area.

b.



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?

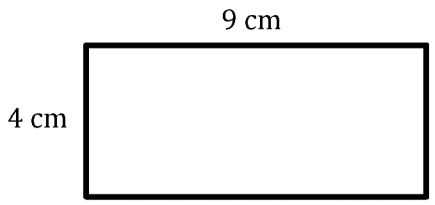
No, Problem 1 doesn't show all possible whole number side lengths. I check by trying to multiply each number 1 through 10 by another number to equal 24. If I can find numbers that make 24 when I multiply them, then I know those are possible side lengths.

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.



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.

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

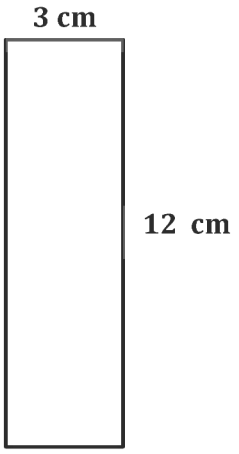
$= (4 \times 3) \times 3$

$= 12 \times 3$

$= 36$

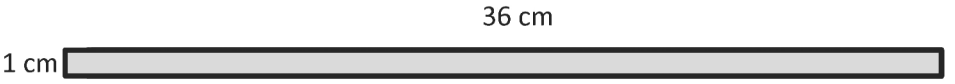
Area: **36 sq cm**

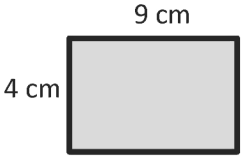
I can rewrite 9 as 3×3. Then I can move the parentheses and multiply to find the new side lengths, 12 cm and 3 cm. I can estimate to draw the new rectangle. If I need to, I can use repeated addition, $12 + 12 + 12$, to double check that $12 \times 3 = 36$.



Name _____ Date _____

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





b. Area: 1 × 36 = _____

Area: _____ sq cm

a. Area: 4 × _____ = _____

Area: _____ sq cm

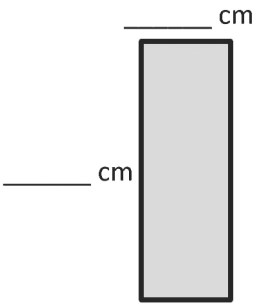
c. Area : $4 \times 9 = (2 \times 2) \times 9$

$= 2 \times 2 \times 9$

= _____ × _____

= _____

Area: _____ sq cm



d. Area : $4 \times 9 = 4 \times (3 \times 3)$

$= 4 \times 3 \times 3$

= _____ × _____

= _____

Area: _____ sq cm

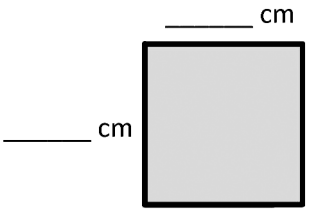
e. Area : $12 \times 3 = (6 \times 2) \times 3$

$= 6 \times 2 \times 3$

= _____ × _____

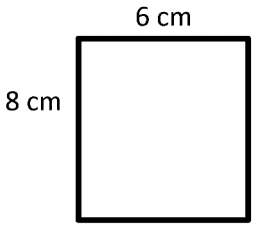
= _____

Area: _____ sq cm



2. Does Problem 1 show all the possible whole number side lengths for a rectangle with an area of 36 square centimeters? How do you know?

3. a. Find the area of the rectangle below.



b. Hilda says a 4 cm by 12 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 Hilda correct? Why or why not?

$4 \times 12 = 4 \times 2 \times 6$

$= 4 \times 2 \times 6$

= _____ × _____

= _____

Area: _____ sq cm

c. Use the expression 8 × 6 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.