Decomposing for Area and Perimeter

5th Grade CST: NS1.4	4th Grade CST: AF1.4
13) Which of the following shows the number 60 factored into prime numbers?	**49)** Which equation below represents the area *(A)* of the rectangle in square centimeters?
A) 2 ! 30	
B)	
C) × ×	**A)** = ×
D) × × ×	**B)** 45×9
	C) = × + ×
	D)

Answer Key

5th

Decomposing for Area and Perimeter

Level: 4th Grade

Measurement and Geometry Standard Set 1.0	
Students understand perimeter and area.	
4MG1.2	Recognize that rectangles that have the same area can have different perimeters.
4MG1.3	Understand that rectangles that have the same perimeter can have different areas.
4MG1.4	Understand and use formulas to solve problems involving perimeters and areas of rectangles and squares. Use those formulas to find the areas of more complex figures by dividing the figures into basic shapes.

Measurement and Geometry Standard Set 3.0
Students demonstrate an understanding of plane and solid geometric objects and use this

Area: the two-dimensional measurement of space within a perimeter (or circumference). Area of a rectangle can be determined by multiplying its base by its height *(use multiplication chart or arrays to reinforce two dimensions).*

Discuss with students 'base x height' vs 'length x width' (which will be seen in texts and on assessments). 'Base x height' is the preferred terminology for area; this differentiates between finding area and finding volume, when the formula 'base x height x width' is used.

The area of this rectangle is $6 \text{ units} \times 4 \text{ units} = 24 \text{ units squared}$, or 24 square units.

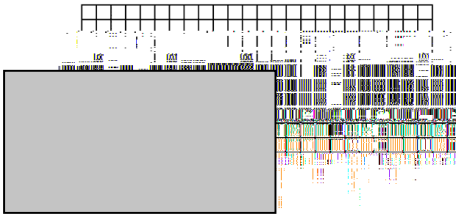
Congruent ( ): two geometric figures that have the same size (=) and shape (~).

The

of 6?" [Yes, 2 x 3] "Now multiply the rest of the factors together to get the height for a rectangle with an area of 24 square units."

! ! !

"What is the area of this rectangle?" [24 square units.] "What is the perimeter of this rectangle?" [20 units.]



Continue following these orderly steps until all possible rectangle dimensions are found—see rectangles below.

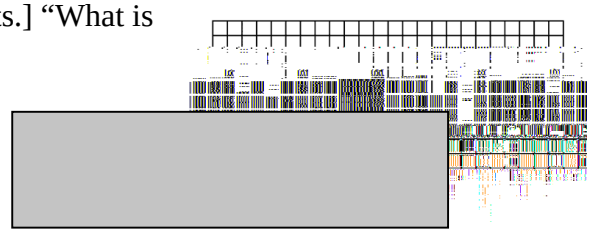
$$(2 \cdot 2 \cdot 2)(1 \cdot 3) = 24$$

$$\text{Area } (8 \text{ units})(3 \text{ units}) = 24 \text{ square units}$$

$$P = 8 \text{ units} + 8 \text{ units} + 3 \text{ units} + 3 \text{ units}$$

$$P = 22 \text{ units}$$

"What is the area of this rectangle?" [24 square units.] "What is the perimeter of this rectangle?" [22 units.]



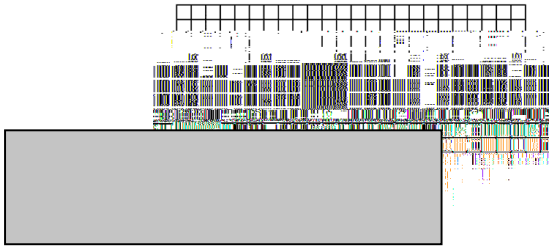
(! !)(!) =

( )( ) =

P 12 units 12 units 2 units 2 units

P 28 units

"Area?" [24 square units.] "Perimeter?" [28 units.]

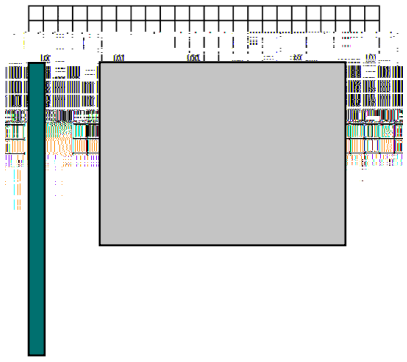


$$(2 ! 2 ! 2 ! 3)(1) = 24$$

$$\text{Area } (24 \text{ units})(1 \text{ unit}) = 24 \text{ square units}$$

“Area?” [24 square units.] “Perimeter?” [50 units.]

“Since we have a factor of 1 for our height, kept numeric order, and used all factors in each



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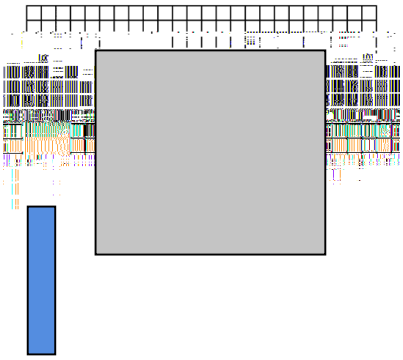


P = 4 units + 4 units + 5 units + 5 units

P = 18 units

A = 20 square units, P = 18 units

5 1!2!2 20

Area 5 units 4 units 20 square units

P = 5 units + 5 units + 4 units + 4 units

P = 18 units

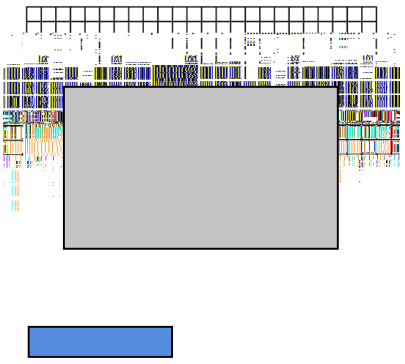
A = 20 square units, P = 18 units

(·)(·) =

( )( ) =

P = 10 units + 10 units + 2 units + 2 units

P = 24 units



A = 20 square units, P = 24 units

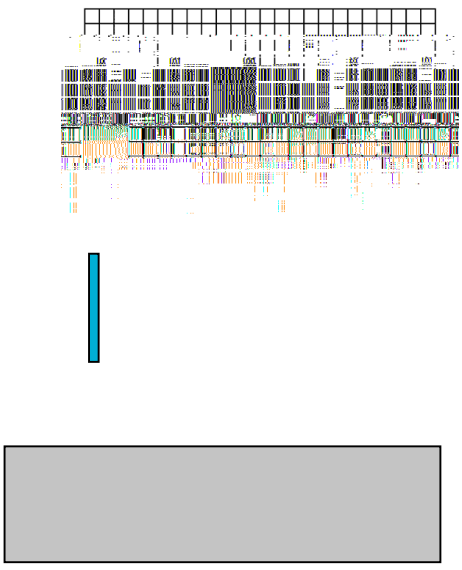
$$(2 \cdot 2 \cdot 5)(1) = 20$$

$\text{Area } (20 \text{ units})(1 \text{ unit}) = 20 \text{ square units}$

$P = 20 \text{ units} + 20 \text{ units} + 1 \text{ unit} + 1 \text{ unit}$

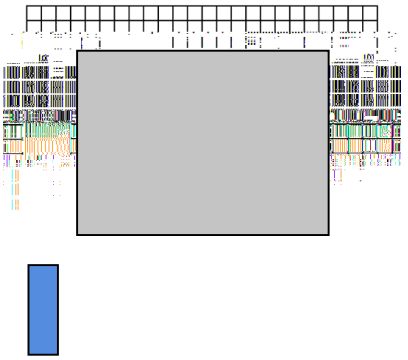
$P = 42 \text{ units}$

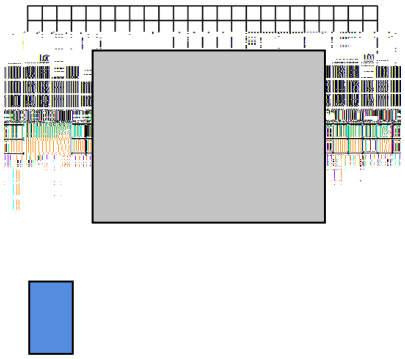
$A = 20 \text{ square units}, P = 42 \text{ units}$



“Remember to keep numeric order and you will be able to find all the (whole number) different dimensions for a rectangle with a perimeter of 16.”

Ask students to discuss amongst themselves if it is possible for a rectangle to have fractions/decimals as its dimensions; support and give examples. [Yes; sample response: 4.25 inches for the base and 5.5 inches for the height.] Confirm this with students, and share that since the standard for 4th grade regards whole numbe





Have students discuss the relationship and the patterns they see in the rectangles; make and display posters. While working in groups of 2 or 3, challenge them to come up with different ways to write the perimeter and share their ideas.

[P = 2(b) + 2(h); P = 2 (b + h)]

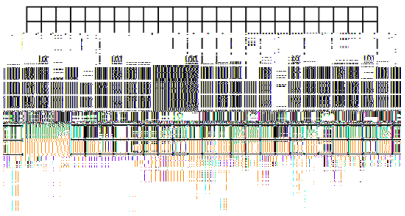
Discuss the perimeter formula. Have students use the perimeter formula for all the rectangles.

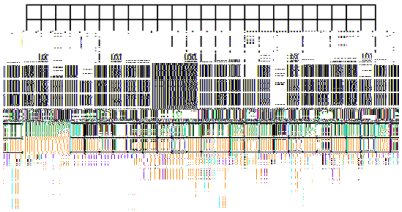
Perimeter Solutions:

= ( )+ ( )

= +

=





$P_2 = 14$ units

$P_2 = 4$ units $+ 10$ units

$P_2 = 2$ units $+ 2$ units $+ 5$ units $+ 5$ units

$A_2 = 2$ units $\cdot 5$ units

$A_2 = 10$ units squared

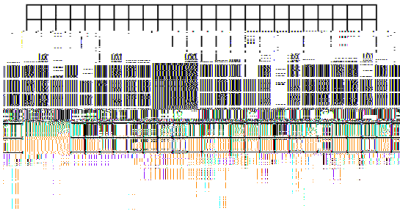
4 units

A 12 units squared

P_6 14 units

P_6 12 units 2 units

P_6 6 units 6 units 1 unit 1 unit



A_6 6 units $\cdot$ 1 unit

A_6 6 units squared

Perimeter Solutions

( ) ( )

units