

activity sheet 1

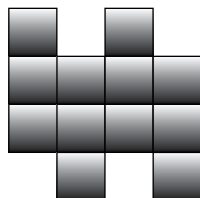
Name _____

AREA AND PERIMETER

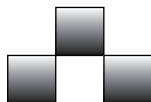
1. Use 12 tiles. Keeping in mind that each tile is a square unit, make as many different rectangles with the tiles as possible, each with an area of 12 square units.
2. Sketch the figures on a separate piece of graph paper, and label each figure with its perimeter. Number the figures, beginning with 1.
3. Complete the table below.

Figure Number	Area in Square Units	Perimeter in Units	Ratio of Perimeter to Area (P/A)	Ratio in Decimal Form
1				
2				
3				

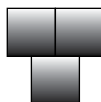
4. Use 12 square unit tiles and make 6 *different* nonrectangular shapes. See the figure below for an example. When creating nonrectangular shapes, notice that the tiles are joined edge to edge.



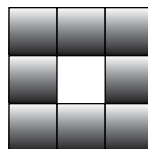
The following figures are not allowed: Tiles that only touch at the corners (a), a tile that overlaps two other tiles (b), and tiles that produce a figure with an open space (c).



(a)



(b)



(c)

activity sheet 1 *(continued)*

Name _____

5. Sketch and number the figures on a piece of graph paper, and label each one with its perimeter.

6. Use the table below to enter the data and complete the calculations.

Figure Number	Area in Square Units	Perimeter in Units	Ratio of Perimeter to Area (P/A)	Ratio in Decimal Form
Example from question 4	12	20	20/12	1.66

7. Begin with a 4×3 rectangle. What happens to the perimeter when you shift 1 tile to another column?

8. Which nonrectangular figure has the smallest perimeter? Which nonrectangular figure has the largest perimeter?

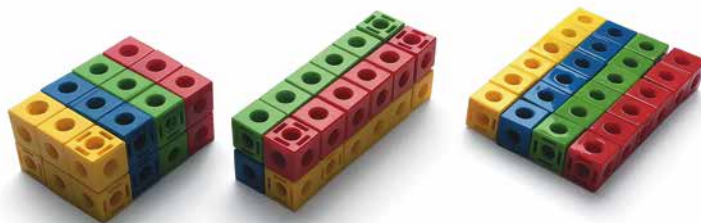
9. Is there any relationship between the number of exposed edges and the length of the perimeter?

activity sheet 2

Name _____

VOLUME AND SURFACE AREA

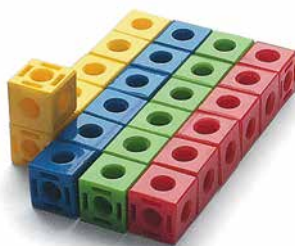
1. Use 24 cubes and make as many different rectangular prisms as possible with a volume of 24 cubic units. Each cube has a volume of 1 cubic unit. Sample prisms are shown below.



2. Use the table below to enter the data and complete the calculations for each shape you build.

	Number of Units						
Figure	Width	Length	Height	Surface Area (SA) in Square Units	Volume (V) in Cubic Units	SA/V Ratio	SA/V Ratio in Decimal Form
$3 \times 4 \times 2$	3	4	2	52	24	52/24	2.16

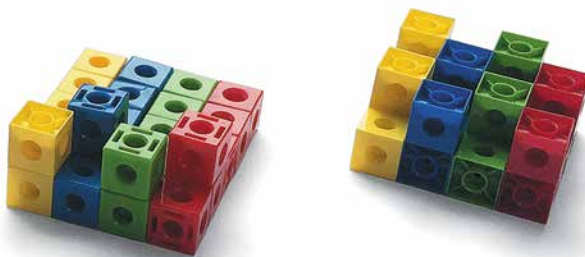
3. Use a $4 \times 6 \times 1$ shape and move 1 corner cube from the first layer to the second layer. See the figure below for an example. Notice that the volume stays the same. By how much did the surface area change from the $4 \times 6 \times 1$ prism's surface area?



activity sheet 2 *(continued)*

Name _____

4. Using the $4 \times 6 \times 1$ rectangular prism, continue to move cubes to the second layer. The faces of the cubes in the second layer should not be touching (only the edges of the cubes can touch). Two examples are shown below. Calculate the new surface area by moving 2, 3, 4, 5, 6, 7, and 8 cubes from the first layer. Record your findings in the table below.



Number of Cubic Units Moved	Surface Area (in Sq. Units)	Surface Area/Volume Ratio
0	68	68/24
1		
2		
3		
4		
5		
6		
7		

5. Which shape has the smallest surface area? Which shape has the largest surface area?

6. Identify mathematical patterns you notice in the data set.

Modeling the Shapes of Cells

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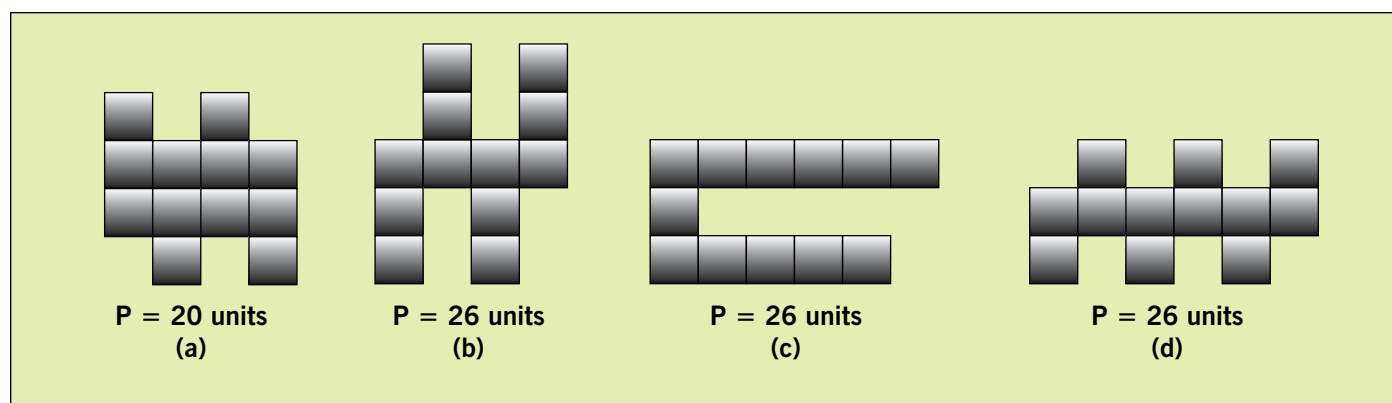
(continued from pp. 180–88)

ACTIVITY SHEET 1: AREA AND PERIMETER

- Three different noncongruent rectangles can be made with 12 tiles: 1×12 , 2×6 , 3×4 .
- A 1×12 rectangle has a perimeter of 26 units, a 2×6 rectangle has a perimeter of 16 units, and a 3×4 rectangle has a perimeter of 14 units.
-

Figure Number and Dimensions	Area in Square Units	Perimeter in Units	Ratio of Perimeter to Area (P/A)	Ratio in Decimal Form (rounded to hundredths)
1 (1×12)	12	26	$26/12$	2.17
2 (2×6)	12	16	$16/12$	1.33
3 (3×4)	12	14	$14/12$	1.17

- Answers will vary.
- Some examples are shown.



6. Answers will vary. Examples from question 5 are shown in the table.

Figure Number	Area in Square Units	Perimeter in Units	Ratio of Perimeter to Area (P/A)	Ratio in Decimal Form (Rounded to Hundreths)
(a)	12	20	20/12	1.66
(b)	12	26	26/12	2.17
(c)	12	26	26/12	2.17
(d)	12	26	26/12	2.17

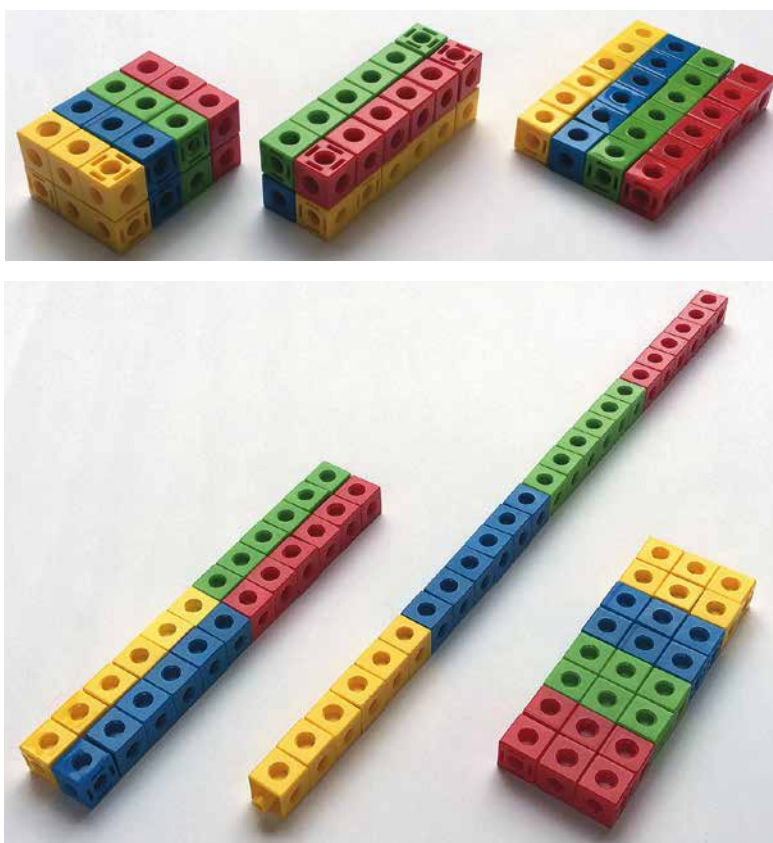
7. Possible answers: The perimeter increases by 2.

8. Answers will vary.

9. Possible answer: For each edge exposed, there is an increase in perimeter.

ACTIVITY SHEET 2: VOLUME AND SURFACE AREA

1. Six different noncongruent rectangular prisms can be made with 24 cubes.



2.

	Number of Units						
Figure	Width	Length	Height	Surface Area (SA) in Square Units	Volume (V) in Cubic Units	SA/V Ratio	SA/V Ratio in Decimal Form (rounded to hundredths)
$3 \times 4 \times 2$	3	4	2	52	24	52/24	2.16
$2 \times 6 \times 2$	2	6	2	56	24	56/24	2.33
$4 \times 6 \times 1$	4	6	1	68	24	68/24	2.83
$2 \times 12 \times 1$	2	12	1	76	24	76/24	3.17
$1 \times 24 \times 1$	1	24	1	98	24	98/24	4.08
$3 \times 8 \times 1$	3	8	1	70	24	70/24	2.92

3. The surface area increased by 2 square units.

4.

Number of Cubic Units Moved	Surface Area (Sq. Unit)	Surface Area/Volume Ratio
0	68	68/24
1	70	70/24
2	72	72/24
3	74	74/24
4	76	76/24
5	78	78/24
6	80	80/24
7	82	82/24
8	84	84/24

5. Possible answer: When one cubic unit is relocated, the surface area has the least surface area. When 8 cubic units are relocated, the figure has the most surface area.

6. Possible answers: The surface area increases by 2 for each cube relocated. $S = 68 + 2 \times x$ is the amount of surface area and x is the number of cubes relocated. The only numbers allowed for x are the whole numbers from 0 to 8.