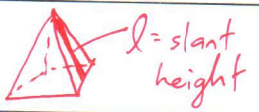
GEOMETRY 11

Name: Key Date:_____ Period:_____

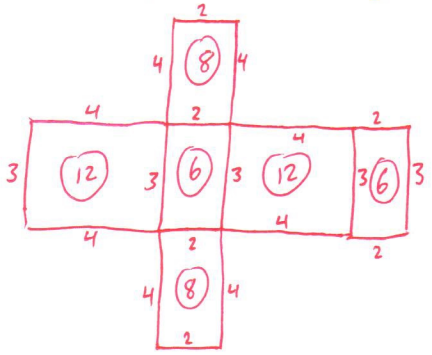
SECTION 11.7 SURFACE AREA AND NETS

VOCABULARY

DEFINITION	EXAMPLE
Surface area: area needed to cover the surface of a three-dimensional figure	
Lateral surface area: sum of the areas of the non-base sides	
Total surface area: lateral surface area + surface area of bases	
Nets: "flattened" exterior of a three-dimensional figure	
Slant Height: the height of a side of a pyramid (not the height of the pyramid)	

Big Idea: How do we find surface area of prisms and pyramids?

Draw a net for a rectangular prism with side lengths of 2 x 3 x 4 units, and find the surface area.



$6+6+8+8+12+12$

Surface area = 52 units^2

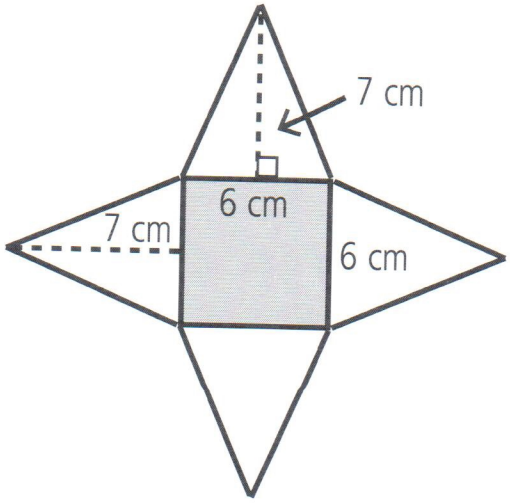
Can you determine a pattern, or formula, that can be used to determine the surface area of a rectangular prism? How will this be different for a cube?

$2lw + 2wh + 2lh$ = Surface area of a rectangular prism

cube: $6s^2$

EXPLORATION 1

Find the surface area of the square pyramid by examining the net for the pyramid given below.



Determine

slant height (L) = 7 cm

area of base (B) = $6 \cdot 6 = 36\ cm^2$

area of lateral faces = $84\ cm^2$

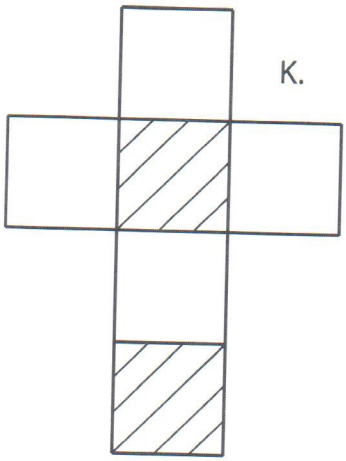
Total surface area = $120\ cm^2$

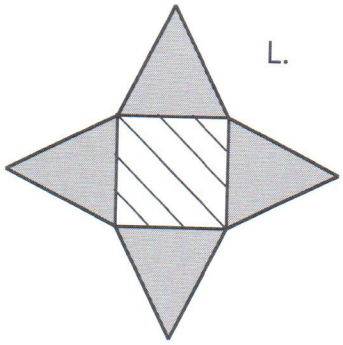
area of one lateral face = $\frac{1}{2} \cdot 6 \cdot 7$

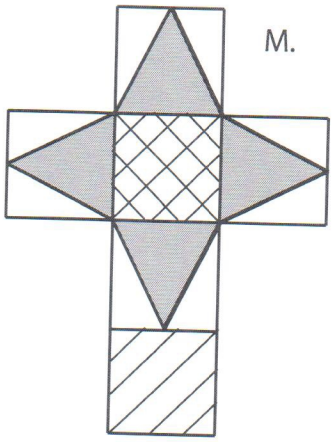
$= 21\ cm^2$

EXPLORATION 2

Below are two nets, a net of a cube and a net of a square pyramid. Using the formula for the total surface area of a prism, which is $S = 2B + Ph$, can you create a formula to calculate the surface area of a pyramid?







A. What is different about nets K and L?

K: 2 bases, 4 square sides

L: 1 base, 4 triangular sides

B. What is similar about nets K and L?

share a base & number of sides

C. Figure M. shows Net K combined with Net L. What is the relationship between their areas?

Area of L < Area of K

D. How can we change the formula for the surface area of a cube to find the surface area of the square pyramid?

cube: 2(bases) + 4(lateral sides)

pyramid: 1(base) + 4(triangular lateral sides)

Area = $\frac{1}{2}bh$

$= \frac{1}{2}s^2$

Area of this square pyramid = $s^2 + 4(\frac{1}{2}s^2) = 3s^2$

In general: $S = B + \frac{1}{2}Pl$ where P is the perimeter of the base of the pyramid

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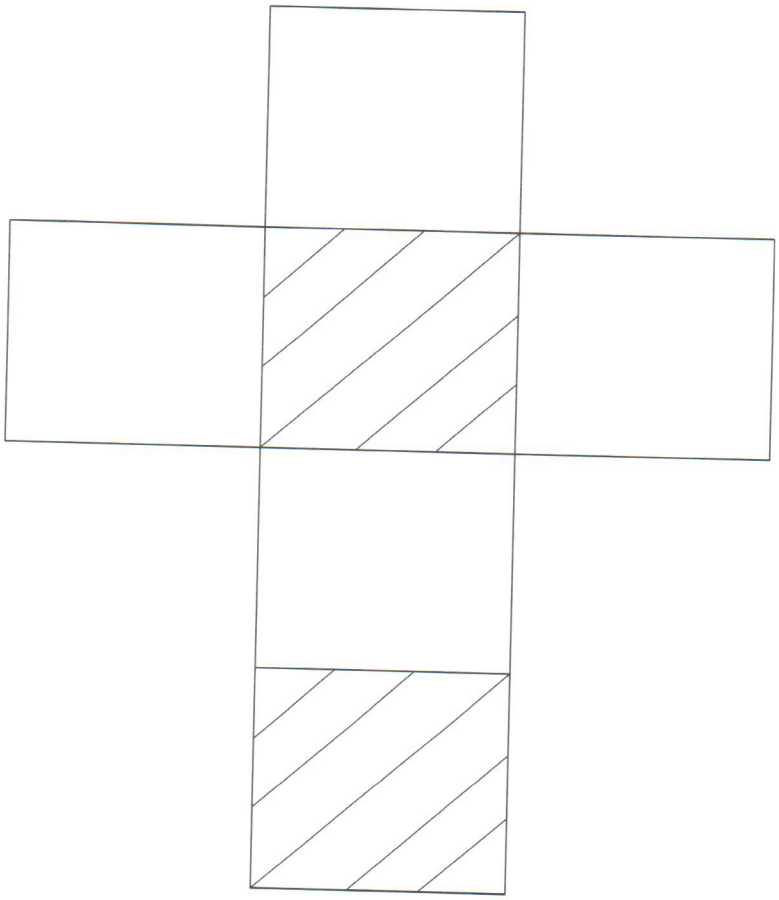

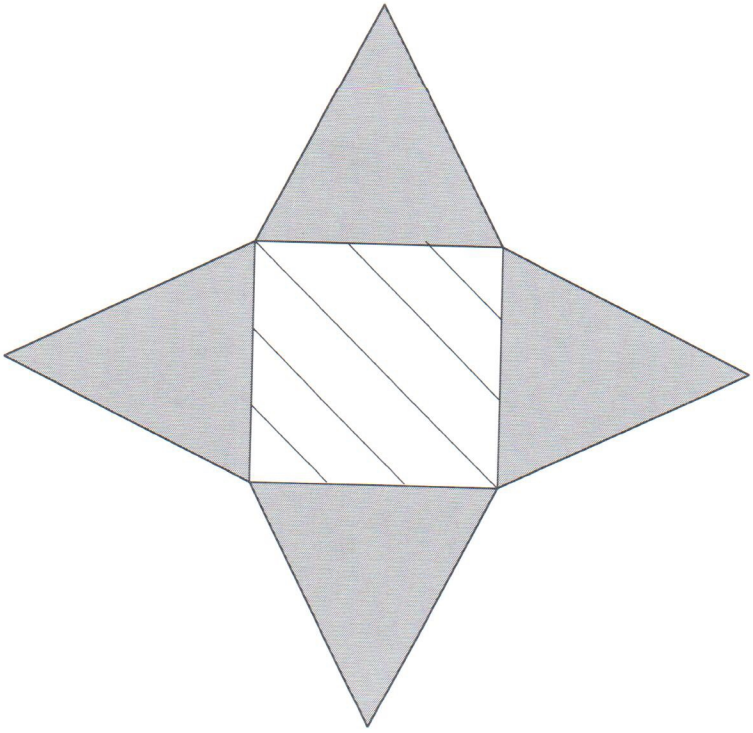

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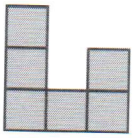
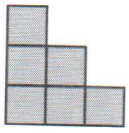
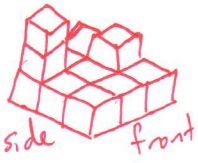
EXPLORATION 3

Consider the following two-dimensional views of a three-dimensional solid. Create the three-dimensional figure that corresponds to the three views. Is there only one such figure? Could there be more?

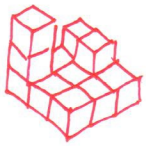
no yes

Top View: **Front View:** **Side View:**



OR



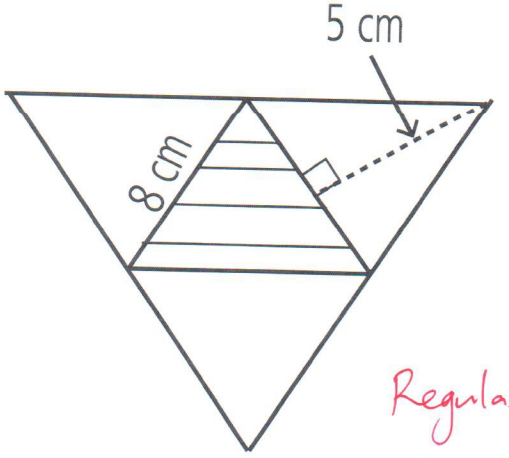
PRACTICE EXERCISES

1. What is the surface area of a pizza box with side lengths of 24" x 24"x 2"?

$2(24 \cdot 24) + 2(24 \cdot 2) + 2(2 \cdot 24) =$

$1152 + 96 + 96 =$ **1344 sq. inches**

2. Find the surface area of a regular pyramid with a triangular base. The dimensions are given in the figure.



one side:

$A = \frac{1}{2}(8)(5)$

$= 20\ cm^2$

Regular pyramid: all sides are congruent.

$4(20) =$ **$80\ cm^2$**

3. How many different nets does a cube have? Draw as many as you can.

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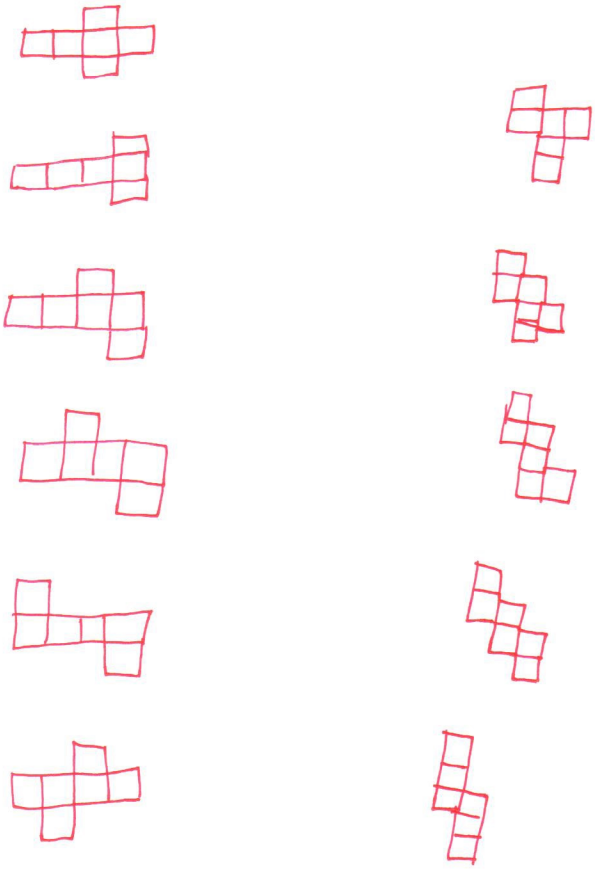

SUMMARY (What I learned today)