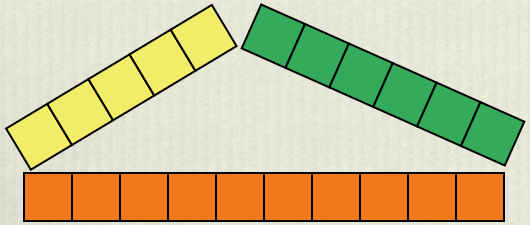
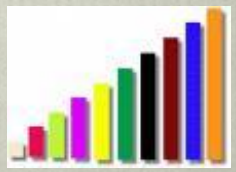
Triangles and Angles

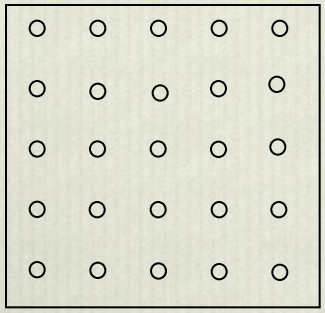
Cheryl Schaub
cschaub@crcpd.ab.ca



Making Triangles

- Work with a partner to make Cuisenaire rod triangles.
- Roll three dice. The numbers on the dice represent the three side length of a triangle. Use Cuisenaire rods to see if they will form a triangle.
- Make a list of combinations that make triangles.
- Make a list of combinations that do not make triangles.
- Why do some 3-rod combinations make triangles and why do some not make triangles?
- Sort and classify your triangles.





How many triangles?

- Using two rubber bands, divide your geoboard into four sections.
- Make a different-shaped triangle in each section, using one rubber band for each triangle.
- Compare your findings with a partner to see if any of your triangles are the same. Keep only one of a kind.
- When you have no more room transfer your one of a kind triangles onto the geodot paper.

The Super Source - Geoboards, 2007, ETS Cuisenaire

Cut out the triangles and sort them.

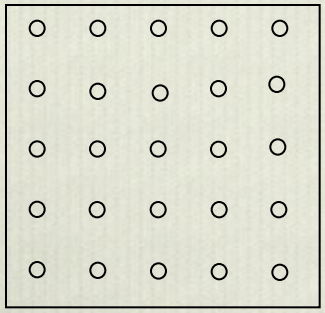
By right angles (4)
By obtuse angles (2)
By acute angles (2)
By length of sides – isosceles (5)
By length of sides – scalene (3)

Measure the angles and ask,
"What do you notice about the
sum of all the angles in a triangle?"

The Super Source - Geoboards, 2007,
ETS Cuisenaire

Squares on a geo-board

1. How many non-congruent squares can you make on a 5 by 5 geo-board/geo-paper? Record this on dot paper.
2. Calculate the perimeter and area of each (in more than one way)



Measuring Angles of Polygons

Create a quadrilateral.

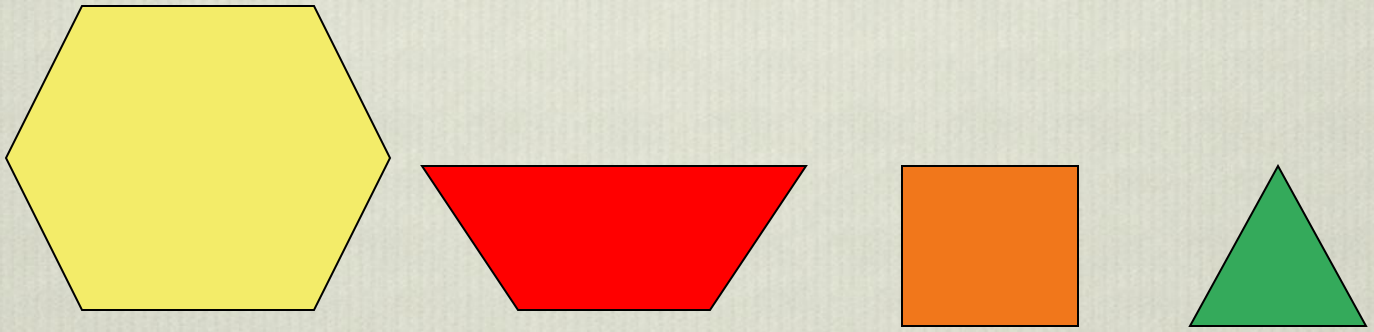
What are the sums of the angles?

Share your discovery with your elbow partner.

Continue this exploration by creating a pentagonal polygon.
What are the sums of the angles?

What patterns do you notice?

- Determine the angles of each of the following pattern blocks



	How many sides?	What is the sum of the angles?
Triangle	3	180^o
Quadrilateral	4	
Pentagon	5	
Hexagon	6	
Heptagon or Septagon	7	
Octagon	8	
Nonagon or Novagon	9	
Decagon	10	

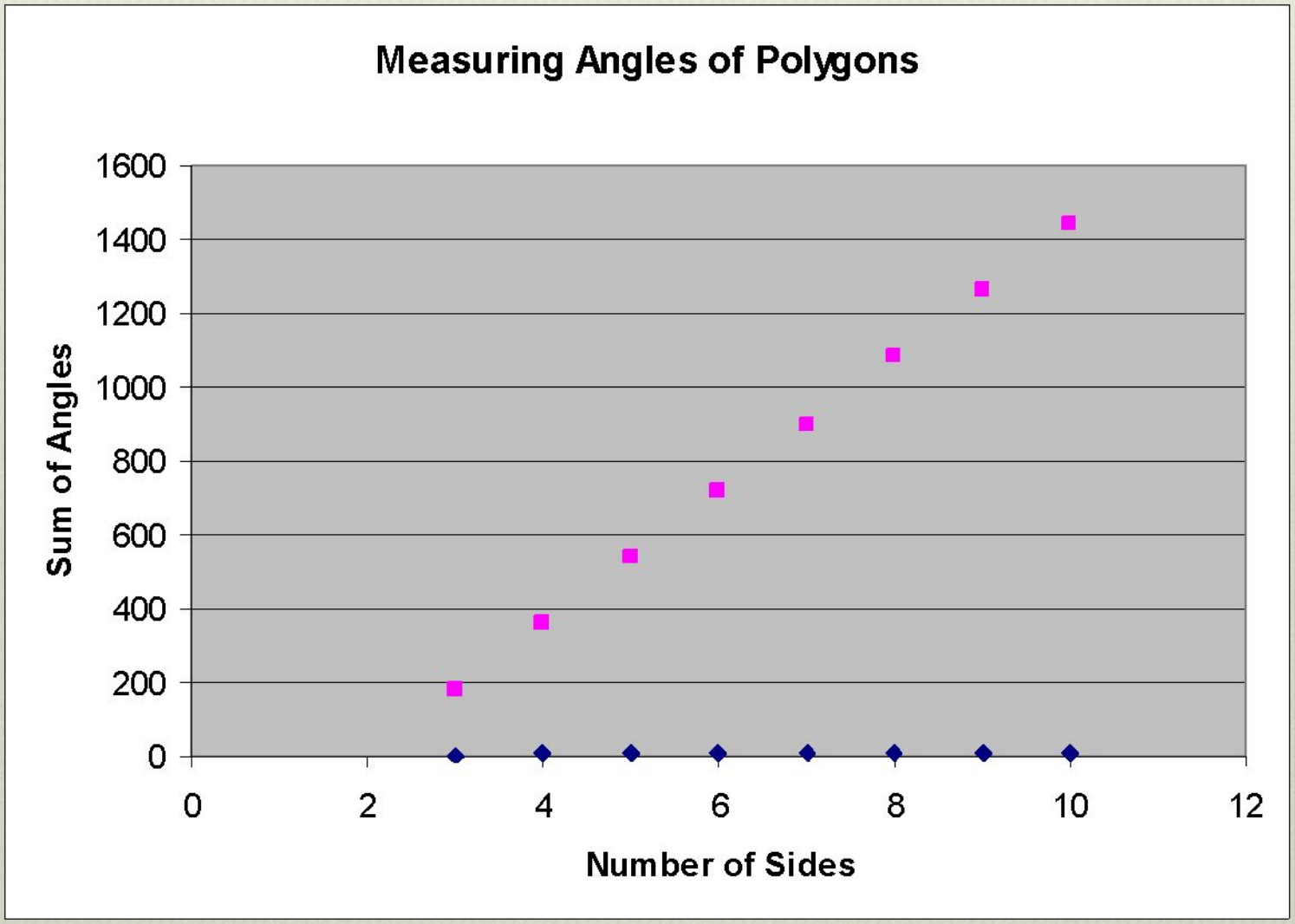
rule **(+180°)**
algebraic expression **180(n-2)**
arithmetic general term $\mathbf{t_n=180n}$

What patterns do you notice?

	How many sides?	What is the sum of the angles?
Triangle	3	180º
Quadrilateral	4	360º
Pentagon	5	540º
Hexagon	6	720º
Heptagon or Septagon	7	900º
Octagon	8	Predict ?
Nonagon or Novagon	9	Predict ?
Decagon	10	Predict ?

rule **(+180º)**
algebraic expression **180(n-2**)
arithmetic general term $\mathbf{t_n = 180n}$

What patterns do you notice?



Dot Paper Geometry Cuisenaire Company of America Charles Lund

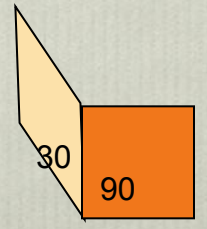
Pattern block explorations

- Use pattern blocks to make a polygon such that the sum of its angles is the same as the sum of the hexagon.

- Use pattern blocks to make a polygon such that the sum of its angles is less than the sum for the hexagon but more than the sum for the square

How many angles?

- Find all the different possible angles you can show using a single pattern block or any combination of pattern blocks
- Record each solution by tracing the blocks and labelling the angle you have found with both the measurements of the individual angles.
- Be ready to explain how you know you have found all possible angles.



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Volume

Painted Cubes

- Imagine you have to dip a larger and larger cube structure into quick drying paint.
- Start with a 2 x 2 x 2 structure.
- For each structure figure out how many snap cubes would have 3 faces painted, 2 faces painted, 1 face painted and 0 faces painted.
- Record your findings and look for patterns.
- Continue investigating until you can figure out how to find the number of snap cubes with 0, 1, 2, or 3 faces painted in a cube structure of any size.

Dimension of cube	# of snap cubes	Number of cubes painted			
		0	1	2	3
2 x 2 x 2					
3 x 3 x 3					
4 x 4 x 4					
5 x 5 x 5					
6 x 6 x 6					
7 x 7 x 7					

The Great Waffle Baffle

"The Great Waffle Company wants to freeze its waffles for sale in stores, but the company is baffled about how to go about it. It can't decide how many waffles to pack together and what size box to pack them in. Since each waffle is exactly the same size as a base 10 flat, how can you use flats to help the Great Waffle Company make its decisions?"

- Work with a group. Use base 10 flats as ‘waffles’. Imagine how each number of waffles from 1 -15 could be packed together in different ways. Talk about how the waffles could be lined up and/or stacked so that they could just fit into boxes of different sizes.

- Find the dimensions – length, width and height – of all the possible boxes that could hold from 1 to 15 waffles.

- For each number of waffles,1 to 15, record the dimensions (in waffles and in units) and the number of boxes in which that number of waffles would just fit.

- Discuss which box sizes are best for the company to pack its waffles.

- Be ready to tell how you found the box sizes and why certain ones would be best for packing the waffles.