Regular Polygons
Shippensburg Area Math Circle
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Math Challenge: Figure out which regular polygons can be made with the Zome system.

No construction system (OK, they're toys) is perfect, and we can't make every possible regular polygon with the Zome system. To figure out which ones we can build, we need a plan of attack! Let's determine which angles we can make with the Zome system. That should help us figure which regular polygons are possible by finishing the chart in #5 below.

Here are some things to try:

1. Examine a zomeball. What shapes do you see?

2. Fill all the rectangular holes around one of a zomeball's equators with blue struts. The resulting shape is called a *pincushion*. The blue struts should be evenly spaced out around the zomeball. How does this help us figure out what angles are possible with blue struts?

3. Put your pincushion on the table with the blue struts sticking out. What shape is facing up?

4. With your group, make pincushions with the blue struts that have different shapes facing up. Like you did for #2, figure out what angles we can make.

5. Complete the table below.

	Number of Sides	Angle Measure	Zome Possible?		Number of Sides	Angle Measure	Zome Possible?
Triangle	3	60		Heptagon	7	about 128.6	
Square	4	90		Octagon	8	135	
Pentagon	5	108		Nonagon	9	140	
Hexagon	6	120		Decagon	10	144	

6. Are there any regular polygons that your group hasn't built yet, but are possible with the Zome system? What are you waiting for? Build them now!

7. Wait! We only considered blue struts, we also have red and yellow struts. Can we make pincushions with them?

This document is based on material from Zome Geometry by Hart and Picciotto.