Plenty of Pentagons   *M005 scoring rubric*

Math Domain

|		
☐ Number/Quantity	✔ Shape/Space	☐ Function/Pattern
☐ Chance/Data	✔ Arrangement	

Math Actions (possible weights: 0 through 4)

4 Modeling/Formulating	1 Manipulating/Transforming
3 Inferring/Drawing Conclusions	2 Communicating

Math Big Ideas

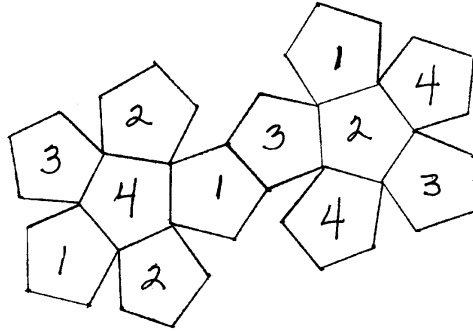|		
☐ Scale	✔ Reference Frame	✔ Representation
☐ Continuity	☐ Boundedness	☐ Invariance/Symmetry
☐ Equivalence	☐ General/Particular	☐ Contradiction
☐ Use of Limits	☐ Approximation	☐ Other

1. The definition of a regular pentagon should include the following information:

- Five-sided figure
- All sides have equal length
- Five equal angles, each measuring 108º

2. Students may choose to use a ruler to measure the length of each side, or they may do it by replicating the first length with a compass. Most will use the protractor to measure out the angles. It is also possible, through a process of trial and error, to divide a circle into five equal arcs and then connect these points on the circle to form the pentagon.

3. a. The resulting figure would look like a cup made up of pentagonal faces.

b. The smallest number of colors needed is four.

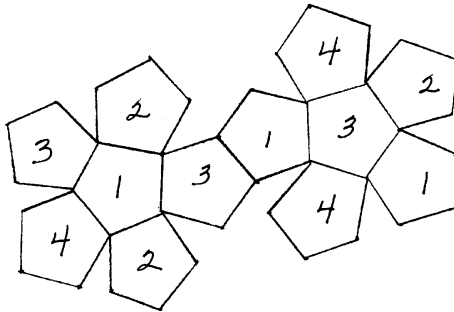**c.** There are several ways to arrange the colors; here are two examples:
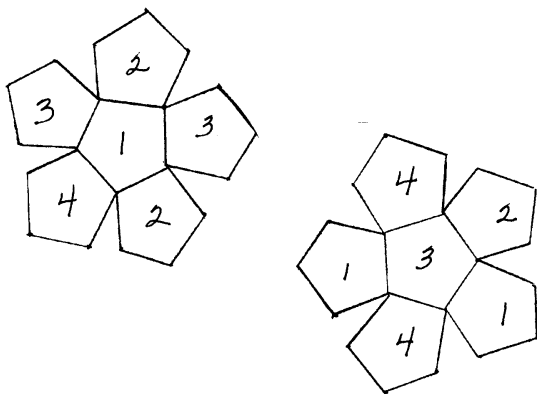
4. **a**. If the two figures are fitted together, they form a 3-dimensional figure having twelve pentagonal faces, properly called a dodecahedron. Students may describe it as looking like "a soccer ball" or "one six-sided bowl up-side down on top of another one."

You would still need only four colors to accomplish the stated directions.

b.

c.

	partial level (1 or 2)	full level (3)
Modeling/ Formulating (weight: 4)	Student is able to formulate either a complete definition **or** a construction, or does a partial job on both. Student is not able to follow all the directions in **3**.	Student formulates a complete definition that includes all pertinent information, and an efficient, clear construction. Student follows all of the directions in **3**.
Transforming/ Manipulating (weight: 1)	Student does not calculate the angle measure for the pentagon correctly, but does include this measure in the definition and construction.	Student calculates the angle measure correctly. Student uses this fact correctly in the construction.
Inferring/ Drawing Conclusions (weight: 3)	Student uses more colors than four in the solution to **4**. Student is only able to come up with one possible arrangement.	Student uses only four colors in answering **4**. Student comes up with two possible arrangements.
Communicating (weight: 2)	Prose definitions and explanations (**1** and **3b**), and/or constructions (**3a** and **4b**) are not clear and precise.	All prose definitions and explanations are clear and precise. Construction and composite figure are clearly drawn. Colors are clearly labeled on net.