

Geometry #12

Before 11 pm, Tuesday, November 6

This week the Forum and the Homework are the same — the Homework will *be* the Forum. You do not have to submit any assignment; “simply” participate in the forum. Be sure to make at least two substantive contributions throughout the week. Make your first contribution by 11 pm, Tuesday, November 6, and then keep working on the forum with the class to wrap things up by 11 pm, Sunday, November 11. Of course, the goal is for the class collectively to answer all of the questions, so you will need to visit the forum frequently to help everyone make progress, and perhaps more than two contributions will be necessary to accomplish this goal.

Go to the Forum “Building for Symmetry,” where I have set up several discussion threads. Please don’t create any new discussion threads, but just use the ones given. The website <http://illuminations.nctm.org/ActivityDetail.aspx?ID=125>, may be helpful. Here are the questions:

1. Refer to *Geometry for Middle School Teachers: Companion Problems for the Connected Mathematics Curriculum*, Exercise 4.7, p. 68. One middle school text asks students to draw a cube in two different ways on isometric dot paper.
 - (a) Why are there only two possible ways? (One way is given on p. 62.)
 - (b) Suppose each of the faces of the cube is colored with a different color. Now how many ways are there to draw the cube, given that you can hold it in front of you in the same orientation but with different colors showing?
 - (c) What does the answer to the previous question have to do with the symmetries of the cube?
2. Refer to the diagram in *Geometry for Middle School Teachers: Companion Problems for the Connected Mathematics Curriculum*, Exercise 4.8, p. 68. Fasten two cubes together face to face, and hold them in front of you in various ways. How many ways are there to draw the structure on isometric dot paper? Why?
3. Refer to the diagram in *Geometry for Middle School Teachers: Companion Problems for the Connected Mathematics Curriculum*, Exercise 4.9, p. 68. Fasten three cubes together face to face to form an “L”, and hold them in front of you in various ways. How many ways are there to draw the structure on isometric dot paper? Why? What does your answer have to do with the symmetries of the object?

4. Refer to the diagram in *Geometry for Middle School Teachers: Companion Problems for the Connected Mathematics Curriculum*, Exercise 4.10, p. 69. Fasten three cubes together face to face to make a $1 \times 1 \times 3$ rectangular prism and fasten a fourth cube to this to make an “L”. How many ways are there to draw the structure on isometric dot paper? Why? What does your answer have to do with the symmetries of the object?
5. Refer to *Geometry for Middle School Teachers: Companion Problems for the Connected Mathematics Curriculum*, Exercise 4.14, p. 69. Armed with your answers to the previous exercises, find cubical structures for which the number of ways to draw them on isometric dot paper is:
 - (a) 2.
 - (b) 4.
 - (c) 6.
 - (d) 8.
 - (e) 12.
 - (f) 16.
 - (g) 24.
 - (h) 48.

Thursday, November 8, 7–9 pm

Attend the Adobe Connect session. We will have three class presentations.