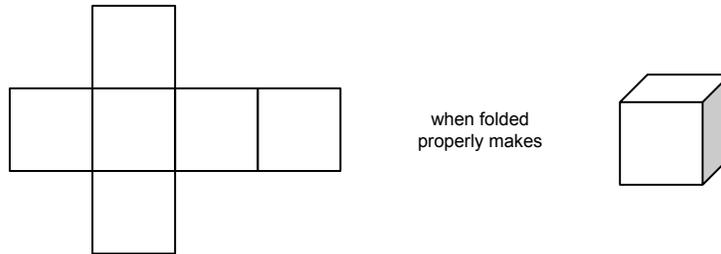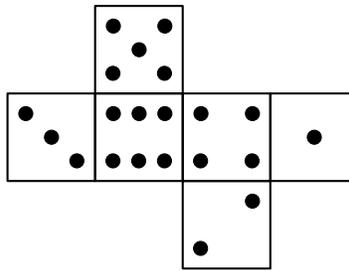# Problem of the Week
Problem A and Solution
Which Way Do I Roll?

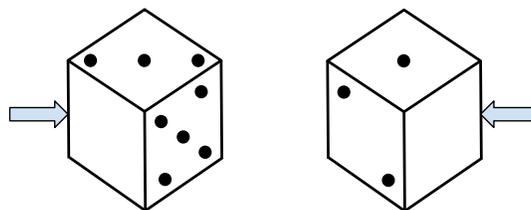**Problem**

A net is a pattern that can be cut out and then folded together to create a solid shape like a cube. For instance:

when folded
properly makes

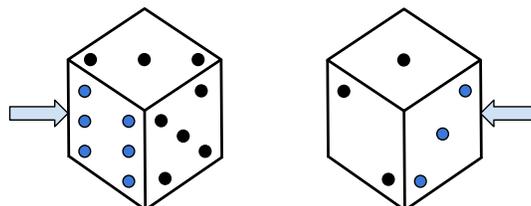Here is a net that can be used to form a single die.

Here are two views of the die that is formed by this net.

Complete the blank faces of the die, indicated by the arrows. Ensure that you have the correct number of dots, oriented in the right direction.

Solution

Teacher's Notes

A net is a 2-dimensional object that can be folded to form a 3-dimesional object. The 3-dimensional objects in this problem are represented by freehand graphical images that are still drawn in 2-dimesional space. It is not easy to visualize 3D transformations of objects that we represent in 2D space.

In mathematics we can use the Cartesian plane with the X-axis and the Y-axis to draw 2D shapes, and we can include the Z-axis to represent the third dimension. This means we can model the 3D objects using coordinates that are written using three numbers. For example (5, 2, 4) represents a point in 3D space that is 5 units along the X-axis, 2 units along the Y-axis and 4 units along the Z-axis.

Engineers, architects, animators and others have drawn representations of solid objects on paper or on computer screens for years. A good mathematical understanding of 3D geometry is essential to being able to accurately describe the models that are eventually built or animated. Computer software can help visualize 3D objects, since you can rotate and view your design from different angles to make sure it is correct. With the increased accessibility of 3D printers, the ability to represent solid objects on a 2D surface is even more useful.