

# Pop-Up Algebra – Class Handout

## I. Pop-Up Page Construction

1. Follow the instructions to create the single crease and fold pop-up.

① Fold the paper in half width-wise. Cut a 3" slit perpendicular to the folded edge, 3" up from the bottom of the page.

② Draw a line from point b to the folded edge making a 30° angle.

③ Firmly crease over  $\overline{bc}$  and fold the triangle inside of the page.

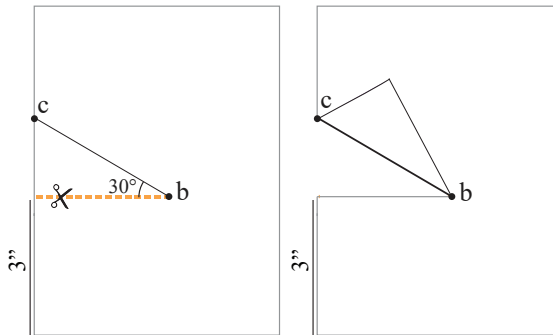


Figure 1

2. Open the pop-up and think about the solid that fills the negative space.
3. How many faces would the solid have? What shapes would they be?
4. What kinds of symmetry could you find in the solid?
5. How would the solid change as the page was opened and closed?

## II. Geometric Solid Construction

6. Fill in the blanks by finding the coordinates of the vertices on the diagram.
7. Notice that the distances of  $\overline{P_4P_3}$ ,  $\overline{P_4P_2}$ , and  $\overline{P_4P_1}$  are fixed. Use these distances to find a system of equations and solve for  $(x, y, z)$ .
8. Find the length of  $\overline{OP_4}$ . Use the law of cosines on  $\triangle OP_1P_4$  to find  $\angle O$ .
9. Fill in the lengths and angles of all of the triangles in the net below.

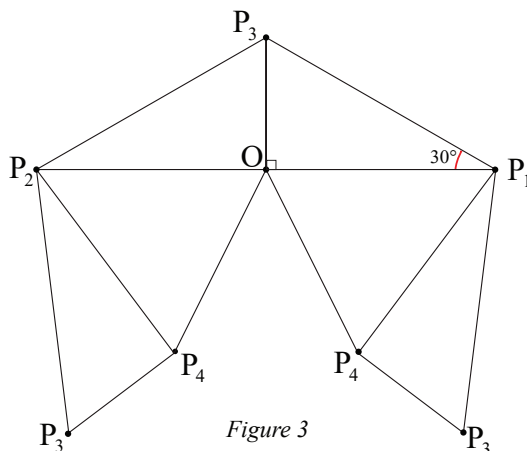


Figure 3

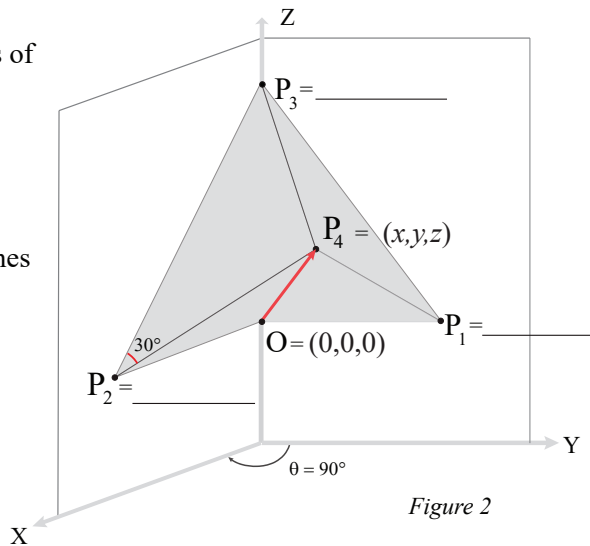


Figure 2

10. Collect the full-scale net, scissors, and tape. Construct a solid by cutting out the net and taping the tabs together. Place the solid in your pop-up.
11. How would the shape of the solid change as the page is opened? Closed?
12. How would the shape of the solid change as the angle of the crease is increased? Decreased?

# Net of Geometric Solid

