

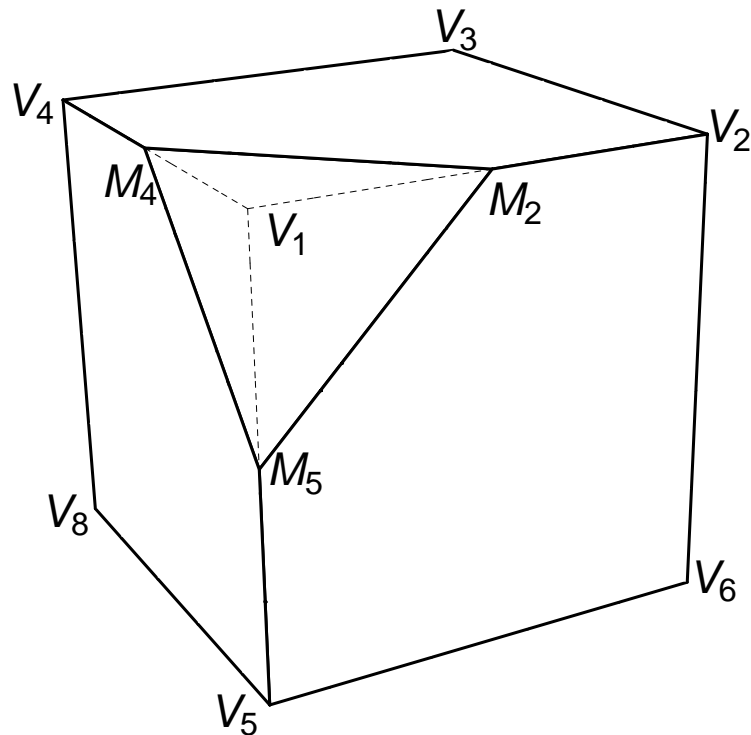
# Math Meet 2013

## Cutting Corners All-day Sprint

Take a solid cube of side length 2. It has eight vertices, labeled  $V_1$  through  $V_8$  as shown. Let  $M_2$ ,  $M_4$ , and  $M_5$  be the midpoints of edges  $V_1V_2$ ,  $V_1V_4$ , and  $V_1V_5$  respectively. Cut the cube along the plane that goes through  $M_2$ ,  $M_4$ , and  $M_5$  leaving the larger piece behind and discarding the smaller piece.

We now have a cube with one of the vertices truncated off. Seven of the eight original vertices are still there (plus a few new vertices). The truncated cube has seven faces: three square faces, three pentagonal faces, and one triangular face.

**Hint:** There's a diagram on the back of this page. If you cut it out and then fasten the appropriate edges to each other, you can build a truncated cube.



**Question:** Walking along the surface of the truncated cube, what is the exact length of the shortest path from  $V_4$  to  $V_6$ ?

**Answer:**

Want to cut this out and build your own truncated cube? You do not have to do that in order to answer this question, but it could still be fun! There are stations with tape and scissors located at the entrance to the Robert Scott Small Building that you can use.

