RECONSTRUCTING 3D SOLIDS FROM THEIR 2D PROJECTIONS

MATH CIRCLE GROUP A 02/06/2011

(1) Use the blocks you have brought for this question.
    (a) Build a 3d shape over a 2 x 2 square base so that it fits into a cube of size 2 x 2 x 2. (This means that you will use ≤ 8 blocks.)
    (b) Shade the grids below to indicate the top, front and left side projections of the 3d shape you have built.
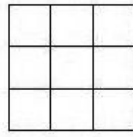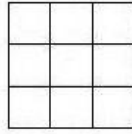
TOP   FRONT   SIDE

(2) With the shape you built in question 1, do the following.
    (a) Share the top, front, and side projections of your solid with a partner. Ask them to build a solid which has the same projections.
    (b) Are your shapes the same?

    (c) Do you think it is possible to have 2 different solids that have the same projections?
        (i) If yes, build such a pair of solids.
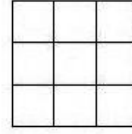   (ii) If no, explain why not.

(3) Use the blocks you have brought for this question.
    (a) Build a 3d solid over a 3 x 3 square base so that it fits into a 3 x 3 x 3 cube. (This means you will use ≤ 27 blocks)
    (b) Shade the grids below to indicate the top, front, and left side projections of the 3d solid you have built.
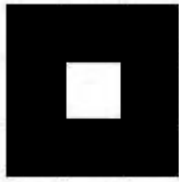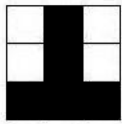
TOP   FRONT   SIDE

(4) With the solid you built in question 2, do the following.
    (a) Share the top, front and side projections of your solid with a partner. Ask them to build a solid which has the same projections.
    (b) Are your solids the same?

    (c) Do you think it is possible to have 2 different solids that have the same projections?
        (i) If yes, build such a pair of solids.
        (ii) If no, explain why not.
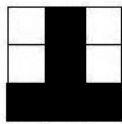
(5) Alyssa drew this projection:

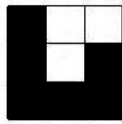Is it the top, front or side projection? How do you know?

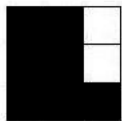(6) Make a 3d solid that has the following projections:
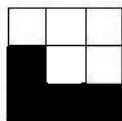

TOP   FRONT   SIDE

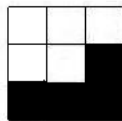(a) Can you remove or add any blocks so that the projections are the same?

(7) Make a 3d solid that has the following projections.

TOP   FRONT   SIDE

(a) Can you remove or add any blocks so that the projections are the same?

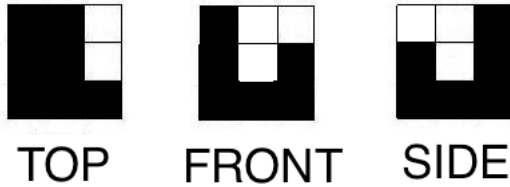(8) Make a 3d solid that has the following projections.

TOP   FRONT   SIDE

(a) Can you remove or add any blocks so that the projections are the same?

(9) Make a 3d solid that has the following projections.
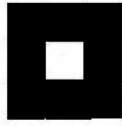
TOP   FRONT   SIDE

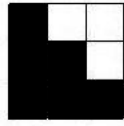(a) Can you remove or add any blocks so that the projections are the same?

(b) How many different solids have these three projections?

(c) Given that there are 14 cubes used, do you know what the solid is?
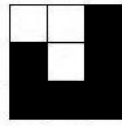
(10) Make a 3d solid that has the following projections.
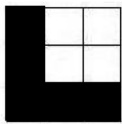

TOP   FRONT   SIDE

   (a) Can you remove or add any blocks so that the projections are the same?

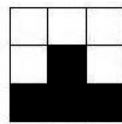   (b) How many different solids have these three projections?

   (c) Give that there are 13 cubes used, do you know what the solid is?

(11) Given the top and the front projections, can you figure out what the third (the side) projection is?
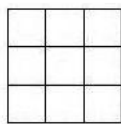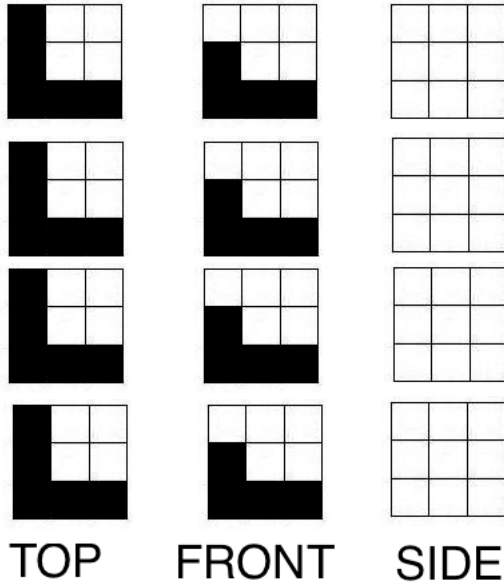   –Try to do it without building the solid if you can. If not, build the solid first.

TOP   FRONT   SIDE

(12) Give the top and the front projections, can you figure out what the third (the side) projection is?

–Try to do it without building the solid if you can. (Hint: There is more than 1 way)

TOP   FRONT   SIDE

(13) Build a solid over a larger base (4 x 4, 3 x 4, 5 x 4...) and encode it using projections.