

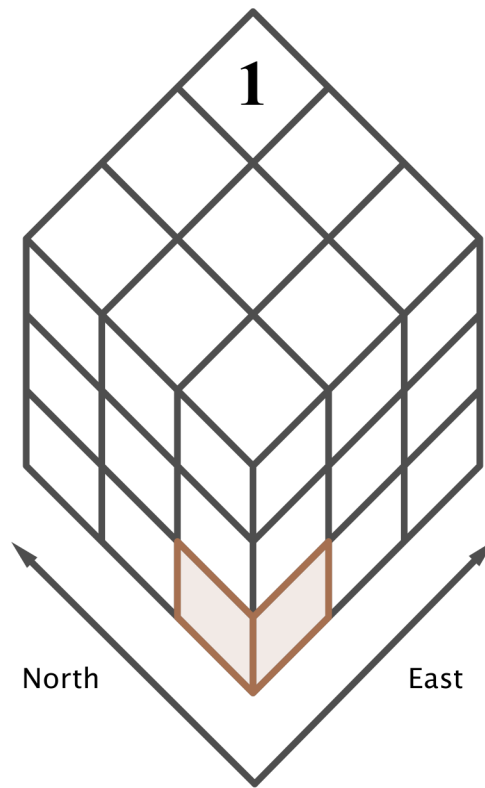
Team Number:

1. Find two positive numbers  $x \neq y$  with the property that  $x^y = y^x$ .

Team Number:

2. A mouse-house is made up of 27 rooms arranged in a  $3 \times 3 \times 3$  cube, as shown in the figure below. A mouse begins on the lowest floor, in the southwest corner room. For each move, he can travel to the room above, the room to the east, or the room to the north.

The mouse wishes to travel from his starting room (shaded in the figure) to the room in the northeast corner of the top floor (marked "1"). How many ways are there for him to do this?

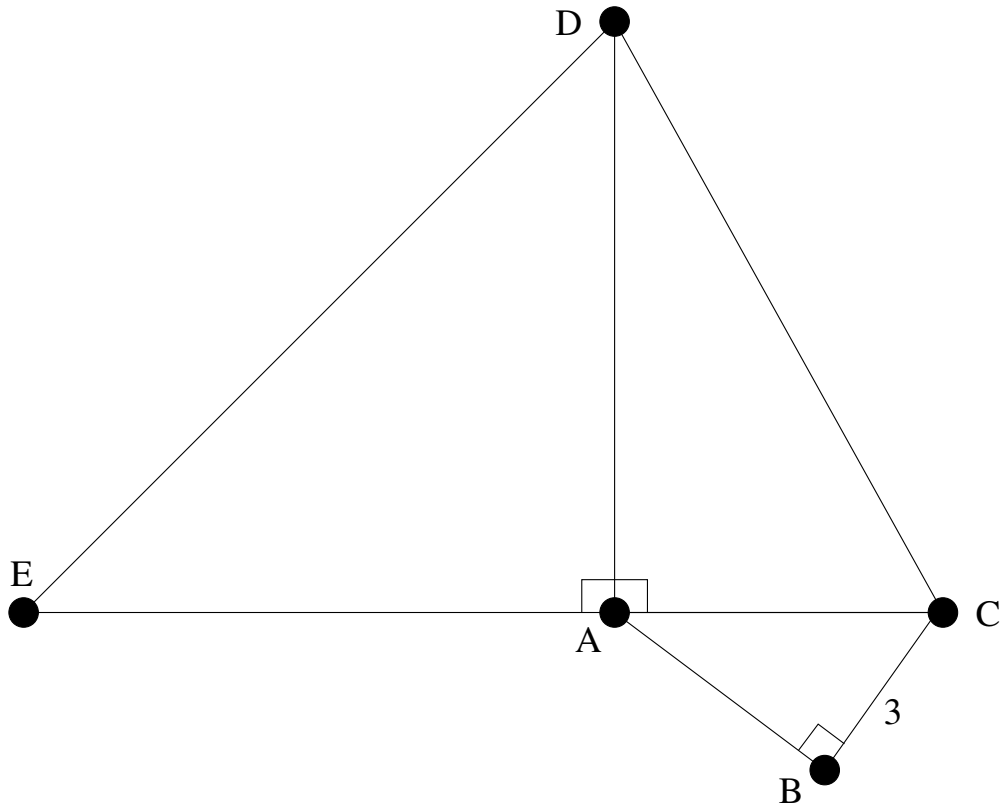


Team Number:

3. A seating section in a corner of Boone Pickens Stadium is arranged as a trapezoid: There are thirty rows, each of which contains one more seat than the row immediately in front of it. If row 7 contains 12 seats, how many seats are in the section?

Team Number:

4. In the figure below, all the line segments ( $AB$ ,  $AC$ ,  $AD$ ,  $AE$ ,  $BC$ ,  $CD$ , and  $DE$ ) have integer length, and angles  $ABC$ ,  $CAD$ , and  $DAE$  are right angles. If  $BC = 3$ , find a possible value of  $DE$ . (There is more than one correct answer.)



Team Number:

5. Call a set of natural numbers *self-referential* if it contains its size. For example,  $\{1, 3, 4\}$  is self-referential because it contains 3, but  $\{1, 5\}$  is not, because it does not contain 2. How many self-referential subsets of  $\{1, 2, 3, 4, 5\}$  are there?