

Solution - Challenge of the Week

Challenge of the Week # 8 - March 21 to March 28, 2007

A cubical box contains some marbles. Each of the six faces of the box is labelled with a different number chosen from 1, 2, 3, 4, 5, 6. Also, each face contains the following statement:

**The number of marbles in this box is greater than $10 + 2k$,
where k is the label on this face.**

If half of the statements are true and half are false, how many marbles are in the box?
Justify your answer.

Robert Johnson and Matt Niemerg submitted complete solutions to this week's challenge. Partial solutions were provided by Mollie Neff and JuLee Simpson.

The statements are "The number of marbles in this box is greater than 12", "The number of marbles in this box is greater than 14", ..., "The number of marbles in this box is greater than 22". Consider the statements in the order indicated. If one of the statements is true, then all of the statements before that statement are also true. Since three statements are true, the first three, in the given order, are true, while the last three are false. In particular, it is true that the number of marbles is greater than 16, but false that the number of marbles is greater than 18. Hence, there could be either 17 or 18 marbles in the box.