# Problem of the Week
Problem C and Solution
A One in Six Chance

Problem

A regular die has faces numbered 1, 2, 3, 4, 5, and 6. The numbers on the faces are arranged so that opposite faces total seven. For example, the face containing 2 is opposite the face containing 5. The four dice shown have been placed so that the two numbers on the faces touching each other always total nine. The face labelled P is the front of one die as shown. What is the number on the face labelled P? If you randomly guessed, you have a one in six chance of getting this right!

Solution
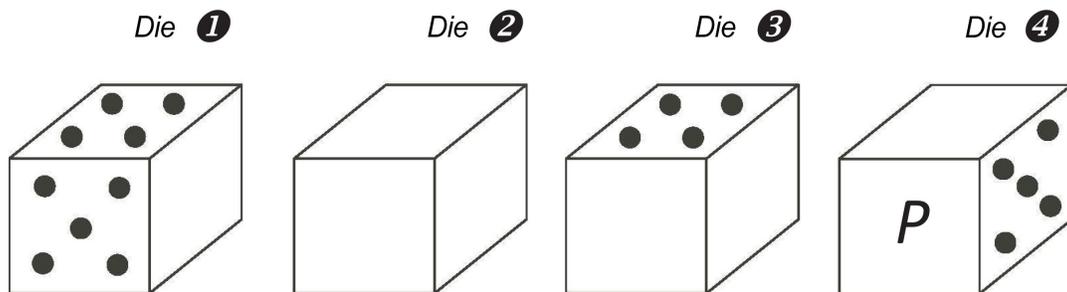
On Die ①, since 5 is on the front, there is a 2 on the back. Since 4 is on the top, there is a 3 on the bottom. That leaves a 6 and 1 for the sides. Since the sides facing each other add to 9, the right side of die ① must be a 6. If it were a 1, the left face of die ② would have to be 8 and that is not possible. Therefore, the right side of die ① must be a 6.

That means that the left side of die ② must be a 3 since the sides facing each other total 9. If the left side of die ② is 3, then the right side of die ② must be a 4 since opposite sides add to 7.

Then the left side of die ③ must be a 5. If 5 is on the left side, 2 is on the right side. Since 4 is on the top of die ③, there is a 3 on the bottom. That leaves 1 and 6 for the front and back of die ③. The front must be 6 in order for the numbers on the front of die ③ and the back of die ④ to total 9.

Since the front of die ③ is a 6, the back of die ④ must be a 3. If the back of die ④ is a 3, then the front of die ④ must be a 4. But the front of die ④ is P. Therefore $P = 4$.