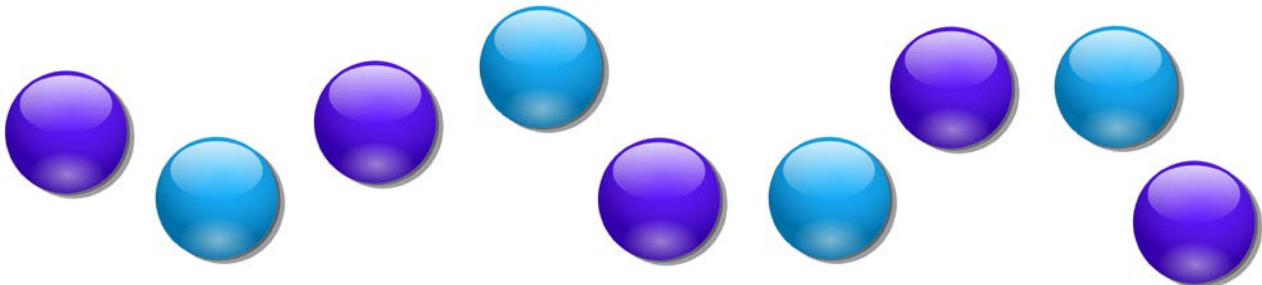# How Many Draws?
by Eric Kogel, MSPE

You are presented with three buckets, each of which contains 50 marbles.

The buckets are labeled as shown below:

The labels for the buckets were printed correctly,
but each bucket received the wrong label.

What is the minimum number of times a person could draw a marble out of
any of the buckets in order to know how to correctly label all three of them?

(Solution can be found in the *Solutions* section at the back of this issue.) Ω

How Many Draws?—Solution
by Eric Kogel, MSPE

The answer is that it takes **only 1 draw** in order to know how to correctly label all three of the buckets.

The key to solving this problem is understanding that each bucket is currently labeled *incorrectly*.

Because the first bucket is labeled "50 purple marbles," we know that it must actually contain either 50 blue marbles or the 25 purple/25 blue mix.

The second bucket, which is labeled "50 blue marbles," must actually contain either 50 purple marbles or the 25 purple/25 blue mix.

Finally, the third bucket, which is labeled "25 purple/25 blue marbles mix," must actually contain either 50 purple or 50 blue marbles. In other words, we know this bucket contains 50 marbles all of one color. So, if we draw one marble from this bucket, we can determine what its correct label should be.

Let's say that we draw one marble from this third bucket, and it is purple. Now, we can correctly label this bucket "50 purple marbles."

Next, we can move on to the second bucket, which is currently labeled "50 blue marbles." We know that it is labeled incorrectly, so it cannot contain 50 blue marbles. We also know that it does not contain 50 purple marbles, because we have already identified that bucket. Therefore, the only option left is that this second bucket contains the 25/25 mix. So, we can now correctly label the second bucket as "25 purple/25 blue marbles mix."

The only bucket that is not yet correctly labeled is the first bucket, and there is only one option left. Therefore, we can correctly label the first bucket as "50 blue marbles." Ω