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Math Puzzles

# Favorite Puzzle

I heard my favorite puzzle Winter term during writing class. There are fifteen factories that manufacture steel plates. All of the factories are the same. The plates are all supposed to weigh ten pounds. However, one of the factories manufactures only nine pound steel plates. You are an agent sent by the owner of the factories, and your job is to figure out which of the factories is making the nine-pound plates. You have a scale with you but, the scale will break after one use. So you can only use the scale once. How do you figure out which factory is making the nine-pound steel plates?

The way you solve this problem involves labeling the factories. You label them one through fifteen. You then take one plate from the first factory, two plates from the second, three from the third, four from the fourth, five from the fifth, and so on. The total weight from steel plates would be 1200 if all factories produced steel plates that were the same weight. However, since they don't you will get a number less than 1200. If the number is one less than 1200 it is the first factory that manufactures nine pound steel plates because the steel plate weighs one less pound than all the other plates. Since there is only one steel plate on the scale from the first factory the difference between what the total weight should be and the actual weight is one. If the number is two less than 1200 it is the second factory that

manufactures nine pound steel plates because the steel plates weighs one less pound than the other plates manufactured by other factories. Since there are two plates from the second factory the weight will be two less than what it would be if all the plates were manufactured to be ten pounds. Using this same logic for the rest of the fifteen factories you can determine which factory manufactures the nine-pound plates.

This factory puzzle is my favorite puzzle is because there is only one answer to the problem for fifteen factories. I first tried to think of weighing some of the plates but that doesn't work because you have to determine the weight of all the plates after only one weigh in. The answer was also very clever; it really causes you to think outside the box. Other puzzles involve reasoning or probability but this problem poses a question with one answer that is different than most problems.

The nature of the solution is also what I like about this problem. It is relatively uncomplicated compared to other problems but it is hard to think of ways to solve the problem. The real barrier to finding the solution is the way we tend to naturally think. We naturally want to weigh each of the plates from the different factories. The riddle is also ambiguous concerning how many plates you can weigh, which prevents you from considering the solution. To get to the solution you need to think about what the riddle doesn't specify. I think that this aspect of the problem also makes it my favorite problem.

Usually when we deal with weights and scales in puzzles they can be used any number of times but with the number limited to only one use this problem is

really complicated. This makes us think more about the solution because we don't really think in this way.