Chapter 22

Paper Folding Traps and Tips

Like number puzzles, there are only 16 questions in the paper folding subtest. That means it’s one of the two hardest subtests in CogAT. So we need to use good thinking here. In order to identify strategies students use in the paper folding test, Hegarty Spatial Thinking Lab asked test takers to think aloud while solving test problems.* Dr. Hegarty found that many good test takers “started at the last step shown and worked backward to unfold the paper and see where the holes would be.” In addition to this imagery strategy, some students also used analytic strategies such as figuring out how many layers of paper were punched through and therefore how many holes there would be in the paper at the end. According to this study, “students who reported determining the number of holes in the final answer choice had significantly higher scores on the test than those who did not report using this strategy.”

Tip: For paper folding, count the number of layers of paper that are punched through to determine how many holes there should be.

Let’s assume that a maximum of $4 \times 4$ holes could be punched in a piece of square paper because the same strategy can be applied to other cases with more than 16 or fewer than 16 holes. Let’s borrow chess notations to identify these 16 positions as shown in the figure below. We call the holes in the last row A1, B1, C1, and D1. We call the holes in the second to last row A2, B2, C2, and D2, etc.

Now let’s look at an example.
1. The paper is folded twice. Each fold doubles the number of the holes. So there should be four holes in total. So Answer B is ruled out. Next we identify the location of the original hole. We see that location D2 of the paper is punched. Unfolding the second fold, we get one more hole in location A2. Unfolding the first fold, we get two more holes in locations A3 and D3. Therefore the right answer is D.

Now let’s look at another example.

2.
Some people use a quick but unreliable strategy to solve paper folding problems. They first note the location of where the hole is punched. Next they check the answer choices to see if there are any choices that do not have a hole in this location and eliminate these answer choices. This strategy almost always works because there is usually a hole in the location at which the hole is originally punched after the unfolding process. But this strategy does not work 100% of the time. The problem we are working on now is such an example.

To solve this problem, first let’s determine how many holes are punched. The paper is folded twice, but after the first fold nothing is there in location C1 where the original hole is punched. So there are only two layers of paper that are punched through and therefore only two holes in total. So Answers J, L, and M are ruled out.

Next let’s unfold the second and also the last fold of the paper. This moves the original hole in location C1 to a hole in location C4. Finally we unfold the first fold and get a second hole in location D3. So the right answer is N.