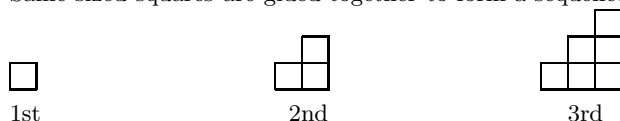


Math 210 - Dr. Miller - Homework #1: Justifying Strategies

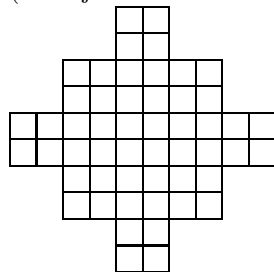
1. Name a strategy that could reasonably be tried to solve each problem below, justifying your choice by telling what qualities the problem has that suit that strategy. (Tell **WHY** you chose it, not **HOW** you'd use it.) **DO NOT ACTUALLY SOLVE** any!

- (a) Find the sum $1 + 2 + 3 + \dots + 98 + 99$.
- (b) Cookies are sold singly, or in packages of two or six. How many different combinations/ways can you buy a dozen cookies?
- (c) Ali, Bubba, Cory, and Dandy are in a horse race. Bubba is the slowest, Cory is faster than Ali but slower than Dandy. Name the finishing order of the horses.
- (d) The sign says you are leaving Missoula and that Butte is 120 miles away and Bozeman is 200 miles away (in the same direction). There is a rest stop halfway between Butte and Bozeman. How far is the rest stop from Missoula?
- (e) What is the largest sum of money - all in coins with no silver dollars - that you could have in your pocket without being able to give someone exact change for a dollar, nor a half-dollar, nor a quarter, nor dime, nor nickel?
- (f) Using each of the digits 1, 2, 4, 5, and 7 exactly once, create a three-digit number and a two-digit number whose product is as large as possible.
- (g) A compass and a ruler together cost \$4. The compass costs 90 cents more than the ruler. How much does the compass cost?
- (h) Same-sized squares are glued together to form a sequence of staircase-like shapes:



How many squares are needed to make the 100th shape?

- (i) Marc goes to the store with exactly \$1.00 in change. He has at least one of each coin less than a half dollar, but he does not have a half dollar. What is the least number of coins he could have?
 - (j) A farmer needs to fence a rectangular piece of land. She wants the length of the field to be 80 feet longer than the width. If she has 1080 feet of fencing material, what should the dimensions of the field be?
2. Many students over-use the “guess and check” and “write an equation” strategies, assuming that because they are most familiar, that they are then also most common.
- (a) Why is “guess and check” not a viable strategy to try on this problem: “How many squares of all sizes (NOT just the little individual ones) are in the following figure?”



- (b) Why is it not a viable strategy for this one: “Suppose you could spend \$10 every minute night and day. How much could you spend in a whole 365-day year?”
 - (c) Why is “write an equation” not a viable strategy for this problem: How many different 9-digit numbers have the same digits as the number 125,560,293?
 - (d) Find another problem from those in Problem #1 for which “write an equation” is not a meaningful strategy, telling why you think so.
3. *Make up* your own original problem that would likely require each strategy listed. You may make the problem as simple as you like – the more suitable for children, the better.
- (a) Create a chart or table.
 - (b) Use a formula.
 - (c) Draw a picture.
 - (d) Solve a simpler problem.
 - (e) Guess and check.
 - (f) Create an equation.

Math 210 - Dr. Miller - Solutions to HW #1: Justifying Strategies

1.
 - (a) Look for a pattern - there may be some repetition in this problem.
Solve a simpler problem - the numbers are pretty big.
 - (b) Make a chart - you want to stay organized.
 - (c) Draw a picture - you can then visualize the race order.
Make a chart - you can organize your information.
 - (d) Draw a picture - you need to visualize.
 - (e) Make a table - you need to stay organized.
Guess and check - there aren't many options, and there's a condition (the lack of change) to check against.
 - (f) Guess and check - there aren't many options, and there's a condition (greatest or least) to check against.
Use direct reasoning - there are logical properties of numbers to think about, such as large first digits making large products.
 - (g) Guess and check - there aren't many options, and there are conditions (the \$4 and the 90 cents) to check against.
Make a table - you want to keep (your guesses) organized.
Use an equation - there's a relationship between the prices.
 - (h) Look for a pattern - there may be some repetition in this problem.
Solve a simpler problem - the numbers are pretty big. Draw a(another) picture - you need to visualize the shapes.
 - (i) Make a table - you need to keep all the options organized.
Guess and check - there aren't many options, and there's a condition (the \$1) to check against.
 - (j) Draw a picture - you want to visualize the field.
Use a formula - we know there is one for area.
2.
 - (a) There's no condition to check against: if I say "I think there are 39 squares," how will I check? (In fact, by solving the problem using a meaningful method, such as looking for a pattern!)
 - (b) Again, there's no condition to check against: if I guess that the total is \$99,820, how will I check? I'd have to solve the problem outright via another method just to do that.
 - (c) There are no relationships among unknowns.
 - (d) #1c, #1h for sure - there are definitely no relationships among unknowns in these. Several others could be argued to use algebraic EXPRESSIONS, but that is different from having an equation to solve.
3. (All these were taken directly from a sixth grade workbook.)
 - (a) A bell rings every 2 minutes, a horn blows every 3 minutes, and a rooster crows every 4 minutes. At noon they all sound off together. In how many minutes will all three sound off together again? (Anything that needs organization will do.)
 - (b) A rectangle has a perimeter of 26 inches and an area of 40 square inches. What are the length and width of the rectangle? (Anything about geometric measurement will do.)
 - (c) Mr. Hart wants to fence in a square garden that is 6 meters on each side. He wants to place the fence posts 2 meters apart. How many posts will he need? (Anything geometric will do.)
 - (d) If one French franc is worth 0.186 American dollars, which is the better buy: 1 liter of gas at 44.9 cents, or at 3.92 francs? (Anything with "ugly" numbers will do.)
 - (e) Marta has exactly 100 coins, all nickels and dimes. She counted her money and it came to \$8.10. How many of each coin does Marta have? (Anything with different types of objects and a target total will do.)
 - (f) A chicken and an egg cost \$2.00. The chicken costs \$1.60 more than the egg. What is the cost of the chicken? (Anything with one known and one unknown amount with numbers relating them will do.)