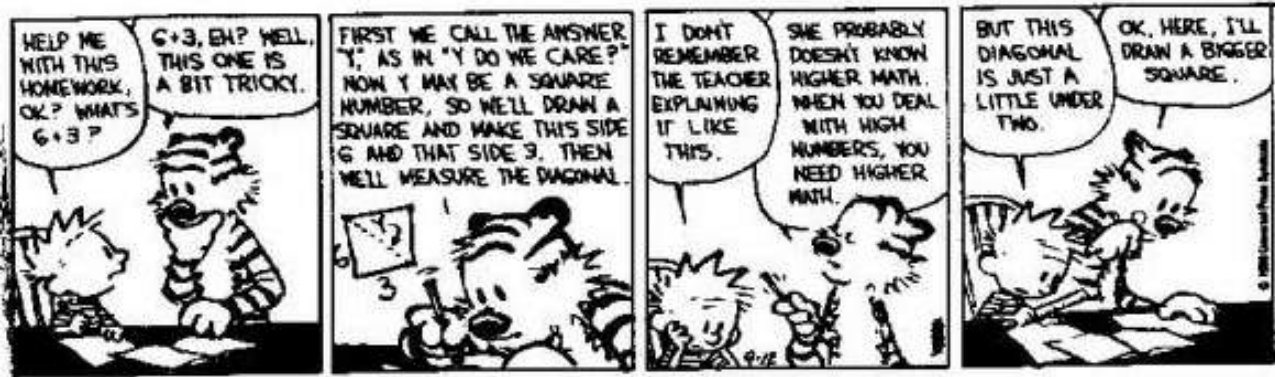


Name: \_\_\_\_\_

|          |       |
|----------|-------|
| Problem  | Total |
| Possible | 100   |
| Received |       |

Don't open exam  
until told to do so.

**FOR FULL CREDIT, SHOW ALL WORK RELATED TO FINDING EACH SOLUTION.**  
*You will not use a calculator on this exam.*  
**In answering the following questions, not simplify the answers.**  
**For example, leave your answer in the form**  
 $P(5,3)$  or  $12!$  or  $C(4,3) \cdot C(7,4)$  or  $2^5 - 2^3$  or  $7 \cdot 6 \cdot 5$  or ...

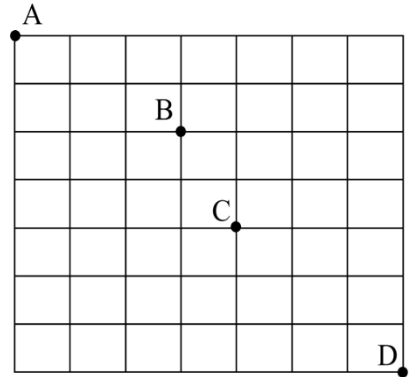


- /3 How many different Zoom Meeting IDs are possible if the IDs have 10 digits, each digit is from 0 to 9, and the first digit cannot be a 0.
- /3 How many different passwords can there be if passwords are 8 characters (of any type) from your keyboard? Assume that there are 100 possible characters on the keyboard, and you are allowed to repeat characters in your password.
- /3 How many ways are there to divide a group of 24 people up into 4 groups of 6 each?
- /5 Two 11-member soccer teams play a match. After the match, each member of both teams shakes hands with each member of his own team and each member of the other team. How many handshakes take place?
- /2 How many possible outcomes are there if you flip a coin 10 times?
- /2 How many 5-digit numbers from 10000 to 99999 are there (note that for this problem, 0 cannot be the first digit)?
- /5 How many 5-digit numbers 10000 to 99999 (note that for this problem, 0 cannot be the first digit) are there in which three digits are one number and the other two digits are another (e.g. 52522 or 25252 or 52522 or ...)?

In the diagram at right, if you can only move right (east) and down (south):

/2 How many ways are there to go from A to B?

/5 How many ways are there to go from A to D if you must pass through both B and C?



/3 If I have 5 shirts, 3 pairs of pants, and 2 pairs of sandals, how many ways can I select an outfit (a shirt, pair of pants and sandals)?

/3 How many possible ways are there to award gold, silver, and bronze medals in a race with 20 participants?

/3 In how many ways can a committee of 10 persons be chosen from 14 married couples if the committee must consist of 4 men and 6 women?

/4 In how many ways can a committee of 10 persons be chosen from 14 married couples if a husband and wife cannot both serve on the committee?

- /5 In how many ways could we divide 24 persons into five groups if:  
4 people get an apple, 4 people get a banana, 4 people get a carrot  
The other 12 people are simply divided into two groups of 6 people each
- /3 How many ways can I choose 2 persons from a group of 20? **SIMPLIFY THIS ANSWER TO AN ACTUAL SINGLE NUMBER.**
- /4 There are ten people. One is Bob. In how many ways can I select a president, vice-president and secretary if Bob must be one of the three selected?
- /2 In how many ways can I arrange 15 books on a bookshelf?
- /5 An ice cream shop offers 10 flavors. In how many ways could you order three scoops?
- /3 Four artists each have five paintings. In how many ways can the paintings be arranged if there are no restrictions about whose paintings are next to anyone else's?
- /5 Four artist each have five paintings. In how many ways can the paintings be arranged if each all of the paintings of each artist must be kept side-by-side?

*For the next four questions, there are 20 balls: 12 blue and 8 green. We'll select 5 balls.*

- /4 How many different samples are possible?
  
- /4 How many samples contain all green balls?
  
- /4 How many samples contain 2 blue & 3 green balls?
  
- /4 How many samples contain 1 or more blue balls?

*For the next five questions, suppose there is a deck of 80 cards of 4 different colors of cards numbered 1 to 20. We will choose 6 cards.*

- /5 In how many ways can you choose the 6 cards and have three of one number, two of another and one of another (for example, 2 2 2 5 5 9)?
  
- /5 In how many ways can you choose 6 cards and have exactly 4 of them be 7's. There could be repetition/duplication in the other 2 cards, but no other 7's (for example, 7 7 7 7 5 5 or 7 7 7 7 5 9 or ...).
  
- /4 In how many ways could you have all 6 cards be the same color (a flush)?

Extra credit:

- /4 In how many ways can you have two straights, each length 6, that do not overlap?  
For example: 1 2 3 4 5 6 and 7 8 9 10 11 12  
Or: 3 4 5 6 7 8 and 12 13 14 15 16 17