

NCC 2015

**Part E**

Student name: \_\_\_\_\_

1. Alice, Bob, Carol run in a 100m race. They each run at different, but constant, speeds. When Alice finishes, Bob is 10m from the finish line. When Bob finishes, Carol is 10m from the finish line. How far back from the finish line is Carol when Alice finishes?

Answer: \_\_\_\_\_

2. A four-digit number, whose first (leftmost) two digits are identical and whose unit digit is 5, is divided by a two-digit number and a remainder of 98 is obtained. What was the original 4-digit number?

Answer: \_\_\_\_\_

3. A paper water cup is in the shape of a reverse cone. What fraction of its height should you fill it to, if you want it to be  $\frac{1}{8}$  filled (by volume)?

Answer: \_\_\_\_\_

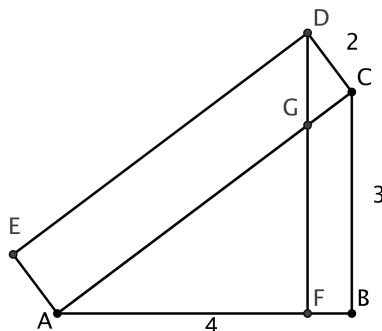
4. There are 100 students in Mr. Bazel’s grade 5 class. (It’s a very large class.) 90 of them play soccer, 85 of them play piano, and 80 of them play Crossy Road. What is the least possible number of students who play all three things?

Answer: \_\_\_\_\_

5. Stephen rolls a fair 6-sided die to get a number  $n$ . A number between 1 and  $n$  is then chosen **at random**, and Stephen gets paid in dollars the value of the number chosen. On average, how many dollars will Stephen receive?

Answer: \_\_\_\_\_

6. Triangle  $ABC$  has  $\angle B = 90^\circ$ ,  $AB = 4$ , and  $BC = 3$ . On side  $AC$  we draw a rectangle  $ACDE$  with  $DC = 2$ , as shown below. If  $F$  is chosen on side  $AB$  so that  $DF$  is perpendicular to  $AB$  and  $G$  is the intersection of  $AC$  and  $DF$ , find the length of  $DG$ . (diagram not drawn to scale)

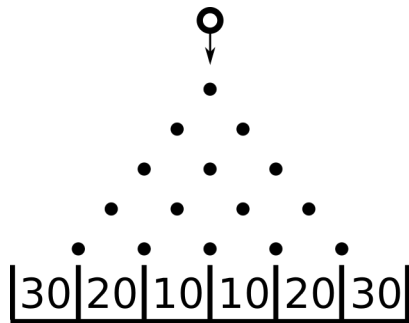


Answer: \_\_\_\_\_

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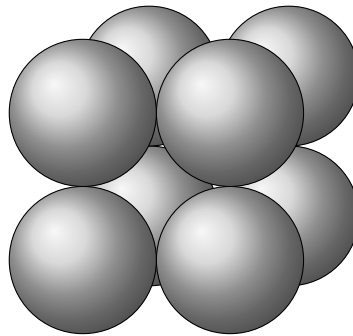
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7. In the pictured game with 15 pegs, you drop a ball from above the top peg and it falls into one of the bins at the bottom. You win points equal to the number in the bin. When the ball hits a peg, it has a 50% chance of dropping to the left and a 50% chance of dropping to the right. Note that every ball will hit exactly five pegs on its way down into a bin. What is the probability that you win 10 points?



Answer: \_\_\_\_\_

8. 8 spheres with radius 1 are stacked in a “cube” formation, as shown. Determine the radius of the smallest sphere that completely encloses these 8 spheres.



Answer: \_\_\_\_\_