

Student Name: _____

Please write your name on *every* page.

5 Section E

E1

A student is taking a test, and incorrectly reads “80% of 2025” as “8.010 times 2025”. Assuming the student computes his interpretation correctly, how many times larger is his answer than the correct answer assuming he had read the question correctly?

Answer to E1: _____

E2

A regular polygon has all of its angles measuring 135° . How many sides does the polygon have?

Answer to E2: _____

E3

How many odd multiples of 3 are less than 2025?

Answer to E3: _____

E4

Given an even number of students, a gym teacher splits them into two basketball teams, each of which has the same number of players. What is the smallest number of students for which there are more than 100 different ways of selecting these two teams?

Answer to E4: _____

E5

A group of 8 people are sitting down at a circular restaurant table to eat. Two of these people are sworn enemies, and will only agree to sit directly opposite one another so they can be as far away from each other as possible. Two seating arrangements are considered identical if each person has the same person sitting to their left and to their right in both arrangements. How many distinct seating arrangements would the group agree to?

Answer to E5: _____

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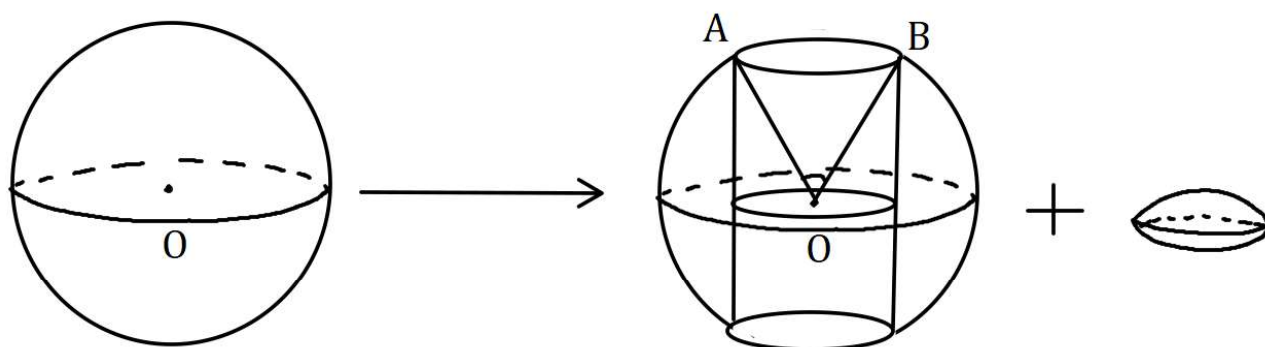
E6

The triangle $\triangle AOB$ has $\angle ABO < \angle BAO < \angle AOB$ and has the property that each of these three angles, in degrees, is a perfect square. Let C be the point of intersection between AB and the line through O perpendicular to OB , and extend OC through C to meet the circle with radius OA at D . If $OA = 1$, what is the area of sector OAD ?

Answer to E6: _____

E7

A sphere of radius 1 centered at O has the caps removed and then a cylindrical hole drilled through the middle. The two caps of the sphere where the hole was drilled are then glued together. Points A and B on the sphere are such that the line AB is a diameter of the hole that was drilled. If $\angle AOB = 60^\circ$, how much more surface area do these two new solids have combined than the sphere itself?



Answer to E7: _____

E8

The number 13 can be written in binary as 1101, since $1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 = 13$. If we interpret the binary number 1101 as a decimal number (one thousand one hundred and one), we find that it is divisible by 3 since $1101 = 3 \times 367$. How many numbers from 1 to 100 inclusive have a binary expansion that is divisible by 3 when they are interpreted as decimal numbers?

Answer to E8: _____