

Write your answers in the Blue Book. Print your names & write the number of students taking this test in the upper right corner of the Blue Book. Put this test & the Blue Book in the provided envelope.

1. Fill in the diagram below using each of the numbers from 0 to 12 exactly once, such that

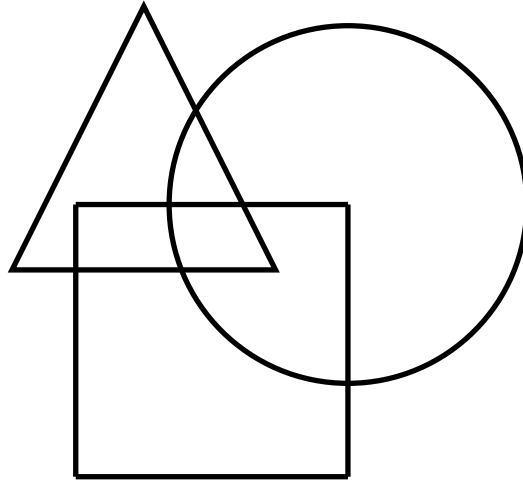


Figure 1:

- ☛ The odd numbers are in the triangle.
- ☛ The even numbers are in the circle.
- ☛ The numbers that are divisible by 3 go in the square.

2. Sam and Jordan play a dice game. Two standard six-sided dice are rolled, and Sam wins if the product of the two numbers is odd or is a multiple of three. Otherwise Jordan wins. Who is more likely to win, and what are the odds of that person winning? Express your answer as a common fraction.
3. The number 2009 is divisible by 7. How many other numbers of the form  $a00b$ , where  $a$  and  $b$  are in  $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$  are also divisible by 7? What interesting observations can you make about this collection of numbers?
4. Johnny walks to school at a steady pace every morning. On the way, he passes a railroad station and a bank, each of which has a large clock above the building. The railroad station is  $\frac{1}{4}$  of his way to school, and as he passes the station, he notices the clock says 7:30. The bank is  $\frac{1}{3}$  of his way to school, and as he passes it, he notices its clock says 7:35. If both clocks are correct, what time did Johnny leave home, and what time will he get to school?
5. The pages of a book are numbered consecutively, beginning with page 1. If 1650 digits are used to number the pages, how many pages are in the book?
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