

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. The cube shown below has each side of length 2. Let \mathcal{P} be the midpoint of its edge. Find the area and the perimeter of the shaded triangle, or gray triangle.

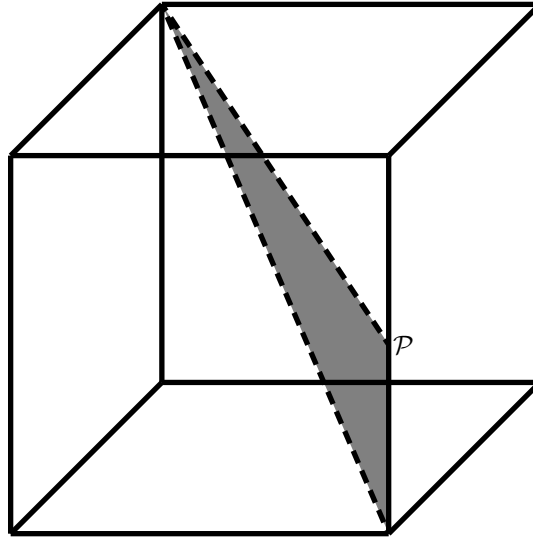


Figure 1: What is the area & the perimeter of the gray triangle?

2. If the numerator of a fraction is selected from $\{1, 3, 5, 7, 9\}$ and the denominator of the fraction is selected from $\{2, 3, 4, 5, 6, 7\}$, what is the probability that the resulting fraction can be written as a terminating decimal? Express your answer as a common fraction.
 3. On 3/7/2009, a group of talented math students was asked to determine the remainder of the number $3 \cdot 7^{2009}$ after division by 100. Naturally they got the correct solution. What was their answer?
 4. A square region with perimeter 52 inches is made up out of one-inch square tiles. One tile is removed from the square, and the remaining tiles are rearranged to make a rectangle with no overlapping tiles. What is the smallest possible perimeter for such a rectangle?
 5. A hiker went out for a hike. The first part of his trip was on level ground, and he hiked at a speed of 4 mph. The second part was uphill, and he slowed to 3 mph. Upon reaching the top, he turned around and went back downhill at a speed of 6 mph. When he reached level ground again, he finished the trip at 4 mph. The total trip took 5 hours. How far did he hike?
-