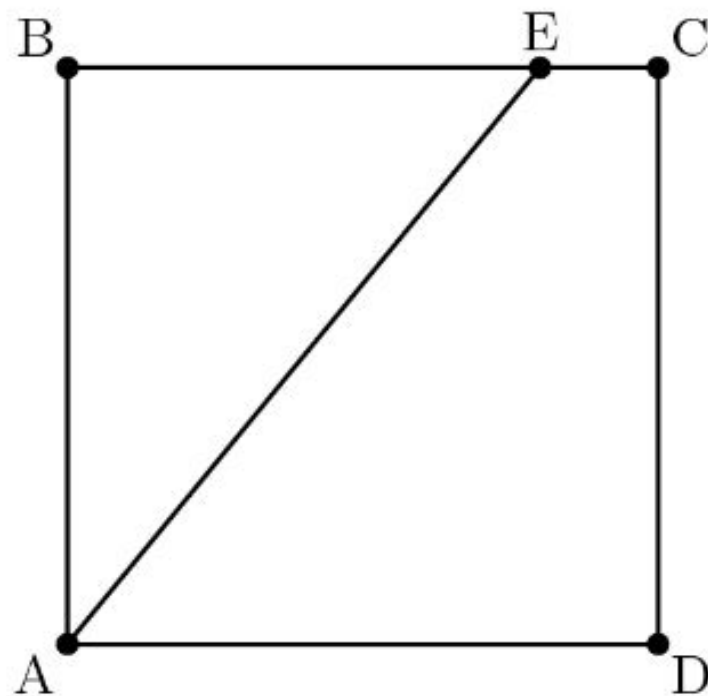# AMC 10/12 Prep

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Problem

Square $ABCD$ has side length 10. Point E is on $\overline{BC}$, and the area of $\triangle ABE$ is 40. What is BE?

(A) 4 (B) 5 (C) 6 (D) 7 (E) 8

Problem 6

A data set consists of 6 (not distinct) positive integers: $1, 7, 5, 2, 5$, and X. The average (arithmetic mean) of the 6 numbers equals a value in the data set. What is the sum of all possible values of X?

(A) 10 (B) 26 (C) 32 (D) 36 (E) 40

Problem 12

Let M be the midpoint of $\overline{AB}$ in regular tetrahedron $ABCD$. What is $\cos(\angle CMD)$?

(A) $\dfrac{1}{4}$ (B) $\dfrac{1}{3}$ (C) $\dfrac{2}{5}$ (D) $\dfrac{1}{2}$ (E) $\dfrac{\sqrt{3}}{2}$
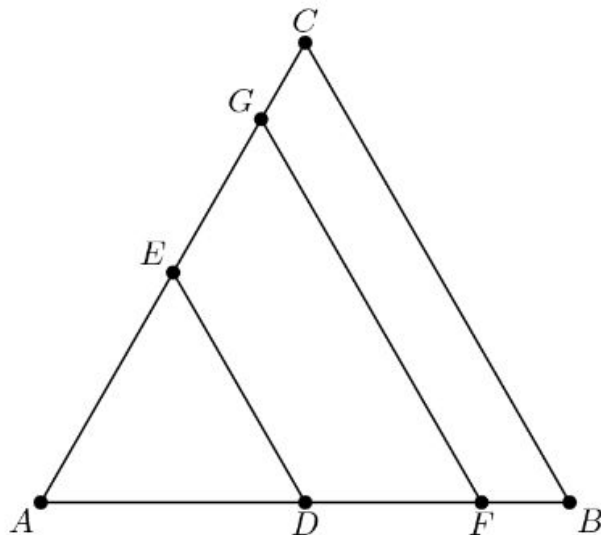
Problem 19

Suppose that 13 cards numbered $1, 2, 3, \ldots, 13$ are arranged in a row. The task is to pick them up in numerically increasing order, working repeatedly from left to right. In the example below, cards $1, 2, 3$ are picked up on the first pass, 4 and 5 on the second pass, 6 on the third pass, $7, 8, 9, 10$ on the fourth pass, and $11, 12, 13$ on the fifth pass. For how many of the $13!$ possible orderings of the cards will the 13 cards be picked up in exactly two passes?

| 7 | 11 | 8 | 6 | 4 | 5 | 9 | 12 | 1 | 13 | 10 | 2 | 3 |

(A) 4082   **(B)** 4095   **(C)** 4096   **(D)** 8178   **(E)** 8191

Problem

Triangle ABC is equilateral with $AB = 1$. Points E and G are on $\overline{AC}$ and points D and F are on $\overline{AB}$ such that both $\overline{DE}$ and $\overline{FG}$ are parallel to $\overline{BC}$. Furthermore, triangle ADE and trapezoids $DFGE$ and $FBCG$ all have the same perimeter. What is $DE + FG$?

(A) 1 **(B)** $\dfrac{3}{2}$ **(C)** $\dfrac{21}{13}$ **(D)** $\dfrac{13}{8}$ **(E)** $\dfrac{5}{3}$