

Solving Advanced Average Problems on the ISEE Middle and Upper Level

LESSON GOAL: Solve multi-step word problems using the average formula.

ISEE Middle-Level Question:

Risa has scored 85, 92, 77, and 98 on her first four math tests. At least which score does she need on her fifth test to achieve a five-score average of 90 or higher?

- (A) 90
- (B) 92
- (C) 98
- (D) 100

Helpful tip: Do NOT figure out her four-score average. You don't need it to solve the problem!

Solution: To solve this problem, we need to use a variation of the average formula: $\text{total} / \text{number} = \text{average}$
Therefore, $\text{average} \times \text{number} = \text{total}$

STEP 1: Use addition to calculate Risa's four-score total.

$$85 + 92 + 77 + 98 = 352$$

STEP 2: Use the variation on the average formula to figure out the five-score total Risa needs.

$$\begin{aligned}\text{average} \times \text{number} &= \text{total} \\ 90 \times 5 &= 450\end{aligned}$$

STEP 3: Find the difference between the total she currently has and the total she needs.

$$450 - 352 = 98$$

Helpful tip: Remember to multiply the average score she needs by 5, not 4, since she'll have taken 5 tests by the time she needs an average of 90.

Solution: Risa needs a score of 98. The answer is C.

ISEE Upper-Level Problem:

Robert has taken three tests in his math class and has received scores of 85, 70, and 95. His final exam will be counted twice in his mean. At least what score does he need on the final exam to receive a score of at least 80 in the class?

- (A) 70
- (B) 75
- (C) 80
- (D) 85

Solution: We solve this problem following the same steps as the middle level problem above, but we must count the final exam score twice. Because of this, we multiply the average by 5, and then divide the difference by two.

$$\text{STEP 1: } 85 + 70 + 95 = 250$$

$$\text{STEP 2: } 80 \times 5 = 400$$

$$\text{STEP 3: } 400 - 250 = 150$$

$$\text{STEP 4: } 150 \div 2 = 75$$

Solution: Robert needs a score of 75, choice B.