Problem of the Week
Problem C and Solution
An Average Quiz

Problem

For a recent quiz about averages, the following information is known:

- There were three questions on the quiz.

- Each question was worth 5 marks.

- Each question was marked right or wrong (no part marks).

- 30% of the students got all 3 questions correct.

- 40% of the students got exactly 2 questions correct.

- 25% of the students got exactly 1 question correct.

- 5% of the students got no question correct.

Determine the overall class average for this quiz.

Solution
Solution 1

To determine the average, we must determine the sum of all the marks and divide by the number of students. We will use the information given for a class of 100 students.

Since 30% of the students got all 3 questions correct, 30 students each scored 15 marks and earned a total of $30 \times 15 = 450$ marks.

Since 40% of the students got exactly 2 questions correct, 40 students each scored 10 marks and earned a total of $40 \times 10 = 400$ marks.

Since 25% of the students got exactly 1 question correct, 25 students each scored 5 marks and earned a total of $25 \times 5 = 125$ marks.

Since 5% of the students got no questions correct, 5 students scored 0 marks and earned a total of $5 \times 0 = 0$ marks.

The total number of marks earned by the 100 students was
$450 + 400 + 125 + 0 = 975$.

The average mark on the quiz was then $975 \div 100 = 9.75$ out of 15, or 65%.

Solution 2

To determine an average, we must determine the total of all the marks and divide by the number of students.

Let n represent the number of students who wrote the test where n is a positive integer.

Since 30% of the students got all 3 questions correct, $0.30n$ students each scored 15 marks and earned a total of $0.30n \times 15 = 4.5n$ marks.

Since 40% of the students got exactly 2 questions correct, $0.40n$ students each scored 10 marks and earned a total of $0.40n \times 10 = 4n$ marks.

Since 25% of the students got exactly 1 question correct, $0.25n$ students each scored 5 marks and earned a total of $0.25n \times 5 = 1.25n$ marks.

Since 5% of the students got no questions correct, $0.05n$ students scored 0 marks and earned a total of $0.05n \times 0 = 0$ marks.

The total number of marks earned by the n students was
$4.5n + 4n + 1.25n + 0 = 9.75n$.

The average mark on the quiz was then $\frac{9.75n}{n} = 9.75$ (since $n \neq 0$) out of 15, or 65%.