



# Problem of the Week

## Problem C and Solution

### Just Testing

#### Problem

The following information is known about the results of a recent math test:

- there were three questions on the test;
- 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; and
- 5% of the students got no questions correct.



Determine the overall class average for this test.

#### Solution

##### Solution 1

To determine an average, we must determine the total of all the scores and divide by the number of students. Without changing the overall class average, we will assume 100 students wrote this test.

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 score on the test was then  $975 \div 100 = 9.75$ .

The second solution does not assume a class size.





## Solution 2

To determine an average, we must determine the total of all the scores 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 score on the test was then  $\frac{9.75n}{n} = 9.75$  since  $n$  is a positive integer.

