The Open University

S271 Discovering Physics
CMA 51 Answers and Comments

Q1   <u>D is the false statement</u>

$(a-b)^2 = (a-b)(a-b) = a^2 - ab - ba + b^2 = a^2 - 2ab + b^2$.

Q2   <u>C is correct</u>

Calculations like this can be done automatically on most electronic calculators, but it is also possible to do the working oneself, as follows:

$$\frac{(5 \times 10^2) \times (6 \times 10^{-3})^2}{3 \times 10^{-4}} = 5 \times 10^2 \times 36 \times 10^{-6} \times 10^4/3 = 60.$$

Q3   <u>A is correct</u>

Substituting $x = 4\,y$ from the first equation into the second equation gives

$2 - 4\,y = 3\,y$ so $2 = 7\,y$ and $y = 2/7$.

Q4   <u>C is the false statement</u>

T is proportional to x (not inversely proportional to x) because a graph of T (plotted vertically) against x (plotted horizontally) is a straight line passing through the origin. Thus, statements A and B are true, while C is false. The proportionality means that, when the value of x doubles, the value of T also doubles so statement D is true. Statement E is also true and is another way of expressing the proportionality.

Q5   <u>C is correct</u>

The gradient of a straight-line graph of z against y is found by taking the ratio $\Delta z / \Delta y$ of the change in z to the corresponding change in y. Any points on the straight-line graph can be used, but accuracy is increased if the points are far apart. When the mass of the cake is 0.0 pound, the recommended baking time is 10 min. (Cooks may find this unrealistic, but we have to work with the given data!). When the mass of the cake is 5.0 pound, the recommended baking time is 55 min. The gradient of the graph is therefore

$$\frac{\Delta z}{\Delta y} = \frac{(55\ \text{min} - 10\ \text{min})}{(5.0\ \text{pound} - 0.0\ \text{pound})} = 9\ \text{min pound}^{-1}.$$