Examiners' Report
Principal Examiner Feedback

January 2018

Pearson Edexcel International a Level
In Chemistry (WME01)

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General Introduction

The vast majority of students seemed to find the paper to be of a suitable length, with no evidence of students running out of time. Overall the paper seemed to be a good discriminator at all levels, with no question found to be entirely straightforward but with all students able to make substantial progress on all questions. Questions 4 and 7 were particularly well answered with 39% of students scoring 7 out of 8 on question 4. Question 2, on the other hand, was poorly answered along with, unusually for a speed-time graph problem, question 5. There was also evidence of more marks being lost due to premature approximation than is usually the case. Students who used large and clearly labelled diagrams and who employed clear, systematic and concise methods were the most successful.

In calculations the numerical value of g which should be used is 9.8, as advised in the rubric on the front of the question paper. Final answers should then be given to 2 (or 3) significant figures – more accurate answers will be penalised, including fractions but simple exact multiples of g are usually accepted.

If there is a printed answer to show then students need to ensure that they show sufficient detail in their working to warrant being awarded all of the marks available. This was especially true in question 2.

In all cases, as stated on the front of the question paper, students should show sufficient working to make their methods clear to the examiner and correct answers without working may not score all, or indeed, any of the marks available.

If a candidate runs out of space in which to give his/her answer than he/she is advised to use a supplementary sheet – if a centre is reluctant to supply extra paper then it is crucial for the candidate to say whereabouts in the script the extra working is going to be done.

Report on Individual questions

Question 1

This equilibrium question proved to be a nice starter for many, with a third of students scoring full marks. However, 22% of them scoring nothing at all. The majority of students attempted to resolve forces horizontally and vertically. The resulting simultaneous equations were not, however, always solved successfully as a result of numerical slips or premature rounding leading to inaccurate answers. Those who used surd values for the trig ratios generally (but not always) manipulated them correctly to achieve the required values. Answers were only credited if they were given in the form 'kW' where k was either a correct decimal to at least 2 significant figures or a correct surd expression (in any form). A surprising number gave answers in the form W/k (where k was a decimal) and a few left trig expressions in their final answers. Weight used as Wg rather than W (as defined in the question) was seen on occasion and sometimes the tensions were treated as equal; such cases were, however, rare. Those who attempted the sine rule on a triangle of forces (or equivalent) generally did so successfully whilst those who attempted to resolve parallel to one string almost invariably omitted the other tension.

Question 2

Many students obtained the first four marks but it was very common to see an assumption that $F = \mu R$ which led to the loss of the final two marks. A significant number of students did not write down an equation for the horizontal resolution, going straight to an inequality and lost the first two marks as well. Others, without quoting $F = \mu R$, substituted values into it with no explanation. As with many "show that" problems, where the final answer is given, a sizeable proportion of students lost marks because they showed only the final algebraic rearrangement without any intermediate working or explanation.

Question 3

In part (a) the vast majority of students knew the formula for impulse in terms of change in momentum and almost all applied it successfully to particle *A*. Most took account of the change in direction of the velocity and so used signs correctly within the equation; only a very small number gave the answer as '-5*mu*' rather than '+5*mu*' (since the magnitude was required). Those few students who chose to use the impulse on *B* could gain no credit unless they also used a conservation of linear momentum equation to enable them to eliminate *k*. In the second part most proceeded to write down a conservation of momentum equation (or equate magnitudes of impulses) very often correctly. Many, however, failed to realise the significance of the given direction of *B* after impact. This determined the sign of the velocity which could then be used to derive the required inequality $k < 5$. Sometimes students attempted a third equation (conservation of momentum or equating magnitudes of impulses) which, if done correctly, gave no new information. However, often sign errors led to them 'finding' an actual value for *k*. There were a few entirely correct solutions seen but these were in the minority.

Question 4

In part (a), most students were able to resolve to obtain an equation for R and go on to find the friction, with virtually all using μR. Occasionally a candidate would use ($-a$) for acceleration rather than the more conventional a, in their equation of motion, but overall there were very few errors. The final answer needed to reflect the fact that g = 9.8 had been used and so only answers of 2.78 ms^{-1} or 2.8 ms^{-1} were acceptable. Some students lost an accuracy mark through a careless rounding error. Errors included wrong normal reactions such as $6g$. In the second part, students applied *suvat* formulae successfully to find the speed but many lost the final mark through premature approximation by using an approximate value from part (a) rather than the true value. Alternative methods, including Impulse=Ft=$m(v-u)$, were also used successfully.

Question 5

In part (a) a significant number of students did not interpret the given information for this velocity-time graph question correctly and drew a trapezium finishing on the t-axis (at $t = 5T + 20$). Those who had the correct shape for the graph generally labelled it correctly.
In the second part, most realised that the area under the graph should be equated to the distance travelled (705 m) to give an equation in T. Nearly all evaluated the constant velocity (12 ms^{-1}) correctly. However, those who were using a trapezium (either because they had drawn the wrong shape in part (a) or because they wrongly interpreted the correct shape as a trapezium when trying to write down the area) simplified the working significantly and could achieve no further credit for this part of the question. The more successful students divided the area up into trapezia/triangles/rectangles as appropriate but there was some confusion evident particularly when dealing with the deceleration phase. Those who reached the correct quadratic generally solved it correctly and chose the appropriate answer (T=10). It should be remembered that if an incorrect quadratic is being solved, a method mark will not be awarded unless there is evidence of a correct method being used such as factorising or the quadratic formula.

Those who scored little in part (b) could still achieve 2 out of the 3 available marks in the final part for finding the deceleration time and using their value of T appropriately to find the total time taken. Those with a correct value for T tended to achieve all 3 marks although occasionally $20 + 5T + 40$ (or just $20 + 5T$) rather than $20 + 4T + 40$ was evaluated.

Question 6

The first part was very well answered, with the most common error being to leave **a** as a vector and not find its magnitude. A few students subtracted the forces and a very small number used a vector triangle and applied the cosine rule or similar. There were more problems with part (b), but those who equated the **i** and **j** components usually went on to get the question correct. Many students, however, used the magnitude from part (a) for the acceleration and scored 0. Where **a** was not explicitly found, students sometimes used (6**i** - 2**j**) for **a**.

Question 7

This question was particularly well-answered. The first part was well done by the vast majority of students who used the method of resolving vertically and taking moments about a point (usually A or C) to find the given value of the distance x. Some neat solutions were seen when g was used rather than its numerical equivalent. The final mark was not awarded if decimals were used in the working which led to an inexact answer. Again, in part (b), many students adopted a correct strategy for finding the value of k. Most used vertical resolution and moments about a point (or two moments equations) to find simultaneous equations in R (reaction) and k. There were occasional errors in the distances used but generally appropriate terms were included and method marks awarded. Those who used values for the reactions from part (a) showed a lack of understanding of the situation and achieved no credit; such instances were, however, rare. Although there were some errors seen in the solution of the simultaneous equations , a fair number did evaluate k correctly as 2/7 or as a correct decimal to at least 2 significant figures.

Question8

This was a familiar final question with 55% of students scoring at least 10 of the 14 available marks. However,16% of students scored nothing at all. The first part was answered well by most students; the correct equations were written down and most then solved for T. A few clearly did not pay sufficient attention to the question and merely found the value of the acceleration. Given that the arithmetic required was basic, it was a little surprising to see so many careless errors and it should be pointed out that errors of this type tend to be more expensive on extended problems. Very few students attempted to use the whole system equation. Part (b) was also done well and the vast majority were able to gain full marks. The final part proved to be more difficult. Some students only found one of the two required distances with some students stopping after finding 4.23 and others only finding the second distance. A few failed to realise that the acceleration had changed while a very small minority used g. Of those that had a complete method for part (c), a final incorrect answer of 6.75, due to premature approximation, was very common.

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