GCSE
ADDITIONAL SCIENCE / PHYSICS

PH2FP

Report on the Examination

4408/4403

June 2013

Version: 1.0

Further copies of this Report are available from aqa.org.uk

General

Questions 1 to 6 were low demand targeting grades E, F and G. Questions 7 and 8 were standard demand targeting grades C and D.

There was no evidence to suggest that students had too little time to attempt all of the questions. However there were a number of part questions with a significant number of blank responses, in particular 2b, 5b and 8ai. Many of the questions that involved recall of basic knowledge were not well answered.

There was evidence of more students using calculators with less indication of iterative methods for multiplication items. However, there were still far too many instances of correct substitution into equations followed by the correct numbers with random positioning of decimal points.

Question 1 (Low Demand)

(a) Surprisingly nearly one third of students scored zero.

(b) The vast majority of students were able to identify the correct reason for using gamma radiation.

(c) Over half of the students scored this mark. The most popular incorrect answer was 'all'.

(d) Very poorly answered with over half of the students failing to score the mark.

Question 2 (Low Demand)

(a) The vast majority of students were able to identify 'L' as the supply with the largest peak potential difference.

(b) This question was poorly answered. A minority of students gave the correct answer of 6, the most common incorrect answer being 12 from measuring from trough to peak on the oscilloscope trace although answers were given in a range from 0 to 256.

(c) This question was poorly answered, the vast majority of students incorrectly choosing to draw waves. Less than 10% of students scored both marks.

Question 3 (Low Demand)

(a) (i) Half of the students scored this mark.

(a) (ii) This was better known with a majority of students giving the correct answer.

(b) (i) A majority of students were able to identify the circuit symbol for a fuse.

(b) (ii) A majority of students answered this question correctly, with most of the incorrect responses being in terms of the fuse blowing up or exploding, or statements regarding the shattering of the glass or metal caps.

(c) (i) Although most students correctly identified the toaster as the appliance needing an earth wire, the second mark was harder to achieve as a significant number of students thought that the metal casing was present due to heat considerations.

(c) (ii) Most students answered correctly that an electric shock or electrocution would be the possible risk from the appliance, the most common incorrect response involved overheating and subsequent burns to a person.

(d) Few students were aware that the inappropriate connection of the wires would cause sparking and heating of the wires. There were many vague responses solely in terms of the overheating of the tapes or the possibility of electrocution.

(e) A majority of the students explained how the use of a connecting box could be a secure way to join two lengths of electrical cable but there were very few correct answers that gained both marks by continuing the answer to explain why this was important.

Question 4 (Low Demand)

(a) A majority of the students gave the correct answer.

(b) (i) A majority of students scored both marks. However, many incorrect answers showed students multiplying the correct answer by 10 to give a final incorrect answer.

(b) (ii) Over half of the students scored both marks, either using their correct answer to part (b)(i) or by the error carried forward route.

Question 5 (Low Demand)

(a) A majority of students gave the correct answer. The most popular incorrect answer was plutonium.

(b) Over half of the students scored zero with a significant minority not attempting the question. Most students got confused between nuclei splitting and atoms splitting and most students forgot about the neutrons that are released.

(c) This was better answered with nearly half of students scoring all three marks. A common error was to interchange the position of the turbine and generator.

Question 6 (Low Demand)

(a) Nearly all students scored at least one mark with nearly half of students scoring both. The most common error was writing distance in the second answer space.

(b) Only just over half of the students gave the correct answer. The most common incorrect answer was ‘The car driver being tired’.

(c) (i) The majority of students who scored one mark on this question correctly identified that braking distance increases with speed but added no further detail to allow them to score the second mark.

Those candidates who scored two marks generally gained the second mark for quoting two points of numerical data from the graph. Students scoring zero were generally making comments about thinking distance increasing with speed or stopping distance increasing with speed.

(c) (ii) A wide variety of lines were drawn, however most were acceptable. Most students did seem to know that in icy conditions the braking distance would increase but a large number of students did not follow the shape of the curve given.

(d) (i) This was well answered by the minority of students who realised that reaction time did not change with speed. There were a number of students who confused 'thinking distance' with thinking time or reaction time and therefore did not score the mark because this would change with speed.

There were a worrying number of students who thought you would react quicker when driving faster because you would concentrate more.

(d) (ii) This was poorly answered, most students did not realise that the evidence required monitoring of the roads in question and suggested collecting data about other roads. There were also a number of students who thought that accident levels on any 20 mph road could be compared with other 30 mph roads to use as evidence not appreciating that other differences in conditions would make that data invalid. Almost no students mentioned the requirement of gathering data over the same period of time, before and after the speed limit was introduced. A number of students thought that repeating tests on stopping distances from different speeds was required.

Question 7 (Standard Demand)

(a) This was very poorly answered with few students scoring any marks. The students had great difficulty in explaining the forces involved to move the boat forward, very few wrote that the water provided a force on the boat. Those that did usually failed to give a direction to the force.

(b) (i) The calculation was well done with nearly three quarters of the students giving the correct numerical answer. However few students were able to give the correct unit. A significant minority of students incorrectly obtained an answer of 15.5. This was caused by incorrect use of the calculator when working out a substitution written as $16 – 4 \div 8$

(b) (ii) Again this calculation was well done with the vast majority of students giving a correct answer.

(b) (iii) Only half of the students gave the correct answer with very few students being able to give a correct reason for their choice. Answers were generally in terms of a greater force is needed as the skier is accelerating.

Question 8 (Standard Demand)

(a) (i) This was very poorly answered with few students realising what the function of 'J' was in the circuit. A significant number of students did identify 'J' as a variable resistor but did not go on to say what it does.

(a) (ii) Again very poorly answered with only a very small minority of students understanding that the resistance increases as the temperature of the bulb increases.

(a) (iii) Again the calculation was well done with nearly three quarters of students giving the correct numerical answer. However the unit was not well known with only just over one fifth of students giving the correct one.

(b) Most students managed to score some marks on this question with the majority of students at level 2 and gaining 3 or 4 marks. Comparison of the cost aspect was done best by students, with many correctly calculating the need for 18 halogen bulbs to last as long as 1 LED and the higher associated costs. Very few students made a comment on efficiency beyond the fact that LEDs were more efficient. A lot could have been written about energy efficiency such as less waste energy, less heat produced, lower power input and lower running costs for the LED bulb. Even a simple statement of not having to change the LED bulb as often as the halogen bulb was not common. There were a small number of students who believed that you could increase the efficiency by adding more bulbs. So for example if you had 4 halogen bulbs at 10% efficiency then this would give you 40% efficiency. This led to erroneous conclusions that you could make halogen bulbs more efficient than an LED bulb. There were also a small number of students who believed that the higher the number for efficiency the more energy was wasted and so a higher efficiency was undesirable. A large number of students wasted time, and a considerable amount of the answer space, just rewriting the information in the table without any comparison other than to quote the numbers given. Specialist terms were usually limited to those given in the question. There was a considerable variation in the ability to use good English; some excellent sentences and clear writing, and at the other extreme an inability even to use capital letters and full stops, and copy correct spellings from words given in the question.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator