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# Examiners' Report
# June 2014

# GCSE Physics 5PH2H 01

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June 2014

Publications Code UG040013

# Introduction

This unit is divided into six topics and all six topics are tested in the examination.

The topics are:

- controlling and using electric current
- static and current electricity
- motion and forces
- momentum, energy, work and power
- nuclear fission and nuclear fusion
- advantages and disadvantages of using radioactive materials.

It was intended that the examination paper would allow every candidate to show what they know, understand and are able to do. To achieve this, each question increased in difficulty as the question progressed. Within the question paper, a variety of question types were included, such as objective questions, short answer questions worth 1 or 2 marks each and longer questions worth 3 or 4 marks each. The two 6 mark questions were used to test quality of written communication.

Successful candidates were:

- well-grounded in the fundamental knowledge required
- willing to think, use their knowledge to solve new problems and apply their knowledge to unfamiliar situations
- able to analyse and interpret data in graphical form
- able to tackle calculations methodically and show the stages in their working
- able to construct their explanations in a logical order, using the marks at the side of the questions as a guide.

Less successful candidates:

- had gaps in their knowledge
- found difficulty in applying their knowledge to new situations
- did not show their working in calculations
- did not think through their answers before writing.

This report will provide exemplification of candidates' work, together with tips and/or comments, for a selection of questions. The exemplification will come mainly from questions which required more complex responses from candidates.

## Question 1 (a) (ii)

Candidates generally found no difficulty in recalling that like charges repel.

## Question 1 (b) (i)

Although the dangers of fire were well known, many candidates did not clearly explain how this could be caused.

Candidates often gave a dangerous consequence ( for example fire or explosion) without explaining why this might occur.

(b) The student reads an article about the possible build-up of static electricity during the refuelling of an aircraft.

(i) Explain why this build-up could be dangerous.

**(2)**

The build-up of static electricity can possibly create combustion due to over power build up of static electricity and fuels are highly flammable, so while refuelling the aircraft can cause a massive explosion.

**ResultsPlus**
**Examiner Comments**

The question mentioned 'build-up of static electricity' and so there are no marks for simply repeating this phrase.

**ResultsPlus**
**Examiner Tip**

Make sure that your answer does not simply repeat what was in the question.

(b) The student reads an article about the possible build-up of static electricity during the refuelling of an aircraft.

(i) Explain why this build-up could be dangerous.

**(2)**

Because if there is a build-up of static electricity it could create a spark igniting the fuel in the aircraft.

**ResultsPlus**
**Examiner Comments**

This is a brief and accurate answer which scored both marks.

## *Question 1 (b) (ii)*

Examiners were looking for an explanation which included the role of the cables. Although most candidates knew about the idea of earthing, they often failed to mention anything about charge movement. Better candidates were able to describe charge flow through the cable or at least to mention that the cable was an electrical conductor.

(ii) The article also states that the aircraft is connected by a metal cable to the ground. The aircraft is also connected by a metal cable to the refuelling tanker.

Explain how these cables reduce the dangers when refuelling the aircraft.

**(3)**

The cables reduce the dangers when refuelling because since the cables are metal, it means they can conduct electricity. This reduces the chance of an electric shock as because it allows the plane to be earthed.

**ResultsPlus**
**Examiner Comments**

This response has the idea of earthing and mentions that the cables are conductors. It is worth two marks.

(ii) The article also states that the aircraft is connected by a metal cable to the ground. The aircraft is also connected by a metal cable to the refuelling tanker.

Explain how these cables reduce the dangers when refuelling the aircraft.

**(3)**

it is able to conduct electricity so the electrons can flow through it and a charge will not build up so the metal earths the aircraft ✗

**ResultsPlus**
**Examiner Comments**

This is a good, concise answer. It clearly states that the cable is a conductor, describes the flow of charge and relates this to earthing of the aircraft.

## *Question 2 (b) (iii)*

It was pleasing to see that very many candidates could write a clear and accurate explanation of electrons colliding with ions to bring about a transfer of energy. Examiners were particular about the incorrect use of terms such as 'create heat energy' and 'electricity colliding with atoms'. Fortunately, such inaccuracies were relatively rare.

(iii) The heating element of the kettle contains a resistor made from a long length of wire. Explain why an electric current in a resistor makes the resistor heat up.

**(2)**

The electrons collide with the positive metal ions in the lattice, transferring electrical to heat energy.

**ResultsPlus**
**Examiner Comments**
This is a good, clear answer easily worth two marks.

Candidates should know that an electric current in a wire is a flow of electrons.

(iii) The heating element of the kettle contains a resistor made from a long length of wire. Explain why an electric current in a resistor makes the resistor heat up.

**(2)**

Because it is hard for the current to pass through, resulting in the resistor heating up, and ~~t~~ the electrical energy may be transferred into thermal energy.

**ResultsPlus**
**Examiner Comments**
There is a mark for correctly writing about energy transfer but at this level, use of terms such as 'hard for the current to pass through' are not sufficiently precise to earn a mark.

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**Examiner Tip**
Make sure that you use scientific language in your answers.

## *Question 2 (b) (i-ii)*

Candidates were required to select and then transpose the appropriate equation before evaluating the expression. Examiners would give some credit for seeing the correct values substituted into an expression even if the transposition was not correct. Many candidates do not lay out their answers with sufficient clarity to enable this mark to be awarded.

It was also very common for candidates to use the numerical value of 1.8 for the power without converting this into watts. This could still gain two out of three marks if the method was clear.

In part (ii) most candidates used the equation in the booklet (E = V x I x T) but some multiplied power x time, which was perfectly acceptable. A large number did not convert the time from minutes into seconds.

As is customary, candidates with an incorrect answer in part (i) could gain full credit if they used this (incorrect) value in part (ii) to arrive at a consistent answer in part (ii).

(b) The power of the kettle when it is heating water is 1.8 kW.
The mains voltage is 230 V.

(i) Calculate the current in the kettle.

power = current x pd. (3)

1.8 = ? x 230

$\frac{1.8}{230}$

current = 0.782 A

(ii) The kettle is switched on for 2 minutes.

Calculate the total amount of energy transferred by the kettle in this time. (2)

power = current x pd x time.

1458 = 0.782 x 230 x 120

energy transferred = 21.5 J

**ResultsPlus**
**Examiner Comments**

In part (i), the candidate has clearly shown a substitution of values into the correct expression and transposed this correctly. Unfortunately the power has not been changed from kW into W and so the final evaluation is 1000 times too small.

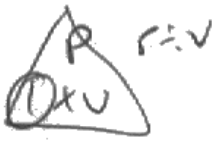
The candidate then correctly used this value in the expression to find the energy transferred to gain 1 mark but made an error in the evaluation (apparently dividing by 1000 at some point).

**ResultsPlus**
**Examiner Tip**

Always show your working so that the examiner can give you credit if you make a mistake with your calculation.

(b) The power of the kettle when it is heating water is 1.8 kW.
The mains voltage is 230 V.

(i) Calculate the current in the kettle.




(3)

P = I × V

1800 = 230 × I

$\frac{1800}{230}$ = 7.826086957

current = 7.83 A

(ii) The kettle is switched on for 2 minutes.

Calculate the total amount of energy transferred by the kettle in this time.

(2)

E = I × V × T

= 7.83 × 230 × 120 = 216108


energy transferred = 216108 J

**ResultsPlus**
**Examiner Comments**

This is a clear answer which scored full marks.

**ResultsPlus**
**Examiner Tip**

The use of triangles may help you to remember how to re-arrange an equation, but the examiner will not give credit for this. Make sure you always write a proper equation as well.

## Question 3 (a) (ii)

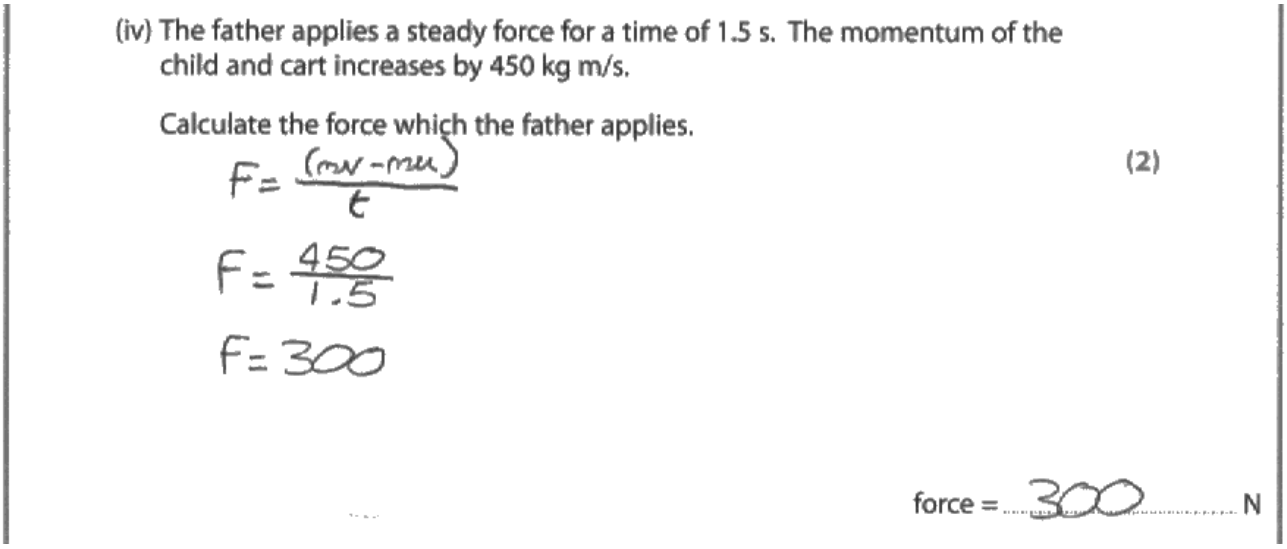
This was generally well answered. The most common mistake was to confuse momentum or force with energy.

## Question 3 (a) (iii)

The calculation of momentum from given values of mass and velocity proved straightforward for most candidates.

## Question 3 (a) (iv)

Most candidates were able to use the equation linking force, change in momentum and time, but a large number subtracted their previous answer (200 kg m/s) from the value given in the question (450 kg m/s) before evaluating the force.



(iv) The father applies a steady force for a time of 1.5 s. The momentum of the child and cart increases by 450 kg m/s.

Calculate the force which the father applies.

$F = \frac{(mv - mu)}{t}$

(2)

$F = \frac{450}{1.5}$

$F = 300$

force = 300 N

**ResultsPlus**
**Examiner Comments**

This is a correct answer.

(iv) The father applies a steady force for a time of 1.5 s. The momentum of the child and cart increases by 450 kg m/s.

Calculate the force which the father applies.

(2)

$F = \frac{(mv - mu)}{t}$

$F = \frac{450}{1.5}$

$F = 300$

force = 300 N

**ResultsPlus**
**Examiner Comments**

The candidate has subtracted the original momentum from the change in momentum already given. However, because the equation had been written out in words and then with values shown, it was obvious to the examiner that the candidate knew how to use the equation and so awarded 1 mark.

## *Question 3 (a) (v)*

Although the definition of a vector as a quantity having both size and direction was quite well known, a large number of candidates seemed to have the correct idea of direction but gave a specfic example (usually velocity or force) rather than a statement which applied to all vectors.

(v) Momentum is a vector quantity.

State what is meant by a vector quantity.

(1)

Something with a speed and direction

**ResultsPlus**
**Examiner Comments**

This was a very common incorrect response. The candidate may have confused velocity with vectors in general.

## *Question 3 (b)*

Candidates could approach this example of vectors in action in two different ways. They could have used the idea of conservation of momentum to argue that , although both mother and daughter had the same (size of) momentum, the daughter, with a lower mass, must have a higher velocity. Alternatively, they could have used Newton's laws to explain that although the force on each had the same magnitude, the lower mass of the daughter would result in her having a greater acceleration and consequently a higher speed when they separate.

Better candidates used either of these with considerable clarity. Weaker candidates could recognise the significance of the difference in mass but a very large number went on to write that this allowed the mother to apply a greater force to the daughter than the daughter applied to the mother.

(b) The photograph shows a mother and her daughter stationary on an ice rink.

The mother and daughter push each other away.
They move in opposite directions with different speeds.

Explain why they have different speeds.

(3)

because they have different masses and if they exhert the same force than the daughter (smaller mass) will move faster than the mother (bigger mass).

**ResultsPlus**
**Examiner Comments**

This is an acceptable answer which correctly identfies the differences in mass and the relative speeds of mother and daughter. It also makes a correct statement about the force(s) being equal. It scored all 3 marks.

This type of response was quite common.

(b) The photograph shows a mother and her daughter stationary on an ice rink.

The mother and daughter push each other away.
They move in opposite directions with different speeds.

Explain why they have different speeds.

**(3)**

They could have pushed each other with different forces meaning they would travel at different speeds due to the difference in forces pushing each other away.

**ResultsPlus**
**Examiner Comments**

This response has the wrong idea about 'action and reaction'. It also did not make it clear who had the greater speed. It did not score any marks.

**ResultsPlus**
**Examiner Tip**

Make sure that you know and understand the laws of motion and be ready to apply them.

Candidates could also use conservation of momentum.

(b) The photograph shows a mother and her daughter stationary on an ice rink.

The mother and daughter push each other away.
They move in opposite directions with different speeds.

Explain why they have different speeds.

**(3)**

The mother has a higher mass which means that she will be slower, because momentum ÷ mass = velocity, so if they both have equal momentum, the child will be going faster because of her lower mass.

**ResultsPlus**
**Examiner Comments**
This is a good, concise answer which scores maximum marks.

## *Question 4 (c) (i)*

This was another question where candidates had to transpose an equation. Similar comments apply regarding the showing of working. This time, however, the units were straightforward and fully correct answers were more frequent.

(c) Both vehicles are travelling at 13 m/s.

The driver of the truck then accelerates at 1.2 m/s² until both vehicles are travelling at 20 m/s.

(i) Calculate the time taken for this acceleration.

(3)

$S = \frac{D}{T}$ 



$\frac{20 - 13}{1.2}$

time = 5.83 s

**ResultsPlus**
**Examiner Comments**
This is a correct answer, gaining 3 marks.

One mark was awarded for method.

(c) Both vehicles are travelling at 13 m/s.

The driver of the truck then accelerates at 1.2 m/s² until both vehicles are travelling at 20 m/s.

(i) Calculate the time taken for this acceleration.

(3)

acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$


time taken = $\frac{\text{acceleration}}{\text{change in velocity}} = \frac{1.2}{7} = 0.17$

time = 0.17 s

**ResultsPlus**
**Examiner Comments**
Athough the equation was incorrectly transposed, the candidate could gain one mark for clearly showing the substituted values.

## Question 4 (c) (ii)

Calculation of force was generally correctly done but there were many candidates who squared the given value of acceleration during their evaluation.

## Question 4 (c) (iii)

Up to this point, the question had been about the horizontal forces involved in towing the car. It was therefore a pity that so many of even the better candidates, focused on the (vertical) force of weight. It would seem that the difference between gravitational effect of mass and inertia was poorly understood. A few responses did consider how the tension might depend upon the acceleration of the truck and/or whether the truck and car were going up a hill, but the large majority of candidates simply wrote that the weight of the car is greater than 12 00N and so the rope would snap. A few seemed to intuitively know that tow ropes do not need to be strong enough to support the entire weight of a car but struggled to express themselves. It was common to read that the truck would 'take all of the weight' and so relieve the tension in the rope.

(iii) A rope can withstand a tension of 12 000 N before it breaks.
The weight of the car is 14 000 N.

Discuss whether this rope could be strong enough to tow the car with the truck.

(3)

yes. This is because the rope isn't holding the entire weight of the car and so the force on the towing rope would be much less than 12000N and most likely less than 12000 N.

**ResultsPlus**
**Examiner Comments**

The candidate has clearly understood the direction of the forces involved. This type of response was quite rare. It scored 2 marks.

it all depends on how the driver of the truck ~~drop~~ drives. but as its towing the car and not lifting it the rope should be strong enough to tow the car with of the force on the car would be the mass x acceleration as long as the acceleration stays be low ! it should be safe

**ResultsPlus**
**Examiner Comments**

This answer also makes the point that the rope would be strong enough if the acceleration was kept small.

## Question 5 (a) (i)

Although almost every candidate knew that uranium was the fuel in a fission reactor, weaker candidates confused the materials used for moderator and control rods.

## Question 5 (a) (ii)

This question was aimed at the higher ability candidates and gave them opportunity to demonstrate a secure understanding of the process of fusion. Examiners were looking for responses that made it clear that the fusion of two light nuclei did not require a neutron to initiate the process. Better candidates were able to provide this. Weaker candidates either wrote that the neutrons were already going slowly enough or that the neutrons needed to be travelling quickly in order to collide and fuse.

(ii) Another type of nuclear reactor is a fusion reactor.
Nuclear fusion also releases fast neutrons.

Suggest why a nuclear fusion reactor does not need anything to slow these neutrons down.

(1)

The neutrons are not used in fusion and so do not need to be slowed to increase collisions.

**ResultsPlus**
**Examiner Comments**
This is a simple, brief and correct answer.

(ii) Another type of nuclear reactor is a fusion reactor.
Nuclear fusion also releases fast neutrons.

Suggest why a nuclear fusion reactor does not need anything to slow these neutrons down.

(1)

As fast neutrons are needed in order for more collisions to occur so ~~the~~ energy is release quickly.

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**Examiner Comments**
This incorrect response was very common.

## *Question 5 (b)*

The essential stages in electrical power generation were generally well known. A few candidates wrote about the evaporation of water rather than the generation of (high pressure) steam. There were also many cases where the turbine and generator were either confused or combined into one device. A large number, however, were able to expand on the minimum required and wrote lucidly about heat exchangers and the recycling of coolants.

Many seemed to forget the need for a generator.

(b) Both nuclear fission and nuclear fusion release thermal energy.

Describe how the thermal energy released could be converted into electrical energy in a power station.

(3)

The thermal energy released boils water which releases steam which turns the turbines in the power station to produce electrical energy.

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**Examiner Comments**
This scores a mark for mentioning steam and a mark for the turbine.

Some took the answer a little further than required.

(b) Both nuclear fission and nuclear fusion release thermal energy.

Describe how the thermal energy released could be converted into electrical energy in a power station.

(3)

The thermal energy produced by the nuclear reactor is used to create steam by boiling water. The steam turns the turbines which create kinetic energy to turn the generator to produce electrical energy and then transformers are used to step up the voltage

**ResultsPlus**
**Examiner Comments**
Full marks were awarded for describing the energy changes. The role of the transformer is correct but was not required for this question.

(b) Both nuclear fission and nuclear fusion release thermal energy.

Describe how the thermal energy released could be converted into electrical energy in a power station.

**(3)**

The thermal energy is used to heat water which turns to steam. The steam flows through a turbine which spins, in turn spinning the coil in a generator. This will induce an electrical current in the generator.

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**Examiner Comments**

This is a good, clear answer worth all three marks.

## *Question 5 (c)*

The requirements (of extreme pressure and temperature) for controlled fusion were well known and a clear description of these was a level 1 response. Those who could correctly relate these requirements to the need to overcome electrostatic repulsion of the nuclei generally gave a response at level 2. For level 3, examiners were looking for an explanation as to how the high temperature and high pressure could overcome that electrostatic repulsion; in other words giving the nuclei a large kinetic energy and increased chance of collisions taking place.

There was sufficient space in the question paper booklet for a well-constructed response at level 3. Very many candidates, however, deviated into consideration of the advantages of nuclear fusion power stations, the process of nuclear fusion, the difficulties of sustaining the required conditions and even cold fusion. Such candidates often continued their answer either into other spaces on the question paper or on supplementary answer sheets. These in particular very frequently contained nothing worthy of further marks to that already given in the space provided.

A well constructed response can gain full marks in a few lines.

*(c) Scientists and engineers are still trying to build a practical and economic nuclear fusion reactor.

They have not been able to sustain the extreme conditions needed for controlled nuclear fusion.

Explain what these conditions are and why they are needed.

(6)

One condition needed for a controlled nuclear fusion is extremely high temperatures. This is so that the two particles can collide with higher energy. The like charged particles will be ~~at~~ moving at faster speeds so will be able to overcome their electrostatic repulsion. This means they can collide and the reaction can take place. Another condition needed is high density, like that of the sun so that the particles are closer together. Particles need to be extremely close to each other for the reaction to take place.

Temp
density

**ResultsPlus**
**Examiner Comments**

The answer explains what conditions are required, why they are required and how they achieve the required result. The explanation of pressure was considered sufficiently accurate for this paper. This is a level 3 response.

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**Examiner Tip**

Think through your answer before writing anything. You can often say a lot in a few sentences.

A level 2 response included a description of the extreme conditions and a reason why they are needed. The description, however, was not a full explanation.

*(c) Scientists and engineers are still trying to build a practical and economic nuclear fusion reactor.

They have not been able to sustain the extreme conditions needed for controlled nuclear fusion.

Explain what these conditions are and why they are needed.

(6)

The extreme conditions needed for a nuclear fusion reaction to take place is a incredibly high temperature and an a high amount of pressure. The reason for the very high temperature. The reason why nuclear fusion is so hard is because during the process you are trying to get two small positive nucleus to join in ~~ord~~ order to make larger nuclei. A the positive charges repel eachother it is very hard for them to join. Therefore in ~~ord~~ order of anychance of them doing so you need high pressure and temperatures. The high temperature is needed because it can make the charges has strong therefore more chances of joining. The high temperatures are needed because they are what can force the repel charges together.

**ResultsPlus**

**Examiner Comments**

'Explain' is different from 'describe'. Here the candidate has described the high pressure and temperatures but has not explained them by writing about how they help to achieve fusion (ie gives the nuclei a high kinetic energy and makes them closer together).

Many candidates gave answers to a different question from that being asked.

*(c) Scientists and engineers are still trying to build a practical and economic nuclear fusion reactor.

They have not been able to sustain the extreme conditions needed for controlled nuclear fusion.

Explain what these conditions are and why they are needed.

(6)

In order to obtain fusion, you need very high density. you need high density in order to keep the particles compacted so that no nuclear energy or power can escape. You also need very high temperatures as nuclear fusion can only happen at a temperature 3 times hotter than the sun which will never be obtained on Earth. you also need high pressure in order to keep the particles compact so that energy will escape. Two scientists named pons and Fleichmann believed to have created 'cold fusion' that uses cold temperatures instead however, this hasn't be redone meaning it's unproven.

(Total for Question 5 = 12 marks)

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**Examiner Comments**

The candidate has made a correct statement about the need for very high temperature and pressure but has not explained why those conditions are required. Instead, the answer moves into discussion of cold fusion which was not asked for. This is a level 1 response.

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**Examiner Tip**

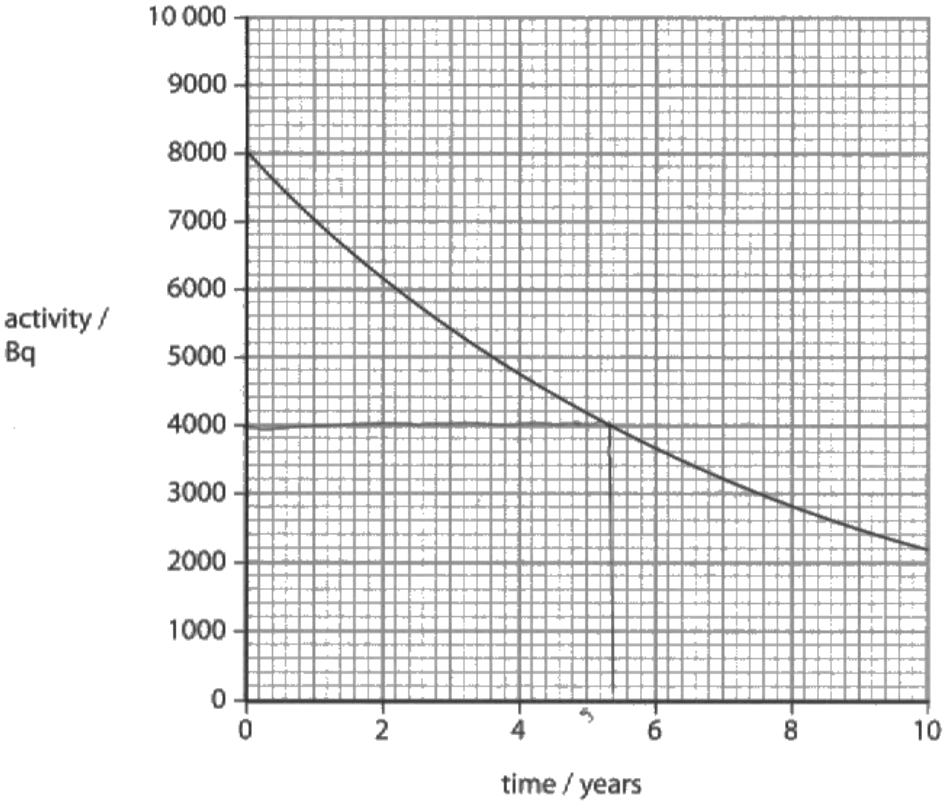
It is a good idea to underline the key words in the question; such as 'what' and 'why' before you start to answer.

## *Question 6 (b)*

It was pleasing to see that so many candidates could interpret the graph and correctly read the scale to arrive at a value between 5.1 and 5.5. The most common error was to look for the activity at 5 years (ie half-way along the time axis) or to simply give 5 years.

In the second part, the majority of candidates recognised that three half-life periods were required for the activity to fall from 8000 Bq to 1000 Bq. Those that had an incorrect value in part (i) could carry that error forward for full credit in part (ii) if they showed appropriate working. Some candidates attempted to extrapolate the graph. Credit was given if they arrived at a value between 15.5 and 16.5, but this was rare to see.

(b) Cobalt-60 is one source of gamma radiation used for food irradiation.
This graph shows how the activity of a sample of cobalt-60 changes over 10 years.




(i) Use the graph to find the half-life of cobalt-60.

(2)

half-life = 5·3 years

(ii) The cobalt-60 has to be replaced when its activity has fallen below 1000 Bq.

Estimate how long it takes for the activity to fall from 8000 Bq to 1000 Bq.

(1)

8000 — 4000 — 2000 — 1000

3 half lives

5·3 × 3 = 15·9

time taken = 15·9 years

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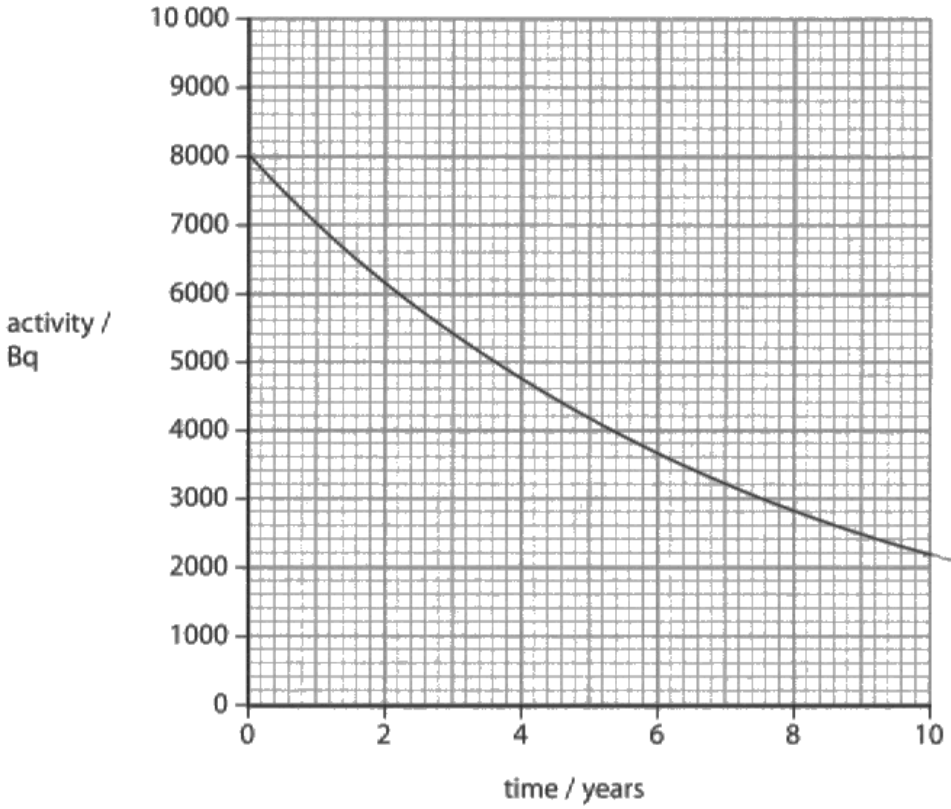
**Examiner Comments**
This is a clear answer worth 3 marks.




(i) Use the graph to find the half-life of cobalt-60.

**(2)**

half-life = 5.4 years

(ii) The cobalt-60 has to be replaced when its activity has fallen below 1000 Bq.

Estimate how long it takes for the activity to fall from 8000 Bq to 1000 Bq.

**(1)**

time taken = 17 years

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**Examiner Comments**
2 marks were awarded for the first part but no mark was given for trying to continue the curve outside of the margin of the paper.

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**Examiner Tip**
The examiner will not expect you to continue a graph outside of the given scale.

## *Question 6 (c) (i)*

Isotopes were well understood by most candidates and very many could give the correct number of neutrons and protons in each nucleus. It was noticeable that fewer candidates mentioned electrons (which are not relevant in this context) than in previous years.

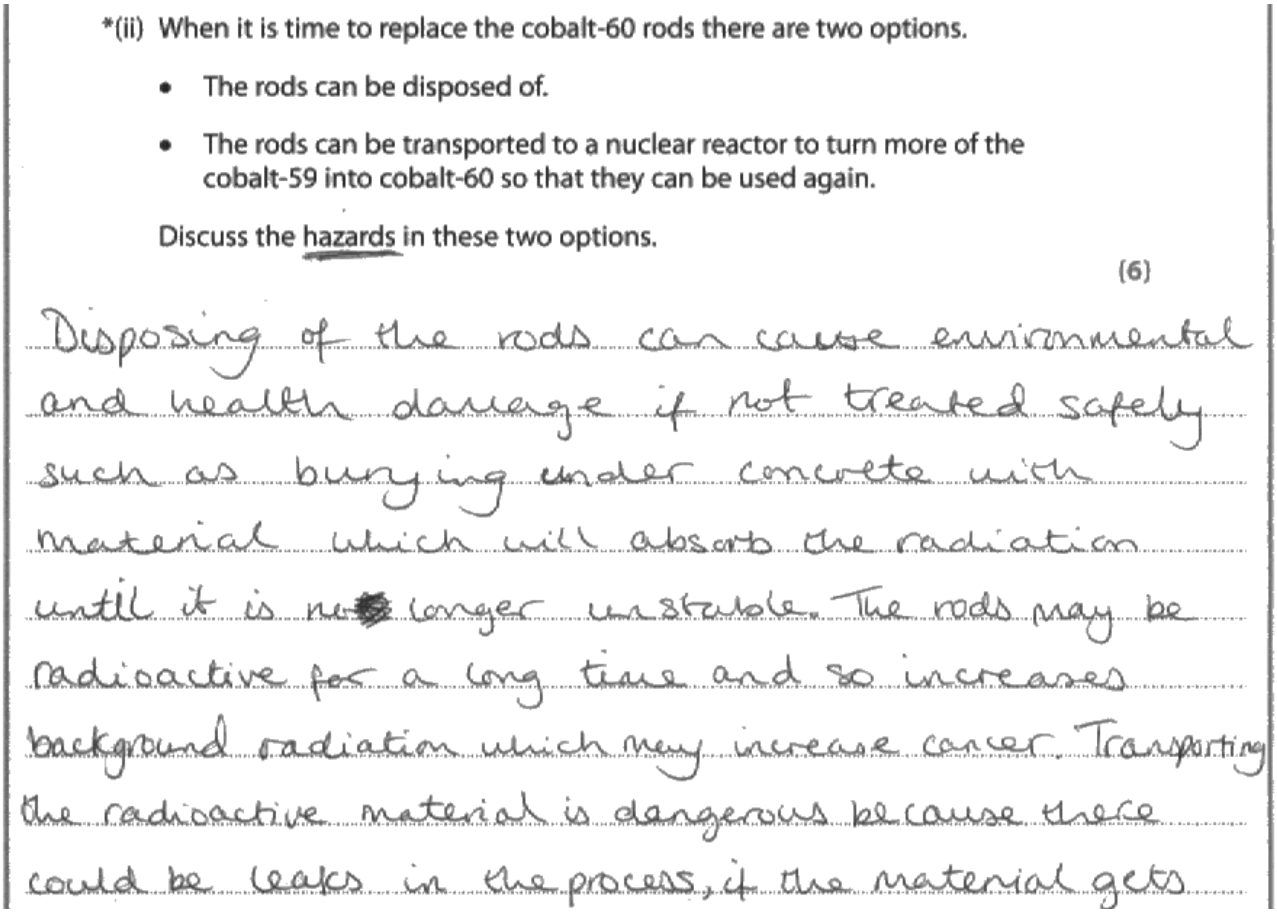
## *Question 6 (c) (ii)*

Most candidates fully engaged with this question. The hazards of radioactive materials were well known and candidates were able to write extensively on this topic. Level 1 answers were able to describe some of the hazards; most frequently the effect of radiation on living organisms. For level 2, examiners were looking for a more detailed response. This might be an expansion on the particular properties of the (gamma) radiation from the pencils or the duration for which they would emit significant amounts of radiation. It might also include details about how these hazards could be addressed such as shielding or particular storage, transport or handling arrangements. Level 3 responses contained a detailed discussion which included both storage and reprocessing.

As with the previous extended response question, there was sufficient space on the paper for a well-structured answer at level 3. Unfortunately, many candidates did not structure their answers but appeared to simply write down everything they could think of. It was common to read of possible disposal methods such as sending into space or disposal at sea which are no longer seriously considered as viable options. It was also very common for candidates to write about dangers of nuclear reactors in general: often quoting named examples of recent accidents. They would then often state that putting the spent cobalt pencils into a nuclear reactor would increase the likelihood of such accidents.

Once again, these responses frequently tended to go outside of the allocated space and onto continuation sheets with little mark-worthy content.

This is a well-constructed answer.



*(ii) When it is time to replace the cobalt-60 rods there are two options.

- The rods can be disposed of.
- The rods can be transported to a nuclear reactor to turn more of the cobalt-59 into cobalt-60 so that they can be used again.

Discuss the hazards in these two options.

(6)

Disposing of the rods can cause environmental and health damage if not treated safely such as burying under concrete with material which will absorb the radiation until it is no longer unstable. The rods may be radioactive for a long time and so increases background radiation which may increase cancer. Transporting the radioactive material is dangerous because there could be leaks in the process, if the material gets

out it can cause radiation sickness, burns or cause cell mutation being in contact with the rods is dangerous due to its activity so workers may receive higher radiation.

**ResultsPlus**
**Examiner Comments**

The candidate has given detail about the hazards and considered how they may be dealt with in both storage and transport. The answer addresses the question concisely. This is a level 3 answer. The quality of written communication was appropriate for this level and scored 6 marks.

*(ii) When it is time to replace the cobalt-60 rods there are two options.

- The rods can be disposed of.
- The rods can be transported to a nuclear reactor to turn more of the cobalt-59 into cobalt-60 so that they can be used again.

Discuss the hazards in these two options.

**(6)**

The problem with the rods can be disposed of are they are still highly radioactive, so have to be disposed of in a certain way, otherwise they can cause damage to peoples health and even trigger cancer. To dispose of the rods is can cause health problems to the people disposing of is. The problem with the second one could be some radition may be lost during transport which may affect divisions, Where it could decay, which is spontaneous and random so may react before is can be used again.

**ResultsPlus**
**Examiner Comments**

This level 1 answer gives a simple description of the health hazard of disposal of the (radioactive) material but does not expand on either the nature of the radiation, how long it might be dangerous nor how the hazard could be addressed. There is a mention of transport but does not describe how this might be hazardous apart from mentioning it being 'spilt'.

## Paper Summary

Based on their performance in this paper, candidates should:

- make sure that they have a sound knowledge of the fundamental ideas in all six topics
- make sure that they understand the meaning of terms like force, momentum, acceleration and velocity and that they use these words accurately
- get used to the idea of applying their knowledge to new situations by attempting questions in support materials or previous examination papers
- show their working at each stage of a calculation and know how to tackle calculations involving changing the subject of an equation
- plan their answers (particularly long answers) to make sure that they are not repeating themselves or writing things which are not being asked for.

## Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx



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