ResultsPlus

edexcel

Examiners' Report

June 2016

GCSE Applied Science Physics P2
5PH2F 01

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk.

Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

ResultsPlus

Giving you insight to inform next steps

ResultsPlus is Pearson's free online service giving instant and detailed analysis of your students' exam results.

- See students' scores for every exam question.
- Understand how your students' performance compares with class and national averages.
- Identify potential topics, skills and types of question where students may need to develop their learning further.

For more information on ResultsPlus, or to log in, visit www.edexcel.com/resultsplus.
Your exams officer will be able to set up your ResultsPlus account in minutes via Edexcel Online.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk.

June 2016

Publications Code 5PH2F_01_1606_ER

Introduction

Unit P2:

Physics for the future

This unit is divided into six topics and candidates' knowledge and understanding of all six topics is tested in the examination.

It was intended that the examination paper would allow every candidate to show what they knew, understood and were 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 one or two marks each, and longer questions worth three or four marks each.

The two six mark questions were used to test quality of written communication.

It was particularly pleasing to note the much improved performance on such questions on this P2 paper compared to that on earlier series of examinations. Candidates usually wrote more, and more sensibly, in this series.

The overall impression of the examiners was that the majority of candidates had been well prepared for this examination.

Successful candidates were:

- Well-grounded in the fundamental knowledge required
- Willing to think through the possibilities and apply their knowledge when the question asked for suggestions to explain new situations
- Able to tackle calculations methodically and show the stages in their working
- Able to construct their explanations in a logical order, using the mark allocations given beside the parts of each question as a guide.

Less successful candidates:

- had gaps in their knowledge
- did not read the questions carefully, and gave answers that were related to the topic being tested, but did not answer the question
- did not understand the meaning of key scientific words and phrases
- found difficulty in applying their knowledge to new situations
- did not show the stages in their working
- did not think through their answers before responding

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)

The most common correct response was 'current flows in one direction.' Very few responses mentioned movement of charge or electrons. Many candidates incorrectly referred to 'current going straight to a device'.

(ii) Explain what is meant by a direct current (d.c.)

(2)

A current in a circuit that only travels in one direction.

ResultsPlus
Examiner Comments

An example of one of the many correct responses seen by examiners.

(ii) Explain what is meant by a direct current (d.c.)

(2)

electricty sent straight to something

ResultsPlus
Examiner Comments

Responses similar to this were often seen by examiners. These responses did not score any marks.

(ii) Explain what is meant by a direct current (d.c.)

(2)

direct current is a flow of electrons in the same direction. it uses a all or batteries as a supply.

ResultsPlus
Examiner Comments

A correct response scoring both marks. Responses mentioning movement of charges or electrons were not very common.

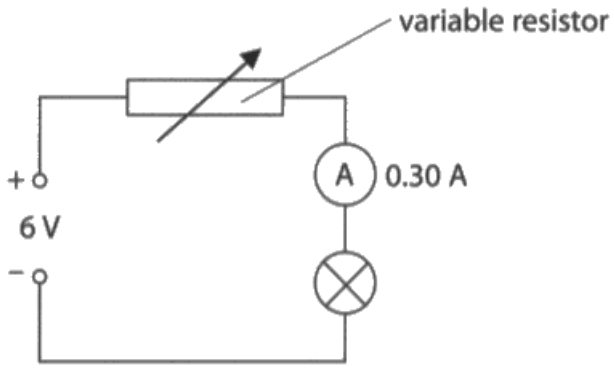
ResultsPlus
Examiner Tip

Explain is the command word used when we want candidates to use some Science to say why something happens.

Question 1 (b) (i)

The calculation was correctly evaluated by the majority of candidates. The most common mark scored by candidates was 2, with the mark for the unit being the missing mark in the vast majority of responses.

(b) The diagram shows an electric circuit.



(i) The current in the lamp is 0.30 A.
Calculate the charge flowing through the lamp in 30 seconds.
State the unit.

(3)

Charge = current x time
0.30 x 30 = charge
= 9

charge = 9 unit Q

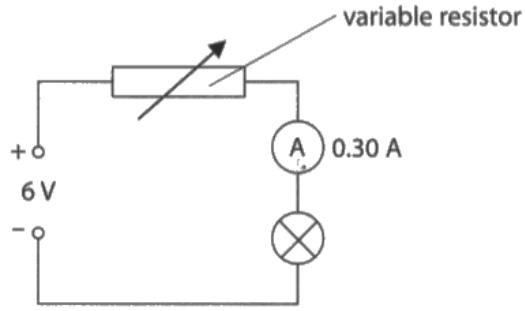
ResultsPlus
Examiner Comments

This was a good response to the question. The candidate has shown full working. Had there been an error in the final evaluation, then some of the marks would still have been available. Whilst Q is the letter used to represent charge, it is not acceptable for the unit mark, and so this was one of the many responses that scored 2 marks.

ResultsPlus
Examiner Tip

Candidates should always show their working. If they get the answer correct with no working then they will get full marks but if their answer is wrong with no working they will get zero.

(b) The diagram shows an electric circuit.



(i) The current in the lamp is 0.30 A.
Calculate the charge flowing through the lamp in 30 seconds.
State the unit.

(3)

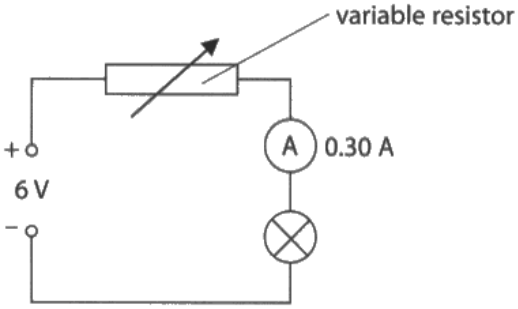
0.30A x 30s
current x time.

charge = 9 unit Coulombs.

ResultsPlus
Examiner Comments

The candidate has correctly evaluated the calculation and was awarded 3 marks as the unit is phonetically close enough to coulomb.

(b) The diagram shows an electric circuit.



(i) The current in the lamp is 0.30 A.
Calculate the charge flowing through the lamp in 30 seconds.
State the unit.

(3)

0.30 x 30 = 9

charge = 9 unit V

ResultsPlus
Examiner Comments

One of the many responses that scored 2 marks because of an incorrect unit for charge.

Question 1 (b) (ii)

Many candidates incorrectly wrote about the increase in resistance producing an increase in current in the circuit or ammeter reading.

(ii) The resistance of the variable resistor is increased.

State the effect on the ammeter reading.

(1)

it goes down

ResultsPlus
Examiner Comments

As the question asked about the effect on the ammeter reading, 'it went down' was an acceptable response.

(ii) The resistance of the variable resistor is increased.

State the effect on the ammeter reading.

(1)

The ammeter reading would go up.

ResultsPlus
Examiner Comments

One of the large number of incorrect respones seen by examiners.

Question 2 (b)

Many candidates were able to correctly complete the table for the name and number of particles that make up an alpha particle. Common mistakes were to give the number of protons as 4 or to name the other particle as an electron.

(b) The nuclei of some atoms can change.

These nuclei are unstable and may emit an alpha particle during radioactive decay.

Complete the table for the particles that make up an alpha particle.

(2)

name of particle	number of particles
proton	2
electron	2

ResultsPlus
Examiner Comments

One common error was to name the other particle in helium nucleus as an electron.

(b) The nuclei of some atoms can change.

These nuclei are unstable and may emit an alpha particle during radioactive decay.

Complete the table for the particles that make up an alpha particle.

(2)

name of particle	number of particles
proton	4
neutron	2

ResultsPlus
Examiner Comments

Another very common mistake, possibly caused by confusion with the nuclide notation for an alpha particle.

(b) The nuclei of some atoms can change.

These nuclei are unstable and may emit an alpha particle during radioactive decay.

Complete the table for the particles that make up an alpha particle.

(2)

name of particle	number of particles
proton	2
neutron	2

ResultsPlus
Examiner Comments

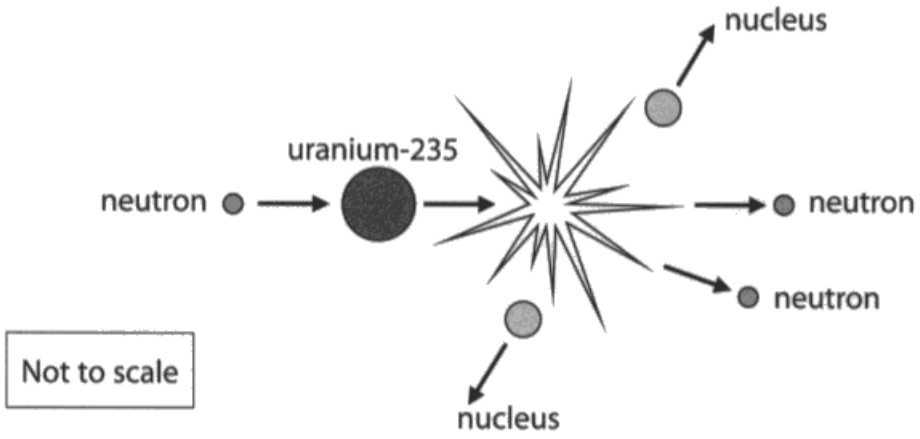
One of the many responses scoring both marks.

Question 2 (c)

Many candidates gave clear concise descriptions, but these were in the minority. Too often responses were too vague and/or described the diagram rather than the continuing process. Answers sometimes lacked clarity on which neutrons were continuing the chain reaction or stated the daughter nuclei as being responsible.

(c) Nuclear fission can cause changes to nuclei.

The diagram shows the fission of a uranium-235 nucleus.



Describe how this fission could cause a chain reaction.

(2)

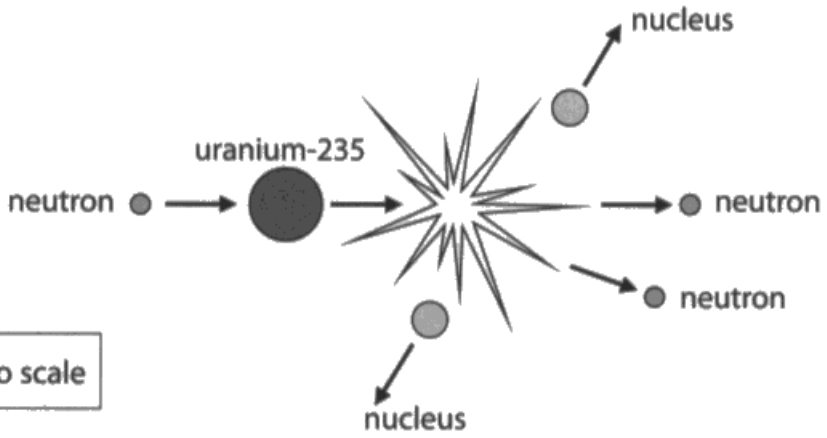
Fission can cause a chain reaction by splitting the atom into smaller daughter nuclei which will create the chain reaction.

ResultsPlus
Examiner Comments

A fairly common response was to suggest that the chain reaction was caused by further splitting of the daughter nuclei or even the neutrons, which could not be awarded any marks.

(c) Nuclear fission can cause changes to nuclei.

The diagram shows the fission of a uranium-235 nucleus.



Describe how this fission could cause a chain reaction.

(2)

Nuclear fission is where one nucleus is split into 2 dauger nuclei, this happens when its hit by a neutron. 3 other neutrons from nucleus are then released the causing a chain reaction

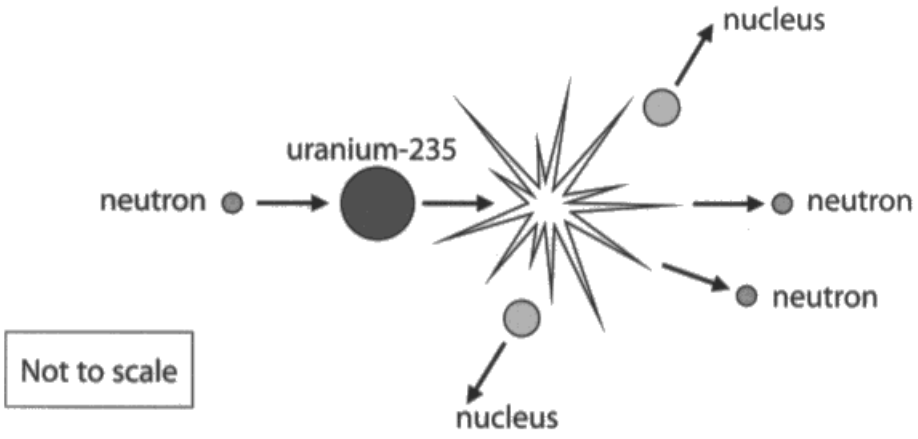
ResultsPlus

Examiner Comments

This response scored one mark for identifying the neutrons from fission being the cause of a chain reaction, but fails to describe how they are absorbed by other U-235 nuclei.

(c) Nuclear fission can cause changes to nuclei.

The diagram shows the fission of a uranium-235 nucleus.



Describe how this fission could cause a chain reaction.

(2)

The two extra neutrons that come off the nuclei of the uranium would continue going and hit othe uranium nuclei which would produce a further 2 more neutron, and will become difficult to control after a while.

ResultsPlus
Examiner Comments

One of the many responses that scored both marks.

ResultsPlus
Examiner Tip

Candidates should use the mark allocation as a guide. They need to make as many correct statements as there are marks available.

Question 2 (d)

Whilst there were many excellent answers seen, a large number of weaker candidates found this item difficult. There was a considerable amount of confusion between the processes of 'nuclear fission' and 'nuclear fusion'.

(d) Nuclei can also be changed by nuclear fusion.

Describe what happens during nuclear fusion.

(3)

During nuclear fusion two small nuclei join together to form one atom.

ResultsPlus
Examiner Comments

A fairly common response from candidates that scored 2 marks.

(d) Nuclei can also be changed by nuclear fusion.

Describe what happens during nuclear fusion.

(3)

smaller
Two/ nuclei are joined together in nuclear fusion. This then creates a larger ~~At~~ nucleus which emits energy. Scientists believe nuclear fusion is the future technology as the energy released is the same of/similar to that ~~that~~ in the sun.

ResultsPlus
Examiner Comments

One of the many responses that scored full marks.

(d) Nuclei can also be changed by nuclear fusion.

Describe what happens during nuclear fusion.

(3)

A nuclear fusion is when a nuclear particle combines with another nuclear particle causing a nuclear fusion.

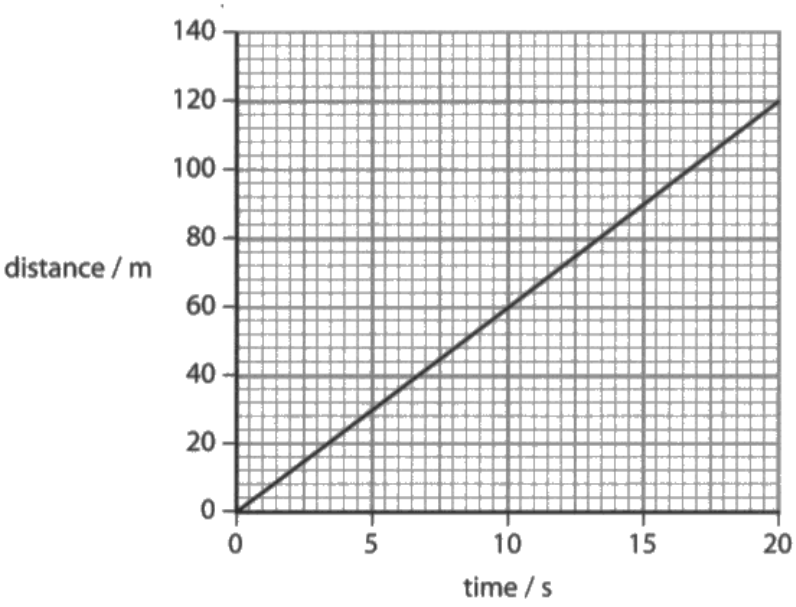
ResultsPlus
Examiner Comments

Many responses were seen that lacked detail. This response scored one mark for the idea of particles combining.

Question 3 (b) (ii)

Most candidates demonstrated a good understanding of how to use the distance/time graph to calculate speed. The most common error was to use a pair of values for distance and time that were not on the line. Of these the most common were 140 divided by 20.

(ii) The graph shows the distance/time graph for the boat.



Use the graph to find the speed of the boat.

(2)

120m / per 20 seconds

$\frac{120}{20} = 60$

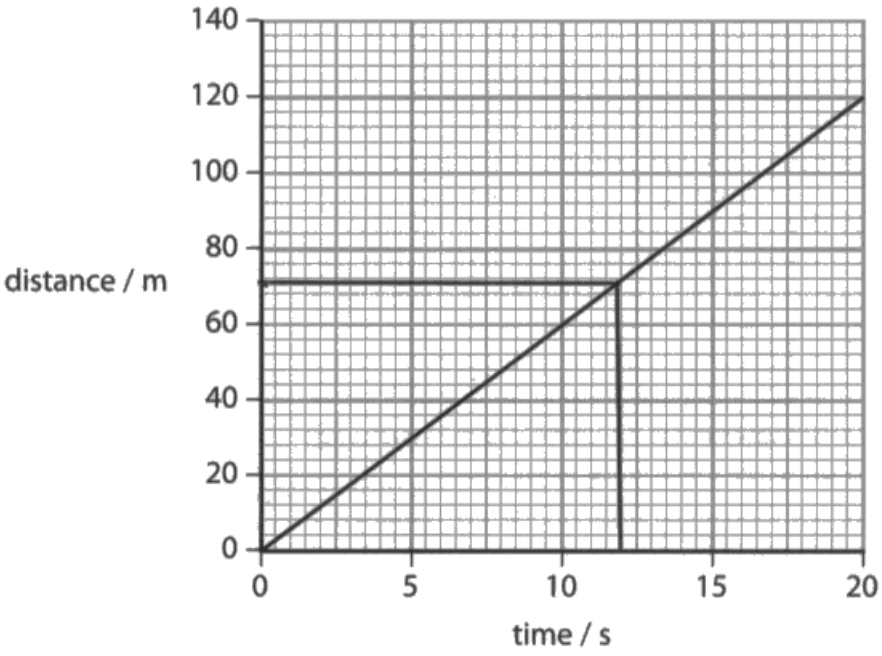
speed = 60 m/s

60m/per second.

ResultsPlus
Examiner Comments

This candidate followed good practice and set out working. Unfortunately, a power of ten error has resulted in an incorrect answer and so only 1 mark was awarded.

(ii) The graph shows the distance/time graph for the boat.



Use the graph to find the speed of the boat.

(2)

70 ÷ 12 = 5.83

speed = 5.83 m/s

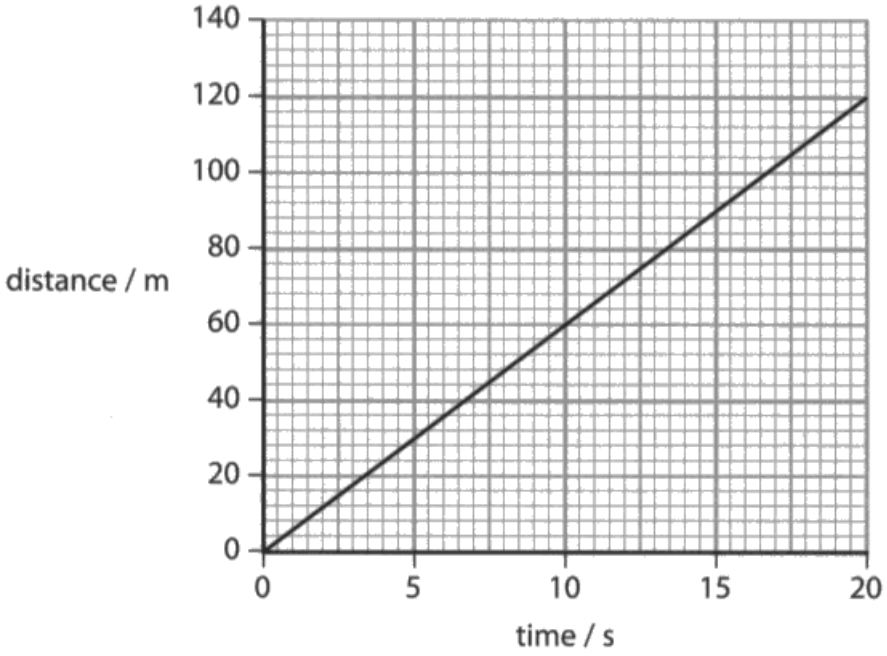
ResultsPlus
Examiner Comments

This answer was within tolerance and awarded both marks.

ResultsPlus
Examiner Tip

When selecting values from a graph always try to choose an easy number for dividing with. On this graph 60 divided by 10 or 120 divided by 20 are suitable values.

(ii) The graph shows the distance/time graph for the boat.



Use the graph to find the speed of the boat.

(2)

140 ÷ 20 =

speed = 7 m/s

ResultsPlus
Examiner Comments

The candidate has chosen a pair of values that do not correspond to any point on the line. No marks were awarded for this type of response.

Question 3 (c) (i)

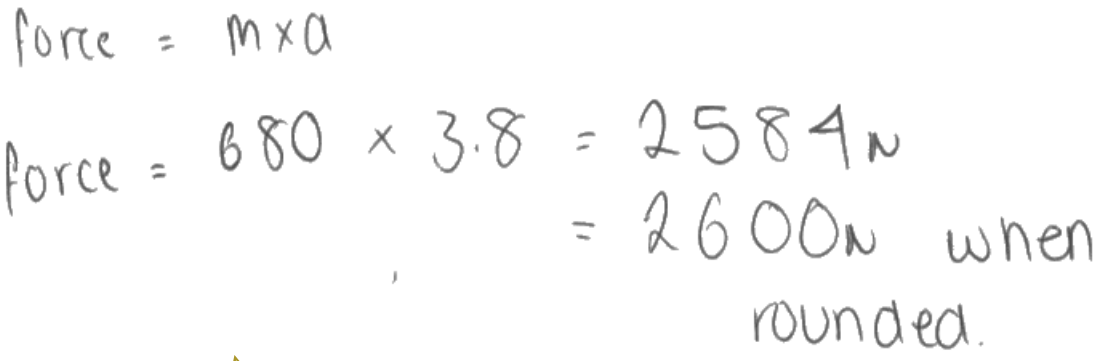
This question was answered well, with the majority of responses using force = mass x acceleration to give an answer of 2584 (N). Only a few candidates used the equation incorrectly.

(c) (i) The boat now accelerates at 3.8 m/s^2.

The total mass of the boat and driver is 680 kg.

Show that the resultant force on the boat is about 2600 N.

(2)



ResultsPlus
Examiner Comments

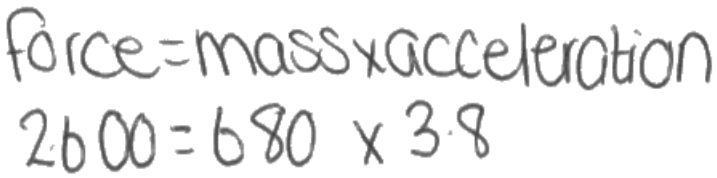
An example of one the many responses that scored both marks.

(c) (i) The boat now accelerates at 3.8 m/s^2.

The total mass of the boat and driver is 680 kg.

Show that the resultant force on the boat is about 2600 N.

(2)



ResultsPlus
Examiner Comments

The candidate started well, but has failed to evaluate 680 x 3.8. This response scored 1 mark.

ResultsPlus
Examiner Tip

In a "show that" question it is easiest to start by writing the equation in words. Then substitute the numbers which you have been given. Then do the arithmetic to show that both sides of the equation had (approximately) the same value.

Question 3 (c) (ii)

Many candidates made errors on this item. The most common error was to subtract 1200 (N) from 2600 (N) instead of adding the two forces.

(ii) The diagram represents the horizontal forces acting on the boat as it accelerates.

(2)

Arrows not to scale

thrust

frictional forces
1200 N

The size of the resultant force is 2600 N.

Calculate the size of the thrust.

2600 − 1200 = 1400

thrust = 1400 N

ResultsPlus
Examiner Comments

One of the many incorrect answers that scored 1 mark.

ResultsPlus
Examiner Tip

Read the question carefully to make sure that you have given the right answer.
If you have spare time at the end of the examination, use it to check your work.

(ii) The diagram represents the horizontal forces acting on the boat as it accelerates.

(2)

The size of the resultant force is 2600 N.

Calculate the size of the thrust.

1200 + 2600 = 3800

thrust = 3800 N

ResultsPlus
Examiner Comments

One of the responses that scored both marks.

Question 3 (d)

Many candidates produced responses that lacked detail and substance. Newton's third law seems to have been forgotten by many candidates. Common incorrect answers given were 'there is no mass on the boat and so it just floats away', 'the river current moves the boat away', 'the tide moves the boat away'. There were even a few responses of 'the bank and the boat have the same charge and so repel each other'.

(d) The boat stops near the bank of the river.
The driver jumps out towards the bank without tying up the boat.

This makes the boat move away from the bank.

Explain why the boat moves away from the bank.

(2)

because the force of the driver jumping out causes waves and cause movement

ResultsPlus
Examiner Comments

This response was awarded one mark as it indicates that the movement was caused by the driver exerting a force on the boat.

(d) The boat stops near the bank of the river.
The driver jumps out towards the bank without tying up the boat.

This makes the boat move away from the bank.

Explain why the boat moves away from the bank.

(2)

Because the driver Jumps out of the boat causing force pushing away as he Jumps out which them will make the Boat move away from the bank.

(Total for Question 3 = 10 marks)

ResultsPlus
Examiner Comments

One of the less common responses that scored both marks.

Question 4 (a) (ii)

This item was well answered by an overwhelming majority of candidates. Many responses explained how cell or DNA mutation was linked to cancer, or a description of the idea of highly penetrating.

(ii) Explain why gamma rays are dangerous.

(2)

They mutate cells which can cause cancer.
They damage tissue in the body

ResultsPlus
Examiner Comments

An example of the type of correct response most frequently seen by examiners.

(ii) Explain why gamma rays are dangerous.

(2)

Gamma rays are dangerous because they are the most penetrative meaning it could go through your body without losing momentum or force

ResultsPlus
Examiner Comments

An example of a response that scored 1 mark for the idea that gamma rays have a high penetrative ability.

ResultsPlus
Examiner Tip

If a question has 2 marks available, two points must be made in your answer.

Question 4 (a) (iii)

A surprising number of candidates failed to score on this item. One very common mistake was to double the mass of cobalt-60, and so 4.0 mg was a very common response. Other candidates thought that they should half the nucleon number to give an answer of 30 mg.

(iii) A sample of nuclear waste contains 2.0 mg of cobalt-60.

The half-life of cobalt-60 is 5 years.

Calculate the mass of cobalt-60 remaining after 10 years.

(2)

2.0 mg
= 5 years

mass = 1.0 mg

ResultsPlus
Examiner Comments

Many candidates calculated the mass of cobalt-60 remaining after one half-life. These responses scored 1 mark.

(iii) A sample of nuclear waste contains 2.0 mg of cobalt-60.

The half-life of cobalt-60 is 5 years.

Calculate the mass of cobalt-60 remaining after 10 years.

(2)

in 5 years the 2.0 mg will become 1.0 mg.
in 10 years the 1.0 mg will become 0.5 mg

mass = 0.5 mg

ResultsPlus
Examiner Comments

This candidate has written a clear explanation of how to arrive at the correct answer.

ResultsPlus
Examiner Tip

Read the question carefully to make sure that you have given the right answer. If you have spare time at the end of the examination, use it to check your work.

Question 4 (a) (iv)

Many candidates gave precautions for handling radioactive isotopes rather than storing. Those candidates who scored the mark for this item generally described the use of a lead-lined box or the need for a locked cupboard or room.

(iv) State one safety precaution that should be taken when storing cobalt-60.

(1)

keep it sealed in a thick lead container.

ResultsPlus
Examiner Comments

One of the many correct responses seen by examiners.

(iv) State one safety precaution that should be taken when storing cobalt-60.

(1)

wear eye goggles / safety goggles.

ResultsPlus
Examiner Comments

Wearing safety goggles was a common incorrect response.

Question 4 (b) (i)

Many candidates scored both marks with clear descriptions of types of atmospheric pollution caused by fossil-fuelled power stations but not by nuclear power stations. Unfortunately, many candidates' responses were too vague and lacked enough detail to achieve any of the marking points. Candidates need to be aware that vague phrases such as 'more environmentally friendly' or 'causes less pollution' are insufficient to score a mark.

(b) The main purpose of nuclear reactors is to generate electricity.

(i) Describe two advantages of generating electricity using nuclear reactors compared to generating electricity using fossil fuels.

(2)

1 There is no greenhouse gases emitted

2 It can provide more ~~energy~~ electricity than fossil fuels.

ResultsPlus
Examiner Comments

This is an example of one of the many responses that scored 1 mark. The second statement could be an attempt at comparing efficiency or the mass of fuel used, but is clearly too vague to score a mark.

ResultsPlus
Examiner Tip

Read the question carefully and underline the key words.

(b) The main purpose of nuclear reactors is to generate electricity.

(i) Describe two advantages of generating electricity using nuclear reactors compared to generating electricity using fossil fuels.

(2)

1 less greenhouse gasses are produced

2 More energy comes of a small piece of uranium than a small piese of fossil fuel.

ResultsPlus
Examiner Comments

One of the many responses that scored both marks.

(b) The main purpose of nuclear reactors is to generate electricity.

(i) Describe two advantages of generating electricity using nuclear reactors compared to generating electricity using fossil fuels.

(2)

1 nuclear reactors don't send CO_2 into the atmosphere. So no global warming.

2 nuclear reactors don't send SO_2 into the atmosphere. So no acid rain

ResultsPlus
Examiner Comments

One of the many excellent responses produced by candidates.

Question 4 (b) (ii)

Many candidates scored at least one mark for the idea of long-term storage in an underground facility. Other candidates scored a mark for the idea of containment through vitrification or in stainless steel cylinders or lead containers. Unfortunately, many candidates failed to realise this was a two mark item and did not put both ideas.

(ii) Nuclear reactors used to generate electricity produce dangerous radioactive waste.

Describe one method of dealing with this radioactive waste safely.

(2)

By putting it in an underground bunker. So it is out the way and out of harm to the environment.

ResultsPlus
Examiner Comments

One of the many responses scoring 1 mark.

ResultsPlus
Examiner Tip

Use the marks at the side of a question as a guide to the form and content of your answer.

(ii) Nuclear reactors used to generate electricity produce dangerous radioactive waste.

Describe one method of dealing with this radioactive waste safely.

(2)

Nuclear power station usuelly deal with the most dangerous radioactive waste by vitrificcation. This means melting the radioactive waste with other materials to form glass. The liquid gluss is sealed in a steel containers and deeped underground.

ResultsPlus
Examiner Comments

One of the responses that scored both marks.

ResultsPlus
Examiner Tip

Candidates must be very clear in their responses and say exactly what they mean. Examiners will not make assumptions about ommisions from what they have written.

Question 5 (a) (i)

The vast majority of candidates calculated the resistance of the lamp correctly to score both marks.

5 (a) A student investigates the resistance of a lamp.
She obtains these readings for the potential difference (voltage) across the lamp and the current in the lamp.

voltage in V	current in A
6.0	0.40

(i) Calculate the resistance, R, of the lamp.

(2)

$R = \frac{V}{I}$ $6 \div 0.40 = 15$

resistance = 15 Ω

ResultsPlus
Examiner Comments

One of the many correct responses for this item.

5 (a) A student investigates the resistance of a lamp.
She obtains these readings for the potential difference (voltage) across the lamp and the current in the lamp.

voltage in V	current in A
6.0	0.40

(i) Calculate the resistance, R, of the lamp.

(2)

$R = \frac{V}{I}$

$R = \frac{6.0}{0.40} = 1.5$

resistance = 1.5 Ω

ResultsPlus
Examiner Comments

This response shows good evidence of the candidate's method of working. This allows the examiner to award 1 mark despite the candidate making a power of ten error when evaluating the resistance.

ResultsPlus
Examiner Tip

Always show your working. You can still get marks even if your final answer is wrong.

Question 5 (a) (ii) – (iii)

Most candidates scored well on these items. Unfortunately, some candidates in part (ii) wrote down power = work done / time taken and were then unable to make any progress. Most of these candidates then went on to score both marks in (iii).

(ii) Calculate the power supplied to the lamp.

(2)

6.0 x 0.40

power = 2.4 W

(iii) Calculate the amount of energy transferred by the lamp in 40 s.

(2)

C x PD x T

0.40 x 6.0 x 40

energy = 96 J

ResultsPlus
Examiner Comments

One of the many responses that scored full marks.

ResultsPlus
Examiner Tip

It is always better to show HOW you arrived at your answer. You may be able to get a mark if your answer is wrong and the examiner can see that you used the correct method.

(ii) Calculate the power supplied to the lamp.

(2)

power = 2.4 W

(iii) Calculate the amount of energy transferred by the lamp in 40 s.

(2)

energy = 15 J

ResultsPlus
Examiner Comments

The candidate has scored both marks for part (ii). Unfortunately, with no working in part (iii) no marks could be awarded as the answer is wrong.

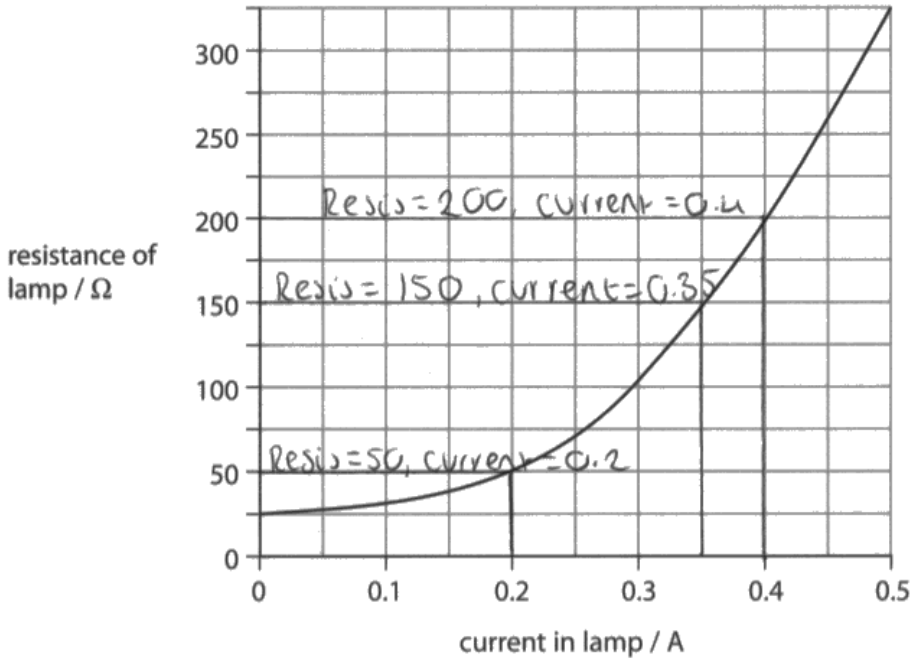
ResultsPlus
Examiner Tip

Always show your working. You can still get marks even if your final answer is wrong.

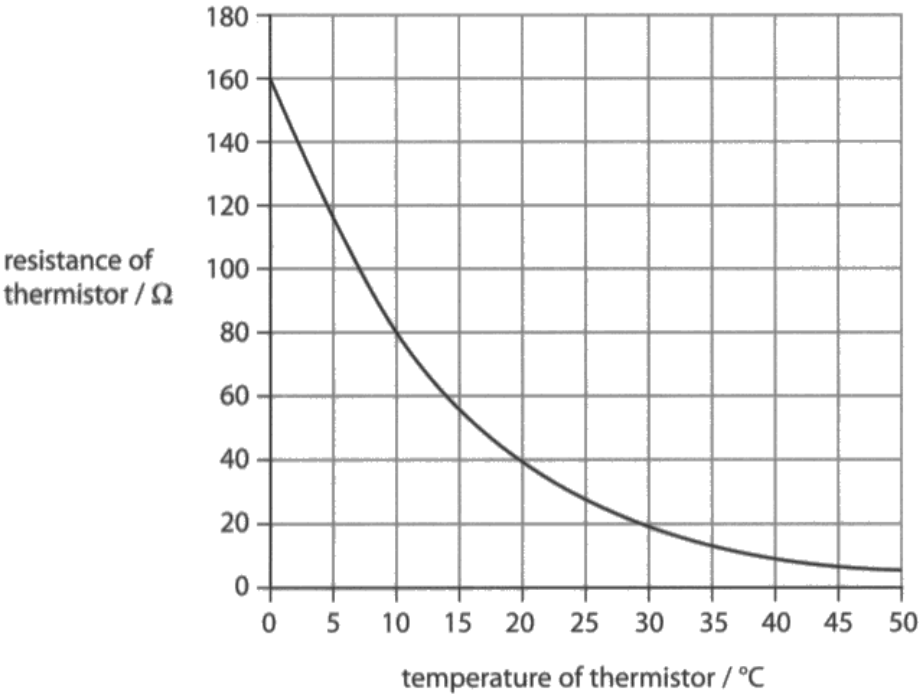
Question 5 (b)

The vast majority of candidates were able to describe resistance changes for the two components. High scoring candidates used data from the graphs to give excellent descriptions of how resistance changed with current and temperature.

*(b) The student produces this graph, showing how resistance of another lamp varies with the current in the lamp.



The student researches resistance and finds this graph, which shows how the resistance of a thermistor varies with temperature.



Describe how the resistance changes for the lamp and how the resistance changes for the thermistor.

(6)

Lamp Resistance Change

- For the current in the lamp, we can see that as the resistance increases, the current in the lamp increases.
- We can see this with:
- Resistance = 50, current = 0.2A
- Resistance = 150, current = 0.35
- Resistance = 200, current = 0.40
- This shows us that the resistance changes in the lamp by increasing along with the current (and vice versa).

Thermistor Resistance Change

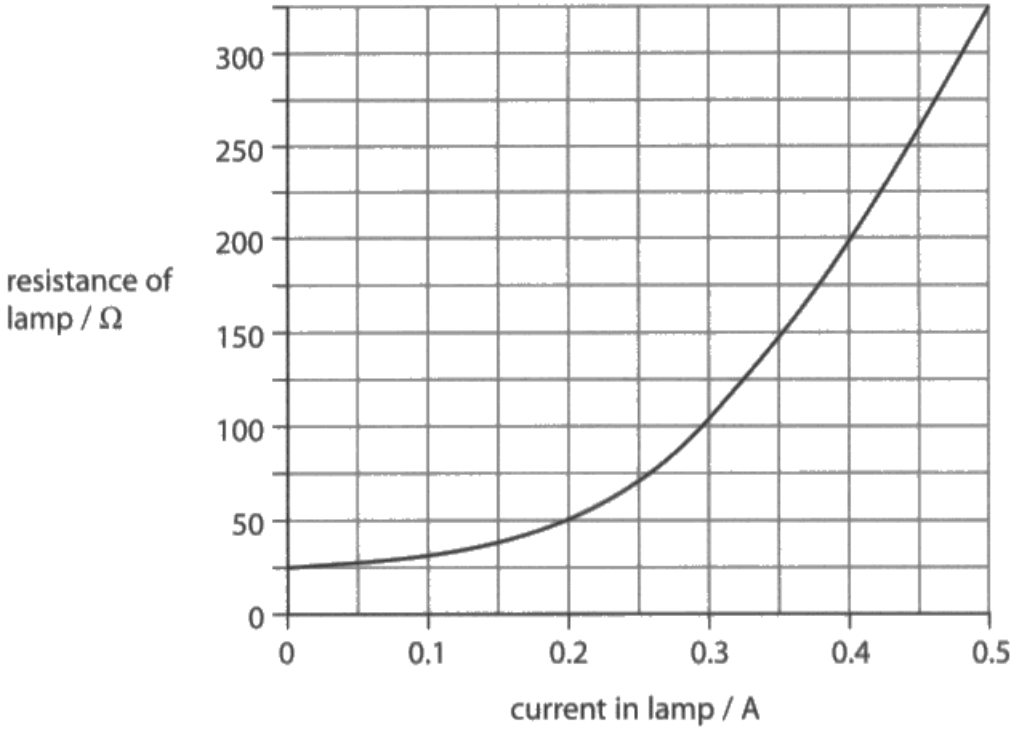
- For the resistance in the thermistor, we can see that as the resistance increases, the temperature decreases (or when the temperature increases, the resistance decreases).
- We can see this with:
- Resistance = 80, temp. = 10°c
- Resistance = 40Ω, temp = 20°c
- Resistance = 20Ω, temp. = 30°c
- This shows us the resistance changes by ~~how~~ whether the temperature is high or low.

ResultsPlus

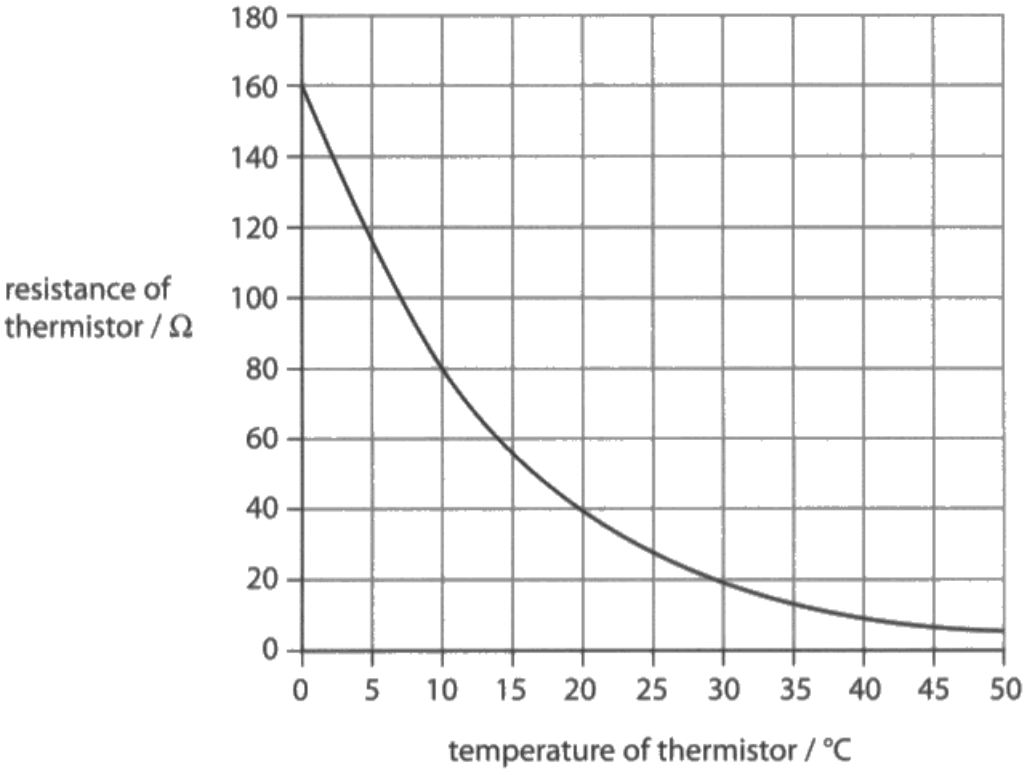
Examiner Comments

An example of one of the many responses at level 3 scoring all 6 marks. The candidate has described the relationships for both graphs and in a simple way has used data from the graph.

*(b) The student produces this graph, showing how resistance of another lamp varies with the current in the lamp.



The student researches resistance and finds this graph, which shows how the resistance of a thermistor varies with temperature.



Describe how the resistance changes for the lamp and how the resistance changes for the thermistor.

(6)

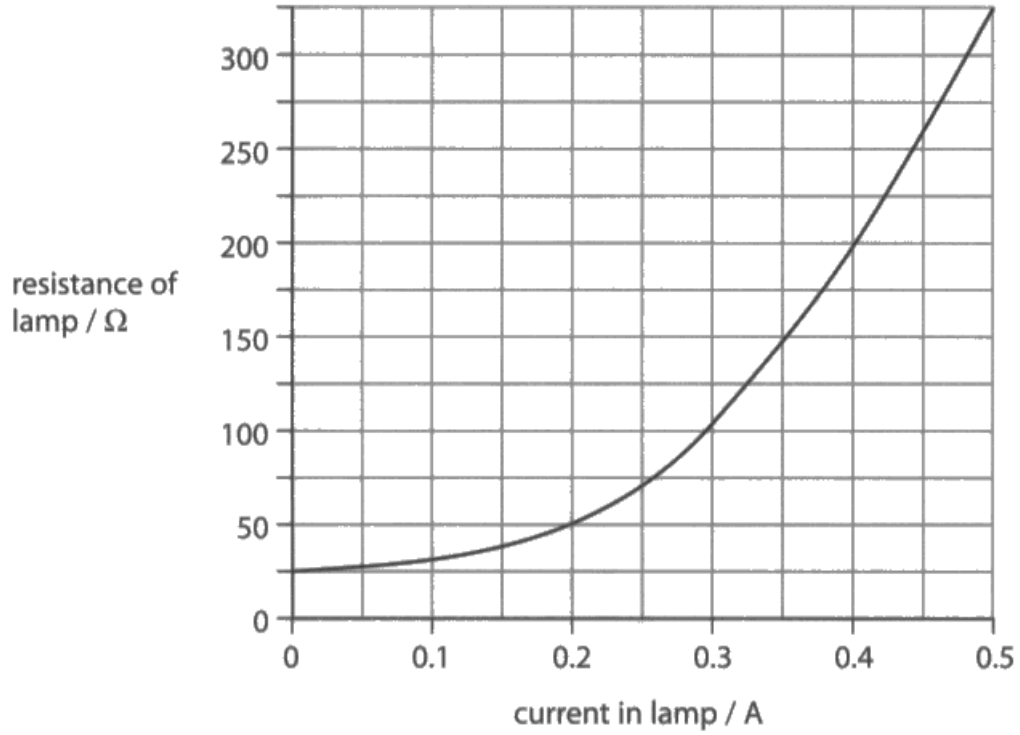
The resistance for the lamp starts low at 25Ω when there is no current however when the current increases in the lamp the resistance increases. ~~0 to 0.2 cuff Aa~~ 0 to 0.2A is a very slow increase in resistance but as the current gets bigger the resistances increases faster.

The resistance for the thermister starts high at 160Ω when the temperature is at 0°C however when the temperature increases the resistance decreases. As the temperature rises from 0°C the resistance of the thermister decreases rapidly however as the temperature reaches 40°C the rate of decrease in thermister slows down and at 50°C plato's.

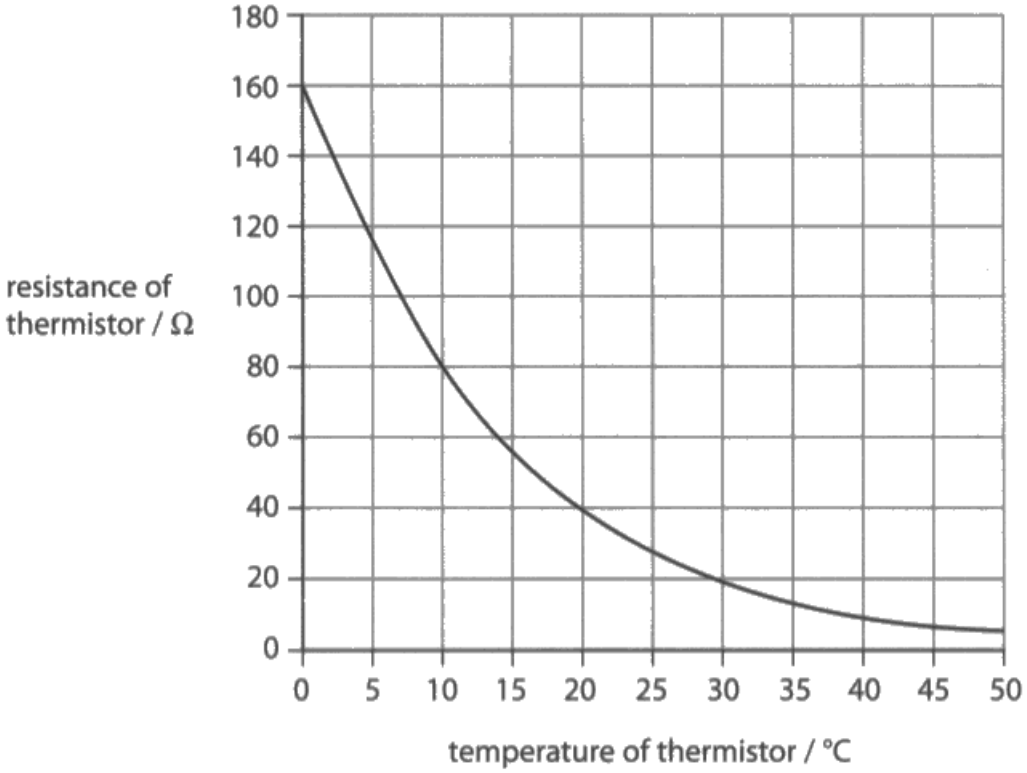
ResultsPlus
Examiner Comments

Another example of a level 3 response scoring 6 marks.

*(b) The student produces this graph, showing how resistance of another lamp varies with the current in the lamp.



The student researches resistance and finds this graph, which shows how the resistance of a thermistor varies with temperature.



Describe how the resistance changes for the lamp and how the resistance changes for the thermistor.

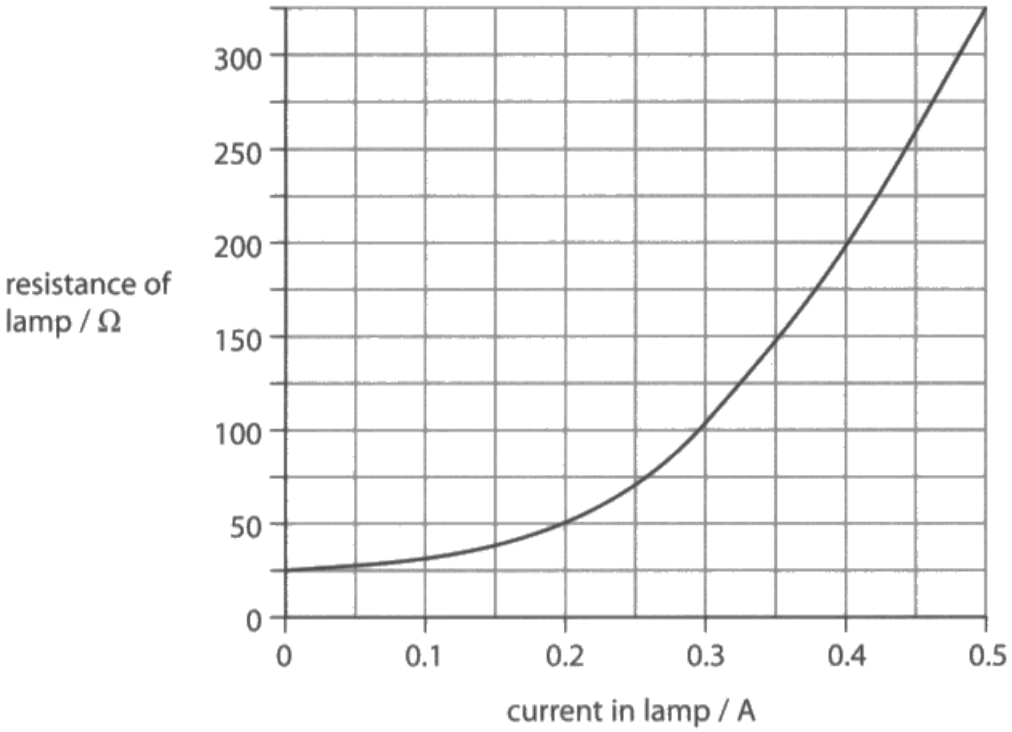
(6)

when the ~~resistance~~ current of the lamp increases, the resistance also increases but when the temprature increases on the thermistor, the resistare decreases.

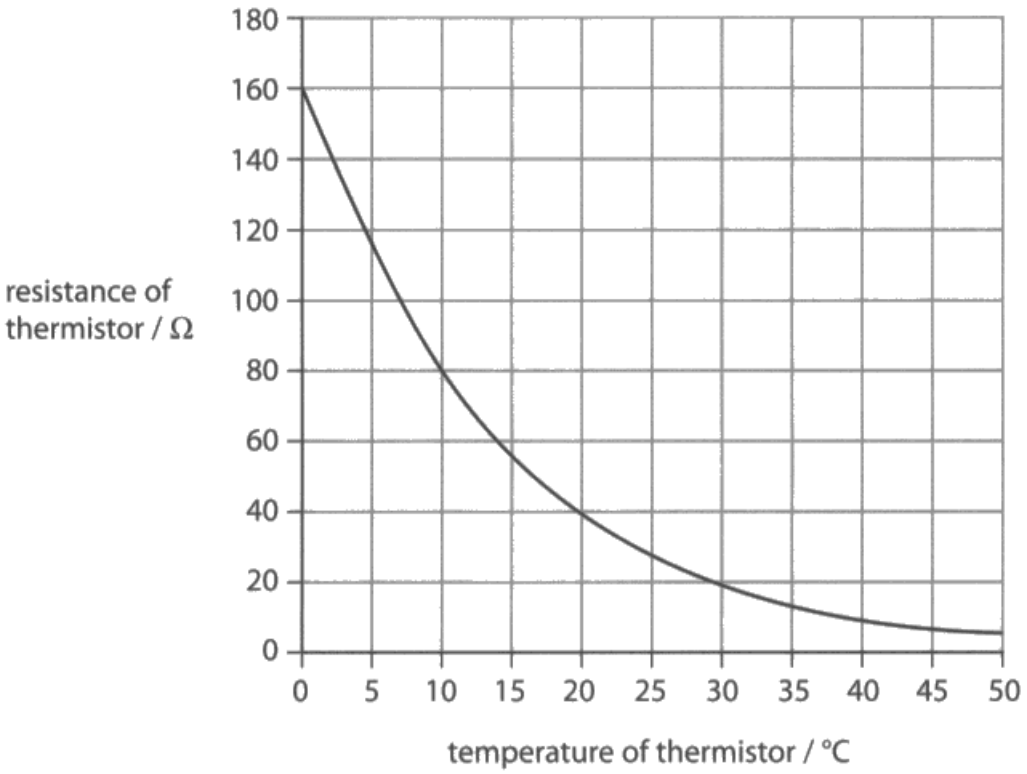
ResultsPlus
Examiner Comments

One the many responses at level 2 scoring 4 marks. The candidate describes both relationships but does not attempt to improve the response by using data from either graph.

*(b) The student produces this graph, showing how resistance of another lamp varies with the current in the lamp.



The student researches resistance and finds this graph, which shows how the resistance of a thermistor varies with temperature.



Describe how the resistance changes for the lamp and how the resistance changes for the thermistor.

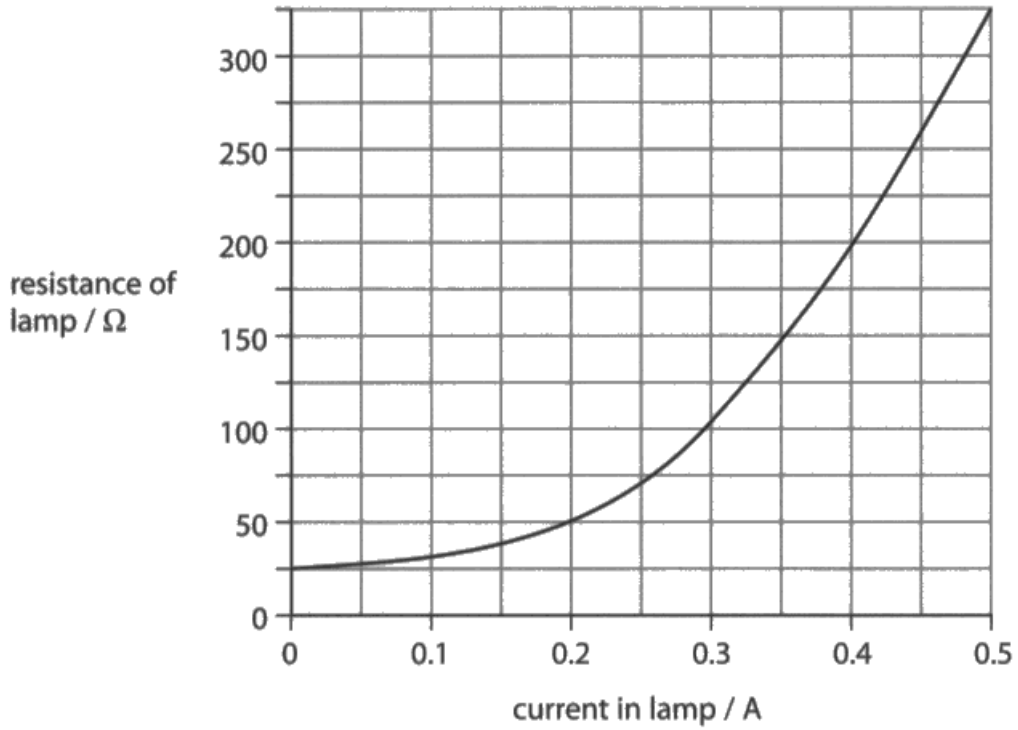
(6)

The resistance of the lamp is a positive correlation, whereas the resistance of the themistor is a negative correlation.

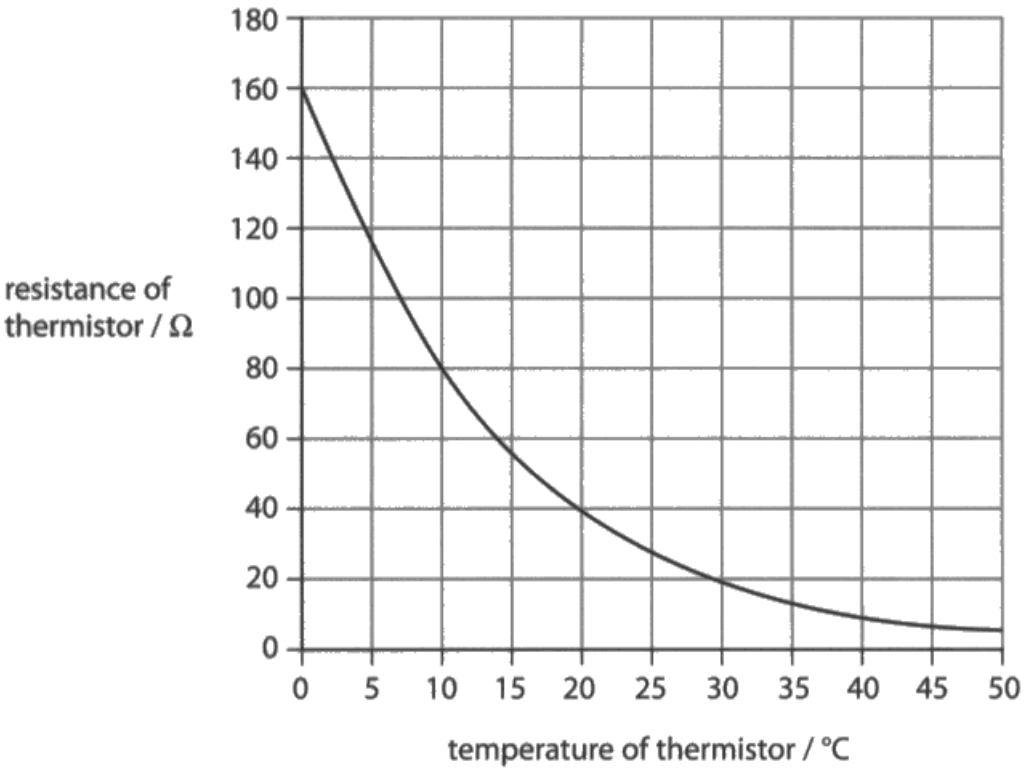
ResultsPlus
Examiner Comments

This is an example of a response scoring 2 marks. The candidate has failed to link the resistance of the lamp to current in the lamp and the resistance of the thermistor to the temperature of the thermistor.

*(b) The student produces this graph, showing how resistance of another lamp varies with the current in the lamp.



The student researches resistance and finds this graph, which shows how the resistance of a thermistor varies with temperature.



Describe how the resistance changes for the lamp and how the resistance changes for the thermistor.

(6)

one goes up and one goes down

ResultsPlus
Examiner Comments

This response was judged to have no rewardable content and so scored no marks. If the candidate had indicated that resistance was increasing in the top graph and decreasing in the second graph they would be at level 1.

Question 6 (a) (i)

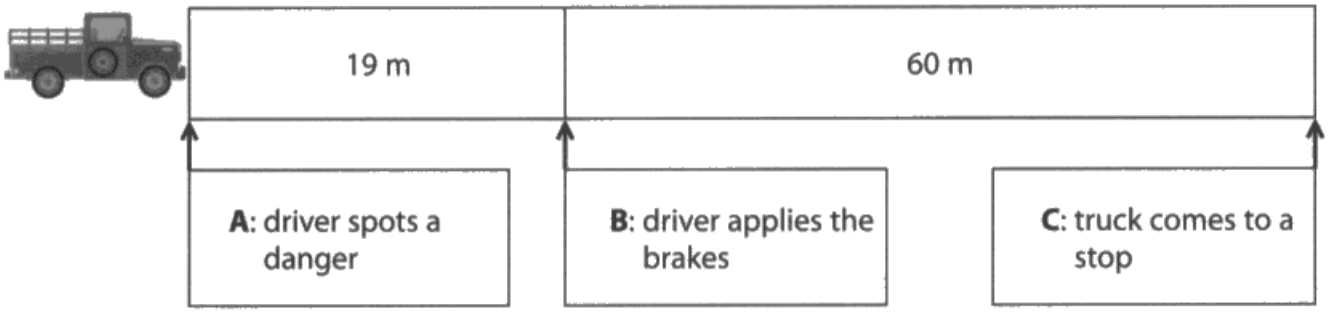
The majority of candidates were awarded this mark with answers ranging from a straightforward statement of 'thinking distance' to longer descriptions of reaction time. Unfortunately, a few candidates went on to state that the driver was also braking or slowing down and this meant no mark could be awarded.

6 (a) The diagram shows what happens to a truck being driven at a constant speed along a flat, straight road.

At **A** the driver spots a danger.

At **B** the driver applies the brakes.

At **C** the truck comes to a stop.



(i) State what is happening between **A** and **B**.

(1)

Between A and B is the thinking distance before the braking distance.

ResultsPlus
Examiner Comments

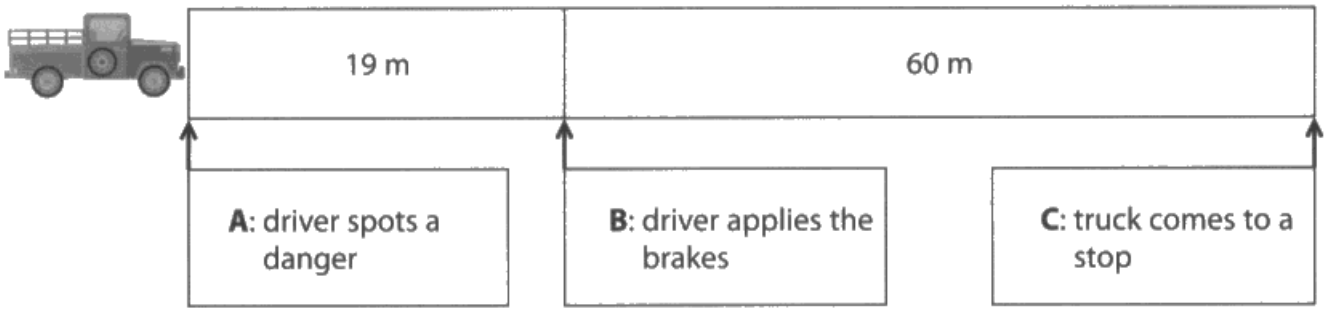
Although braking distance is mentioned it is clear that the candidate is stating that between A and B is the thinking distance.

6 (a) The diagram shows what happens to a truck being driven at a constant speed along a flat, straight road.

At **A** the driver spots a danger.

At **B** the driver applies the brakes.

At **C** the truck comes to a stop.



(i) State what is happening between **A** and **B**.

(1)

The driver is reacting to the danger.

ResultsPlus
Examiner Comments

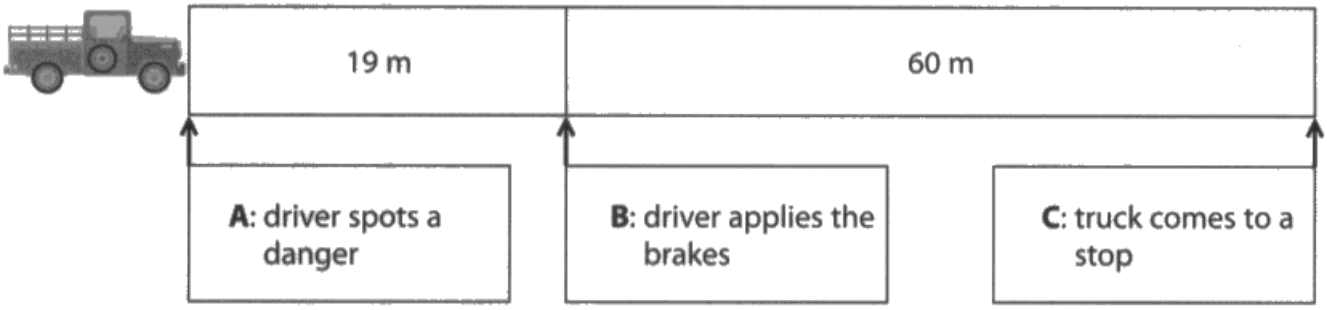
Another example of a response that was awarded the mark for this item.

6 (a) The diagram shows what happens to a truck being driven at a constant speed along a flat, straight road.

At **A** the driver spots a danger.

At **B** the driver applies the brakes.

At **C** the truck comes to a stop.



(i) State what is happening between **A** and **B**.

(1)

The driver puts on the brakes making the excelaration of the car much slower.

ResultsPlus
Examiner Comments

One of the incorrect responses.

Question 6 (a) (ii)

The majority of candidates scored both marks with many of the others scoring 1 mark through using stopping distance instead of braking distance in their calculation.

(ii) The brakes exert a constant force of 700 N on the truck from when they are applied until the truck comes to a stop.

Calculate the work done by the brakes.

(2)

work done = force x D
700 x 60 = 42000

work done = 42000 J

ResultsPlus
Examiner Comments

This was a good response to the question. The candidate has shown full working. Had there been an error in the final evaluation, then one of the marks would still have been available.

ResultsPlus
Examiner Tip

Always show your working. You can still get marks even if your final answer is wrong.

(ii) The brakes exert a constant force of 700 N on the truck from when they are applied until the truck comes to a stop.

Calculate the work done by the brakes.

(2)

wd = F x d
19+60 = 79
~~700~~
700x79 = 55300

work done = 55300 J

ResultsPlus
Examiner Comments

One of the responses that scored one mark because the stopping distance of 79 m is used rather than the braking distance of 60 m.

Question 6 (a) (iii)

Many responses displayed a fundamental misunderstanding, with candidates stating that a heavier truck will have greater friction with the ground and so it would have a shorter stopping distance. Very few candidates commented on the fact that thinking distance would be unchanged, but the increased braking distance would result in an increased stopping distance.

(iii) The diagram gives information about the stopping of the truck when it is not carrying a load.

Explain how the stopping distance is different when the truck, moving at the same speed, carries a heavy load.

(3)

It takes the truck longer to stop when it has a heavy load because its carrying a higher mass, where-as when it hasnt got a heavy mass it will stop quicker.

ResultsPlus
Examiner Comments

One of the many responses that correctly linked an increase in mass to an increase in stopping distance. This response scored two marks.

(iii) The diagram gives information about the stopping of the truck when it is not carrying a load.

Explain how the stopping distance is different when the truck, moving at the same speed, carries a heavy load.

(3)

The stopping distance would change because it will take longer for the truck to stop because it has more mass on it which would make the brakes have to work harder.

ResultsPlus
Examiner Comments

One of the many excellent responses that scored all three marks.

Question 6 (b)

The vast majority of candidates found this a fairly accessible question. As is often the case, the science tended to be too vague and often difficult to identify in longer discourses about the workings of airbags.

*(b) Airbags in cars have reduced the injuries to people involved in car crashes.

Explain how airbags reduce the injuries to people involved in car crashes.

(6)

Airbags inflate into large bags in front of People in a car. Airbags absorb most of the force from ~~the~~ the person in the car. Airbags automatically inflate when there has been a collision. ~~The fairb~~ When a collision has happened the car stops but the people inside of the car still move at the same speed that the car was moving, this can be very dangerous, however airbags inflate instantly as a collision takes place. This means that when the people in the car are moving and the speed of the car and it crashes the ~~airbags~~ airbags absorb most of the force which then stops the people in the car getting as badly hurt.

ResultsPlus
Examiner Comments

This response scored the full 6 marks. The candidate's explanation shows a good understanding of the physics concepts, using a range of scientific terminology accurately.

*(b) Airbags in cars have reduced the injuries to people involved in car crashes.

Explain how airbags reduce the injuries to people involved in car crashes.

(6)

When a car hits an object, hard enough, the airbags will deploy. They work a sort of cusioning barier, between the driver/passinger and what ever they would fallen on to. If they weren't there, when the sudden stop of the car happens, the people inside of the car, will keep traveling forward at the same speed, and will injer them selves on, what ever is in front of them, in the car, is there was no airbags. But is airbags are there, they will protect them from the object (eg steering wheel) in front of them.

ResultsPlus
Examiner Comments

This is an example of a response that scored 4 marks. The candidate uses appropriate scientific terminology to explain about the deployment of airbags in a crash and the fact that people in the car will continue at the same speed until a force acts on them.

*(b) Airbags in cars have reduced the injuries to people involved in car crashes.

Explain how airbags reduce the injuries to people involved in car crashes.

(6)

On impact the air bags are ~~reats~~ released usally from the steering wheel and the dash board. The air bags are filled with air the driver and passengers heeds hit the air bag stoping them from hitting their heads on something hard. and causing damage.

ResultsPlus

Examiner Comments

An example of a response that scored 2 marks.

Paper Summary

The paper allowed candidates of all abilities to access marks in all questions. Weaker candidates found difficulty with describe, explain and discuss questions, and with some of the calculations.

In order to improve their performance, candidates should:

- be able to recall the basic facts as stated in the specification
- use technical terms wherever possible in descriptions and explanations
- give a reason as well as a statement when answering an 'explain' question
- practise applying their knowledge to new situations by attempting questions in support materials or exam papers from previous sessions
- read the question carefully and underline the key words
- have a calculator to use as this is an essential requirement for this examination
- use the marks at the end of a question as a guide to the form and content of their answer

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

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London WC2R 0RL.