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Examiners' Report
November 2012

GCSE Physics 5PH1F 01

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November 2012

Publications Code UG034060

Introduction

This examination sets out to allow students to demonstrate that they can accurately recall concepts and phenomena in physics and can communicate their understanding using both qualitative and quantitative models. The broad base of ideas used in the specification links the discoveries of physicists both past and present to benefits that they have brought to society and our understanding of the Universe.

The assessment is through multiple choice questions, short answers, extended writing and calculations analysis. Students need to be familiar with the use of equations, be able to express their ideas clearly and concisely and interpret scientific data which is presented in a variety of ways.

The work produced for the examination showed that students are most confident in expressing themselves when they did not have to analyse information presented in a form that was new to them. Many students were able to compare the uses of non-renewable and renewable energy sources with sufficient detail to merit the award of six marks. However, when it came to taking information from a diagram and transferring this from times to distances then students were less successful.

Students also need to be able to explain scientific terms accurately. The difference between the vibrations that produce transverse and longitudinal waves should be clearly defined even if only as diagrams. Students should also be aware of the units that are used to measure electrical quantities and how wavelength, frequency and amplitude are defined for waves.

It is important that students learn to produce labelled diagrams to help with descriptions and are able to extract information, such as wavelength or orbit time from labelled diagrams.

The formulae sheet at the front of the examination paper should be familiar to students and should be used on a regular basis throughout the course. Full marks are given to correct answers to calculations, with or without working, unless the student is asked to show that an answer is correct. In this case, the formula given should be used rather than students attempting the reverse argument route. Writing the correct formula enables students to substitute in an equation even if they are unable to make further progress. As many students do not have the use of a calculator, even though it is a prerequisite for this paper, then this would mitigate against them losing all of the marks for a calculation.

Question 1 (a)

This tested knowledge of the order of the colours of light in the visible spectrum. Most candidates could give either red or violet correctly but some confused the limited part of the electro magnetic spectrum given with the whole spectrum and quoted microwaves and radio waves.

Five parts of this have been named.

infrared	1	2	3	green	blue	indigo	4	ultraviolet

State the names of the other four parts, 1, 2, 3 and 4, in the spaces below.

(2)

Part 1 red

Part 2 orange

Part 3 yellow

Part 4 dark purple

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Examiner Comments

The use of purple or dark purple instead of violet was seen on some scripts. This is not acceptable the standard name for the colours of the visible spectrum should be used.

ResultsPlus
Examiner Tip

The use of purple instead of violet does not help the student when placing the visible spectrum correctly within the range of the electromagnetic spectrum.

Question 1 (c)

Candidates found it difficult to provide a complete answer to this question. The majority knew that markings of some sort were being looked for but either did not have the idea of scanning the note with ultraviolet radiation or did not state if seeing markings meant the note was genuine or forged.

(c) Describe how ultraviolet radiation is used in the detection of forged bank notes.

(2)

Ultraviolet can let you see though the Bank notes so you can detect if its forged

ResultsPlus
Examiner Comments

This candidate does not know how the ultraviolet radiation is used and wrongly suggests that it can be seen through, rather than markings do not show up when it is forged.

ResultsPlus
Examiner Tip

This answer shows lack of knowledge and does not explain that the note has to be scanned or put under the ultraviolet source.

(c) Describe how ultraviolet radiation is used in the detection of forged bank notes.

(2)

it lets you see the hidden face clearer and if it is there it is a real note

ResultsPlus
Examiner Comments

This response indicates that there are markings to be seen if the note is real, and would be worth one mark.

ResultsPlus
Examiner Tip

The question asks 'how' the ultraviolet radiation can be used and this is not answered.

(c) Describe how ultraviolet radiation is used in the detection of forged bank notes.

(2)

Put a UV light (Sun or bulb) up to the note and you should see the queens head. If not then it is forged.

ResultsPlus
Examiner Comments

This answers how the ultraviolet radiation is used, and explains if the note is genuine or not.

ResultsPlus
Examiner Tip

Ensure that when there are two marks for the question, two points are made in the answer.

Question 1 (d)

The majority of candidates gave two parts to this answer stating that IR causes burns and UV causes cancer inferring that UV is more dangerous than IR. The preferred answer would have been that UV is potentially more dangerous because it has a higher frequency than IR but this was rarely seen.

(d) Explain the difference in potential danger between ultraviolet radiation and infrared radiation.

(2)

Ultraviolet radiation only tans a person but infrared radiation can damage skin cells dangerously

ResultsPlus
Examiner Comments

This answer includes both UV and IR, but the potential danger is reversed.

ResultsPlus
Examiner Tip

This candidate has read and answered the whole question but lacks knowledge of the dangers of each type of radiation.

(d) Explain the difference in potential danger between ultraviolet radiation and infrared radiation.

(2)

Ultraviolet have a bigger frequency therefore it's more dangerous than infrared radiation

ResultsPlus
Examiner Comments

This is an example of the preferred answer, taking that 'bigger' is the same as higher.

ResultsPlus
Examiner Tip

This candidate uses the detail of the specification to answer the question.

(d) Explain the difference in potential danger between ultraviolet radiation and infrared radiation.

(2)

The protential dangers of ultravidlet radiation is that it can mutalate skin cells & the DNA inside them & cause cancer. Infrared radiation can cause burns to the skin.

ResultsPlus
Examiner Comments

Correct knowledge has been applied to both UV and IR radiations.

ResultsPlus
Examiner Tip

This answer includes information on both radiations given in the question.

Question 2 (a) (i)

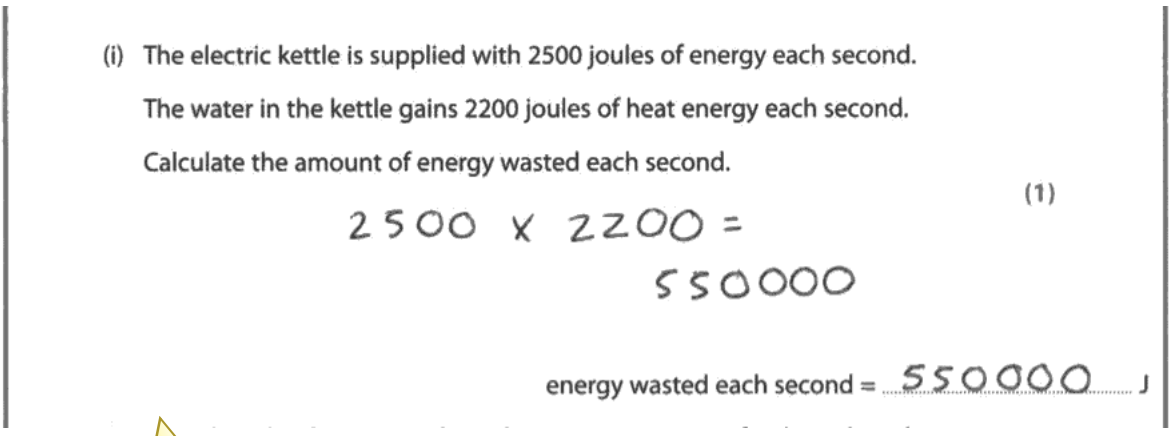
Most candidates gained full marks for this question showing a sound knowledge of energy changes.

Question 2 (a) (ii)

Candidates across the full range of ability appreciated that heat is the energy that is wasted by the devices.

Question 2 (b) (i)

Candidates used the values 2500J and 2200J in a variety of ways. The value obtained for the answer needs to be looked at to see if it makes any sense, i.e. the energy wasted cannot be more than the energy supplied.



(i) The electric kettle is supplied with 2500 joules of energy each second.

The water in the kettle gains 2200 joules of heat energy each second.

Calculate the amount of energy wasted each second.

(1)

2500 x 2200 =

550000

energy wasted each second = 550000 J

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Examiner Comments

Candidates need to apply some logic to this question. As the energy wasted must be less than the energy supplied, this at least limits their options on what do to with the two numbers they are given.

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Examiner Tip

Read the question carefully and look for a logical answer. Do not randomly guess what to do with the two numbers.

Question 2 (b) (ii)

Very few candidates knew that chemical energy was stored in gas and that it was this chemical energy that was converted to heat in the Bunsen Burner flame. This showed lack of understanding of the energy transfer when a substance is burning.

Question 2 (b) (iii)

Common mistakes were to discuss the difference between electricity and gas or the length of time taken to heat up the water. The stem was often repeated without stating which device wasted the most energy. Only a few candidates realised that the kettle was more efficient because the source of heat was enclosed and the kettle had a lid whereas the beaker was open.

(iii) Explain why heating the water using the kettle and the Bunsen burner waste different amounts of energy.

(2)

heating a kettle wastes electricity as that is how it is powered but a bunsen burner wastes Gas as it needs gas to catch flame and keep it going and Gas has a ~~higher~~ lower frequancy that electricity.

(Total for Question 2 = 8 marks)

ResultsPlus
Examiner Comments

The candidate has only considered the different types of heating and not why they waste different amounts of energy.

ResultsPlus
Examiner Tip

Make sure that the answer given actually answers the question that has been set.

(iii) Explain why heating the water using the kettle and the Bunsen burner waste different amounts of energy.

(2)

Because the glass beaker has an open top whereas the kettle is closed up with a plastic case, which will keep in the heat.

ResultsPlus
Examiner Comments

This answer only considers the container for the water, i.e. the kettle and the beaker. These are part of the same marking point as they are the reverse of each other.

ResultsPlus
Examiner Tip

Make sure that two independent reasons are given for two marks, not just one which is the reverse of the other.

(iii) Explain why heating the water using the kettle and the Bunsen burner waste different amounts of energy.

(2)

because the kettle is made of material that keeps the heat in either silver or black, where as the bunsen burner lets of ~~heat~~ alot of heat Because its not contained causing it to lose heat

ResultsPlus
Examiner Comments

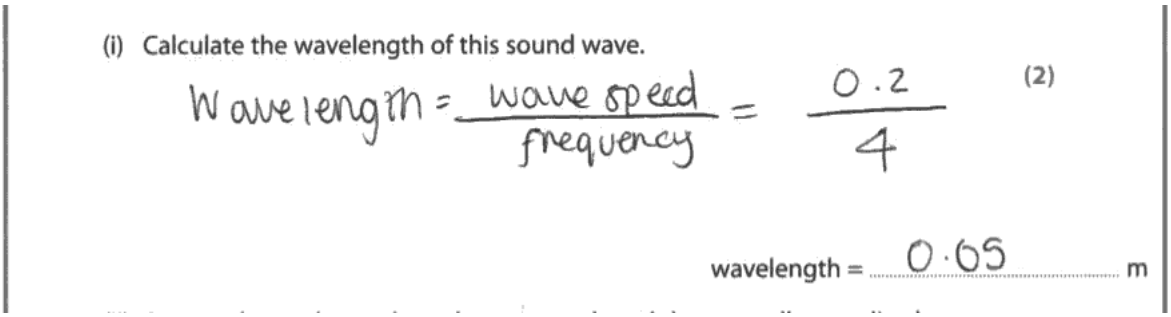
The response includes two separate reasons why the kettle is more efficient than the Bunsen Burner.

ResultsPlus
Examiner Tip

To gain two marks for an explanation, two separate reasons must be given.

Question 3 (a) (i)

Most candidates did not recognise a wavelength as they were unable to determine its value using the diagram. There were various answers given but 2m instead of 4m occurred most often. This could be due to candidates confusing the definition of amplitude with that of wavelength and giving the value of half the wavelength.



(i) Calculate the wavelength of this sound wave.

Wavelength = wave speed / frequency = 0.2 / 4 (2)

wavelength = 0.05 m

ResultsPlus
Examiner Comments

This candidate attempts to use of an equation which has been correctly transformed, but as neither the wavespeed nor the frequency is given, this answer is not worthy of any credit. The calculation required is very simple, e.g.

subtraction 4-0 or 5-1 =4m division 12/3 or 8/2 =4m

ResultsPlus
Examiner Tip

Candidates are not required to be able to change the subject of an equation. If a change of subject from that given on the formula page is required, it will be given in the question.

(i) Calculate the wavelength of this sound wave.

(2)

wavelength = 4 m

ResultsPlus
Examiner Comments

This correct answer with no calculation is awarded full marks.

ResultsPlus
Examiner Tip

This answer is correct and gets 2 marks. If it was incorrect, no marks would be awarded. However, if a correct use of numbers is shown but the answer is incorrect, then one mark can be given.

(i) Calculate the wavelength of this sound wave.

(2)

$0.2 \times 0 - 0.2$

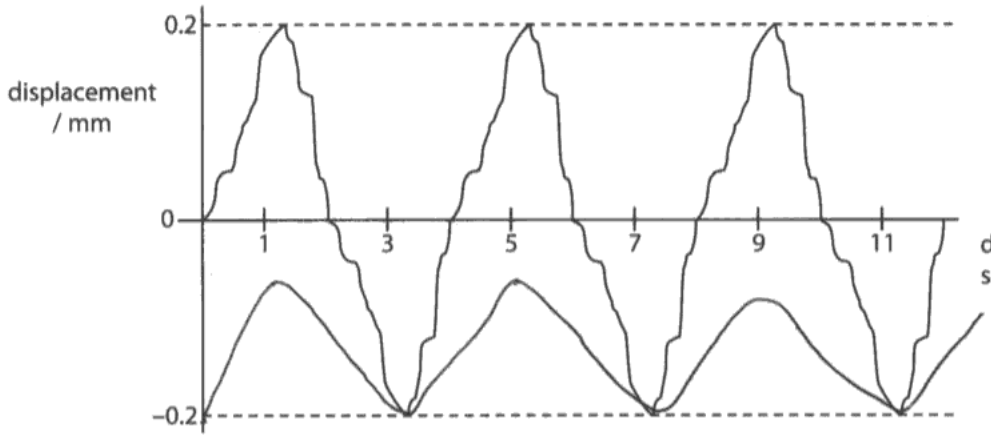
wavelength = -0.04 m

ResultsPlus
Examiner Comments

This answer shows confusion between amplitude and wavelength.

Question 3 (a) (ii)

The wave that was drawn could commence at any point on the y-axis and the majority showed smaller amplitude. However, a significant number showed no decrease in amplitude but a smaller wavelength, or made no attempt to add anything to the diagram.



(i) Calculate the wavelength of this sound wave.

(2)

wavelength = 13 m

(ii) A second sound wave has a longer wavelength but a smaller amplitude.

Sketch a graph of this second wave, on the axes above.

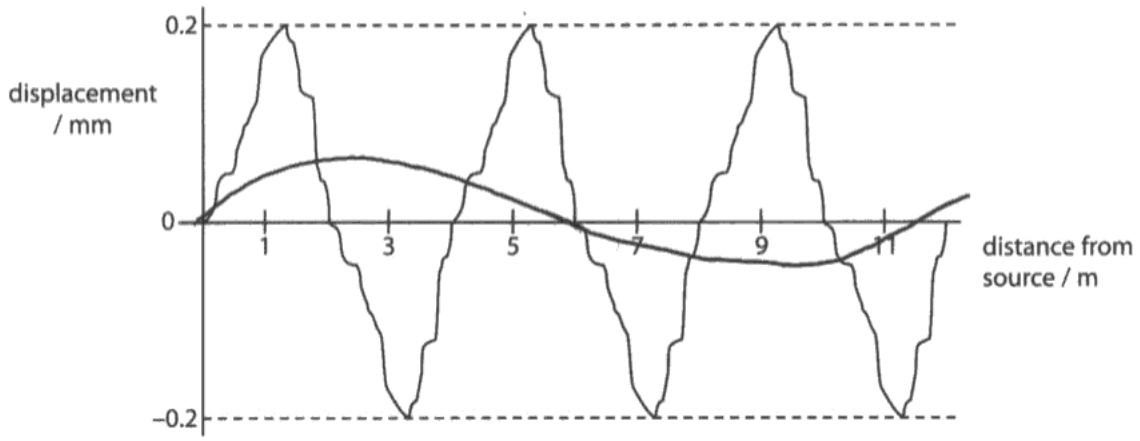
(2)

ResultsPlus
Examiner Comments

This answer shows reduced amplitude but the wavelength is not increased.

ResultsPlus
Examiner Tip

It is easier to see how to draw a longer wavelength if the wave starts at the origin.



(i) Calculate the wavelength of this sound wave.

(2)

5 - 1 = 4

9 - 5 = 4

wavelength = 4 m

(ii) A second sound wave has a longer wavelength but a smaller amplitude.

Sketch a graph of this second wave, on the axes above.

(2)

ResultsPlus

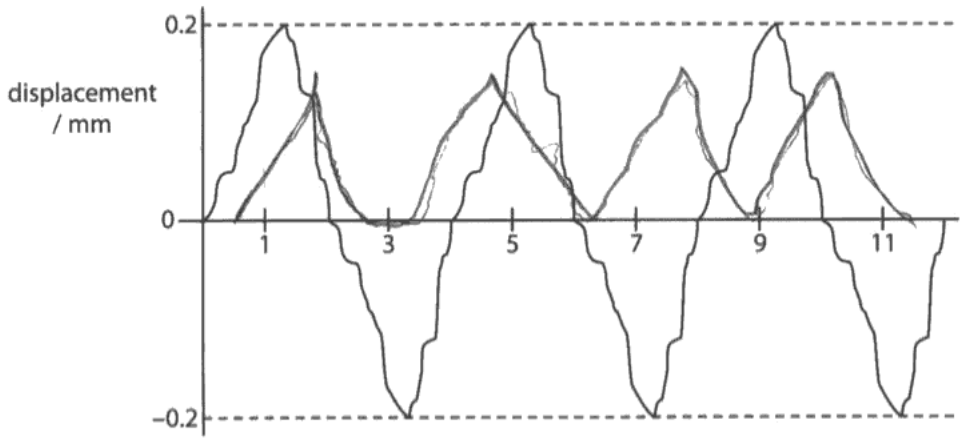
Examiner Comments

An excellent example, showing reduced amplitude and increased wavelength.

ResultsPlus

Examiner Tip

Keep the shape of the wave that is drawn as simple as possible. This clip also shows the simple calculation completed for 3 (a) (i).



(i) Calculate the wavelength of this sound wave.

(2)

wavelength = 5 m

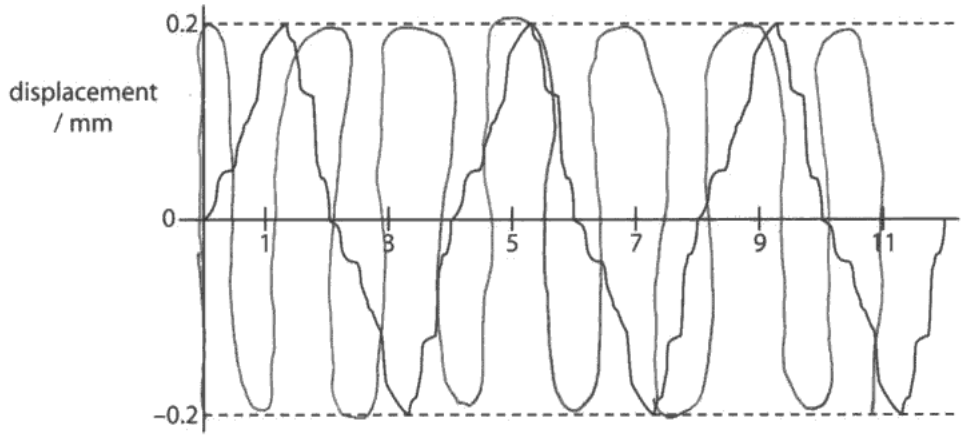
(ii) A second sound wave has a longer wavelength but a smaller amplitude.

Sketch a graph of this second wave, on the axes above.

(2)

ResultsPlus
Examiner Comments

Smaller amplitude but reduced wavelength.



(i) Calculate the wavelength of this sound wave.

(2)

wavelength = 0.2 m

(ii) A second sound wave has a longer wavelength but a smaller amplitude.

Sketch a graph of this second wave, on the axes above.

(2)

ResultsPlus
Examiner Comments

This response shows the same amplitude but a smaller wavelength.

Question 3 (b) (i)

The majority of candidates were unable to distinguish between transverse and longitudinal waves with large numbers under the impression that light, heat and radio waves were longitudinal. The most common example of a correct answer was P-waves and occasionally shock waves or ultrasound.

Question 3 (b) (ii)

A difference between the waves is the direction of their vibrations and this can be shown using a diagram. However, a single line is not sufficient to show the direction of vibration of the particles in a longitudinal wave; there must be some indication of compressions as seen on a slinky. A correct difference in the direction of vibrations was enough to gain one mark. The correct wave did not have to be linked to the vibration. A correctly labelled diagram or description of the vibrations of both waves gave two marks. Movement 'side to side' was only credited for transverse waves as this infers at right angles to the direction of motion. For longitudinal waves, the motion of particles is 'back and forth' or 'to and fro'.

(ii) Explain how a longitudinal wave is different from a transverse wave.

You may draw a diagram to help with your answer.

(2)

because in a longitudinal wave the particles move foward and backwards but on a transverse wave the particles move up and down in the direction it is going.

ResultsPlus
Examiner Comments

The candidate has given a correct statement about the direction of vibration of particles for each wave and is awarded two marks.

(ii) Explain how a longitudinal wave is different from a transverse wave.

You may draw a diagram to help with your answer.

(2)

transverse
the ~~longitudinal~~ wave travels 90° to its
direction whereas longitudinal does not

ResultsPlus
Examiner Comments

The diagram shows the difference in the directions of vibrations and gains one mark. There is not enough in the description of the transverse wave to give the second mark.

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Examiner Tip

Give as much information as you can by labelling the diagrams.

Question 3 (c) (ii)

This calculation was generally done incorrectly or candidates did not appreciate that 'show that' means calculate and there were a large number of drawings of waves. Many of those who attempted a calculation tried to use a reverse argument starting with the speed and the 30cm wavelength and calculating the frequency. If the question is read carefully, it is realised that the glass with the largest amount of water has a frequency of 1047Hz. This and the speed of sound can then be used to calculate the wavelength in metres from the equation given. The value in metres is then converted to cm. If the wrong value of frequency was initially used, then 2 marks could be awarded for evaluation and conversion.

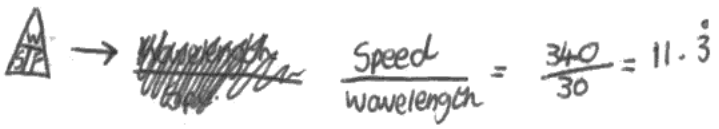
(ii) wavelength = speed / frequency

The speed of sound in air is 340 m/s.

A student listens to the sound from the glass when it contains the largest amount of water.

Show that the wavelength of the wave he hears is about 30 cm.

(3)



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Examiner Comments

This candidate attempted reverse argument but as the wavelength is in cm and the speed in m/s, the value for the frequency of 11.3 does not relate to any frequencies used. Even if the wavelength had been converted to metres, the frequency would be 1133 Hz which does not link to the glass with the largest amount of water.

(ii) wavelength = speed / frequency

The speed of sound in air is 340 m/s.

A student listens to the sound from the glass when it contains the largest amount of water.

Show that the wavelength of the wave he hears is about 30 cm.

(3)

wavelength = Speed / frequency

Speed = 340
frequency = 1047 = 0.32473734448 × 100 = (to convert it)

wavelength = 32.47373448 cm

ResultsPlus
Examiner Comments

This answer merits 3 marks as it shows correct use of 1047Hz. There is correct evaluation in metres, ignoring the excessive significant figures and the correct conversion to cm.

ResultsPlus
Examiner Tip

A 'show that' question must show the calculation, as the answer is already given in the question.

(ii) wavelength = speed / frequency

The speed of sound in air is 340 m/s.

A student listens to the sound from the glass when it contains the largest amount of water.

Show that the wavelength of the wave he hears is about 30 cm.

(3)

1047 340

Speed = 340m/s.

frequency = 1047Hz

0.32m/s.
1047) 340

$\frac{340}{1047} = 0.32 m/s.$

wavelength = 0.32m/s

ResultsPlus
Examiner Comments

A correct answer, well set out, showing substitution, evaluation and conversion to cm.

Question 4 (a) (ii)

Few candidates could explain why the tectonic plates moved. Most considered how they moved, i.e. 'they rub against each other'. The full answer would be that uneven heat from the core causes convection currents in the mantle. However, this type of answer was rarely seen but if any two of the three points were given, then both marks were awarded.

(ii) Explain what causes the plates to move.

(2)

the plates are like floats on the mantle. The mantle has a convection current moving around like:

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Examiner Comments

This answer shows a good understanding of what causes the plates to move and even has a diagram to show a convection current. Although this was not required, it could have been used to gain both marks if it had been labelled.

ResultsPlus
Examiner Tip

If there are two marks, look to make two points to complete the explanation.

(ii) Explain what causes the plates to move.

(2)

The plates move when the core of the Earth heats up, which causes the mantle to move which makes the plates move against each other.

ResultsPlus
Examiner Comments

This answer includes the heat from the core and the mantle, and is again worth two marks.

ResultsPlus
Examiner Tip

This answers the question 'What causes the plates to move', i.e. why do they move. Make sure the answer given is to the question asked.

(ii) Explain what causes the plates to move.

(2)

convection currents underneath the plates slowly cause the plate to move

ResultsPlus
Examiner Comments

With no mention of the mantle, 'under the plates' or what causes the convection currents was not sufficient. Only one mark is awarded.

ResultsPlus
Examiner Tip

Make sure that two points are made for two marks. Repeating the stem of the question will not gain any marks.

(ii) Explain what causes the plates to move.

(2)

The plates move when the core of the Earth heats up, which causes the mantle to move which makes the plates move against each other.

ResultsPlus
Examiner Comments

This answer gains no marks because it answers the question how and not why the plates move.

Question 4 (c) (i)

Only a few candidates were able to state that waves could be reflected or refracted at boundaries. Most responses used terms like 'bounces off' or 'changes direction' if any marks were to be gained. However, many candidates read the question as 'what happens at the boundary between the plates' and gave the answers that 'earthquakes or volcanoes occur'. As the question specifically asked about waves, then the two effects of reflection and refraction were the only possible answers.

(c) Earthquakes produce P-waves and S-waves.

(i) Describe what can happen to these waves when they reach the boundary between the crust and the mantle.

(2)

they get closer together and travel slower. when they reach the boundary between the crust and the mantle.

ResultsPlus
Examiner Comments

This answer describes refraction and gains one mark.

ResultsPlus
Examiner Tip

Try to use correct scientific terms rather than a description of them.

(c) Earthquakes produce P-waves and S-waves.

(i) Describe what can happen to these waves when they reach the boundary between the crust and the mantle.

(2)

they would bounce back, where it came from.

ResultsPlus
Examiner Comments

This description of reflection gains one mark.

(c) Earthquakes produce P-waves and S-waves.

(i) Describe what can happen to these waves when they reach the boundary between the crust and the mantle.

(2)

The p and s waves can ether refract (bend) off a boundary or they can reflect off the boundary (bounce off)

ResultsPlus
Examiner Comments

Both effects are given correct names and explained, although this was not necessary. Two marks were awarded.

ResultsPlus
Examiner Tip

Remember the only two effects to be considered when any type of wave reaches a boundary between different materials are refraction and reflection.

Question 4 (c) (ii)

The calculation was carried out correctly in most cases and usually completed without showing the working. The main errors were confusion between the divisor and the dividend and incorrect powers of ten, both of which may have been eliminated by showing the calculation.

(ii) A P-wave takes 200 s to travel a distance of 1200 km.

Calculate its speed in km/s.

(2)

1200 km ÷ 200 s = 600 km/s

speed of P-wave = 600 km/s

ResultsPlus
Examiner Comments

An incorrect power of ten, although the values are given.

(ii) A P-wave takes 200 s to travel a distance of 1200 km.

Calculate its speed in km/s.

(2)

$\frac{200}{1200} = 0.16$

speed of P-wave = 0.16 km/s

ResultsPlus
Examiner Comments

Writing the correct equation and then inserting the values in the correct positions should have produced the correct answer.

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Examiner Tip

Use the equations given on the formulae page and then insert the numerical values.

(ii) A P-wave takes 200 s to travel a distance of 1200 km.

Calculate its speed in km/s.

(2)

Wave speed = Distance / Time

1200 km / 200 s

= 6 km/s

speed of P-wave = 6 km/s

ResultsPlus
Examiner Comments

All calculations done this way are more likely to yield the correct answer.

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Examiner Tip

Write down the equation, insert the numerical values, then evaluate.

Question 4 (d)

Many candidates just repeated the stem of the question stating that tsunamis were 'hard to predict' or equivalently 'unpredictable'. The reason for tsunamis occurring was frequently given as an earthquake but the necessity of this being underwater was not generally appreciated. The unpredictability was also wrongly linked to poor equipment or not being able to put seismometers under the sea, rather than the randomness or irregularity of the earthquakes happening.

(d) Explain why scientists find it difficult to predict when a tsunami may happen.

(2)

Because they dont have the write technology and they can happen at any time

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Examiner Comments

'can happen at any time' is an acceptable synonym for random or irregular.

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Examiner Tip

This candidate has made two points as there are two marks for the explanation. As the first part is incorrect, just one mark is awarded.

(d) Explain why scientists find it difficult to predict when a tsunami may happen.

(2)

A tsunami is caused by an underwater volcano, Scientists do not know exactly When a volcano Will erupt so it is hard to predict

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Examiner Comments

This candidate knows that a tsunami is caused by an underwater eruption or movement of plates, and 'do not know when' is equivalent to random.

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Examiner Tip

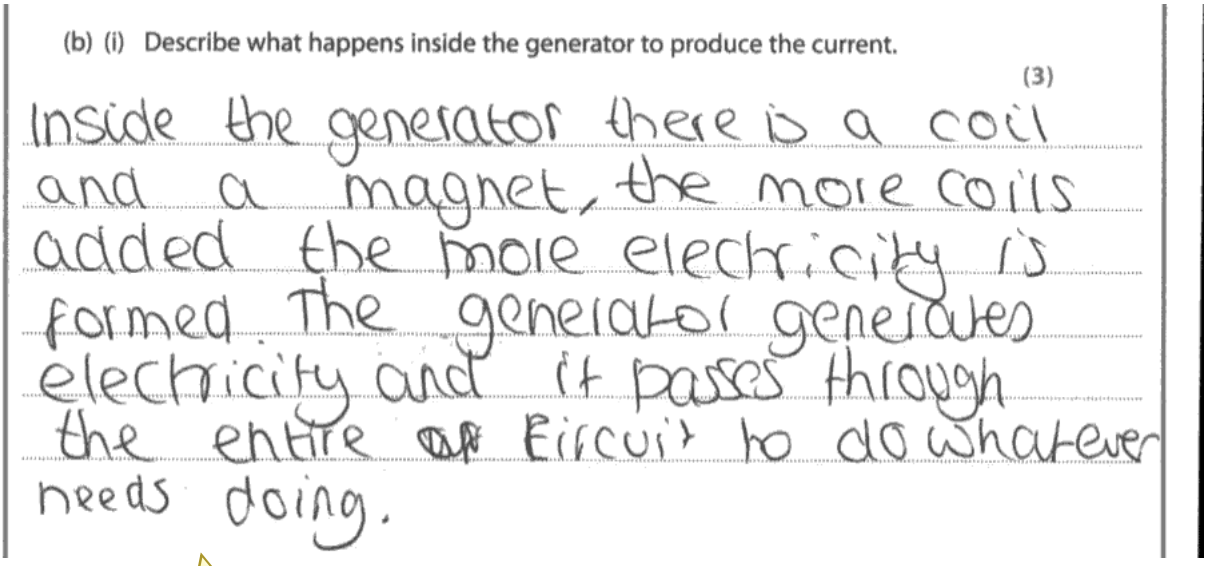
The explanation is worth two marks. Two correct points are made and two marks are awarded.

Question 5 (a) (ii)

The answer amps, A or amperes was rarely seen. Candidates should know the units of the quantities used in each of the equations given on the formulae page as all of the units are given as part of the specification.

Question 5 (b) (i)

This question was either answered very well with candidates gaining all three marks or quite badly when candidates either had no idea of the components that were inside the generator or had misread the question and given the overall effect that a generator has rather than what happens inside to make it work. As this is an explanation required by the specification, then all candidates should have some idea that coils of wire and magnets are used to generate electricity, even if they do not know how.



(b) (i) Describe what happens inside the generator to produce the current.

(3)

Inside the generator there is a coil and a magnet, the more coils added the more electricity is formed The generator generates electricity and it passes through the entire ~~of~~ Circuit to do whatever needs doing.

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Examiner Comments

This candidate knows that a coil (of wire) and a magnet are used but does not include that one of them must be moved to generate a current.

ResultsPlus
Examiner Tip

The answer does not answer the question which is 'what happens inside the generator'. It only satisfies the question 'what is inside the generator'. Make sure the question is answered completely.

(b) (i) Describe what happens inside the generator to produce the current.

(3)

Inside the generator is a coil of wire and a magnet. Both the coil of wire and magnet have to move relative to eachother in order to induce a current. The current is alternating as they are both moving relative to eachother.

ResultsPlus
Examiner Comments

This answer is worth three marks as it gives the two components necessary (coil of wire and a magnet) and states they have to move relative to each other, i.e. it makes no difference which one is moved.

ResultsPlus
Examiner Tip

There are three marks for the question and therefore three pieces of information need to be given to gain three marks.

Question 5 (b) (ii)

The most common answer was 'turn the handle faster' which again suggests that many candidates have seen the hand held generator working, but are not familiar with how a current is generated. Candidates also confused increasing the current produced by a generator with increasing the current in a circuit and incorrectly suggested that increasing the number of batteries or using bigger batteries would increase the current in this case. The preferred answers related to magnets, making them stronger not bigger; coils, adding more turns and increasing the speed of rotation.

Question 5 (c)

Many candidates had the necessary knowledge to answer this question well, naming sources of both renewable and non-renewable energy and comparing the main feature of these sources. The main misunderstanding was to confuse renewable with recyclable. A source of energy such as wind is renewable, therefore it will not run out. However, the wind used is not recycled and cannot be used 'over and over again' as suggested by a number of candidates. The expense or otherwise of producing electricity needs to distinguish clearly between building and running costs to make a sensible comparison. When considering pollution, the type of pollution should be named, i.e. air, noise etc. Describing renewable sources of energy as 'more eco friendly', probably meaning 'not causing pollution', is not sufficiently specific and not necessarily correct when biofuels are considered.

Candidates limited their achievement to a level 1 if only one source of energy was given, or only renewable or non-renewable energy was discussed.

Compare the use of a non-renewable energy source with the use of a renewable energy source to produce electricity for the National Grid.

(6)

The national grid use renewable energy as it is cheaper to get, they use it over and over again. However non-renewable energy can be stronger and more reliable as the same thing wouldn't of been used over and over again making it weaker each time.

ResultsPlus
Examiner Comments

This answer shows the incorrect use of 'over and over again', instead of will not run out. 'cheaper to get' is not sufficiently explained and it cannot be assumed that this means a free source of energy.

The level 1 is awarded for non-renewable being 'more reliable' because the rest of the sentence refers to recycling.

ResultsPlus
Examiner Tip

Do not confuse renewable with recyclable.

Compare the use of a non-renewable energy source with the use of a renewable energy source to produce electricity for the National Grid.

(6)

~~To~~

- A pylon has more waste energy than a wind turbine.
- A wind turbine is noisier.
- A pylon pollutes more.

ResultsPlus
Examiner Comments

This answer gives one correct piece of information about wind turbines and this is sufficient to gain level 1, two marks.

Compare the use of a non-renewable energy source with the use of a renewable energy source to produce electricity for the National Grid.

(6)

With a non-renewable energy source it will eventuallyrun out and when the national grid is produces energy carbon dioxide will be getting let off from a non-renewable source. But using a renewable source its cleaner and it wont run out. So we could produce energy all the time.

ResultsPlus
Examiner Comments

This answer compares renewable and non-renewable energy and gives a feature of each, but does not name a source of either type of energy. It is therefore limited to level 2 and 4 marks.

ResultsPlus
Examiner Tip

The question asks for a renewable energy source and the name of the source should be included.

Compare the use of a non-renewable energy source with the use of a renewable energy source to produce electricity for the National Grid.

(6)

Non-renewable energy sources will one day run out, and it is bad for the enviroment. But as for renewable energy sources, to produce electricity will never run out because it's powered by something natural like wind, sunlight or waves. Although, it might not be windy everyday so it might not always work. But the more wind, sunlight or waves means the more energy produced, for electricity.

ResultsPlus
Examiner Comments

This candidate does not name a non-renewable energy source but states it will run out. The candidate names a renewable energy source (wind, sunlight, waves), states it will never run out and then considers the unreliability of wind.

This response gains Level 3 and 6 marks.

ResultsPlus
Examiner Tip

A comparison should be the same feature compared for each of a renewable and non-renewable energy, i.e. will not run out, will run out.

Question 6 (a) (ii)

The majority of candidates knew that the invention that Galileo used was a telescope, although the heliocentric model was occasionally mentioned.

Question 6 (b) (i)

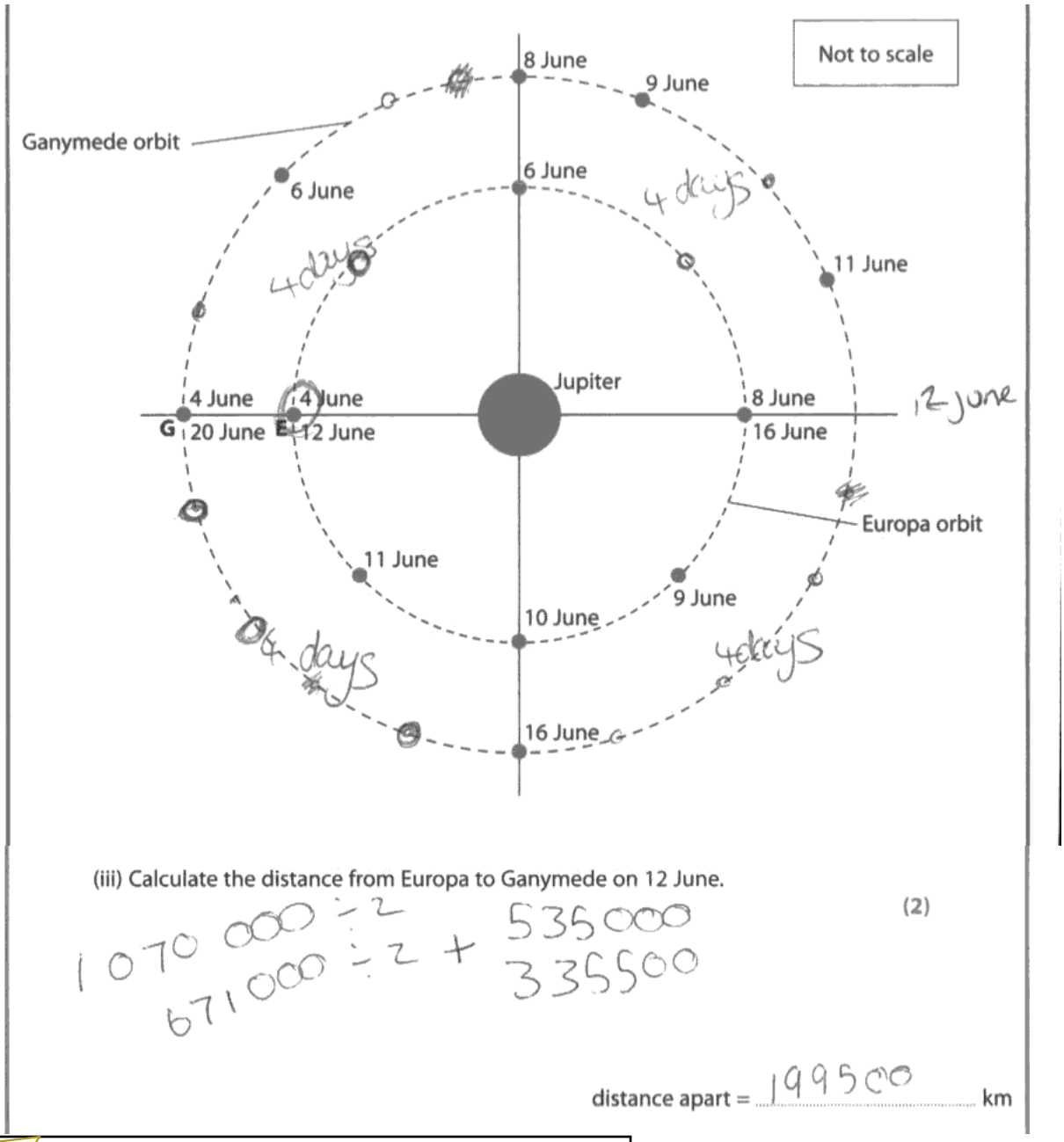
The majority of candidates obtained 4th June from the diagram, although various other dates were also given.

Question 6 (b) (ii)

Working out the time that Ganymede took to orbit Jupiter using the diagram was found to be a little more difficult, although many candidates managed to deduce that it was 16 days.

Question 6 (b) (iii)

The fact that the position of Ganymede on 12th June was not indicated on the diagram made this question very difficult for some candidates. If the first step of noting the position of Ganymede on 12th June was completed, then candidates realised that something had to be done with the values of the radii of the two orbits and generally added the values. However the majority of candidates did not work out where Ganymede was on 12th June, but used where Europa was on this date as this was marked on the diagram. The distance of closest separation was then found by subtraction of the two radii.



(iii) Calculate the distance from Europa to Ganymede on 12 June.

(2)

1 070 000 ÷ 2 = 535 000

671 000 ÷ 2 = 335 500

535 000 + 335 500

distance apart = 199500 km

ResultsPlus
Examiner Comments

Marking 12th June on the Ganymede orbit gave 1 mark.

Using the combination of the two radii also gave 1 mark.

If on E two radii were added to give 1 741 000 km, then 2 marks were awarded.

ResultsPlus
Examiner Tip

Always attempt a question. Supply whatever information may be relevant for the examiner to mark.

Question 6 (b) (iv)

Generally candidates confused distances, positions of the moons and dates and found it difficult to extract the relevant information from the diagram and to visualise what was happening to the moons as they orbited. Most candidates realised that because the moons were orbiting at different rates, then this had an effect on their separation and some could identify what happened to the separation of the moons immediately after 4th June. However very few could extend this to visualising what would happen to the separation as Europa orbited three times.

*(iv) Describe how the distance between Europa and Ganymede changes during three orbits of Europa.

(6)

The distance between the two moons changes because the are different lengths in orbit from jupiter. Europa will be moving faster than Ganymede because its closer to the planet and ganymede has a bigger orbit.

ResultsPlus
Examiner Comments

This is a Level 1 response. The candidate has noted that Europa is moving faster than Ganymede.

ResultsPlus
Examiner Tip

Include any information that you can obtain from the diagram.

*(iv) Describe how the distance between Europa and Ganymede changes during three orbits of Europa.

(6)

They both start at the same point on the 4th June the Europa's orbit in two days is already a 1/4 the way through whereas Ganymede's orbit is only an 1/8 of the way through. On the 8th of June Ganymedes orbit is at the same point as Europa was 2 days ago. the distance between the planets begins to increase and after half way through ~~Europa is 8 days earlier at the halfway point then Ga~~ Europa is 3 days in front on Ganymede on the 11th June Europa is half an orbit in front of Ganymede

ResultsPlus

Examiner Comments

The candidate realises that the moons are orbiting at different speeds and states that the moons' distance apart will increase. This is Level 2 and 4 marks.

*(iv) Describe how the distance between Europa and Ganymede changes during three orbits of Europa.

4

(6)

Because the orbit for Europa is faster it takes 8 days to orbit Jupiter where as Ganymede takes 16 days which is ~~half~~ the dable the around, so every 2 days the distance will get large until it meets in again when it orbits round Jupiter twice Ganymede has done it once so they meet but then the distance grows again as Europa will orbit faster. On the third orbit therefor when Europa has done its third orbit Ganymede orbit is half way round which is at its greatest difference until they both came together again on Europas 4th orbit of Jupiter.

(Total for Question 6 = 12 marks)

ResultsPlus

Examiner Comments

This response scores Level 3 and 6 marks.

The first two lines qualify for Level 1. The candidate talks of being closest together at the start and after second orbit, and furthest apart after the third . It qualifies for Level 3 as it describes how the distance between moon is increasing AND decreasing as Europa orbits, and considers a third orbit.

Paper Summary

Based on their performance on this paper, candidates are offered the following advice:-

- make correct use of scientific terms
- know the units that are used for the quantities given in the specification
- aim to make two clear points when two marks are awarded for a question
- know how to depict wavelength and amplitude on a wave diagram
- read the question carefully and look for the command word before writing an answer
- realise a "show that" question requires a calculation to be completed to agree with an answer given
- practice both obtaining information from a diagram and providing information using a labelled diagram.

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