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Examiners' Report
June 2013

GCSE Physics 5PH1F 01

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June 2013

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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, calculations and 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 have become confident in expressing themselves when they have to analyse information and present comparisons. Many students were able to compare the uses of energy saving lamps with filament lamps qualitatively and some gave at least one correct quantitative comparison to merit the award of six marks. However, knowledge of the methods used to gather evidence of life beyond Earth was often limited and frequently confused. Most candidates were aware of the space probes to other planets but the Search for Extra-terrestrial Intelligence, if mentioned, showed many misconceptions.

Students also need to be able to explain scientific terms accurately. A wavelength should be recognised from the diagram of a travelling wave. Current should be recalled as the rate of flow of charge and a real image should be known as an image which can be shown on a screen. All students should have experience of measuring the focal length of a convex lens.

It is important that students learn to produce labelled diagrams or add to diagrams on the question paper to help with descriptions. They also need to be able to extract information from tables taking note of the units used and accurately add values to graphs and charts paying particular attention to the scales being used.

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. However, writing the correct formula enables students to substitute in an equation even if they are unable to make further progress. This is frequently the case as many students do not have the use of a calculator, even though it is a prerequisite for this paper. Substitution of the correct values into the correct equation then mitigates against candidates losing all of the marks for a calculation as they would do if only an incorrect answer is given.

Question 1 (b)

All candidates correctly assigned the use of microwaves, with just a few confusing the uses of the less familiar ultraviolet and gamma waves.

Question 1 (c) (i)

Most candidates were able to gain one mark for associating the infrared image with heat or temperature. However, only a few gained a second mark for linking this to the parts of the hand which are either hotter/colder or show up as different shades. When given an image to consider, students should be encouraged to state what they see and then infer the scientific information that is being given.

(c) Images of hands can be made using different parts of the electromagnetic spectrum.

Infrared image

X-ray image

Both images give information about a hand.

(i) Suggest what information the infrared image gives about a hand.

(2)

The infared shows where the hotest parts of the hand are

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Examiner Comments

The answer gets one mark for 'The infrared shows where the hottest part of the hand is'. To gain a second mark a hot/cold part of the hand would need to be named or a difference in shading noted.

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Examiner Tip

Use the information on the image shown.

Infrared image

X-ray image

Both images give information about a hand.

(i) Suggest what information the infrared image gives about a hand.

(2)

Infrared is showing us the heat of the hand and what parts of the hand are hottest. The lighter, the hotter.

ResultsPlus

Examiner Comments

The response gains one mark for 'the heat of the hand and what parts of the hand are hottest. The second mark is awarded for 'The lighter the hotter', indicating how the shading on the diagram shows the heat difference.

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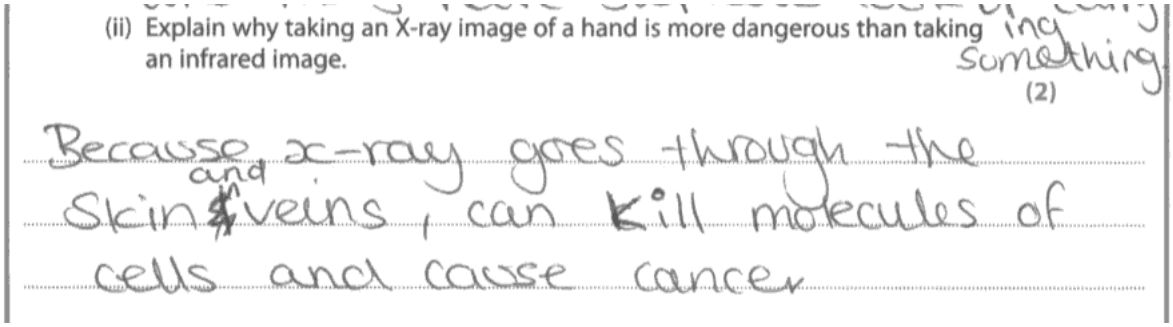
Examiner Tip

State what you can see on the diagram then explain it.

Question 1 (c) (ii)

The question needs to be answered with reference to the X-ray of the hand and the image shows that the X-rays pass through the skin to show the bones. This was a sufficient answer for one mark. The most common acceptable answer for one mark was that X-rays can cause cancer or variations on ionising, damaging, mutating cells or DNA.

Noting the difference in energy, frequency or penetration between infrared and X-rays was also worthy of a mark. If the difference was correctly identified, for example, X-rays have a higher frequency or greater energy, then two marks were awarded.


(ii) Explain why taking an X-ray image of a hand is more dangerous than taking an infrared image.

(2)

Because x-ray goes through the skin and veins, can kill molecules of cells and cause cancer.

ResultsPlus
Examiner Comments

'Goes through the skin' is a fact that can be obtained from the diagram and is acceptable as 'penetrates the skin'. 'kill.... cells' or 'cause cancer' are both the same marking point. 2 marks awarded.

ResultsPlus
Examiner Tip

Use the image given to get information to answer the question.

(ii) Explain why taking an X-ray image of a hand is more dangerous than taking an infrared image.

(2)

Is more dangerous to take an x-ray image because x-ray has ~~a~~ higher energy which causes more damage than infrared that have a longer wavelenght.

(Total for Question 1 = 8 marks)

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Examiner Comments

Correct link is made to energy and the longer wavelength of infrared.

ResultsPlus
Examiner Tip

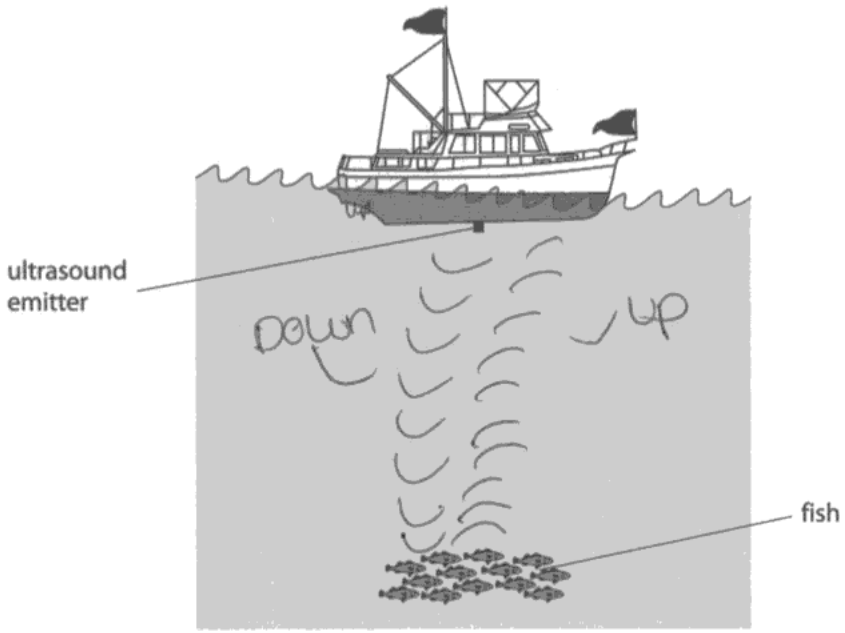
The correct scientific terms such as energy, frequency and penetration should be used.

Question 2 (a) (iii)

Candidates should be encouraged to add to diagrams to clarify their written work. For this question, both marks could be obtained by drawing rays or wavefronts, indicating the direction of travel of ultrasound and the reflection of the ultrasound by the fish. The use of the word 'reflection' is preferable to 'bounce off' as this concept occurs several times in the course and familiarity with it may help candidates to understand the difference between reflection and refraction.

The majority of candidates were able to get one mark for the ultrasound going down into the water. However there were still a significant number that thought the fish emitted the ultrasound or that the ultrasound attracted the fish to the boat.

(iii) The diagram shows a fishing boat above some fish.



Describe how ultrasound waves are used to detect the fish.

You may add to the diagram to help with your answer.

(2)

the boat sends down a ultrasound and when it bounces back will tell the people how far down the fish are

ResultsPlus
Examiner Comments

The diagram showing the wavefronts is sufficient on its own to gain two marks.

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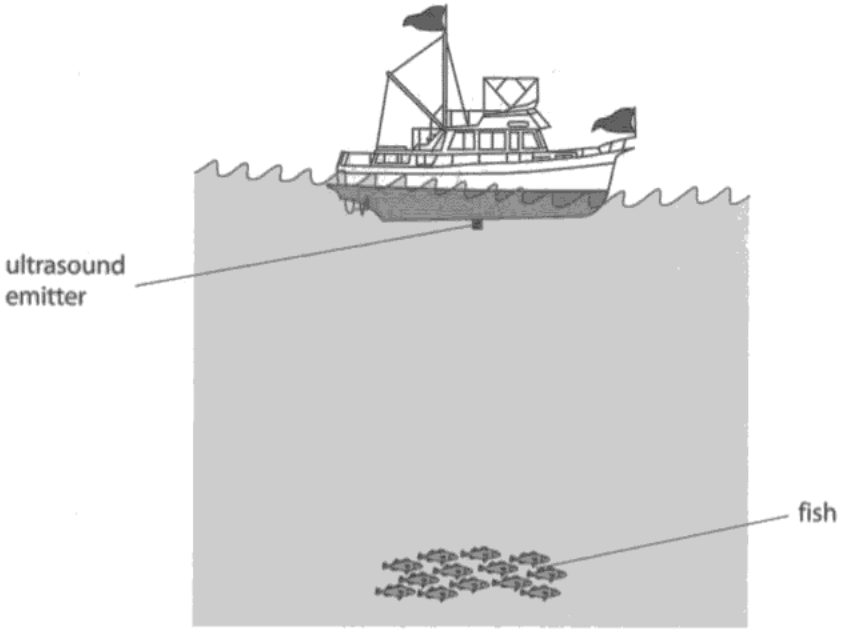
Examiner Tip

Add to diagrams to clarify your ideas.



Describe how ultrasound waves are used to detect the fish.

You may add to the diagram to help with your answer.

(2)

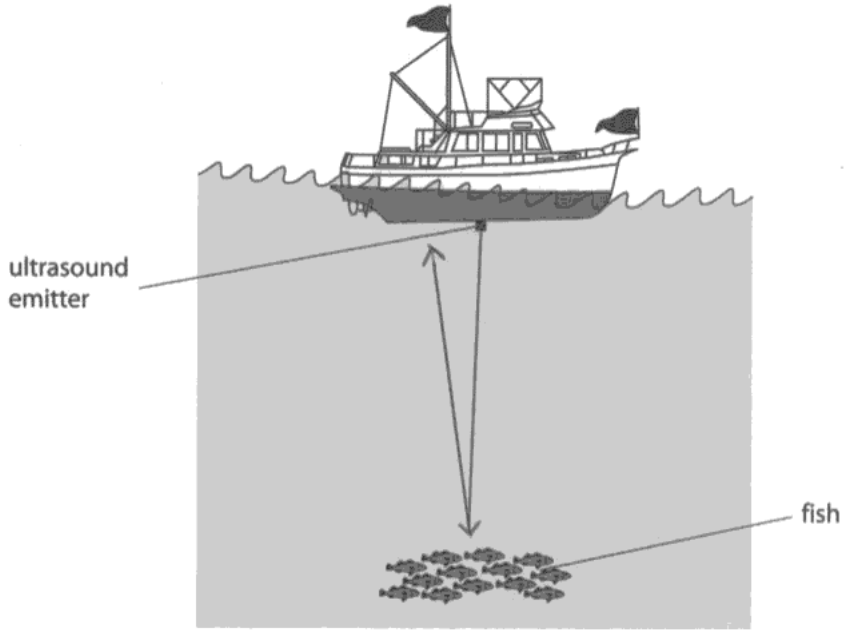
The ultrasound waves will give a signal to the bottom of the sea or towards the fish and the bounce back up to tell you how far down they are.

ResultsPlus
Examiner Comments

'Waves will give a signal to the bottom of the sea' reflects MP 1 ie waves go down through the water and 'bounce back up' reflects MP 2. 2 marks awarded.

ResultsPlus
Examiner Tip

Text is sufficient here but additions to the diagram would be useful.



Describe how ultrasound waves are used to detect the fish.

You may add to the diagram to help with your answer.

(2)

The ultrasound waves are fired down into the ocean. When the waves come into contact with fish they are reflected back up to the boat and this creates an image on a screen.

ResultsPlus
Examiner Comments

The diagram is worth two marks as the direction of each ray is indicated correctly. The written answer would also get two marks.

ResultsPlus
Examiner Tip

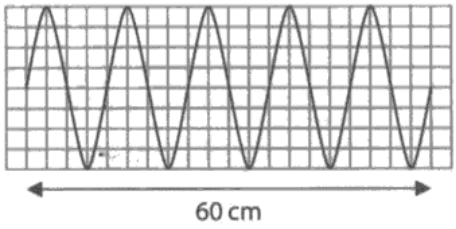
When rays are being drawn, there must be an arrow to indicate direction.

Question 2 (b)

Many candidates were unable to determine the number of whole waves shown on the diagram. Four, six or ten wavelengths were frequently given answers. The definition of a wavelength being given as the distance between two successive crests or troughs probably led to four being quoted and ten because it is the number of half wavelengths. When candidates use the distance between successive crests, then it must be remembered that the additional parts of waves at either end must be added on. Candidates need to be able to work out the number of waves shown when, as is most commonly shown, the wave starts from the rest position.

Many candidates were able to gain a mark for calculating the wavelength with their incorrect value for the number of waves as their error was carried forward. Writing down the numbers being used without completing the calculation was sufficient to gain the mark for 2bii.

(b) Some students are investigating waves.
They produce waves by moving a piece of wood up and down in a tank of water.
The diagram shows the waves over a distance of 60 cm.



(i) State the number of wavelengths shown on the diagram.

(1)

number of wavelengths = 4

(ii) Calculate the wavelength of the waves.

(1)

Wave speed ÷ frequency = wavelength.

60 ÷ 4 = 15

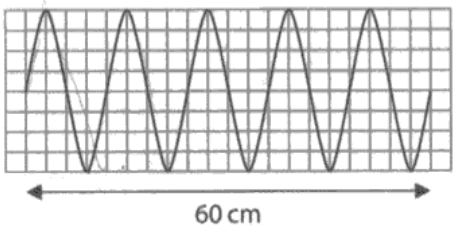
wavelength of waves = 15 cm

ResultsPlus
Examiner Comments

No marks were given for 2bi and the wrong equation quoted for 2bii. However the values quoted, 60/4 would give the mark for 2bii without the answer 15 because the correct procedure has been carried out.

ResultsPlus
Examiner Tip

Learn to count wavelengths from the rest position.



(i) State the number of wavelengths shown on the diagram.

(1)

number of wavelengths = 5

(ii) Calculate the wavelength of the waves.

(1)

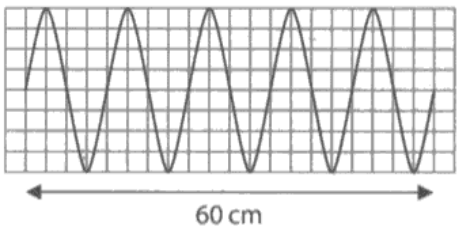
wavelength of waves = 12 cm

ResultsPlus
Examiner Comments

Correct answers, no working shown.
2 marks awarded.

ResultsPlus
Examiner Tip

Better to show your working rather than get no marks if the answer is incorrect.



(i) State the number of wavelengths shown on the diagram.

(1)

number of wavelengths = 4

(ii) Calculate the wavelength of the waves.

(1)

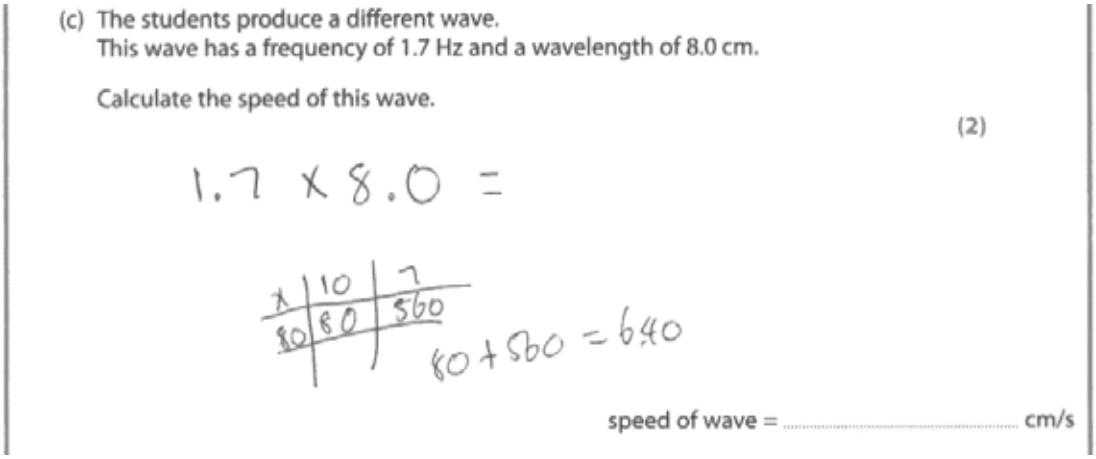
wavelength of waves = 9 cm

ResultsPlus
Examiner Comments

This answer gets no marks as both the answers are incorrect and no working is shown.

Question 2 (c)

Almost all candidates were able to complete this calculation successfully. The equation was rarely written down but there were more instances of the numbers used being shown. This allowed candidates who did not have calculators and find the process of multiplication difficult, to get at least one mark.



(c) The students produce a different wave.
This wave has a frequency of 1.7 Hz and a wavelength of 8.0 cm.

Calculate the speed of this wave.

(2)

1.7 x 8.0 =

x	10	7
8	80	560

80 + 560 = 640

speed of wave = ... cm/s

ResultsPlus
Examiner Comments

One mark was awarded for the correct substitution of the values even though the multiplication proved too difficult.

ResultsPlus
Examiner Tip

Always write down your working.

(c) The students produce a different wave.
This wave has a frequency of 1.7 Hz and a wavelength of 8.0 cm.

Calculate the speed of this wave.

(2)

speed of wave = 136 cm/s

ResultsPlus
Examiner Comments

One mark was awarded. The two correct numbers have been multiplied but the calculator used wrongly has produced the number to the wrong power of 10.

ResultsPlus
Examiner Tip

Estimate your answer for the correct power of ten.

(c) The students produce a different wave.
This wave has a frequency of 1.7 Hz and a wavelength of 8.0 cm.

Calculate the speed of this wave.

(2)

8cm ÷ 1.7 = 4.70

speed of wave = 4.70 cm/s

ResultsPlus
Examiner Comments

There was incorrect substitution, so no marks were awarded.

ResultsPlus
Examiner Tip

The question gives frequency and wavelength. Use the formulae page to find the correct equation, then substitute.

(c) The students produce a different wave.
This wave has a frequency of 1.7 Hz and a wavelength of 8.0 cm.

Calculate the speed of this wave.

(2)

wavespeed = Frequency x wavelength

1.7 x 8.0cm

1.7 x 8.0 = 13.6cm/s

speed of wave = 13.6 cm/s

ResultsPlus
Examiner Comments

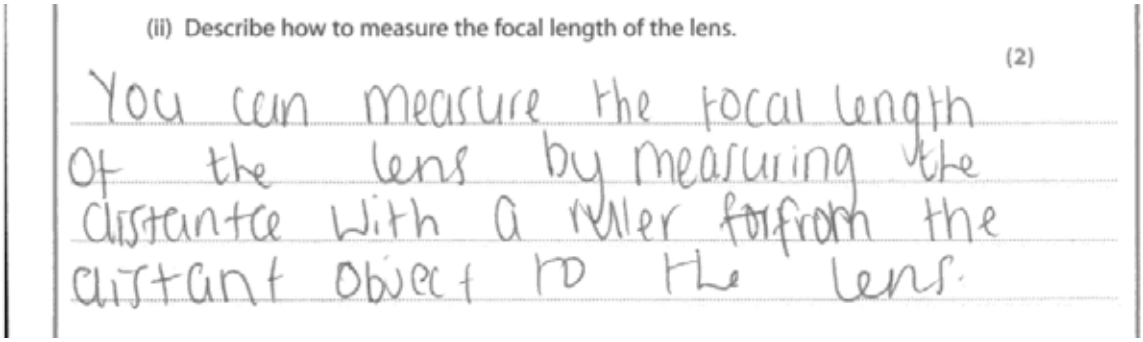
If all candidates completed calculations in this way more full marks would be achieved.

ResultsPlus
Examiner Tip

Find equation on formulae sheet, write out equation, substitute values, complete calculation.

Question 3 (a) (ii)

This question was best answered by those candidates who had completed practical work and had actually measured the focal length of a convex lens. The diagram showed a very simple method of completing that task without indicating where the focal length might be. The first mark only required candidates to know that the focal length of a lens was a distance. Some candidates described the experiment shown in the diagram but neglected to mention what had to be measured to find the focal length. The second mark was for correctly stating that the distance to be measured was from the lens to the image.



(ii) Describe how to measure the focal length of the lens.

(2)

You can measure the focal length of the lens by measuring the distantce with a reller forfrom the distant object to the lens.

ResultsPlus
Examiner Comments

1 mark was given for measuring a distance but the incorrect distance (lens to distant object) is to be measured.

ResultsPlus
Examiner Tip

Learn how to find the focal length of a convex lens.

(ii) Describe how to measure the focal length of the lens.

(2)

move the lens closer or further away from the object until the lense focuses and image is clear. ~~the~~ the

ResultsPlus
Examiner Comments

No marks were awarded. This gives the method of the experiment but does not state how the focal length is to be measured.

ResultsPlus
Examiner Tip

The question asks about focal length so this must be included in the answer.

(ii) Describe how to measure the focal length of the lens.

(2)

measure the distance between the lens and a focused image

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Examiner Comments

Correct answer: 2 marks.

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Examiner Tip

Revise practical work as well as theory.

Question 3 (b) (i)

Many candidates knew that the eyepiece was a magnifying glass, but did not understand that it was the image produced by the objective lens that the eyepiece magnifies. Popular misconceptions were evident, such as the eyepiece magnifies the distant object or that it inverts the image produced by the objective lens.

The fact that the eyepiece lens refracts light was also allowed a mark although this is a property of any lens.

(i) Explain what the eyepiece lens does.

(2)

The eyepiece lens will help the image to rotate to the right way up what will make it a lot more easier to see.

ResultsPlus
Examiner Comments

1 mark was given for reference to the image but nothing for the popular misconception that the eyepiece turns the image the right way up.

ResultsPlus
Examiner Tip

When used as a magnifying glass a convex lens does not 'flip over' the image.

(i) Explain what the eyepiece lens does.

(2)

The eyepiece lens magnifies the image. They also mak the light rays move apart so the image has a longer range.

ResultsPlus
Examiner Comments

Correct answer: 2 marks.

Question 3 (c) (i)

Distance and time are given in order to calculate speed. The equation should be found on the formulae page, values substituted and then a calculator used to find the answer if candidates find division difficult.

(c) Light and sound waves are produced at the same time by an explosion on Earth.

(i) The sound of the explosion is heard 1920 metres away 6.0 seconds after the explosion has happened.

Calculate the speed of sound in air.

(2)

S
T D

Time × Distance = Speed

speed of sound in air = 11520 m/s

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Examiner Comments

No marks were awarded for this response. The candidate has wrongly remembered the triangle. Although knowing equations is useful, candidates should know that they are at the front of the paper and can be looked up.

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Examiner Tip

Use the formulae sheet at the front of the paper.

6
12
18

1920 / 6.0

0 3 6 0
6) 1 9 2 0

speed of sound in air = 360 m/s

ResultsPlus
Examiner Comments

1 mark is awarded as the substitution is correct but the answer was not given correctly. Calculators should be made available to candidates.

ResultsPlus
Examiner Tip

Bring your calculator to the examination.

wave speed = distance / time

wave speed = 1920 / 6.0 = 320

speed of sound in air = 320 m/s

ResultsPlus
Examiner Comments

This is an excellent example of how the calculation should be carried out. 2 marks were awarded.

ResultsPlus
Examiner Tip

Always include your working.

Question 3 (c) (ii)

About half of candidates appreciated that the explosion was seen before it was heard because light travels faster than sound. However, some candidates did not appreciate that light travelled at a particular speed and took a finite time to reach the scientist and concentrated on trying to explain why sound travelled slowly with no reference to the light.

(ii) A scientist is standing a long way from the explosion.

Explain why he hears the explosion a few seconds after he sees it.

(2)

Because in air Sound travels faster than light which is why the Sound is heard first before the explosion is even seen.

ResultsPlus
Examiner Comments

1 mark was awarded. The candidate has the idea of a difference in speed between light and sound but gets it the wrong way around.

Because the sound takes longer to travel than the light.

ResultsPlus
Examiner Comments

The question tells the candidates that the sound takes longer to travel to the scientist than the light. The point is 'Why is this so?' The answer must have some reference to speed.

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Examiner Tip

Make sure you do not just repeat the question in another way.

light travels faster than sound.

ResultsPlus
Examiner Comments
This is a concise correct answer.
2 marks were awarded.

Question 4 (a)

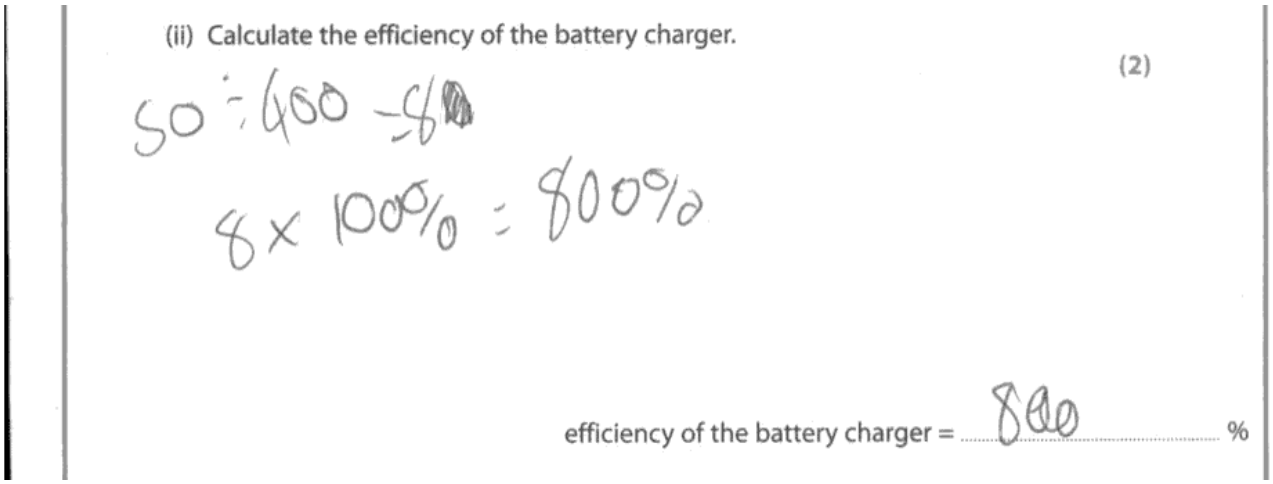
The common error here was that candidates did not know that the energy stored in a battery is chemical energy not electrical.

Question 4 (b) (i)

The majority of candidates were able to find the wasted energy using 400-50 = 350 J.

Question 4 (b) (ii)

Many candidates did not use the equation for efficiency correctly, generally because they did not write it down although it is given on the formulae page. Also 50/400 is not as easy to work out as 400/50 and then using the 100 gives answers of over 100% which they do not appreciate is not possible.



(ii) Calculate the efficiency of the battery charger. (2)

50 ÷ 400 = 8

8 × 100% = 800%

efficiency of the battery charger = 800 %

ResultsPlus
Examiner Comments

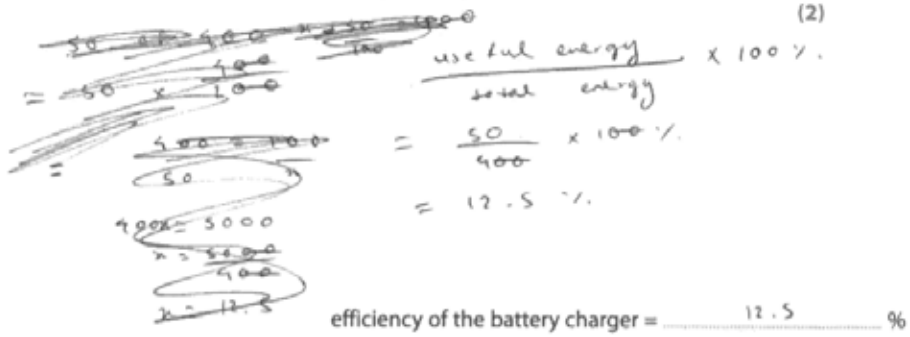
No marks were awarded - incorrect substitution into equation.

ResultsPlus
Examiner Tip

Remember efficiencies cannot be greater than 100%.

(ii) Calculate the efficiency of the battery charger.

(2)



efficiency of the battery charger = 12.5 %

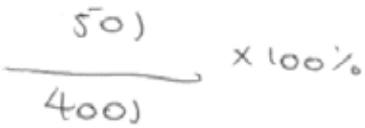
ResultsPlus
Examiner Comments

2 marks were awarded.

The answer is written out with equation substitution and evaluation.

ResultsPlus
Examiner Tip

Find the equation and show your working.



efficiency of the battery charger = 64 %

ResultsPlus
Examiner Comments

This answer gets one mark as the substitution is correct even though the answer is not.

ResultsPlus
Examiner Tip

Show your working.

Question 4 (c) (i)

The majority of candidates were able to state that black was the best colour for the bag. However the explanation must be that black is a good absorber of heat or absorbs/takes in heat radiation. It is not possible to replace this with anything else and many candidates wrote that 'black attracts the heat' which did not get the second mark.

(i) Explain what colour the bag should be to heat the water to the highest temperature.

(2)

The bag should be black. As the colour black attracks heat

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Examiner Comments

One mark was given for 'black', no mark for 'attracts heat'.

ResultsPlus
Examiner Tip

Remember that black is both a good absorber and emitter of heat.

Question 4 (c) (ii)

About half of candidates scored just one mark for realising that it was the sun that heated up the bag of water. However, very few candidate then extended this to 'black is also a good emitter of heat' and then concluded with the temperature stays constant because 'heat is emitted at the same rate as it is absorbed' or words to that effect.

(ii) On a sunny day the bag is filled with cold water.
Explain why the temperature of the water increases and then stays constant.

(3)

The temperature of the bag increases as it absorbs more heat and then the water absorbs the heat from the bag but eventually once the bag reaches a certain heat the amount of heat being re-radiated to the bags surroundings will be the same as the heat the bag is absorbing so the bag won't become any hotter or cooler therefore the heat from the bag the water gets can't become any higher

(Total for Question 4 = 10 marks)

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Examiner Comments

3 marks were awarded as below:

'heat is absorbed' 1 mark

'heat is emitted' 1 mark

'emission and absorption are equal when the temperature is constant' 1 mark.

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Consider both absorption and emission of heat when an object is at a constant temperature.

The temperature of the bag will increase as the ~~heat~~ energy from the sun on a sunny day will heat up the bag.

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Examiner Comments

This was frequently the type of answer given for one mark.

Question 5 (b)

This question was generally answered well, although some candidates over complicated the substitution by subtracting 12 from 230 prior to substituting. As the equation on the formulae page is given as current X potential difference, this may be why candidates are finding a 'difference' by subtracting prior to substituting into the equation. The equivalence of voltage and potential difference needs to be stressed to prevent this.

(b) An electric kettle is connected to a mains voltage of 230 V.
The current in the kettle is 12 A.

Calculate the power of the kettle. (2)

230 − 12 = 218

12 × 218 = 2616

power of the kettle = 2616 W

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Examiner Comments

No marks were awarded as the wrong value was substituted into the equation.

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Examiner Tip

Remember that voltage is equivalent to potential difference.

(2)

electrical power = current / potential difference

$\frac{230}{12} = 19.16^{6}$

power of the kettle = 19.16^{6} W

ResultsPlus
Examiner Comments

No marks were awarded. Incorrect equation used even though the equation required is given on the formulae page.

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Examiner Tip

Use the formulae page to get the correct equation.

230 × 12 = 2760 (2)

power of the kettle = 2760 W

ResultsPlus
Examiner Comments

Correct substitution and correct answer are evident and gain 2 marks.

Question 5 (c)

The common error was not to convert watts into kilowatts and then give an answer of 60,000p without considering that this would make watching television very costly.

(c) A television has a power of 400 W.
The cost of 1 kW h of electrical energy is 15p.

Calculate the cost of using the television for 10 hours.

(3)

Cost = Power × time × cost of 1 kWh
400 10 15p

cost of using the television for 10 hours = 60000 p

ResultsPlus
Examiner Comments

2 marks were awarded. Watts were not converted to kilowatts but the rest is correct.

ResultsPlus
Examiner Tip

Remember energy is paid for in kWh, therefore watts must be converted to kilowatts to get a sensible cost.

400 x 10 = 4000.
15p x 4 = 60p

cost of using the television for 10 hours = 60 p

ResultsPlus
Examiner Comments

3 marks were awarded.

Conversion of Wh to kWh and correct evaluation are evident.

400 x 10 x 0·15 = 600

cost of using the television for 10 hours = ... 600 p

ResultsPlus
Examiner Comments

1 mark was awarded.

Two errors were made. Watts were not converted to kW but pence were converted to pounds with the answer left as pence.

Question 5 (d)

Most candidates were able to show at least two correct advantages or disadvantages of the different lamps or make two correct qualitative comparisons to gain four marks for Level 2. The life time and cost were usually compared successfully, although many candidates were confused considering the power as output rather than input. Candidates need to be made aware that to gain full marks when quantitative data is given some quantitative comparison also needs to be made to achieve Level 3.

energy saving lamp

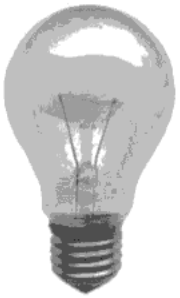
power = 15 W

cost = £1.50

lifetime = 10 000 hours

produces 20 J of light energy for each 100 J of electrical energy supplied

filament lamp



power = 60 W

cost = £0.30

lifetime = 1 000 hours

produces 5 J of light energy for each 100 J of electrical energy supplied

Describe the advantages and disadvantages of each type of lamp.

(6)

Advantages	Disadvantages
Energy Saving lamp uses less power than filament lamp.	Energy Saving lamp has a higher cost than filament lamp.
~~The cost of filament~~ Energy Saving lamp will last longer than the filament lamp.	More light energy is wasted for the energy saving lamp.
More light energy is produced for the energy Saving lamp.	Filament lamp produces less ~~light~~ energy.

ResultsPlus
Examiner Comments

Four marks were awarded, Level 2. Answer gives correct comparison of lifetime, cost and power. No quantitative comparison was given.

ResultsPlus
Examiner Tip

Use the data to give a quantitative comparison to achieve Level 3.

energy saving lamp

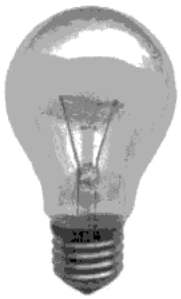
power = 15 W

cost = £1.50

lifetime = 10 000 hours

produces 20 J of light energy for each 100 J of electrical energy supplied

filament lamp



power = 60 W

cost = £0.30

lifetime = 1 000 hours

produces 5 J of light energy for each 100 J of electrical energy supplied

Describe the advantages and disadvantages of each type of lamp.

(6)

The disadvantages of using an energy saving lamp is that it costs £1.20 more than a filament lamp. Also it gives out only 15w whereas the filament lamp gives out 60w. The advantages of using an energy saving lamp is that it lasts 9000 more hours than the filament lamp. Another advantage is that for every 100J of energy supplied it produces 20J of light energy, whereas the filament lamp only produces 5J of light energy for every 100J of energy suppled.

ResultsPlus

Examiner Comments

Level 3: 6 marks

Line 7: 'ELS lasts 9000 hours more' is sufficient for a quantitative comparison.

energy saving lamp

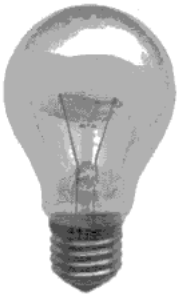
power = 15 W

cost = £1.50

lifetime = 10 000 hours

produces 20 J of light energy for each 100 J of electrical energy supplied

filament lamp



power = 60 W

cost = £0.30

lifetime = 1 000 hours

produces 5 J of light energy for each 100 J of electrical energy supplied

Describe the advantages and disadvantages of each type of lamp.

(6)

One advantage of using an energy saving lamp would be the low watt cost to keep it on all the time compared to a higher watt costing more if you use a filament lamp. another advantage of a energy saving lamp would be the lifetime is ten times the lifetime of a filament ~~bulb~~ lamp and also produces five times more light Energy than a filament lamp. the one disadvantage of a Energy saving lamp is the cost is ~~five~~ times more expensive than a filament lamp.

ResultsPlus
Examiner Comments

Level 3: 6 marks.

Quantitative comparison is evident on line 5 'lifetime is ten times more'.

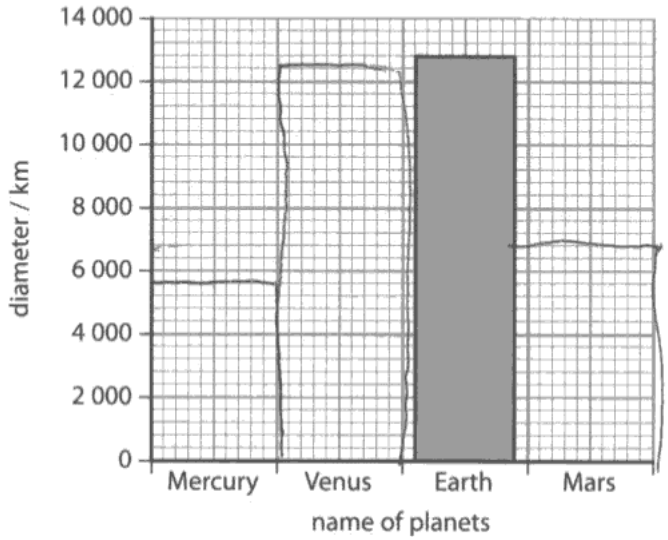
Question 6 (b) (i)

Some candidates did not attempt to complete the bar chart, although most of those who made some attempt gained at least one mark. Some candidates found the scale difficult although for both Mercury and Mars about half way between the scale divisions shown was accurate enough and Venus was just above the 12,000 line. Rulers and pencils are useful for completing any type of graph. As pen lines cannot be removed, it is essential that candidates indicate in some way which line they wish to be marked.

(i) Put the information about the diameter of the planets on to the bar chart.

The diameter for Earth has been done for you.

(2)



ResultsPlus
Examiner Comments

1 mark was awarded. Mercury is incorrect, too close to the 6000 line. Despite the lack of a ruler, the other lines are in tolerance.

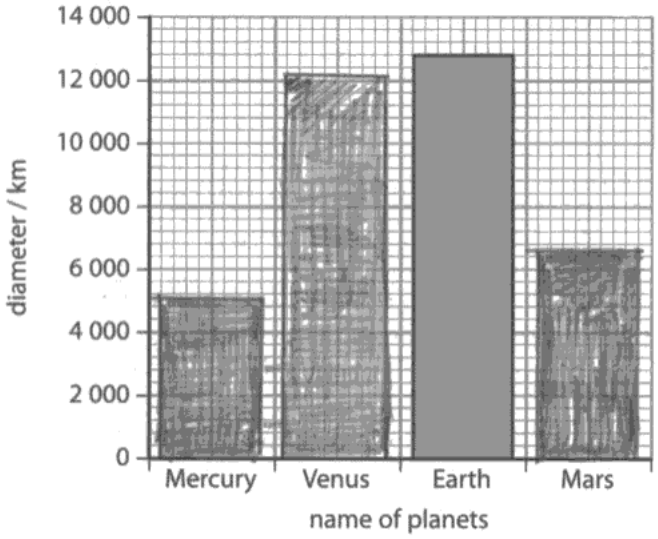
ResultsPlus
Examiner Tip

Use a ruler to complete bar charts.

(i) Put the information about the diameter of the planets on to the bar chart.

The diameter for Earth has been done for you.

(2)



ResultsPlus
Examiner Comments

2 marks were awarded.
All lines are correct and neatly drawn.

Question 6 (b) (ii)

Candidates needed to find the distance in AU of Mars from the Sun. If this, 1.52, was written down then 1 mark was awarded. If the working of 1.52 x 150 000 000 was then written down to show the working then two marks were awarded without the final calculation being completed.

Candidates need to write down their working, especially if completing the calculation requires a calculator. In many case candidates appear not to have a calculator.

(ii) The distance of the planets from the Sun has been given in Astronomical Units (AU).
1 AU is 150 000 000 km.
Calculate the distance of Mars from the Sun in kilometres.

(2)

1.52 × 150 000 000

distance of Mars from the Sun = 228 000 000 km

ResultsPlus
Examiner Comments

2 marks were awarded. This happens to have the correct answer but the two marks would have been given for the line 1.52x150 000 000.

ResultsPlus
Examiner Tip

Show what you would like to do with the values you have found.

1.52.
↓
150 000000

distance of Mars from the Sun = 150000052 km

ResultsPlus
Examiner Comments

1 mark was given for showing that the value 1.52 had been obtained even though there was no indication as to what was to be done with respect to the 150 000 000.

ResultsPlus
Examiner Tip

Write down any information you have found.

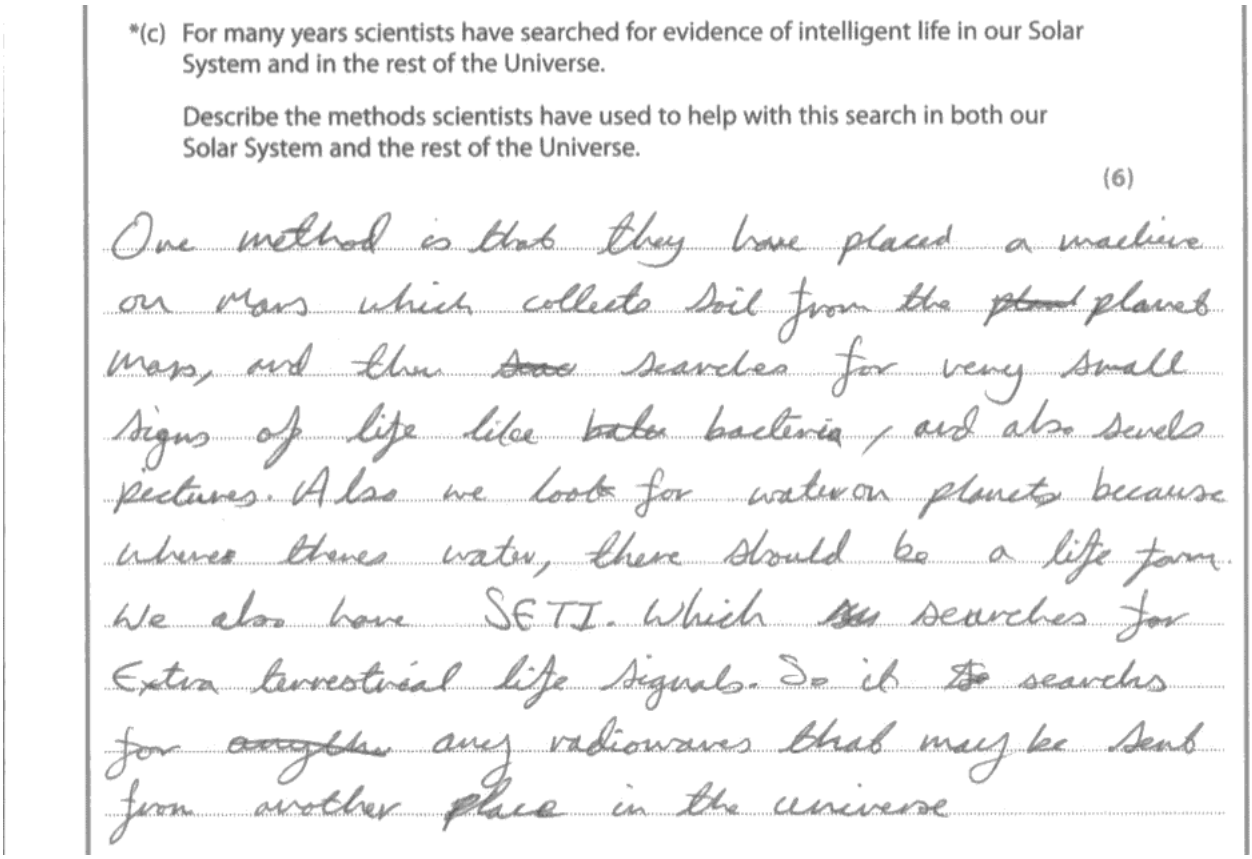
Question 6 (c)

Candidates were generally awarded a Level 2, 4 marks for identifying two forms of evidence from within the solar system. If candidates were only able to name instruments such as telescopes, then they achieved Level 1. To gain Level 3, candidates needed to explain how searches were carried out both in our solar system and in the rest of the universe. The robot landers on Mars searching for evidence of water and analysing soil samples were most frequently cited for within the solar system and using radio telescopes to search for radio signals from space used as examples for the rest of the Universe. SETI was mentioned but often not understood. Although many of the methods described had some inaccuracies, this did not count against the correct information that was given.

*(c) For many years scientists have searched for evidence of intelligent life in our Solar System and in the rest of the Universe.

Describe the methods scientists have used to help with this search in both our Solar System and the rest of the Universe.

(6)



ResultsPlus
Examiner Comments

Level 3: 6 marks.

This response includes sufficiently correct information of the search for intelligent life both inside our solar system and in the rest of the universe.

ResultsPlus
Examiner Tip

Read the question carefully and make sure all parts of it are considered in your answer.

Scientists use telliscopes and robots to go to distant planets to pick up rocks or dust to bring back to analise.

ResultsPlus
Examiner Comments

This is a very short answer but has sufficient information to gain Level 2: 4 marks.

ResultsPlus
Examiner Tip

Better to be concise and correct.

Scientists have gone and taken samples from different planets. They have & also checked for water because if there is water then there is a chance of life. Scientist also send out robots to check out different planets and they take photos and then the robots send the information back.

ResultsPlus
Examiner Comments

The answer only relates to Solar System so does not qualify for Level 3. The response gives a number of appropriate methods such as 'sampling', 'search for water', 'use of robots', 'taking photos and sending info back', for searching within Solar System so qualifies at Level 2. QWC more than acceptable – conveys ideas clearly, so 4 marks awarded.

The methods Scientists have used to help with this search in both our Solar System and the rest of the universe is that they study the solar system through a telescope.

ResultsPlus
Examiner Comments

Level 1 response for idea of use of telescope, but there are no further ideas so it cannot be awarded at higher levels. For QWC, the response conveys this simple idea adequately, so 2 marks are awarded.

Paper Summary

In order to improve performance candidates should:

- make better use of the formulae page to provide equations for calculations
- show their workings for calculations
- add to diagrams where appropriate to clarify text
- use the information provided by diagrams and images to help answer questions
- learn the meanings of scientific terms such as focal length, real image and the definition of current
- read extended writing questions carefully and complete all parts
- use the data provided in an extended writing question quantitatively
- have a calculator and a ruler for the examination.

Grade Boundaries

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

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