edexcel

ResultsPlus

Examiners' Report
November 2011

GCSE Physics/Science 5PH1F/01

Edexcel is one of the leading examining and awarding bodies in the UK and throughout the world. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers.

Through a network of UK and overseas offices, Edexcel's centres receive the support they need to help them deliver their education and training programmes to learners.

For further information, please call our GCE line on 0844 576 0025, our GCSE team on 0844 576 0027, or visit our website at www.edexcel.com.

If you have any subject specific questions about the content of this Examiners' Report that require the help of a subject specialist, you may find our **Ask The Expert** email service helpful.

Ask The Expert can be accessed online at the following link:
http://www.edexcel.com/Aboutus/contact-us/

Alternatively, you can contact our Science Advisor directly by sending an email to Stephen Nugus on ScienceSubjectAdvisor@EdexcelExperts.co.uk.
You can also telephone 0844 576 0037 to speak to a member of our subject advisor team.

ResultsPlus

Get more from your exam results

...and now your mock results too!

ResultsPlus is Edexcel's free online service giving instant and detailed analysis of your students' exam and mock performance, helping you to help them more effectively.

- See your students' scores for every exam question
- Spot topics, skills and types of question where they need to improve their learning
- Understand how your students' performance compares with Edexcel national averages
- Track progress against target grades and focus revision more effectively with NEW Mock Analysis

For more information on ResultsPlus, or to log in, visit www.edexcel.com/resultsplus.
To set up your ResultsPlus account, call 0844 576 0024

November 2011

Publications Code UG029808

Introduction

This was the inaugural examination of the 2011 specification. Much of the content had appeared in the previous (360 Science) specification in some form, but it also embraced work on the use of telescopes in the astronomy section. Use of transformers was also included.

The layout of the examination was also somewhat different and this style of paper will continue. There are six multiple choice items spread between the six questions although not always one per question. These are not necessarily the easiest parts of a question. The first two questions are worth about 8 marks each, the next two about 10 marks and the last two about 12 marks.

There will be a general increase in difficulty from question 1 to question 6 but each will start with at least one item targeted at the lowest ability expected for the paper. It is important, therefore, that all candidates start to answer each question.

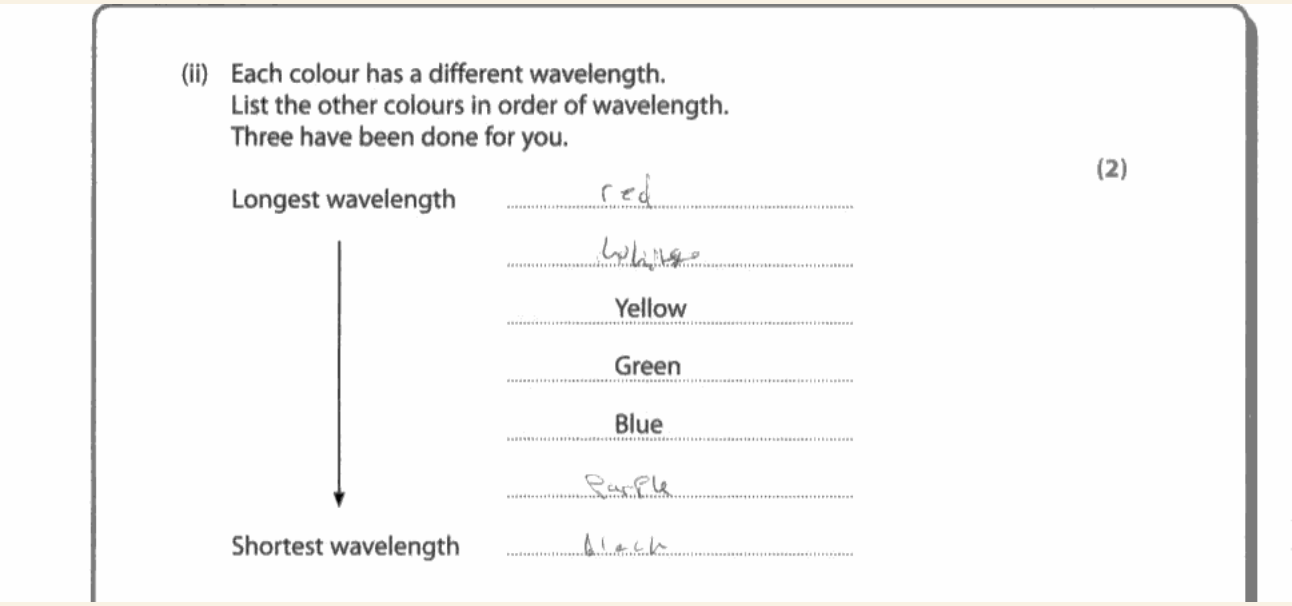
This report will provide exemplification of candidates' work, together with tips and/or comments, for a selection of questions.

The exemplification will come mainly from questions which required more complex responses from candidates.

Question 1 (a) (ii)

Many students would score more marks if they deliberately set out to learn the facts stated in the specification. There will always be some questions which ask simply for recall of such facts. In this question the first three parts are basically recall of fact.

Most candidates were able to place red at the top of the sequence but a variety of colours, particularly purple, and even the non-colours, white and black, often featured.


(ii) Each colour has a different wavelength.
List the other colours in order of wavelength.
Three have been done for you.

(2)

Longest wavelength ..... red .....

..... White .....

Yellow .....

Green .....

Blue .....

..... Purple .....

Shortest wavelength ..... black .....

ResultsPlus
Examiner Comments

This response scored the first mark for positioning red, but not the second for the rest of the sequence.

ResultsPlus
Examiner Tip

Using an aid to memory such as 'ROYGBIV' or in words 'Read Out Your Good Book In Verse' will help you to recall the colours. It is even better if you can make up your own sentence.

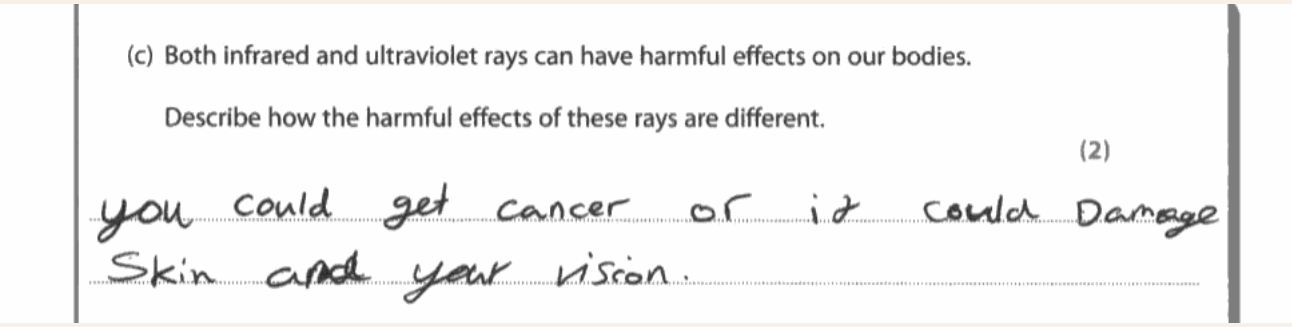
Question 1 (b)

Nearly one third of students scored all three marks on this item.

Question 1 (c)

In many cases,words like 'it', 'this', 'these' etc. can be ambiguous and could potentially relate to several things.

The use of 'it' here will limit the marks awarded since it could refer to either of the two rays under discussion.



(c) Both infrared and ultraviolet rays can have harmful effects on our bodies.

Describe how the harmful effects of these rays are different.

(2)

you could get cancer or it could Damage Skin and your vision.

ResultsPlus
Examiner Comments

This answer would score zero even though three harmful effects are mentioned. The question asks how the effects are different. So, to score marks, the danger must be linked either to ultraviolet or to infrared.

ResultsPlus
Examiner Tip

Make a list of the different parts of the electromagnetic spectrum and the harmful effects peculiar to each. (While you are doing this, a third column could be used to show the uses of each.) These can then be memorised.

(c) Both infrared and ultraviolet rays can have harmful effects on our bodies.

Describe how the harmful effects of these rays are different.

(2)

infrared waves can cause minor burns to the body and can do little damage to the body, but ultra violet can cause sun burn and if you stay in the sun to long it can eventually cause skin cancer.

ResultsPlus
Examiner Comments

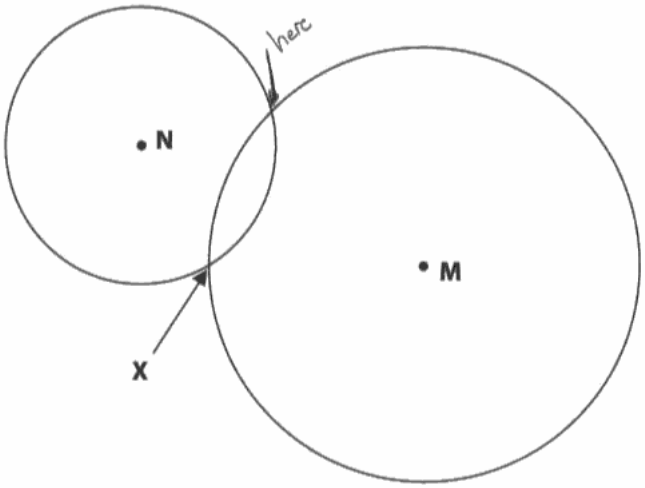
By contrast, this response would score two marks since it is clear which type of ray is responsible for each effect. (It is ignored that the burns caused by infrared 'can' be 'minor' but they may also be severe!)

Question 2 (b) (i)

Question 2 tested the locating of an earthquake's position and the way in which the particles of the Earth move for a longitudinal seismic wave.

The inadequacy of two stations was tested here.

(b) The diagram shows circles drawn around two research stations, **M** and **N**.
The stations are for detecting earthquakes.
Each circle shows the distance of the earthquake from that station.



(i) Two students discuss the diagram.
Student A said: the earthquake **must** have been at X.
Student B said: the earthquake **might** have been at X.

Explain why the statement from student B is better.

(2)

because the circles meet in two places, So the earthquake either happened at X or the other cross over point

ResultsPlus
Examiner Comments

This response scored 2 marks as it is specific where another possible site for the earthquake is.

Several students referred to the difficulty of predicting *when* an Earthquake would occur.

(i) Two students discuss the diagram.
Student A said: the earthquake **must** have been at X.
Student B said: the earthquake **might** have been at X.

Explain why the statement from student B is better.

(2)

Because you can not tell when an earthquake is going to go off they are unpertictable

ResultsPlus
Examiner Comments

This scored zero.

Question 2 (b) (ii)

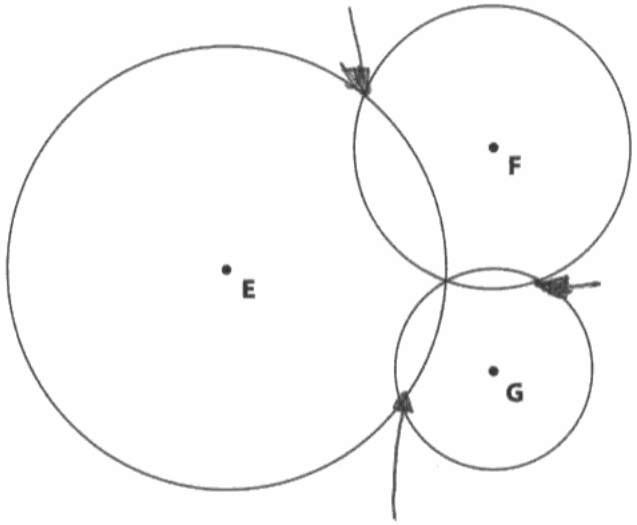
This tested understanding of how three seismic stations is sufficient.

When asked for 'an' (or sometimes a given number), more than that number will automatically leave it to the examiner to choose.

(ii) The diagram shows circles drawn round three research stations, **E**, **F** and **G**, for another earthquake.

Draw an arrow on the diagram to show where this earthquake probably happened.

(1)



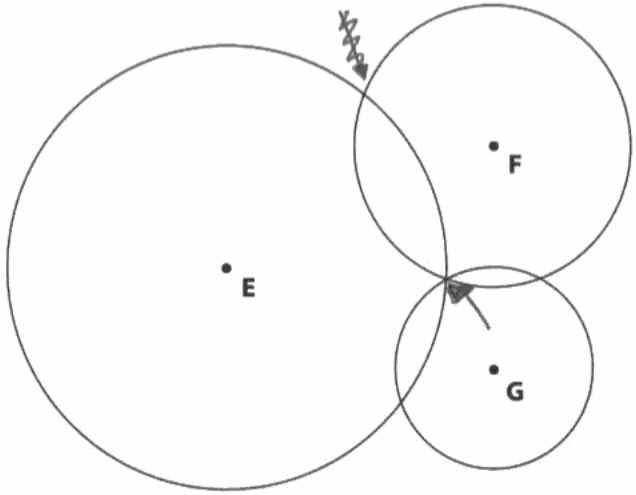
ResultsPlus
Examiner Comments

This ambiguity will be unrewarded, as here, even if one of the options is correct.

(ii) The diagram shows circles drawn round three research stations, **E**, **F** and **G**, for another earthquake.

Draw an arrow on the diagram to show where this earthquake probably happened.

(1)



ResultsPlus
Examiner Comments

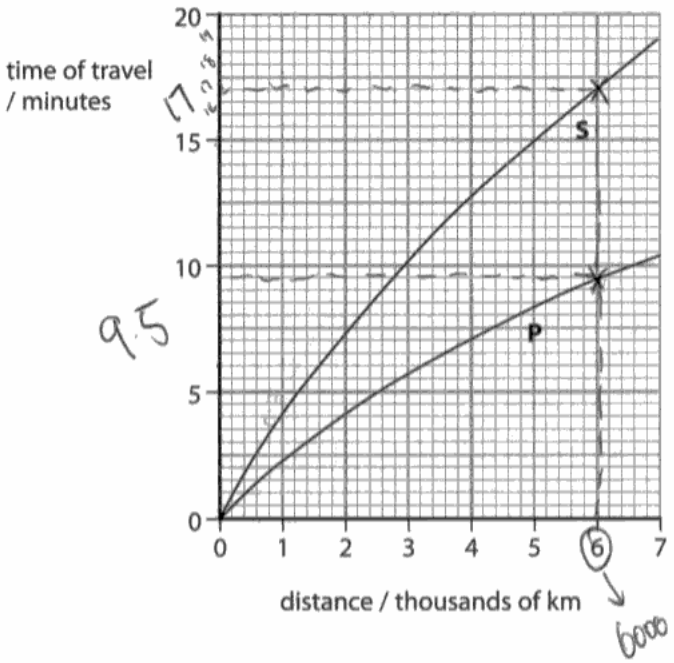
When there is a change of heart, students should make it clear which answer is to be marked. This response would score the mark.

Question 2 (c)

This tested extraction of information from a graph.

Students are encouraged to show working although this normally happens for calculations. But it can also help with graphs.

(c) The graph shows information about P-waves and S-waves from an earthquake.



An earthquake station is 6000 km from an earthquake.
The P-wave reaches the earthquake station before the S-wave.

Use the graph to find the difference in the arrival time of the S-wave and P-wave.

(2)

17 - 9.5 = 7.5

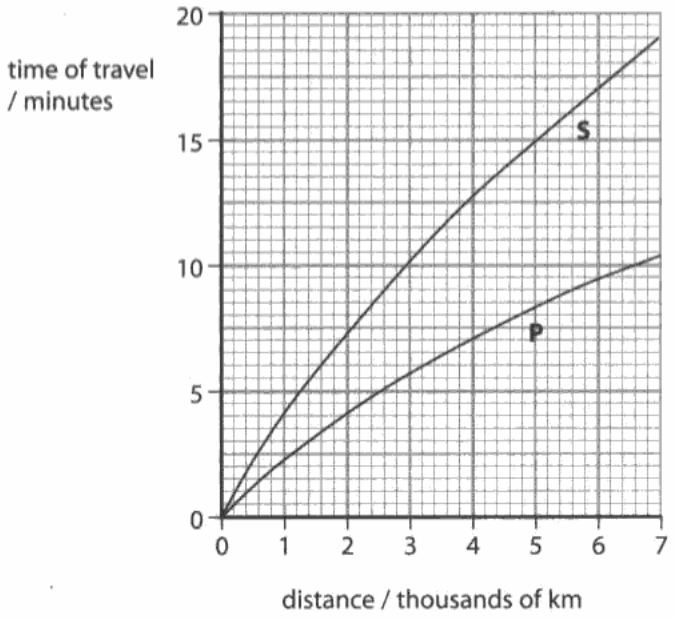
difference in arrival time = 7.5 minutes

ResultsPlus
Examiner Comments

This student showed the working on the graph and is well worth the two marks.

Working can be shown in other ways and enable the response to be awarded partial credit.

(c) The graph shows information about P-waves and S-waves from an earthquake.



An earthquake station is 6000 km from an earthquake.
The P-wave reaches the earthquake station before the S-wave.

Use the graph to find the difference in the arrival time of the S-wave and P-wave.

(2)

P – 10.5
S = 19

19 − 10 = 9

difference in arrival time = 8.5 minutes

ResultsPlus
Examiner Comments

This candidate was awarded only one mark since the scale was understood and the process was performed correctly but for a distance of 7 km rather than the 6 km for the station.

Question 2 (d)

Many candidates found it difficult to relate the directions of vibration and wave movement.

(d) P-waves are longitudinal.

Describe how particles in the ground move when P-waves pass through it.

(2)

The particles in the ground vibrate side to side in the direction of the wave.

ResultsPlus
Examiner Comments

Here 'in the direction of' was sufficient to add the second mark to the description of the movement as a vibration.

(d) P-waves are longitudinal.

Describe how particles in the ground move when P-waves pass through it.

(2)

The particles in the ground vibrate side to side in the direction of the wave.

ResultsPlus
Examiner Comments

This was allowed as the 'backwards and forwards' was just sufficient to indicate the relative directions. 'Up and down' or 'side to side' gave the idea of a vibration (one mark) but were too ambiguous (even though they may be applicable in some circumstances) to score the second.

Question 3 (c)

Many candidates appreciated that finding water offered the chance (though not proof) that life as we know it could be present.

(c) Some scientists look for signs of water on other planets.

Suggest why they do this.

(1)

Because if there is water on a planet there might be life

ResultsPlus
Examiner Comments

This response shows the possibility of life if there is water.

(c) Some scientists look for signs of water on other planets.

Suggest why they do this.

(1)

Scientists look for signs of water on planets to see if other 'life' exsists

ResultsPlus
Examiner Comments

This response assumes that water = life and so did not score.

(c) Some scientists look for signs of water on other planets.

Suggest why they do this.

(1)

to see if there is anyway of something living up there because living things need water.

ResultsPlus
Examiner Comments

This response scored the mark by explaining that humans 'need water' to survive, and so we could, maybe, live there in the future.

Question 3 (e) (i)

Many noted that the atmosphere played a major part in reducing the clarity of astronomical photographs.

(e) The photograph was taken using a powerful telescope on Earth.
It shows a nebula and many stars.

(i) Explain why photographs from telescopes in space show the nebula more clearly.

(2)

It is taken more clearly because the ecurths atmosphere (clouds) are not in its way

ResultsPlus
Examiner Comments

Mention of the atmosphere scored one of the two marks. Few, however, went further and explained the effect that the atmosphere had. Here, clouds were mentioned to qualify for the second mark.

(i) Explain why photographs from telescopes in space show the nebula more clearly.

(2)

It shows it more clearly because there is no light polution in space like there is on earth, or Dust particls in the atmosphere won't absorb the light from ~~start~~ stars or the telescope.

ResultsPlus
Examiner Comments

This however was well worth the second mark as it not only mentioned the effect of dust but also mentioned another factor which limits clarity on Earth.

Question 3 (e) (ii)

The effect of gravity in the collapse of a nebula was quite well known.

(ii) A nebula is a cloud of gas and dust where stars are formed.
A hot object forms when gas and dust in a nebula come together.

Explain why the gas and dust come together and form a hot object.

(2)

Because the gravitational force pushes them together, and as they spin around eachother the movement, kinetic energy, turns to heat because of friction.

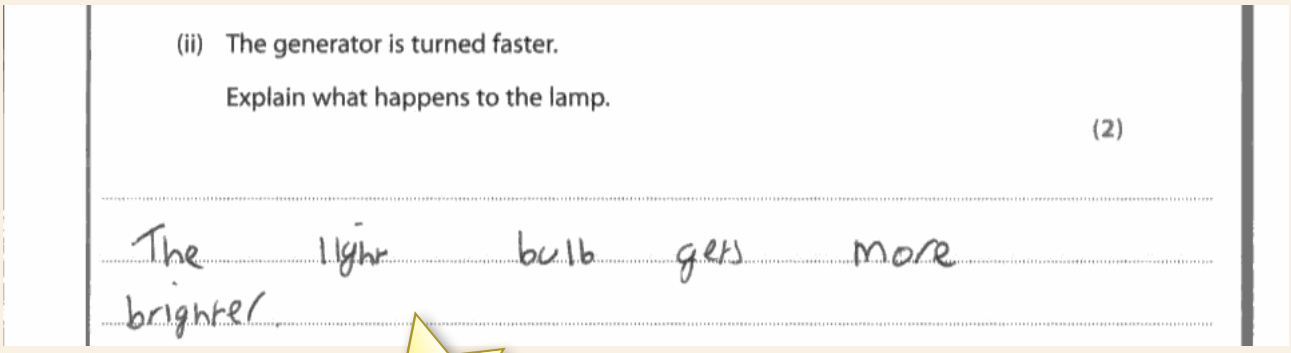
ResultsPlus
Examiner Comments

Rather fewer students linked the collapse to the energy change (from potential) to thermal (via kinetic), as this one does, to score the second mark.

Question 4 (b) (ii)

Question 4 tested ideas about alternating current and its uses.

This part is a good example of the linking which is necessary to answer items which begin with the command word 'Explain'.



(ii) The generator is turned faster.

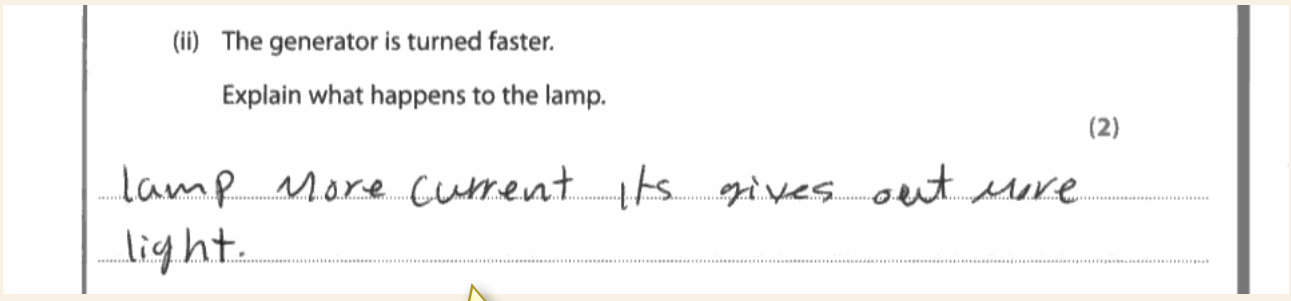
Explain what happens to the lamp.

(2)

The light bulb gets more brighter.

ResultsPlus
Examiner Comments

Simply stating what happens scores only one mark. A reason must be given for the second mark.



(ii) The generator is turned faster.

Explain what happens to the lamp.

(2)

lamp More current its gives out more light.

ResultsPlus
Examiner Comments

Here relating the extra light emitted to a greater current is enough for the second mark.

Question 4 (c)

When calculating a numerical value for a quantity, it is important to state the unit in which it is measured. In this exam, students were supplied with a space in which to write this.

When calculating a numerical value for a quantity, it is important to state the unit in which it is measured. On this examination paper, students were supplied with a space in which to write the unit.

power generated = 6 unit = Watt

ResultsPlus
Examiner Comments

This response scored one mark for the unit even though the numerical value was incorrect. Some candidates did not realise what the 'unit = ' was for with some inserting the units out of tens and units. Volts was a common answer.

Question 4 (d)

The correct use of technical terms is not confined to the new six-mark questions. Students tend to use a generality when they are unsure of the speciific word required.

(d) Transformers are designed to use alternating current.

Describe what change happens when a step-up transformer is used.

(2)

When a step-up transformer is in use there is a higher amount of electricity being carried.

ResultsPlus
Examiner Comments

Here 'electricity' is insufficient to replace 'voltage'.

Question 5 (a) (iii)

Candidates are often asked to use data to indicate how changing one factor affects another. In this case, the data was the graph.

(iii) Describe how the image distance changes as the object distance changes.

(2)

When the object distance/cm increases the image distance descreases.

ResultsPlus
Examiner Comments

A large number of candidates, such as this one, gained the first mark by describing how increasing one causes the other to decrease.

(iii) Describe how the image distance changes as the object distance changes.

(2)

When the object distance/cm increases the image distance descreases.

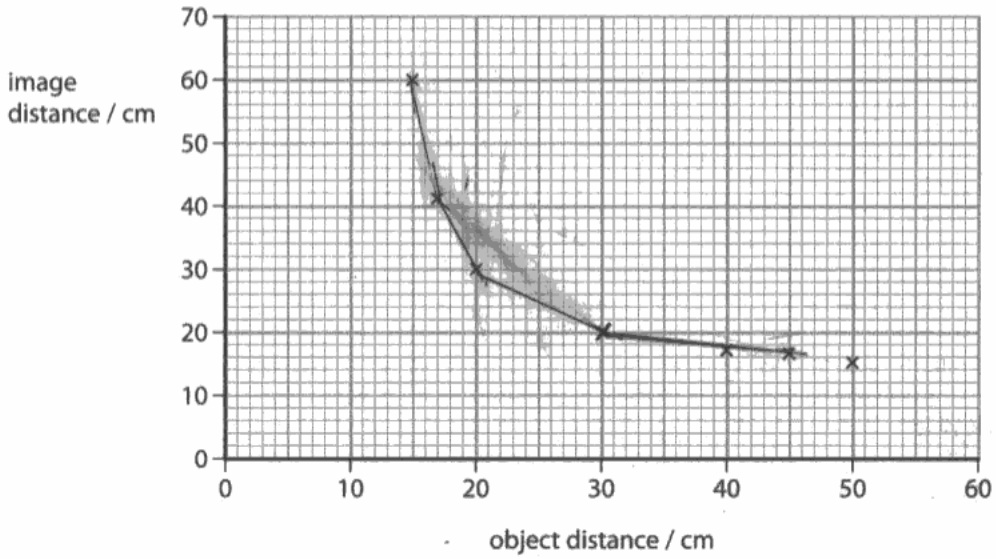
ResultsPlus
Examiner Comments

A few went further and, like this response, noted that the changes were not linear. This scored the second mark as well.

Question 5 (a) (i)-(ii)

Question 5 tested ideas about optical instruments including telescopes. It was encouraging that most students gained the mark for plotting the point. Some, however, would benefit from having more practice at drawing a line of best fit, where appropriate. When both variables are continuous, it is possible to interpolate between experimental points and a smooth curve is the best way of doing this.

He plots a graph of image distance against object distance.



(i) Add to the graph the point for the object distance of 30.0 cm.

(1)

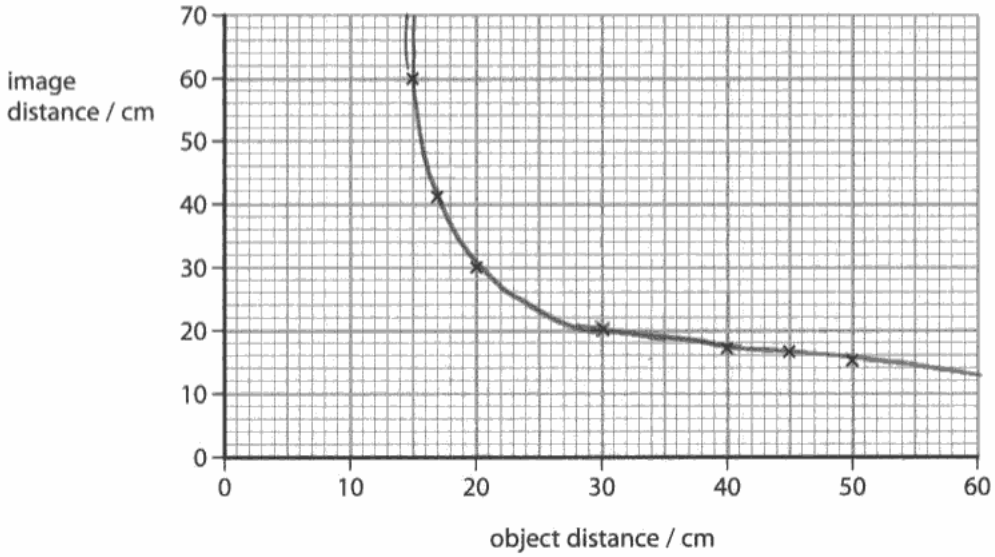
(ii) Draw the curve of best fit.

(1)

ResultsPlus
Examiner Comments

Marks were lost by students who etched or tramlined, drew straight lines between points or were not careful to include as many points as possible in their line. This graph qualified for plotting the point but not for drawing the line.

He plots a graph of image distance against object distance.



(i) Add to the graph the point for the object distance of 30.0 cm.

(1)

(ii) Draw the curve of best fit.

(1)

ResultsPlus
Examiner Comments

Although not perfect, this graph scored both marks.

Question 5 (a) (iv)

Most candidates did not realise that using a lens like this corresponded to a magnifying glass. They described the clarity as poor - most often blurry.

(iv) The focal length of this lens is 12 cm.
The student takes the lens and holds it 6 cm away from an object.

Describe the image the student sees when he looks through the lens.

(2)

a blury picture, he wouldn be able to see it properly. a virtual image.

ResultsPlus
Examiner Comments

This response did eventually score one mark because it included a reference to a virtual image.

(iv) The focal length of this lens is 12 cm.
The student takes the lens and holds it 6 cm away from an object.

Describe the image the student sees when he looks through the lens.

(2)

By holding the lens closer to the object it image will appear appear bigger and it will be a Virtual image.

ResultsPlus
Examiner Comments

A substantial number described the image as magnified with a few adding a comment about it being virtual and/or upright.
This response scored both marks.

Question 5 (b)

This was the first of the new style six-mark questions. Some students left the space blank but most wrote something. The quality covered the complete range of marks.

*(b) Describe the similarities and differences between refracting telescopes and reflecting telescopes.

(6)

a refracting telescope is bigger and heavier and you can get a clearer image.
a reflecting telescope is made so it reflects lf light so you can get a Good imagl.

ResultsPlus
Examiner Comments

This response scored zero. References to bigger, heavier etc. can contibute to the score as long as the answer gives reasons. The logic should be evident as here, 'clearer' presumably means 'supergood'!

The most obvious way to move into level 1 was to mention mirrors and lenses correctly.

*(b) Describe the similarities and differences between refracting telescopes and reflecting telescopes.

(6)

A refracting telescopes uses lenses to see things and a refleting teliscope uses a Murrior to ~~bounce~~ reflect the image into your eye. They both let you see Objects More Clearly. A refracting telescope has a focal point, ~~and~~ it goes A reflecting one uses 2 Murrors which dont loose any light

ResultsPlus
Examiner Comments

This scored two marks.

Students could move to level 2 by giving both a difference (in this case mirrors and lenses) and a similarity (both have eyepiece lens).

*(b) Describe the similarities and differences between refracting telescopes and reflecting telescopes.

(6)

The differences between a refracting ~~Re~~ telescope and a reflecting telescope is that reflecting telescopes have mirrors in them and refracting telescopes have lenses in them. The similarities are that they both have a eyepiece lense which magnifies the image.

ResultsPlus
Examiner Comments

This response scored four marks.

A second way of rising to level 2 was to give detail about either a similarity or a difference.

*(b) Describe the similarities and differences between refracting telescopes and reflecting telescopes.

(6)

Refracting telescope using two converging lens and reflecting telescope uses concave mirrors.
The lenses in the refracting telescopes are ~~ob~~ the objective lens and the eyepiece lens.
The objective lens collects the parallel ~~rays~~ rays to form an image.

ResultsPlus
Examiner Comments

Here, the candidate has pointed out the difference in terms of mirrors and lenses but has provided more details about the lenses in the refracting telescope. This response scored four marks.

To move to level 3 requires at least one similarity and a difference and some sort of comparison between the telescopes.

*(b) Describe the similarities and differences between refracting telescopes and reflecting telescopes.

(6)

Refracting telescopes refracts light at boundries, eg it refracts the light so the image can be viewed through the eyepiece.
Reflecting Telescopes use Mirrors to Reflect the light from the object up to the eyepiece Reflecting Telescopes ~~are~~ allow more light to be gathered from the object as ~~mirrors~~ it is easier and cheaper to make Large mirrors than it is Lenses.
they both collect light and have an objective and eyepiece.

(Total for Question 5 = 12 marks)

ResultsPlus
Examiner Comments

The comparison here is in terms of size of objective and why bigger in this situation is better. This was worth six marks.

Question 6 (b)

Question 6 was about solar radiation including some effects in the Antarctic and also the use of energy in the generation of electricity.

The vast majority of candidates correctly calculated the percentage reflected by the water, but the ability to combine this with the data in the chart towards justifying a given idea proved much more demanding. All things in the chart are solids and so any comparison between the chart and water was acceptable. Many students compared only two things in the chart and even stated that ice and snow were liquids!

(b) Radiation from the Sun which is not absorbed is reflected.
For water, the amount of solar radiation absorbed (taken in) is 94%.

(i) Calculate the percentage of solar radiation reflected by water.

(1)

6 %

percentage of solar radiation reflected by water 6 %.

(ii) Use the graph to show how this information supports the idea that solid surfaces reflect better than liquid surfaces.

(1)

All the materials on the graph are solid and they reflect a lot more solar radiation than the water.

ResultsPlus
Examiner Comments

This response scored two marks.

Question 6 (c) (i)

Items which ask students to explain usually need a statement and a reason of some sort.

(c) As Antarctic ice melts, its surface area decreases.
At the same time, the area of water surface increases.

(i) Explain what happens to the amount of radiation absorbed.

(2)

Because there is a bigger water surface area than ice, more of the radiation is absorbed, much more than reflected.

ResultsPlus
Examiner Comments

This, just, scored two as it mentions the water surface rather than just the amount of water and also states that more radiation is absorbed.

(c) As Antarctic ice melts, its surface area decreases.
At the same time, the area of water surface increases.

(i) Explain what happens to the amount of radiation absorbed.

(2)

The amount of radioanon absored will increase because there will be more water to take it all in and less land to reflect it.

ResultsPlus
Examiner Comments

The reference to more water is insufficient for the mark but the reference to less reflection from the land compensates. This scores both marks.

Question 6 (c) (ii)

This item could be answered in a variety of ways.

(ii) State the effect that this change in the amount of radiation absorbed will have on the water.

(1)

The will get hotter and will melt more ice

ResultsPlus
Examiner Comments

This scores one, clearly, since it refers to the temperature rise of the water.

(ii) State the effect that this change in the amount of radiation absorbed will have on the water.

(1)

sea level will rise.

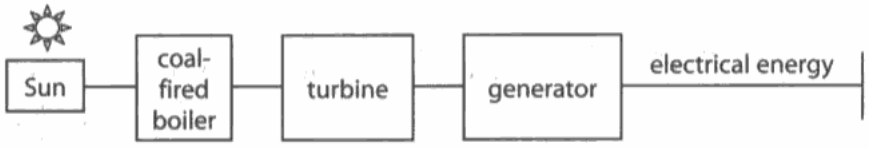
ResultsPlus
Examiner Comments

This scores the mark because of the use of the term 'level'.. many missed the mark by simply saying 'water will rise' [possibly into clouds?] or 'water will increase' without specifying what aspect of the water will increase.

Question 6 (d)

This, the second of the six-markers was based on a given energy flow chart. Accordingly, a higher percentage of candidates were able to make a start than on 5b. To score at level 1, students needed either to associate an energy type with a particular location or to show that the same amount of energy (or less) flowed from one device to the next in the chain. Moving on to level 2, it was necessary to show an energy transfer between two named places while level 3 scripts exhibited a sequence of such energy transfers.

*(d) The diagram shows how some of the energy released by the Sun is converted into electrical energy.



A student boils some water using energy which came from the Sun.

Using the information in the diagram, describe the energy transfers involved in producing the electrical energy he used.

(6)

the energy From the Sun was transferd to the Coal fired boiler which heats up the water then the energy is transferd to the turbine then to the generator which causes the electrical energy.

ResultsPlus
Examiner Comments

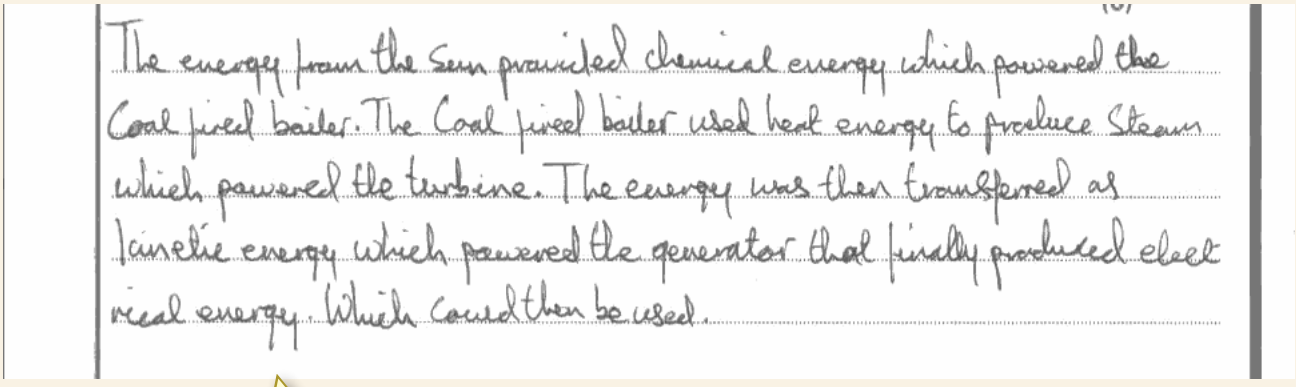
Here the idea of energy flow through the system was sufficient to score two marks.

The energy transfers involved in producing the electrical energy he used which came from the sun would be when he used the energy to boil his water, it firstly - before that got generated to become electrical energy, which before that got turbined to create more energy. Which before that was used in a coal fired boiler in which, the electrical power and energy came from the Sun. And this shows the energy released by the Sun is converted into electrical energy like the studend is doing.

ResultsPlus
Examiner Comments

This response also gives the general idea of the same energy flowing (most of the time). The quality of written communication though is poor and so instead of two marks this scored only one mark.

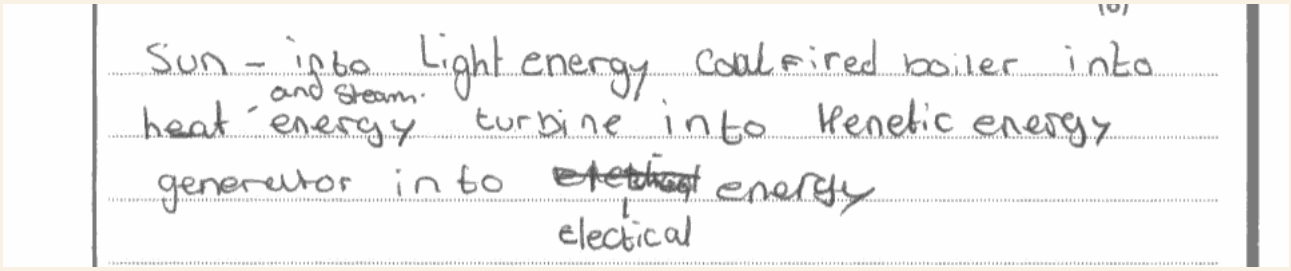
For level 3, a sequence of energy changes was needed.


The energy from the Sun provided chemical energy which powered the Coal fired boiler. The Coal fired boiler used heat energy to produce Steam which powered the turbine. The energy was then transferred as kinetic energy which powered the generator that finally produced elect rical energy. Which could then be used.

ResultsPlus
Examiner Comments

In this answer, the flow of energy through the system is clear and the types of energy at each stage is stated. This was in fact one of the few which hinted at an understanding that the solar energy went into chemical energy in the coal before transferring into thermal, kinetic and finally electrical. This, although short, was worth six marks.

The quality of written communication directly affects the score on the item at this level also.


Sun - into Light energy Coal fired boiler into heat energy and Steam. turbine into Kenetic energy generator into ~~electrical~~ electical energy

ResultsPlus
Examiner Comments

This scored five marks. Sufficient science is included almost to merit six marks for the sequence of energy changes but the quality of written communication is poor and so the score is restricted to five.

Paper Summary

In order to improve their performance, candidates should:

- memorise the basic facts which are 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
- attach units to numerical quantities where appropriate in the space provided
- practice drawing smooth curves through points for continuous data
- try to avoid the use of 'it' etc. by using the relevant noun instead.

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

Further copies of this publication are available from
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467
Fax 01623 450481
Email publication.orders@edexcel.com
Order Code UG029808 November 2011

For more information on Edexcel qualifications, please visit
www.edexcel.com/quals

Ofqual

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Rewarding Learning