Write your name here

Surname	Other names

Centre Number | Candidate Number

Edexcel GCSE

Physics/Science

Unit P1: Universal Physics

Foundation Tier

Additional Sample Assessment Material
Time: 1 hour

Paper Reference
5PH1F/01

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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FORMULAE

You may find the following formulae useful

wave speed = frequency × wavelength $v = f \times \lambda$

$$\text{wave speed} = \frac{\text{distance}}{\text{time}} \qquad v = \frac{x}{t}$$

electrical power = current × potential difference $P = I \times V$

cost of electricity = power × time × cost of 1 kilowatt-hour

$$\text{power} = \frac{\text{energy used}}{\text{time taken}} \qquad P = \frac{E}{t}$$

$$\text{efficiency} = \frac{\text{(useful energy transferred by the device)}}{\text{(total energy supplied to the device)}} \times 100\,\%$$

Answer ALL questions

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

High energy

1 The photograph shows an athlete doing the high jump.

(a) (i) Which forms of energy does the athlete have at the top of his jump?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** only gravitational potential

☒ **B** gravitational potential and kinetic

☒ **C** kinetic and light

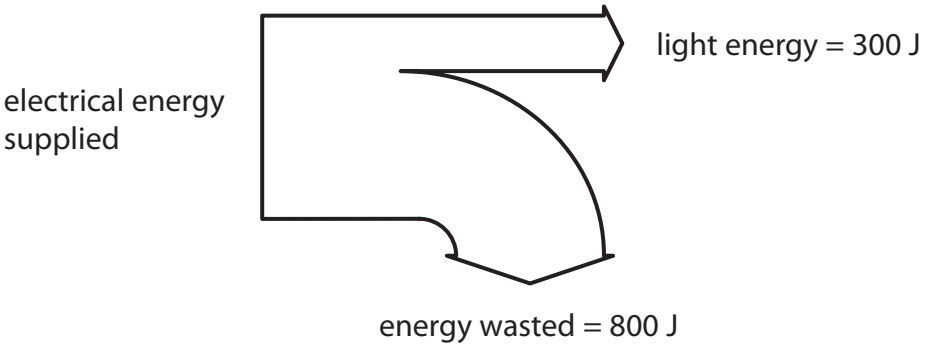
☒ **D** only kinetic

(ii) The athlete gets the energy he needs for his jump from his food.
Complete the sentence.

(1)

The form of energy stored in food is .....

(b) The electronic scoreboard in the photograph lights up to let people know the height of the jump.
The diagram shows the energy transfer in the electronic scoreboard for one second.



(i) State the form of energy that is wasted.

(1)

.....

(ii) Use numbers from the diagram to calculate the electrical energy supplied to the scoreboard in one second.

(1)

energy supplied = ... J

(iii) The scoreboard does not use energy very efficiently.
Explain how the diagram shows the scoreboard has low efficiency.

(2)

.....

.....

.....

.....

(c) The high jump results are given out using loudspeakers.

Describe the energy transfer taking place in a loudspeaker.
You may draw a labelled diagram to help with your answer.

(2)

.....

.....

.....

.....

(Total for Question 1 = 8 marks)

Looking for Pluto

2 (a) The dwarf planet Pluto was discovered in the Solar System.

The table shows a timeline for this.

year	event
1905	an astronomer begins to search for Pluto
1915	an astronomer takes a photograph which includes Pluto, but he does not notice Pluto
1930	an astronomer takes two photographs at different times and notices Pluto because it has moved
2006	astronomers decide that Pluto is not really big enough to be a planet

(i) When was Pluto discovered?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** before 1905

☒ **B** 1905

☒ **C** 1930

☒ **D** 2006

(ii) The astronomers photographed Pluto using light waves.

energy	information	mass	matter	sound

Use words from the box to complete the sentence.

(2)

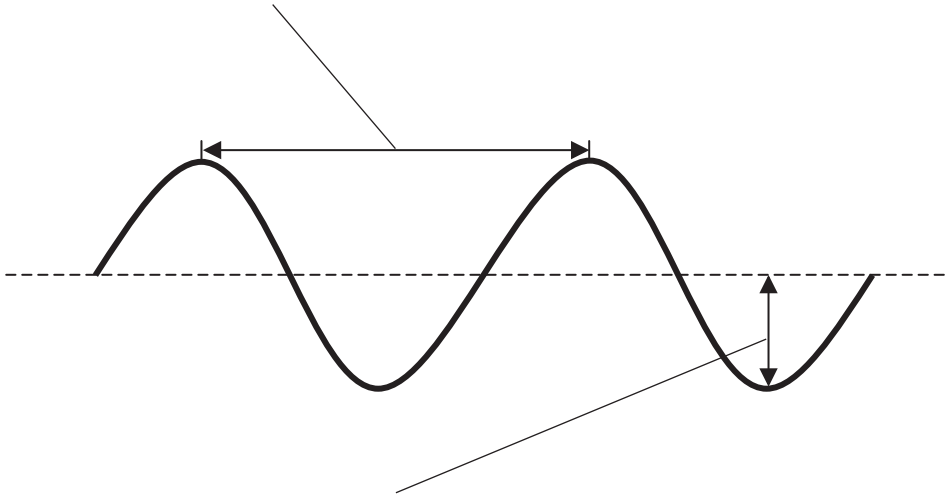
Light waves transfer ..... and ..... .

(b) The diagram shows the shape of a moving wave.

(i) Complete labels 1 and 2 on the diagram.

(2)

1 .....



2 .....

(ii) The frequency of the wave is 5.0 Hz.
The wavelength is 0.25 m.

Calculate the speed of the wave.

(2)

speed = ... m/s

(Total for Question 2 = 7 marks)

Galileo's telescope

3 This picture shows the telescope that Galileo designed.

(a) Galileo used his telescope to look at stars, planets and moons.

(i) Complete the table by putting ticks (✓) in the correct boxes to show your answers.

(1)

statement	right	wrong
stars are further away from the Earth than the planets		
the Sun and the Moon are the same size		

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Galileo used his telescope to discover moons orbiting Jupiter.

This helped to disprove the old theory that

(1)

☒ **A** the Earth is at the centre of the Solar System

☒ **B** the Sun is at the centre of the Solar System

☒ **C** the Moon is at the centre of the Solar System

☒ **D** Jupiter is at the centre of the Solar System

(b) There are two theories for the origin of the Universe:

- the Big Bang Theory
- the Steady State Theory.

(i) Describe the evidence which supports the Big Bang Theory.

(2)

(ii) The Steady State Theory is not as widely accepted as the Big Bang Theory.

Suggest a reason for this.

(1)

(c) When Galileo used his telescope, he observed the stars from his home in Italy.

Now astronomers can study the stars using a telescope fixed to a satellite in space.

(i) Describe an advantage of using a telescope that is in space rather than a telescope on the Earth.

(2)

(ii) Galileo's telescope used a small lens to focus the light.
Modern telescopes often use a large mirror instead.

Explain how using a modern telescope helps astronomers to understand the Universe better.

(3)

(Total for Question 3 = 10 marks)

Electrical power

4 (a) The photograph shows Russell's wind-up torch.
Inside the torch is a small generator.

(i) Russell turns the handle and the lamp lights up.

How could Russell make the lamp brighter?

(1)

.....

.....

(ii) Which of these spins round in the generator?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** a lamp

☒ **B** a battery

☒ **C** a transformer

☒ **D** a magnet

(iii) Russell turns the handle in the other direction.

Explain what happens to the lamp.

(2)

.....

.....

.....

.....

(b) The photograph shows Alan's bike-powered generator.
Alan pedals at a steady speed.

(i) The output voltage of the generator is 12.3 V.
The output current is 8.00 A.

Calculate the output power of the generator.

(2)

output power = ... W

(ii) Alan supplies 15 600 J to the generator in 120 s.

Calculate the input power to the generator.

(2)

input power = ... W

(c) Electricity can be generated on a large scale from renewable resources.

Describe how electrical energy is obtained from **one** named renewable resource.

(2)

.....

.....

.....

.....

(Total for Question 4 = 10 marks)

Dangerous waves

5 The chart shows the types of radiation in the electromagnetic spectrum in order of increasing frequency.

radio waves	microwaves	infrared waves	visible light	ultraviolet waves	x-rays	gamma rays

Increasing frequency ⟶

(a) (i) Which type of radiation has the shortest wavelength?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** radio waves

☒ **B** microwaves

☒ **C** visible light

☒ **D** gamma rays

(ii) Ultraviolet waves can cause harm.

Describe a harmful effect of ultraviolet waves.

(2)

.....

.....

.....

.....

(iii) Which type of radiation shown in the chart is likely to be the most dangerous?

(1)

.....

.....

(b) The Sun emits ultraviolet waves.
People can wear special clothing to protect themselves from these waves.

(i) Suggest other ways in which people can protect themselves from these ultraviolet waves.

(2)

.....

.....

.....

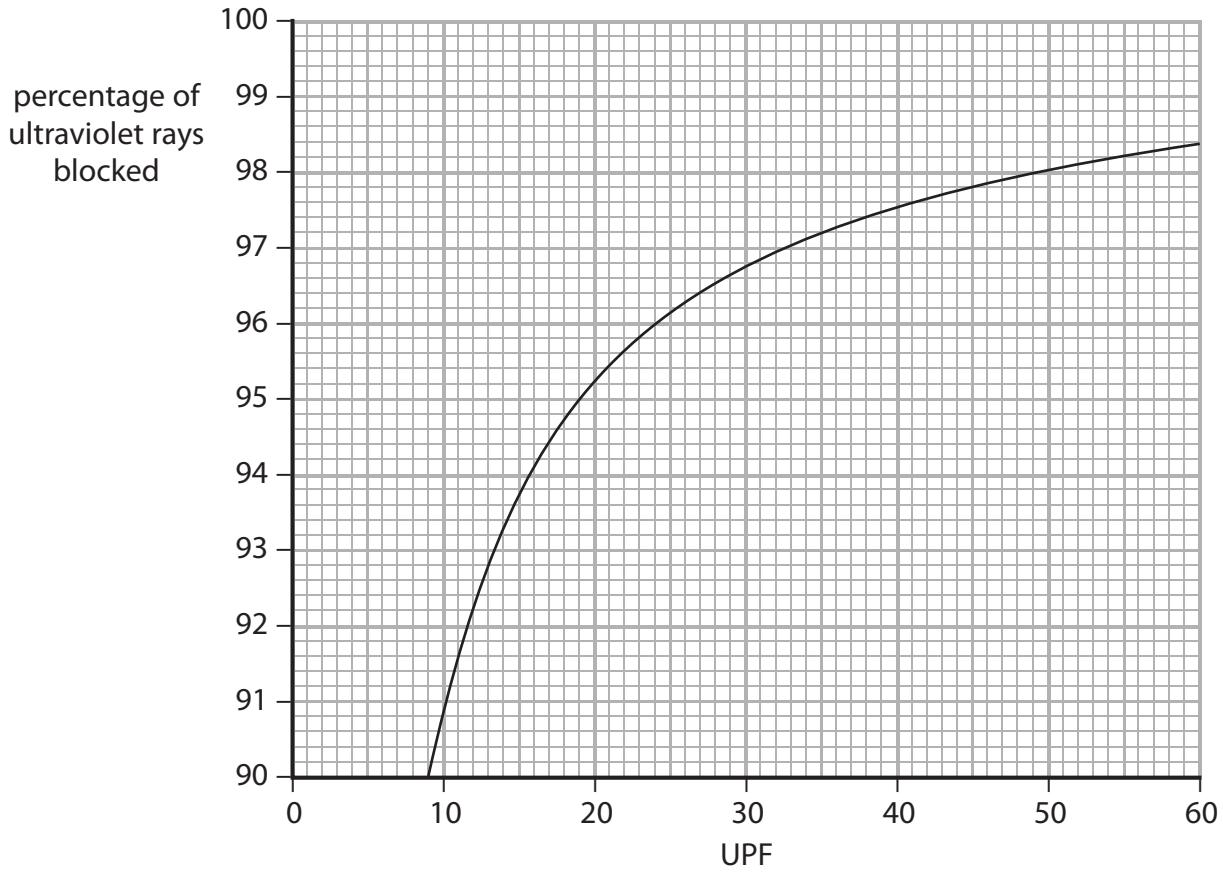
.....

.....

*(ii) The special clothing is rated according to its Ultraviolet Protection Factor (UPF).

UPF rating	protection category
15 to 24	good
25 to 39	very good
40 to 49	excellent
50 or more	ultimate

The graph shows the percentage of ultraviolet rays blocked for different values of UPF.



Compare the effectiveness of 16 UPF, 32 UPF and 48 UPF rated clothing.

(6)

(Total for Question 5 = 12 marks)

Waves under the sea and under the ground

6 This fishing boat has sonar equipment.

A fisherman uses ultrasound to check the depth of the sea under his boat.

(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

Ultrasound is sound with a frequency

(1)

☒ **A** below 20 Hz

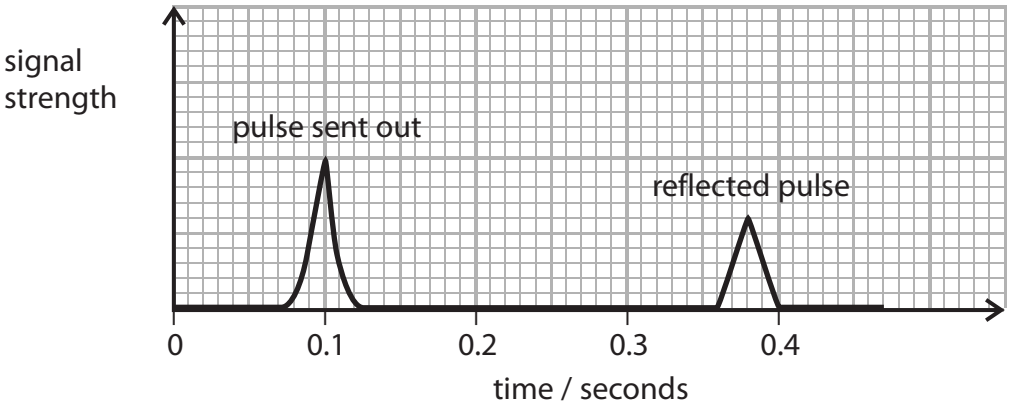
☒ **B** of 20 Hz

☒ **C** below 20 kHz

☒ **D** above 20 kHz

(b) The boat's sonar sends out pulses of ultrasound.
The pulses are reflected from the seabed.
The boat's sonar detects the reflected pulses.

The graph shows a pulse sent out and its reflected pulse.



(i) How long did the pulse take to travel to the seabed and then back to the boat?

(1)

time = ... s

(ii) The speed of ultrasound in water is 1500 m/s.

Calculate the depth of the sea under the boat.

(3)

distance = speed × time

depth = ... m

(c) An earthquake emits P waves and S waves.

(i) P waves are longitudinal waves.
S waves are transverse waves.

Explain the difference between longitudinal waves and transverse waves.

(2)

.....

.....

.....

.....

*(ii) Describe how scientists use P waves and S waves to locate the position of an underground earthquake.

You may draw a labelled diagram to help with your answer.

(6)

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

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Additional Sample Mark Scheme
GCSE Science 2011

GCSE

GCSE Physics (5PH1F/01)

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

General Information

The following symbols are used in the mark schemes for all questions:

Symbol	Meaning of symbol
eq	Indicates that credit should be given for other correct alternatives to a word or statement
/ oblique	Words or phrases separated by an oblique are alternatives to each other
{ } curly brackets	Indicate the beginning and end of a list of alternatives (separated by obliques) where necessary to avoid confusion
( ) round brackets	Words inside round brackets are to aid understanding of the marking point but are not required to award the point

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	B		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	chemical (energy)		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	thermal (energy)	heat	**(1)**

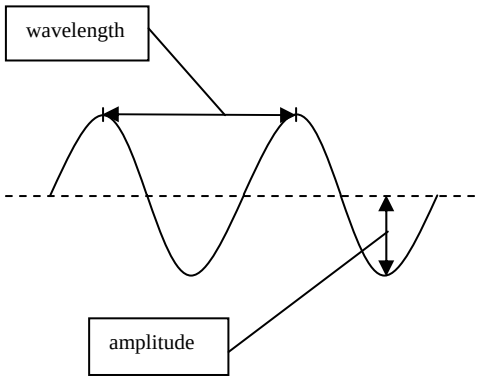
Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	300 (J) + 800 (J)	1100 (J)	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(iii)	An explanation to include the following points • a lot of energy is wasted (1) • compared to the amount of {energy supplied / useful energy} (1)	**Accept** correct use of figures	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)	A description including the following points • electrical (energy) (1) • to sound (energy) (1)	**Ignore** reference to heat /thermal **Accept** kinetic energy of cone or coil **Accept** answers in the form of a labelled diagram	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	C		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	• energy (1) • information (1)	order unimportant	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	wavelength (1) amplitude (1) e.g.  		**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	substitution (1) (speed =) 5×0.25 evaluation (1) 1.25 (m/s)	 give full marks for correct answer, no working	**(2)**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Acceptable answers</th><th>Mark</th></tr>
<tr><td>3(a)(i)</td><td>first statement right
second statement wrong

both correct one mark

<table>
<tr><th>statement</th><th>right</th><th>wrong</th></tr>
<tr><td>stars are further away than the planets</td><td>✓</td><td></td></tr>
<tr><td>the Sun and the Moon are the same size</td><td></td><td>✓</td></tr>
</table>
</td><td></td><td>(1)</td></tr>
</table>

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	A		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	A description including the following points in a logical order **EITHER** • red shift (1) • detail of red shift (1) **OR** • cosmic microwave background (CMB) (1) • detail of CMB (1)	**<u>Accept</u>** • galaxies are moving away • correct {wavelength / frequency} change • echo of the Big Bang • uniform in all directions • correct reference to temperature of space	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	more evidence for the big bang theory / converse	evidence for the big bang theory is more {reliable / repeatable} / eq CMB does not support Steady State	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(c)(i)	A description including the following points • idea of an improved image using space telescope (1) e.g. can see the stars more clearly • idea that the atmosphere degrades image quality (1) e.g. {air / atmosphere / dust} absorbs light (from the stars)	not in atmosphere / seen from space, the stars look brighter seen from space, the stars do not twinkle some of the starlight does not reach the ground some of the starlight is scattered	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)(ii)	An explanation to include the following points in a logical order **EITHER** • idea of more {data / light} (captured) (1) • so can see dimmer objects (1) • so can identify {smaller / more distant} objects (1) **OR** • idea of more magnification (1) • so can see more detail (1) • so can identify {smaller objects}(1)	image looks brighter image looks bigger more distant objects	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	turn faster		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	D		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(iii)	An explanation linking **two** of the following points the lamp (still) lights (1) still relative movement (between magnet and coil) (1) because {current / potential difference (p.d.)} still produced (1)	generators work in either direction	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	substitution (1) (output power =) 8.00 × 12.3 evaluation (1) 98.4 (W)	give full marks for correct answer, no working	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	substitution (1) (input power =) 15600 ÷ 120 evaluation (1) 130 (W)	give full marks for correct answer, no working	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(c)	A description including the following points in a logical order name of method (1) e.g. HEP, geothermal, wind appropriate transducer (1) e.g. water turbine, steam turbine, wind turbine	 correct energy transfer described e.g. wind → electrical dam for water turbine	 **(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	D		**(1)**

Question Number	Answer	Acceptable answers	**Mark**
5(a)(ii)	A description including the following points in a logical order a named harmful effect (1) suitable detail (1) e.g. UV damages {DNA / cells}, UV enters eye	 damage to skin / sunburn / (skin) cancer / damage to eyes / eye problems / snow blindness	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)(iii)	gamma (rays) / γ		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)(i)	Any **two** from: • sunscreen / suncream • sunglasses / UV glasses • go into shade / stay indoors		**(2)**

Question Number		Indicative content	Mark
QWC	*5(b)(ii)	Basic qualitative comparison (e.g. using data from table) • UPF 16 is good • UPF 32 is very good • UPF 48 is excellent Qualitative or quantitative comparison (e.g. using graph and table) • the higher the UPF, the more UV is blocked • UPF 16 good because it blocks 94 % of UV rays • UPF 48 excellent because only 2 % of UV rays pass through Detailed qualitative and quantitative comparison (e.g. using graph, table and / or the shape of the curve) • high UPF ratings are not very different to each other • UPF 16 good but UPV 32 better because it blocks 3 % more UV rays whilst UPF 48 only blocks 1 % more • there is a bigger difference between UPF 16 and UPF 32, but a smaller difference between UPF 32 and UPF 48	**(6)**
Level	**0**	no rewardable material	
1	**1-2**	• ratings compared only in terms of protection category only • no use of data from graph • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3-4**	• ratings compared and related to the graph in terms of qualitative or quantitative difference • some appropriate use of data from graph • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• ratings compared and related to the graph in terms of qualitative and quantitative difference • confident use of data from graph / some basic mention of the non-linearity / shape of the graph • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
6(a)(i)	D		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(b)(i)	0.28 (s)		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(b)(ii)	substitution (1) division by 2 applied correctly (1) correct answer (1) e.g. (depth =)1500 × 0.28 ÷ 2 210 (m)	**Accept** ecf from 6(b)(i) (answer to 6 (b)(i)× 750 gets 3 marks answer to 6 (b)(i)× 1500 gets 2 marks) **Accept** 420 (m) for 2 marks	**(3)**

Question Number	Answer	Acceptable answers	Mark
6(c)(i)	An explanation linking the following points • recognising that directions of oscillation are different (1) • comparison with correct detail for each wave (1) e.g. for longitudinal waves the oscillations are in the same direction as wave travels for transverse waves the oscillation are perpendicular to the direction in which the wave travels		**(2)**

Question Number		Indicative content	Mark
QWC	*6(c)(ii)	**Basic statements** • the waves are detected by seismometers • the waves travel at different speeds • P waves travel faster than S waves • two or more seismometers stations used **Descriptions that include relationships between variables** • waves travelled same distance in different time • distance travelled derived from speed and time • two or more seismometers stations needed **Full description** • description including the reasons for at least two seismometer stations • a diagram explaining triangulation • idea that difference in arrival time relates to how far the waves have travelled Ideas maybe expressed through a labelled diagram	**(6)**
Level	**0**	no rewardable material	
1	**1-2**	• description mentions appropriate detection instruments • description mentions and different speeds or arrival times of waves • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3-4**	• description relates speed, distance and time • description relates arrival time to speed • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• description including some correct spatial relationships • description including the need for data from more than one location • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	