OCR
Oxford Cambridge and RSA

GCSE

Physics B

Unit **B752/01:** Unit 2 – Modules P4, P5, P6 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2015

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

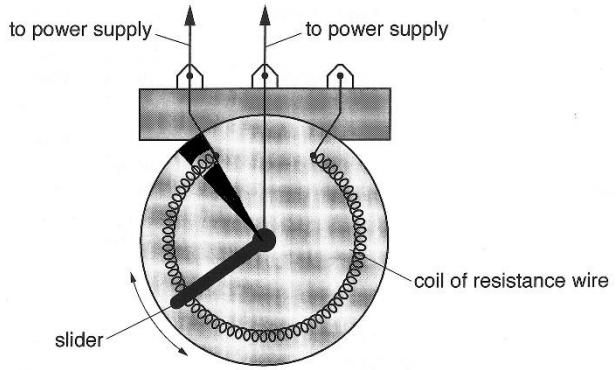
OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Annotation	Meaning
	correct response
	incorrect response
BOD	benefit of the doubt
NBOD	benefit of the doubt **not** given
ECF	error carried forward
^	information omitted
I	ignore
R	reject
CON	contradiction
L1	Level 1
L2	Level 2
L3	Level 3

Subject-specific Marking Instructions

Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/ = alternative and acceptable answers for the same marking point
(1) = separates marking points
allow = answers that can be accepted
not = answers which are not worthy of credit
reject = answers which are not worthy of credit
ignore = statements which are irrelevant
( ) = words which are not essential to gain credit
__ = underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
ecf = error carried forward
AW = alternative wording
ora = or reverse argument

Question	Answer	Marks	Guidance
1 a i	**D** (1)	1	if answer line blank allow correct answer circled or underlined more than one answer = 0 marks
ii	**D** (1)	1	if answer line blank allow correct answer circled or underlined more than one answer = 0 marks
b	 (1)	1	**allow** drawn slider or clear mark anywhere within the black segment (1)

Question	Answer	Marks	Guidance
c	**ohms (1)** **4.7 (2)** **but if calculation incorrect** **0.7 (1)** **0.15** **or** **4.67 (1)** **or** **4.66 (1)**	3	**allow Ω (1)** **allow any number of figures after the decimal point e.g. 4.6666 (1)**
	Total	6	

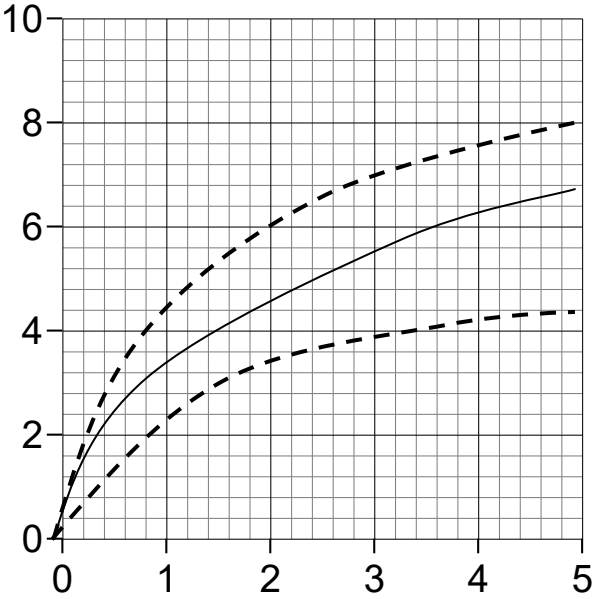
Question	Answer	Marks	Guidance
2	**Level 3** **Description and explanation of what is not correct for diagram** **AND** **description and explanation of what is not correct for table** Quality of written communication does not impede communication of the science at this level (5 – 6 marks) **Level 2** **Description of what is not correct for diagram** **AND** **description of what is not correct for table** **OR** **Description and explanation for what is not correct in EITHER the table or the diagram** Quality of written communication partly impedes communication of the science at this level (3 – 4 marks) **Level 1** **Description of what is not correct for diagram** **OR** **description of what is not correct for table** Quality of written communication impedes communication of the science at this level (1 – 2 marks) **Level 0** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to C.** **Descriptions of what is wrong in the diagram may include** • bands across the diagram • rarefaction wrong / compression wrong **Description and explanation of what is wrong in the diagram may include:** • longitudinal waves have a gradual change or do not have bands • rarefaction and compression are the wrong way round or compression is where the particles are more concentrated / ora **Descriptions of what is wrong in the table information may include:** • ultrasound is not a transverse wave • sound is not used to measure blood flow • ultrasound is not used for X-ray of bones • ultrasound is not used to cook food **Description and explanation of what is wrong in the table may include:** • ultrasound is a longitudinal wave • ultrasound is used to measure blood flow • X-rays are used to X-ray bones • microwaves / infrared are used to cook food **L1 can be scored by just annotating what is wrong on the diagram or table** **Use the L1, L2, L3 annotations in scoris.** **Do not use ticks.**
	Total	6	

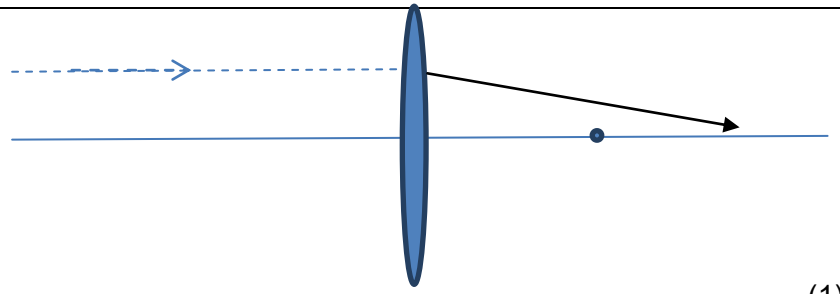
Question	Answer	Marks	Guidance
3 a	**any two from** (idea that for **absolute dating**) absolute dating gives a more exact date / ora (1) (Idea about **absolute dating**) not enough Carbon-14 in old rocks (for absolute dating) or absolute dating only works when there is enough carbon in the sample (1) (idea that **relative dating**) can get the age of (very) old plants / wider age range of plants / ORA [1] (idea that for **relative dating**) need comparative data eg. requires knowledge of the ages of surrounding rocks (1) Idea that using **both methods** together gives a more **reliable** / valid / complete answer or both results support each other / [1]	2	**allow** Carbon dating for absolute dating **Eg** more accurate / precise / **Ignore** 'better result' **allow** relative dating can get the age of (very) old rocks [1] **Eg both methods** give more certain answer [1] **Eg, both methods** give more confidence in the result [1] Allow **both methods** give a more accurate answer [1] **Accuracy mark can only be given once.**
b	lead (1)	1	if answer line blank allow correct answer circled or underlined more than one answer = 0 marks
	Total	**3**	

Question	Answer	Marks	Guidance
4 a	decrease (1) as time increases (1)	2	**allow** decrease with time (2) **allow** decrease faster initially /AW (2) **allow** higher level answers e.g. decrease exponentially (2)
b	the numbers half the fastest or the numbers half in less time / AW (1)	1	**allow** higher level answers e.g. the half-life is 50 ± 5 minutes or in each 100 minutes the numbers quartered1)
c	nucleus (1)	1	if answer line blank allow correct answer circled or underlined more than one answer = 0 marks
	Total	**4**	

Question	Answer	Marks	Guidance
5 a	**any one from** gains charge from the carpet (1) idea of friction (between carpet and feet (1) the carpet is an insulator or his shoes are an insulator (1) he gains electrons / he loses electrons (1) **any one from** he touches another person (1) he touches something metal (1) (idea that) he is earthed (1) (idea that) he is discharged (1)	2	**NOT** Positive electrons Ignore ions

Question	Answer	Marks	Guidance
b i	electrostatic voltage or charge increases (with distance) AW (1) (idea of) voltage related to charge / electrons [1] **but** the increase in electrostatic voltage is faster at the start / increases slower at the end / the increase is not linear (2)	2	 **eg.** the electrostatic voltage increases (with distance) as he gains (negative) charge or electrons [2] **allow** there is a steeper gradient at the start (1) **allow** trend shown with data from the graph: e.g. electrostatic voltage rises to 6kV in 2 metres but by only 2 in the next 3 metres [2]
ii	(idea that) greater voltage (gained) when there is less humidity / ORA Or idea that increase is more when there is less humidity / ORA (1)	1	**answer needs to be comparative with reference to humidity** **allow** more charge leaks away on a humid day (1)

iii	curved line starting a (0,0) with similar shape to those on graph but between the two lines (1)	1	**allow** any curved line starting at (0,0) and between the two lines on graph e.g.  **(1)** **BUT** any line that touches either of the two original lines after the start scores (0)
	Total	**6**	

Question	Answer	Marks	Guidance
6 a	(... it) **REFRACTS** (and .....). (1) (... colour A is) **RED**. (1) (... has the shortest) **WAVELENGTH**. (1)	3	**not** reflects
b	Any one from : reflective clothing / cat's eyes / reflector on the road / binoculars / periscopes / (some) cameras/ (some LCD) projectors/ optical fibres for communications (1)	1	**allow** named application of TIR e.g. endoscope (1) **allow** (fibre optic) Christmas trees
c i	convex (1)	1	**allow** biconvex (1)
ii	straight ray drawn from the original ray or lens to (or through) the focal point (1)	1	 (1) ignore continuation of ray after focal point
d	real image(1) on a screen or sensor or film (1)	2	**allow** upside down or diminished (1) **allow** on back of camera

Question	Answer	Marks	Guidance
e	**E** **C** both in correct order and above (**B**) (1) (B) **A** **D** both in correct order and below (**B**) (1)	2	**Allow both correct lenses above B and below B but in wrong order (1) ie C E (B) D A (1)**
	Total	**10**	
7 a	 **B** [1] less than 30MHz / low**est** frequency / few**est** MHz / high**est** wavelength [1]	2	**If B not chosen (0)** **Allow** 15m or 20MHz [1] **second mark is conditional on B being chosen** look for a comparison. Eg. 'it's the low frequency one [1]
b	**C** (1) **above 30GHz** (waves absorbed or scattered) (1)		**If C not chosen (0)** Allow 0.006m or 50GHz [1] **second mark is conditional on C being chosen**
	Total	**4**	

Question	Answer	Marks	Guidance
8 a	(average speed) 3000 (m/s) (1) (distance travelled) 900000 (2) OR correct calculation of ecf average speed x 300 (2) **BUT** if distance answer incorrect 5 minutes converted to 300 seconds (1)	3	Allow 3000 x 5 (= 15000) OR ecf average speed x 5 (1)
b	(other) scientists (1) check work /check results / inform future direction of work or research / evaluate effectiveness (1)	2	
	Total	**5**	

Question	Answer	Marks	Guidance
9	**Level 3** **Description of experimental set up** **AND** **A detailed explanation of interference** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **Level 2** **Description of experimental set up** **AND** **A simple explanation of interference** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **Level 1** **Description of experimental set up** **OR** **An attempt at an explanation of interference** Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **Level 0** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted up to grade C** **Full marks can be awarded by labelled diagrams of experimental set up and explanation of interference effects** **Indicative scientific points may include:** **L3 Detailed Explanation** Loud sounds made • constructive interference • idea of in phase or (superpositioning of) peak + peak • constructive interference Quiet sounds made by • destructive interference • idea of out of phase or (superpositioning of) peak + trough coherent sources or sources with constant phase difference **L2 Simple Explanation** Same frequency or wavelength Same amplitude at each speaker Waves add or subtract to make loud and quiet sounds **Description of experimental set up** 2 speakers a distance apart One note or pitch or same notes from each speaker Hear loud and quiet sounds (in front of speakers or when walking across) **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**6**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>10</td><td>Level 3
Truth table all correct
AND
Gates correctly identified OR BOTH correct conditions for E = 1

Quality of written communication does not impede communication of the science at this level
(5 – 6 marks)
Level 2
Any 2 from
gates correctly identified
OR
at least two rows in truth table correct
OR
Identifies 2 correct conditions for E=1

Quality of written communication partly impedes communication of the science at this level
(3 – 4 marks)
(Level 1)
gates correctly identified
OR
at least two rows in truth table correct
OR
Identifies 1 correct condition for E=1

Quality of written communication impedes communication of the science at this level
(1 – 2 marks)
(Level 0)
Insufficient or irrelevant science. Answer not worthy of credit.
(0 marks)</td><td>6</td><td>This question is targeted at grades up to C.

Indicative scientific points may include:

conditions when E = 1:
• E = 1 when conditions are light (cold wet and)
• E = 1 when conditions are hot wet (and dark)

completed truth table:
<table><tr><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td></tr><tr><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td></tr></table>
identification of gates:
• AND (gate) and OR (gate) either order
But if specified
• AND gate connected to inputs A and B
• OR gate connected to inputs C and D

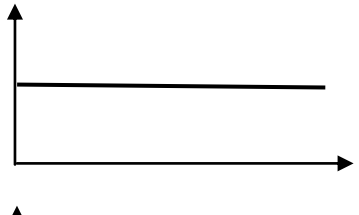
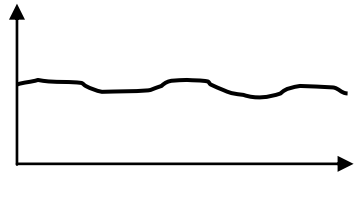
Use the L1, L2, L3 annotations in scoris.
Do not use ticks.</td></tr>
<tr><td></td><td>Total</td><td>6</td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
11 a	**A** (1)	1	if answer line blank allow correct answer circled or underlined more than one answer = 0 marks
b	(Transformers are devices that work with) **AC**. (Phone chargers use) **step-down** (transformers.) (Bathroom shaver sockets use) **isolating** (transformers.)	2	3 correct = 2 marks 1 or 2 correct = 1 mark
c	**any two from** transformers can be used to change voltage or increase voltage or decrease voltage (1) 110 000 V is dangerous or make the **voltage** safer for people (in their homes) (1) less power loss (at high voltages) or more efficient (at high voltages) (1)	2	**allow** idea of a step up transformer for increasing voltage from power station to power lines (1) **allow** idea of a step down transformer for decreasing voltage from power lines to house for safety (1) **allow** higher level answers e.g. increases the efficiency because it lowers the current (2)
	Total	**5**	

Question	Answer	Marks	Guidance
12 a	82 104 128 (1)	1	all correct for 1 mark
b i	I_b is (always much) smaller than I_c	1	
ii	(idea that) a small base current is needed to switch on the transistor (1) (this allows) a large current through the transistor (1)	2	**allow** higher level answers e.g. transistors have a high gain (1)

Question	Answer	Marks	Guidance
c	**any one from** **advantages** lightweight (1) can be put in a pocket / easy to store (1) easy to carry (1) **any one from** **disadvantages** difficult to see the numbers or words or images (1) difficult to text on or difficult to enter information (1) need pen or stick to use the screen or keyboard (1) not very good at taking photographs (1) easier to lose (1) harder to repair small parts (1)	2	
	Total	**6**	

Question	Answer	Marks	Guidance
13 a	magnet coil brush slip ring (1)	1	all four required
b	moving the magnet(s) (1)	1	**allow** move magnet and coil (1)
c	(supply) voltage of **B** is lower / ORA (1) frequency of **B** is higher / ORA(1)	2	
	Total	**4**	

Question	Answer	Marks	Guidance
14 a	**Max 3 marks** **up to two from** graph **A** shows no rectification (1) graph **B** shows half (-wave) rectification (1) graph **C** shows full (-wave) rectification (1) **up to two from** **B** has a diode in the circuit (1) **C** has a diode in the circuit (1)	3	**allow** graphs **B** and **C** show rectification (1)
b	smoother line than original graph (1)	1	**allow** any line that is smoother than original graph e.g.  (1)  (1)
	Total	**4**	

Question	Answer	Marks	Guidance
15 a i	elephant (1)	1	
ii	dolphin (1)	1	
iii	dolphin (1)	1	
b i	Dionne (1) 20 100 – 24 (is largest value) **OR** 20 076 (is largest value) (1)	2	The calculated value may be shown in the table **If** Dionne is **calculated** to be less than 19985 (Evangelos) then award one mark for naming Evangelos.
ii	19 780 scores (2) **but if answer is incorrect or incomplete then:** $\frac{19\,000 + 20\,000 + 20\,100 + 19\,800 + 20\,000}{5}$ (1)	2	**Mark answer on line** **But** if no answer given and value calculated in table mark the answer calculated in the table.
iii	Any three from inaccurate measurements (1) unreliable measurements (1) idea of different sample size (1) the sample is not representative (1) some (may) have a hearing defect (1) different ages in the sample (1) other named and described reason why the sample is unrepresentative (1)	3	Eg. Equipment may be faulty [1]
	Total	**10**	

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