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 2017

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

Annotations used in scoris

Annotation	Meaning
	correct response
	incorrect response
	benefit of the doubt
	benefit of the doubt **not** given
	error carried forward
	information omitted
	ignore
	reject
	contradiction

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	earth – safety wire / stops appliance becoming live / prevents shock(1) live – brown (1) neutral – blue (1)	3	
b	live (and) neutral (1)	1	both required, either order
c i	2 (2) **if answer incorrect or incomplete then:** $\frac{3}{1.5}$ (1)	2	**Ignore any units**
ii	**any two from** decrease the resistance of the variable resistor (1) remove the lamp / change lamp for one of lower resistance (1) make the wires shorter (1) use thicker wires (1) add a bulb in parallel (1)	2	 allow remove variable resistor (1) allow remove ammeter (1) ignore less wires allow any component in parallel (1)
		8	

Question	Answer	Marks	Guidance
2 a i	**C** (1)	1	if answer line blank allow answer in correct place on the diagram
ii	**any one from** movement of air (particles) (1) can't see **air particles** (1) (frequency) too high (1)	1	 **allow** the air particles are moving too fast (1) **ignore** cannot see the wave
b	 **any two from** less chance of infection (1) does not damage the patient (1) so the patient does not need an operation (to see if anything is wrong) (1) idea of non-ionising (1)	2	 **ignore** safer **ignore** harmless
	Total	**4**	

Question	Answer	Marks	Guidance
3	**Level 3: (5-6 marks)** **Detailed explanation of results** **AND** **useful and nuisance given.** Quality of written communication does not impede communication of science at this level. **Level 2: (3-4 marks)** **Simple explanation of results** **AND** **useful and nuisance given.** Quality of written communication partly impedes communication of science at this level. **Level 1: (1-2 marks)** **Simple description of results** **OR** **useful** **OR** **nuisance given.** Quality of written communication impedes the communication of science at this level **Level 0: (0 marks)** Insufficient or irrelevant science. Not worthy of credit.	6	This question is targeted up to grade C Indicative scientific points may include (but are not limited to) the following: **explanation of results** • **insulating** materials rubbed together attract paper / **conducting** materials do not attract paper • unlike charges attract / the rod is a different charge to the paper for them to attract • **electrons** are transferred for attraction / no electrons are transferred for copper and steel wool • electrons are negative **description of results** • some rubbed materials attract paper / some rubbed materials do not attract paper • non metals attract paper/ metals do not attract the paper **useful static electricity** • dusting • removing soot in chimneys • spray painting • crop spraying • defibrillators / restarting the heart **nuisance static electricity** • electrostatic shock • clothes cling • dust on TV screen
	Total	**6**	

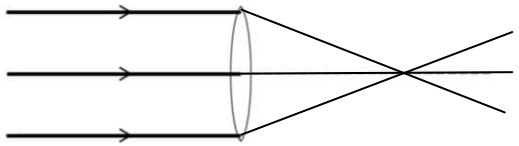
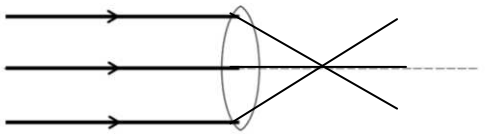
Question	Answer	Marks	Guidance
4 a	by placing materials in a nuclear reactor (1)	1	if answer line blank allow answer indicated in list
b i	**A** and **C** (1) **and any two from** because gamma radiation passes through skin (1) because it is harmful to healthy cells (1) because it is used to treat cancer (1)	3	
ii	**any one from** limit exposure time (1) use a screen (1) keep a safe distance (1) wear protective clothing (1) use appropriate handling technique (1)	1	**allow** any named example of a limit to exposure time e.g. wear radiation badges (1) **allow** any named example of a screen e.g. stand behind a glass wall (1) **allow** any named example of a safe distance e.g. keep away from the patient when treating them (1) **allow** named appropriate protective clothing e.g. lead apron (1) **allow** use tongs (1)
c	blockage at C / blockage between C and D / blockage after C (1) mean in area **C** = 34 **and** mean in area **D** = 4 (1)	2	**allow** indication of blockage location on the diagram (1) if answer line does not contain the mean values allow answers in the table
	Total	**7**	

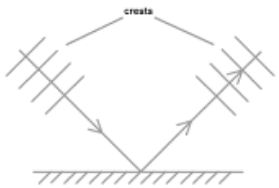
Question	Answer	Marks	Guidance
5 a	(force of) gravity (1) attracts the Moon to the Earth (1)	2	 **allow** idea of centripetal force (1)
b	**any one from** communications (1) military use (1) scientific research (1) GPS (1) imaging the Earth (1)	1	**ignore** weather forecast **allow** examples e.g. (satellite) TV (1) **allow** Satnav (1)
c i	1000km takes 105 minutes **and** 2000km takes127-128 minutes (1) not double/ use of values to show not double/ 23 difference (1)	2	
ii	**any one from** scan whole surface of the Earth / can 'see' much of the surface of the Earth / can 'see' the weather patterns (of the Earth) (1) orbit the Earth many times a day / can 'see' changes in weather patterns / can be used to forecast future weather/ can see the changes more quickly(1) idea of a more detailed image (due to proximity to the Earth) (1)	1	 **ignore** more accurate **allow** clearer image (1)

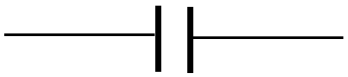
d	any **three** from geostationary satellites use **C** (1) low orbit satellites use **B** or **C** (1) low orbit satellites use low frequency waves / radio waves (1) geostationary satellites use high(er) frequency waves / geostationary satellites use microwaves or radio waves that can **pass straight through the atmospher**e (1) no satellites use A / high frequency microwaves/ radiowaves as they are **absorbed** by rain and dust (1)	3	**allow** if type of satellite is not given then one mark can be awarded for satellites use C(1)
		9	

Question	Answer	Marks	Guidance
6 a	Direction is **not** important when measuring speed. ✓ Relative speed does **not** depend on the direction of movement. Speed and velocity are vector quantities. Speed is a scalar quantity. ✓ Velocity is always higher than speed. (2)	2	
b	5 (m/s) (2) **but if answer is incorrect or incomplete then** 11 – 6 (1) **or** 11 – (0.6 x 10) (1) **or** 11 = u + (0.6 x 10) (1)	2	**Ignore all units**

c i	**Any one from the following pairs** Car slows down **and** tree moves right (1) Car stops **and** tree remains stationary (1) Car carries on moving **and** tree is knocked down (1) Car recoils **and** tree remains stationary (1) Car recoils **and** tree moves right (a little) (1)	1	
ii	forces are equal and in opposite directions (1)	1	more than one answer = 0 marks if answer line blank allow correct answer indicated in list
	Total	**6**	

Question	Answer	Marks	Guidance
7	**Level 3: (5-6 marks)** **Labels the diagram** **AND** **both diagrams completed** **AND** **description of convex lens producing a real image.** Quality of written communication does not impede communication of science at this level. **Level 2: (3-4 marks)** **Labels the diagram** **OR** **both diagrams completed** **AND** **simple description of convex lens producing a real image.** Quality of written communication partly impedes communication of science at this level. **Level 1: (1-2 marks)** **Simple labels on the diagram** **OR** **one diagram completed** **OR** **simple description of convex lens producing a real image.** Quality of written communication impedes the communication of science at this level **Level 0: (0 marks)** Insufficient or irrelevant science. Not worthy of credit.	6	This question is targeted up to grade C Indicative scientific points may include (but are not limited to) the following: **labels** • (convex) lens / optical centre of lens • (incident light) ray • principal axis • focal point / focal length **diagram**   **description** • light refracted • light goes through the lens • focused at focal point • real image can be projected onto a screen or film
	Total	**6**	

Question	Answer	Marks	Guidance
8 a i	reflection (as particles bouncing on mirror) (1)	1	
ii	 (1)	1	**allow** rays **OR** wave fronts in diagram (1)
b	projectile motion (1) picture made by putting all the photographs together / use of strobe/ use burst mode or description of burst mode in camera or phone (1)	2	**allow** parabola (1)
	Total	**4**	

Question	Answer	Marks	Guidance
9 a	 (1)	1	**allow** 
b i	starts at 0 (V) / starts at 0,0 / starts at the origin (1)	1	**ignore** starts at 0 seconds
ii	**from 0 to 2.5 seconds** **any one from:** • large / fast change in voltage (1) • voltage changes from 0 to about 0.9 (V) (1) • it increases by about 0.9 (1) **from 2.5 to 5 seconds** **any one from:** • small / slow change in voltage (1) • voltages changes from about 0.9 to 1.0 (V) (1) • it increases by 0.1 (1)	2	**Assume 'it' means voltage unless indicated otherwise.** **accept** if value can be rounded to 0.9 **allow** comparison e.g. there is a greater change in voltage between 0 to 2.5 seconds than 2.5 to 5 seconds (2) If no marks scored then allow for a maximum of ONE mark: Either - 'goes up quicker at the start' / ORA (1) OR - 'gradient higher at the start' / ORA (1)
c	**any two from** may not switch on (1) may get damaged / may break (1) charge may not be stored (1) charge may discharge/ leak (1)	2	**allow** may become disconnected during take-off / the journey (1) **allow** it is very difficult to go and fix the capacitor in space (1)_
		6	

Question	Answer	Marks	Guidance
10 a	isolating (1) **and any one from** shaver not connected directly to mains / shaver isolated from mains (1) reduces risk of electrocution (1) current cannot reach user (1)	2	 **allow** idea that voltage is unchanged / primary coils = secondary coils (1) **allow** no risk of electrocution / no risk of (electric) shock (1) **allow** blocks current from one circuit to another / decouples one circuit from the other (1)
b	Step-down transformers are used in mobile phone chargers. ✓ Step-up transformers are used in laptops. ☐ Transformers change AC to DC. ☐ Transformers only work with AC. ✓ Transformers only work with DC. ☐ **(2)**	2	each correct tick = 1 mark three ticks, with one or two correct = 1 mark four ticks = 0 marks

c i	25 000 (V) 275 000 (V) 230 (V)	1	all three correct = 1 mark
ii	step-up used (to increase voltage) at power station or before National Grid (1) step-down used (to decrease voltage) after National Grid or at houses (1)	2	if no other marks awarded **allow** there are step-up **and** step-down transformers to change the voltage (1)
	Total	**7**	

Question	Answer	Marks	Guidance
11	**Level 3: (5-6 marks)** **similarity OR difference** **AND** **detailed description of how the size of the voltage can be changed.** Quality of written communication does not impede communication of science at this level. **Level 2: (3-4 marks)** **similarity OR difference** **AND** **simple description of how the size of the voltage can be changed.** Quality of written communication partly impedes communication of science at this level. **Level 1: (1-2 marks)** **similarity** **OR** **difference** **OR** **simple description of how the size of the voltage can be changed.** Quality of written communication impedes the communication of science at this level **Level 0: (0 marks)** Insufficient or irrelevant science. Not worthy of credit.	6	This question is targeted up to grade C Indicative scientific points may include (but are not limited to) the following: **similarities** • generate electricity • work in an opposite way to a motor • both have moving parts • movement of coil of wire relative to magnet / ORA **differences** • simple generator has coil inside the magnet / generator in power station has magnet inside coil • simple generator has coil of wire moving / spinning • generator in power station has magnet moving / spinning **changes to size of voltage** • change speed of rotation of coil (in the simple generator) • change speed of rotation of magnet (in the generator in the power station) • change number of coils (in both generators) • change the strength of the magnet
	Total	**6**	

Question	Answer	Marks	Guidance
12 a	LDR (1) thermistor (1)	2	if answer line blank allow answers indicated in list each correct answer = 1 mark answers can be in either order
b	**any two from** less or least energy transferred to the surroundings (1) for the same amount transferred to moving the robot (1) most efficient (1)	2	
c	idea that as input changes to 1 the output from the NOT gate is 0 (1) idea that an output of 0 stops the motor working (and so stops the robot moving) (1)	2	
	Total	**6**	

Question	Answer	Marks	Guidance
13 a	14.60/14.6 (1)	1	
b	16 / 16.0 / 16.00 (2) If answer incomplete or incorrect then 48 – 15.65 – 16.35 or 48 – 32 scores (1)	2	
c	1.75 (2) But if answer is incomplete or incorrect then: 1.750666 scores (1)	2	
d i	All 4 points plotted accurately (1) Straight line (by inspection) (1)	2	**allow** tolerance of +/- ½ square
ii	Increasing length increases time period / AW (1)	1	
iii	220 (1) Evidence of working on graph scores (1)	2	**allow** 216 ➔ 224 (1) **allow** ecf from previous parts **allow** value sources from table (rather than graph)
	Total	**10**	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk/

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553