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Cambridge International General Certificate of Secondary Education

PHYSICS

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Paper 3 Core Theory

May/June 2017

MARK SCHEME

Maximum Mark: 80

Published

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This document consists of **9** printed pages.

Question	Answer	Marks
1(a)	any two from: use a ruler with mm (scale) ruler close(r) to book/no space between book and ruler have zero on ruler at one end of book take reading with eye in line with end of book owtte	B2
1(b)	use large number of pages i.e. more than 50	B1
	measure (total) thickness (with ruler)	B1
	divide (total) thickness by number of pages	B1
1(c)	convert g to kg or $400 \div 1000$	B1
	Weight = mass $\times$ gravitational field strength in any form	C1
	(weight =) 4.0	A1
	(unit) N or newtons	B1
	Total:	9

Question	Answer	Marks
2(a)	chemical	B1
2(b)(i)	Moment = force $\times$ (perpendicular) distance (from pivot) in any form	C1
	3.0×25.0	C1
	75 (N cm)	A1
2(b)(ii)	any two from: idea that work done = energy gained total energy does not change the student loses chemical energy laptop gains (gravitational) PE (of lid) energy dissipated as thermal energy in the environment	B2
2(c)	any two from: laptop can be charged anywhere owtte cost of charging is zero (Sun is a) renewable energy (source)/not using fossil fuels	B2
2(d)	(Takes 5 times) longer to (re-)charge (battery)	B1
	Total:	9

Question	Answer	Marks
3(a)(i)	1.75 (hours) 1 hour 45 minutes	B1
3(a)(ii)	0.5 (hours) 30 minutes	B1
3(a)(iii)	100 (km)	B1
3(a)(iv)	Speed = distance $\div$ time in any form	C1
	50 $\div$ 0.75	C1
	66.67 (km / h)	A1
3(a)(v)	(average) speed after stopping is faster	B1
	line on graph is steeper	B1
	Total:	8

Question	Answer	Marks
4(a)	convert kN / m ² to N / m ² or 240 $\times$ 1000	B1
	pressure = force $\div$ area	C1
	transformation force = pressure $\times$ area	C1
	3600 (N)	A1
4(b)	any 3 from: molecules move about (randomly) collisions impacts with walls/surfaces (of tyre) idea of force produced (by bombarding molecules) idea of pressure as force on an area	B3
	Total:	7

Question	Answer	Marks
5(a)	B between E and C	B1
	G between C and D	B1
	A followed by F in last two boxes	B1
5(b)	any 2 from: risk of radioactive material escaping into environment products of nuclear fission are radioactive many isotopes produced have long half-lives reactors can be used to produce material for nuclear weapons	B2
5(c)	useful energy output compared to total energy input	B2
	Total:	7

Question	Answer	Marks
6(a)	top diagram labelled <i>diffraction</i>	B1
	middle diagram labelled <i>reflection</i>	B1
	bottom diagram labelled <i>refraction</i>	B1
6(b)(i)	amplitude correctly indicated by eye	B1
6(b)(ii)	wavelength correctly indicated by eye	B1
6(c)	straight line (by eye) drawn through centre of lens to Y	B1
	sloping ray that emerges horizontally from lens to Y	B1
	Total:	7

Question	Answer	Marks
7(a)	horizontal arrows by eye	B1
	arrows pointing in opposite directions	B1
7(b)	3rd box ticked <i>vacuum</i>	B1
7(c)(i)	value less than 20 000	B1
	Hz	B1
7(c)(ii)	sound with frequency above upper (frequency) limit of human hearing	B1
	Total:	6

Question	Answer	Marks
8(a)	circuit completed with 3 lamps in parallel	B1
	switch in each branch	B1
	variable resistor in each branch	B1
8(b)	switch all lights on/off	B1
8(c)	name: Fuse	B1
	if the current (in the fuse/circuit is) too large	B1
	(the wire in the fuse) melts	B1
	Total:	7

Question	Answer	Marks
9(a)	repel no effect attract attract	B2
9(b)	any two from: (soft) iron is easily magnetised (but) loses its magnetism (very) quickly Steel is harder to magnetise and retains its magnetism (for a long time)	B2
	Total:	4

Question	Answer	Marks
10(a)	(coil X) primary (coil Y) secondary	B1
10(b)	$N_s / N_p = V_s / V_p$ in any form	C1
	$240 / V_s = 6400 / 400$ OR $V_s / 240 = 400 / 6400$	C1
	15 (V)	A1
	Total:	4

Question	Answer	Marks
11(a)	Any two from: two curves/loops drawn from one end of coil to the other above line AB two curves/loops drawn from one end of coil to the other below line AB field pattern symmetrical by eye above and below line XY straight lines by eye within coil (accept some lines leaving side of coil near ends)	B2
	arrow from B to A	B1
11(b)(i)	electromagnet	B1
11(b)(ii)	Scrap yards/relay/motor/generator/(security) doors/(electric) bells	B1
	Total:	5

Question	Answer	Marks												
12(a)	Any 4 from: type of detector named e.g. Geiger counter place absorber between sample and detector and measure count rate uses paper to absorb/stop alpha particles if count rate or radiation decreases/is stopped/is absorbed returns to background sample is emitting alpha particles OR if count rate remains unchanged sample is emitting beta particles uses aluminium to absorb/stop alpha particles if count rate or radiation decreases/is stopped/is absorbed returns to background sample is emitting beta particles	B4												
12(b)	<table border="1"> <thead> <tr> <th>particle</th><th>charge</th><th>location</th></tr> </thead> <tbody> <tr> <td>electron</td><td>negative</td><td>outside/orbiting nucleus</td></tr> <tr> <td>neutron</td><td>neutral/zero</td><td>in the nucleus</td></tr> <tr> <td>proton</td><td>positive</td><td>in the nucleus</td></tr> </tbody> </table>	particle	charge	location	electron	negative	outside/orbiting nucleus	neutron	neutral/zero	in the nucleus	proton	positive	in the nucleus	B3
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proton	positive	in the nucleus												
	Total:	7												