Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

PHYSICS **5054/22**

Paper 2 Theory **October/November 2017**

MARK SCHEME

Maximum Mark: 75

Published

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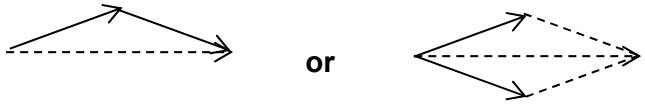
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Question	Answer	Marks
1(a)	scale at least: 1.0 cm : 10 kN	**B1**
	correct triangle **or** correct parallelogram **and** resultant, i.e.  **or**	**B1**
	90 kN ⩽ resultant ⩽ 94 kN	**B1**
1(b)	no <u>resultant</u> force **or** balanced forces **or** all forces cancel	**B1**
	(force of tugboats cancelled) by drag / water resistance / water friction etc.	**B1**

Question	Answer	Marks
2(a)	shape	**B1**
	size / volume / density	**B1**
2(b)(i)	0.12 N	**B1**
2(b)(ii)	<u>weight</u> of first spring (increases extension) **or** <u>weight</u> of first spring (takes spring beyond the limit of proportionality)	**B1**
2(b)(iii)	where / point / load / extension / limit beyond which the extension is not directly proportional to load / extension-load graph is not straight	**B1**
2(c)(i)	elastic potential energy	**B1**
2(c)(ii)	friction / air resistance mentioned **or** thermal energy / heat produced	**B1**

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Question	Answer	Marks
3(a)	(P =) F / A **or** 240 / (0.44 × 0.21) **or** 240 / 0.092(4)	**C1**
	2.6×10^3 Pa	**A1**
3(b)	atmospheric pressure (is acting on the block / ground)	**B1**
3(c)(i)	0.065 m **or** 6.5 cm **or** 65 mm	**B1**
3(c)(ii)	**two** separate approaches **I** / **II**	
	I centre of mass rises	**B1**
	gravitational potential energy gained	**B1**
	or **II** block has weight	**B1**
	force **moves or** something moves in direction of force **or** force makes block move / rotate	**B1**

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Question	Answer	Marks
4(a)(i)	(*E* =) *Pt* **or** 75 × 63 **or** 75 × 63 × 60	**C1**
	75 × 63 × 60 × 60 **or** 2.835×10^5 **or** 0.075 × 63	**C1**
	1.7×10^7 J	**A1**
4(a)(ii)	2.0×10^6 J	**B1**
4(b)(i)	non-renewable **and** gets used up / not replaced / will run out / finite	**B1**
4(b)(ii)	**three** separate approaches **I** / **II** / **III**	
	I greenhouse gases / CO / CO_2 emitted	**B1**
	global warming / <u>increase</u> greenhouse effect / ice caps melt	**B1**
	or II acid rain / NOx / SO_2 emitted	**B1**
	breathing difficulty / damage to buildings / acidify lakes **or** damages / kills plants / sea-life / animals / fish	**B1**
	or III oil spills	**B1**
	damages / kills plants / sea-life / animals / fish	**B1**

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Question	Answer	Marks
5(a)	joining together of (small) nuclei (to make bigger nuclei)	**B1**
	energy released	**B1**
	hydrogen (used) **or** helium (produced)	**B1**
5(b)	electromagnetic radiation / infra-red / light / ultraviolet	**B1**
	travels through vacuum **or** no medium needed	**B1**

Question	Answer	Marks
6(a)	reflection of sound	**B1**
6(b)(i)	decreases	**B1**
6(b)(ii)	does not change	**B1**
6(c)	(λ =) c / f **or** 330 / 3700	**C1**
	0.089 m **or** 8.9 cm **or** 89 mm	**A1**

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Question	Answer	Marks
7(a)(i)	$1/R = 1/R_1 + 1/R_2$ **or** $R_1R_2/(R_1 + R_2)$ **or** $1/R = 1/1800 + 1/9000$ **or** $9000 \times 1800/10\,800$ **or** 0.00066667	**C1**
	1500 Ω	**A1**
7(a)(ii)	(I =) V/R **or** $4.5/1500$	**C1**
	0.0030 A **or** 3.0×10^{-3} A **or** 3.0 mA	**A1**
7(b)(i)	increases **and** resistance of LDR decreases	**B1**
7(b)(ii)	does not change **and** resistance / e.m.f. does not change / not affected by LDR	**B1**

Question	Answer	Marks
8(a)	(Q =) It **or** 120×3.5	**C1**
	420 C	**A1**
8(b)	(small current) magnetises something physical **or** produces a magnetic field **or** produces an electromagnet	**M1**
	(terminals of motor) switch / contacts / terminals (in first circuit) attract / close	**A1**

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Question	Answer	Marks
9(a)(i)	(*F* =) *ma* **or** 160 × 0.35	**C1**
	56 N	**A1**
9(a)(ii)	(*v* = *u* +) *at* **or** 0.35 × 1.2	**C1**
	0. 42 m / s	**A1**
9(b)(i)	straight line of positive gradient from origin to *t* = 1.2 s	**B1**
	horizontal line after *t* = 1.2 s	**B1**
9(b)(ii)	area mentioned	**B1**
	area under the line **or** convert cm^2 (of graph paper) to distance **or** in terms of the scales	**B1**
9(c)(i)	**1** arrow from space-station towards centre of Earth	**B1**
	2 gravitational field / attraction	**B1**
	of Earth	**B1**
9(c)(ii)	**two** separate approaches	
	I change of displacement	**M1**
	per unit time **or** divided by time	**A1**
	or **II** rate of change of distance **or** distance moved per unit time	**M1**
	in specified direction	**A1**
9(c)(iii)	**1** (it / velocity) changes **and** (because its) direction changes / force perpendicular to velocity	**B1**
	2 (remains) constant **and** depends on speed / g.p.e. remains constant / (k.e.) is a scalar quantity / speed is constant	**B1**

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Question	Answer	Marks
10(a)(i)	(I =) P / V **or** 2.8 / 230 **or** 2800 / 230	**C1**
	0.012 **or** 12	**C1**
	12 A	**A1**
10(a)(ii)	12 A < integral number of amperes < 20 A	**B1**
10(b)(i)	(Q =) $m\Delta Tc$ **or** 6.3 × (49 – 23) × 4200 **or** 6.3 × 26 × 4200	**C1**
	6.9×10^5 J	**A1**
10(b)(ii)	more thermal energy is lost (per unit time)	**B1**

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Question	Answer	Marks
10(c)(i)	(when heated) water expands / volume of water increases / water becomes less dense	**B1**
	heated water / water with more energetic particles rises	**B1**
	cooler / denser water sinks **or** circulation **or** convection current	**B1**
10(c)(ii)	**two** separate approaches **I** / **II**	
	I atoms / molecules / ions / particles vibrate (more violently)	**B1**
	collide with neighbouring atoms/molecules / ions / particles	**B1**
	energy / heat / vibration passed on (to neighbour)	**B1**
	or II particles / atoms / molecules / ions vibrate (more violently)	**B1**
	atoms / molecules / ions / particles strike electrons	**B1**
	electrons travel through transporting energy / heat	**B1**
10(c)(iii)	particles / molecules / atoms move apart (on average)	**B1**
	volume increases **and** density decreases	**B1**

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Question	Answer	Marks
11(a)(i)	steel	**B1**
11(a)(ii)	iron	**B1**
11(a)(iii)	iron B1 **(i)** and **(iii)** both correct B1 **(ii)** correct	
11(b)(i)	clear use (e.g. change voltage / current)	**M1**
	detail of operation (to transmit electricity **or** in a charger etc.)	**A1**
11(b)(ii)	**1** *voltage* on vertical axis **and** *time* on horizontal axis	**B1**
	clear attempt at sinusoidal curve for at least one cycle	**B1**
	2 (V_S =) $V_P N_S / N_P$ **or** 220 × 85 / 1700	**C1**
	11 V	**A1**
11(c)(i)	**1** magnetic field / flux / flux linkage mentioned	**B1**
	magnetic field (lines) cut solenoid **or** v.v. **or** changing (magnetic) field / flux / flux linkage (in solenoid)	**B1**
	induced e.m.f. / voltage	**B1**
	2 it / current magnetises solenoid / produces magnetic field / flux(linkage) in solenoid / produces a S-pole (in solenoid)	**B1**
	magnet repelled **or** experiences a force to the left	**B1**
11(c)(ii)	smaller reading / deflection	**B1**
	reading in opposite direction	**B1**

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