

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge Ordinary Level

MARK SCHEME for the May/June 2015 series

5054 PHYSICS

5054/21

Paper 2 (Theory), maximum raw mark 75

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Page 2	Mark Scheme	Syllabus	Paper
	Cambridge O Level – May/June 2015	5054	21
1	(a) (i) 60 m		B1
	(ii) 12 s		B1
	(b) (i) straight line from origin to 200 m at 40 s any line straight or curved from (40,200) to (60,500)		B1 B1
	(ii) $s = d/t$ or 500/60 8.3 m/s		C1 A1
2	(a) (i) force moves through a distance (in same direction)		B1
	(ii) chemical (potential) energy		B1
	(b) (i) 480 Nm		B1
	(ii) attempt to apply moments with two forces and distances 400 N		C1 A1
3	(a) Pa or N/m^2 or cm of mercury or atmosphere(s)		B1
	(b) correct points plotted at $(0.5V_0, 2P_0)$ and $(2V_0, 0.5P_0)$ curve through points of decreasing gradient		B1 B1
	(c) molecules hit sides/piston		B1
	more molecules hit per second/hit more frequently		B1
	molecular impacts create large(r) force (upwards on piston)		B1
4	(a) oscillate/vibrate stated or described transverse movement described		B1 B1
	(b) 0.40 m		B1
	(c) (i) $v = f\lambda$ or $(f =) v/\lambda$ or 2/(b) 5.0 Hz		C1 A1
	(ii) clear attempt to draw wave moved along 0.20 m to right		B1
5	(a) $\sin i/\sin r$ or $\sin 50/\sin 30$ 1.5(321)		C1 A1

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	(b) moving from more dense to less dense medium or moving to lower refractive index (air) angle of incidence is greater than critical angle		B1 B1
	(c) less heat loss / more efficient less chance of hacking / more secure / less interference less reduction in signal / less need for boosting / larger distances possible / thinner or less bulky		B1
6	(a) (i) $(I =) V / R$ or 6/60 0.1(0) A		C1 A1
	(ii) $(I =) P / V$ or 0.9/6 or 0.15 (A) seen 0.25 A		C1 A1
	(b) (i) lamp correctly drawn in series with resistor but not the lamp		B1
	(ii) less voltage (across lamp) because some voltage across resistor / shares voltage with resistor or less current because of effect of resistor		B1
7	(a) field lines of magnet mentioned or magnetic flux mentioned field lines cut the coil or flux changes		B1 B1
	(b) reversed movement of magnet causes one of <ul style="list-style-type: none"> • reversal of (induced) emf • reversal of (induced) current • field lines cut / flux change in reverse direction LED emits light when current passes in one direction		B1 B1
	(c) more current or more induced emf and flux lines cut faster or faster change in flux		B1
8	(a) emission of electrons emission caused by heat / high temperature		B1 B1
	(b) anode positive anode attracts / accelerates electrons or electric field between filament and anode		B1 B1
	(c) two sets of plates shown at 90° to each other with connection(s) labelled y plates and x plates / time base		B1 B1

Page 4	Mark Scheme	Syllabus	Paper
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- 9 (a) (i) speed and mass B2
- (ii) 1 speed and direction
or distance/time and direction
or displacement/time B1
- 2 direction changes B1
- (iii) force of gravity from/towards Earth B1
force is centripetal B1
or at right angles to motion/velocity
- (b) (i) 450 000 N B1
- (ii) $(a =) F/m$ or 50 000/40 000 C1
1.25 m/s² A1
- (c) (i) same change in velocity/speed M1
in same time period A1
- (ii) start at origin and straight line for first 4 minutes B1
gradient increases at first after 4 and then decreases B1
constant speed from 10 minutes until 12 minutes B1
- (iii) area **under** graph B1
- 10 (a) (liquid) molecules not arranged (so) regularly B1
(liquid) molecules not vibrating/moving in same direction B1
or do not have same speed
- (b) (i) molecules/liquid escape (from surface)/break bonds B1
- (ii) fast moving/more energetic molecules evaporate/escape B1
leaving slow molecules or molecules with less **kinetic** energy (on average) B1
- (c) (i) hot air rises B1
- (ii) (steam) condenses or changes to liquid (on thermometer) B1
or heat (conducted) from hot to cold
gives out latent heat (to thermometer) B1
or explanation involving bonds being made

Page 5	Mark Scheme	Syllabus	Paper
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	(iii) 1	$(E =)Pt$ or 200×120 24 000 J	C1 A1
	2	$(E =) mcT$ or $100 \times 4.2 \times 20$ 8400 J	C1 A1
	3	$(E =) mL$ or 5×2250 11 250 J	C1 A1
	4	4350 J or $1 - (2+3)$	B1
11 (a)	(i)	51	B1
	(ii)	more protons than electrons or different number of protons and electrons positive and negative do not cancel	B1 B1
	(iii)	25 protons a different number of neutrons	B1 B1
(b)	(i)	147	B1
	(ii)	α has mass number 4 α has proton number 2 correct proton number for U ecf their value for α	B1 B1 B1
(c)	(i)	alpha particles only travel a short distance in air or alpha particles stopped / scattered / deflected by air or alpha particles ionise air	B1
	(ii)	particles come off in different directions or not emitted in one line / as a ray or not all the particles pass through the slit	B1
	(iii)	B correct shape and deflected more than A	B1
	(iv)	particles close to / fired at the nucleus are deflected (back) / repelled some particles pass (straight) through a few particles come back / large deflection or most pass (straight) through (with little deviation) and how this explains the nucleus is small	B1 B1 B1