

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge Ordinary Level

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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	505

- 1 (a) (i) 60 m
(ii) 12 s
- (b) (i) straight line from origin to 200 m at 40 s B1
any line straight or curved from (40,200) to (60,500) B1
- (ii) $s = d/t$ or $500/60$ C1
8.3 m/s 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 C1
400 N 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 $(2V_0, 0.5P_0)$ B1
curve through points of decreasing gradient 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 B1
transverse movement described B1
- (b) 0.40 m B1
- (c) (i) $v = f\lambda$ or $(f =) v/\lambda$ or $2/(b)$ C1
5.0 Hz A1
- (ii) clear attempt to draw wave moved along 0.20 m to right B1
- 5 (a) $\sin i/\sin r$ or $\sin 50/\sin 30$ C1
1.5(321) A1

Page 3	Mark Scheme	System Paper
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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
- (c) less heat loss / more efficient B1
less chance of hacking / more secure / less interference
less reduction in signal / less need for boosting / larger distances possible / thinner
or less bulky
- 6 (a) (i) $(I=) V/R$ or 6/60 C1
0.1(0) A A1
- (ii) $(I=) P/V$ or 0.9/6 C1
or 0.15 (A) seen A1
0.25 A 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 B1
or less current **because** of effect of resistor
- 7 (a) field lines **of magnet** mentioned or magnetic flux mentioned B1
field lines cut the coil or flux changes B1
- (b) reversed movement of magnet causes one of B1
- 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
- (c) more current or more induced emf B1
and flux lines cut faster or faster change in flux
- 8 (a) emission of electrons B1
emission caused by heat / high temperature B1
- (b) anode positive B1
anode attracts / accelerates electrons B1
or electric field between filament and anode
- (c) **two sets** of plates shown at 90° to each other with connection(s) B1
labelled y plates **and** x plates / time base B1

Page 4	Mark Scheme	Syllabus Paper
	Cambridge O Level – May/June 2015	505

- 9 (a) (i) speed and mass
- (ii) 1 speed and direction
or distance/time and direction
or displacement/time
- 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/s^2 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
- 2 $(E =) mcT$ or $100 \times 4.2 \times 20$
8400 J
- 3 $(E =) mL$ or 5×2250
11 250 J
- 4 4350 J or 1 – (2+3)
- 11 (a) (i) 51
- (ii) more protons than electrons
or different number of protons and electrons
positive and negative do not cancel
- (iii) 25 protons
a different number of neutrons
- (b) (i) 147
- (ii) α has mass number 4
 α has proton number 2
correct proton number for U ecf their value for α
- (c) (i) alpha particles only travel a short distance in air
or alpha particles stopped / scattered / deflected by air
or alpha particles ionise air
- (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
- (iii) B correct shape and deflected more than A
- (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