

MARK SCHEME for the May/June 2013 series

0625 PHYSICS

0625/21

Paper 2 (Core Theory), maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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NOTES ABOUT MARK SCHEME SYMBOLS & OTHER MATTERS

B marks	are independent marks, which do not depend on any other marks. For a B mark to be scored, the point to which it refers must actually be seen in the candidate's answer.
M marks	are method marks upon which accuracy marks (A marks) later depend. For an M mark to be scored, the point to which it refers must be seen in a candidate's answer. If a candidate fails to score a particular M mark, then none of the dependent A marks can be scored.
C marks	are compensatory method marks which can be scored even if the points to which they refer are not written down by the candidate, provided subsequent working gives evidence that they must have known it, e.g. if an equation carries a C mark and the candidate does not write down the actual equation but does correct working which shows he knew the equation, then the C mark is scored.
A marks	are accuracy or answer marks which either depend on an M mark, or which are one of the ways which allow a C mark to be scored.
c.a.o.	means "correct answer only".
e.c.f.	means "error carried forward". This indicates that if a candidate has made an earlier mistake and has carried his incorrect value forward to subsequent stages of working, he may be given marks indicated by e.c.f. provided his subsequent working is correct, bearing in mind his earlier mistake. This prevents a candidate being penalised more than once for a particular mistake, but only applies to marks annotated "e.c.f."
e.e.o.o.	means "each error or omission".
brackets ()	around words or units in the mark scheme are intended to indicate wording used to clarify the mark scheme, but the marks do not depend on seeing the words or units in brackets, e.g. 10 (J) means that the mark is scored for 10, regardless of the unit given.
<u>underlining</u>	indicates that this <u>must</u> be seen in the answer offered, or something very similar.
OR/or	indicates alternative answers, any one of which is satisfactory for scoring the marks.
Spelling	Be generous about spelling and use of English. If an answer can be understood to mean what we want, give credit.
Significant figures	Answers are acceptable to any number of significant figures ≥ 2 , except if specified otherwise, or if only 1 sig.fig. is appropriate.
Units	Incorrect units are not penalised, except where specified. More commonly, marks are allocated for specific units.
Fractions	These are only acceptable where specified.
Extras	Ignore extras in answers if they are irrelevant; if they contradict an otherwise correct response or are forbidden by mark scheme, use right + wrong = 0.
Ignore	Indicates that something which is not correct is disregarded and does not cause a right plus wrong penalty.
Not/NOT	Indicates that an incorrect answer is not to be disregarded, but cancels another otherwise correct alternative offered by the candidate i.e. right plus wrong penalty applies.

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1	(a) $15 \pm 1 \text{ (cm}^3\text{)}$	B1
	(b) level shown at $40 \pm 1 \text{ cm}^3$ OR $25 +$ candidate's (a) $\pm 1 \text{ cm}^3$ on magnified figure	B1
	(c) idea of goes up further OR more sensitive OR idea of small variations causing larger height differences OR larger divisions / more gradations	B1
		[Total: 3]
2	(a) (i) $D = M / V$ in any form OR $D \times V$ 2300×0.0012 2.76 OR 2.8 (kg)	C1 C1 A1
	(ii) (mass of bricks =) 500×2.76 OR $500 \times$ candidate's (a)(i) (total mass =) 1480 OR e.c.f. candidate's (a)(i) yes / no ticked (expect yes), must be compatible with candidate's total mass	C1 C1 A1
	(b) (i) the <u>same</u> because made of <u>same material</u>	B1
	(ii) less than OR equivalent answer	B1
		[Total: 8]
3	(a) (frictional/tension/applied) force <u>and</u> newton/N distance <u>and</u> metre/m, centimetre/cm or correct metric unit	B1 B1
	(b) time / speed	B1
	(c) (i) smaller / less / drops	B1
	(ii) smaller / less / drops	B1
	(iii) smaller / less / drops	B1
	(d) <u>chemical</u>	B1
		[Total: 7]
4	(a) mercury/Hg OR alcohol OR named alcohol e.g. ethanol	B1
	(b) vacuum OR nothing OR empty OR vapour	B1
	(c) ice point <u>indicated</u> and labelled <u>at 0°C</u> steam point <u>indicated</u> and labelled <u>at 100°C</u>	B1 B1

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- (d) (i) moves to the right (or equivalent e.g. goes higher/up/rises) B1
- (ii) liquid expands NOT thermometer/particles expands B1
- [Total: 6]**

- 5 (a) 4 (hours) OR 5 ½ / 5.5 (hours) / 5 hours 30 mins B1
- (b) (i) 300 (km) B1
- (ii) 30 (km) B1
- (iii) 270 (km) e.c.f. (i) & (ii) B1
- (c) 2 horizontal sections clearly indicated B1
- (d) last section, however expressed e.g. after 6 hours B1
smallest slope OR smallest distance in ½ hour B1
- (e) distance ÷ time C1
300 ÷ 6.5 C1
answer in range 46–46.2 A1
correct unit e.g. km/h B1
- [Total: 11]**

- 6 (a) same pressure B1
- (b) 6 cm of oil greater B1
- (c) (i) 1. falls / decreases / down
2. rises / increases / up } both needed B1
- (ii) they move faster / more energetically o.w.t.t.e.
collisions more frequent/often or harder
collisions with walls/container/sides
larger force (on wall/container) } any 3 points B1 × 3
- [Total: 6]**

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7	(a) refracting, converging	B2
	(b) dispersing, refracting	B2
	(c) violet accept blue/purple/mauve/indigo	B1
	(d) (i) infra-red / IR	B1
	(ii) idea of lamp hot/emitting heat OR glass passes IR	B1
		[Total: 7]
8	(a) (i) principal focus / focal point / focus / focus point	B1
	(ii) PF	B1
	(b) (i) rays from top of object ray parallel to axis, to lens centre and through F ray to P and then straight on ray through other f.p. and then parallel	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> $\left. \begin{array}{l} \text{ray parallel to axis, to lens centre and through F} \\ \text{ray to P and then straight on} \\ \text{ray through other f.p. and then parallel} \end{array} \right\}$ </div> <div>any 2</div> </div>
	<u>Z</u> labelled at intersection of rays (even if rays wrong)	B1 × 2
	(ii) correct <u>inverted</u> image drawn (condone no labelling) between candidate's Z and the axis and perpendicular to axis (if no label, must be very clear what is image)	B1
		[Total: 6]
9	(a) current	B1
	(b) (i) 1. $R_1 + R_2$ OR $16 + 8$ 24 (Ω)	C1 A1
	2. $V = I R$ in any form OR V / R 12 / 24 e.c.f. 1. 0.5 A/amp/ampere(s)	C1 C1 A1 B1
	(ii) 1. 0 OR zero/nothing (ignore any unit)	B1
	2. <u>12 V</u>	B1
		[Total: 9]

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- 10 (a)** rheostat/potential divider/variable resistor/potentiometer/dimmer B1
- (b) (i)** 0 (V) OR zero OR nothing B1
- (ii)** 12 (V) B1
- (c)** idea of increasing brightness as S moves from A to B C1
appropriate correct comment on resistance or voltage A1
[Total: 5]
- 11 (a)** towards top of page B1
- (b)** indication of battery connected correctly to the bare wires B1
magnet's poles shown either side OR end OR above and below X C1
magnetic field clearly vertical and interact with conductor A1
[Total: 4]
- 12 (a)** inside positive / + / +1 B1 + B1
outside negative/ – / –1 B1 + B1
inside no charge / nothing / neutral / 0 B1 + B1
- (b) (i)** electron B1
- (ii)** electron B1
[Total: 8]