

## **MARK SCHEME for the October/November 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 October/November 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".
- o.w.t.t.e.** means "or words to that effect".
- 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.
- Underlining** indicates that this must 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  $\geq 2$ , 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) (i)** 7 minutes 20 seconds
- (ii)** 440 (s)  
division by 40  
11 (s)
- (b)** (speed =) distance/time in any form  
75/15  
5 (m/s)  
Note: 6.8 (m/s) gains 2 marks as correctly using time 11(s) from (a)
- [Total: 7]**
- 2 (a)** (D = ) mass/volume  
476/35  
13.6 OR 13 600  
g/cm<sup>3</sup> OR kg/m<sup>3</sup>  
note: if value calculated, unit must agree with value)
- (b)** top box ticked (mass of water is less than mass of mercury)
- (c) (i)** middle box ticked (stays the same)
- (ii)** top box ticked (decreases)
- [Total: 7]**
- 3 (a)** turning effect OR force x distance (between force and pivot)
- (b) (i)** equal (magnitude) accept the same size/balanced  
note: no turning effect is insufficient  
opposite direction  
note: CW moment = ACW moment scores both marks
- (ii)** 1. at pivot (however expressed) e.g. idea of where plank in contact with log  
2. upwards accept up, vertically is insufficient
- [Total: 5]**

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- 4 (a) number of (complete) vibrations/oscillations/waves per second/unit time  
note: rate of oscillations/vibrations scores both marks
- (b) (i) particles/air/solid vibrates/is moved OR prongs push/collide with air molecules B1  
reference to/idea of (sound) waves B1  
idea of pressure/longitudinal/compressions/rarefactions (transmitted through air) B1
- (ii) amplitude decreases o.w.t.t.e. e.g. smaller vibration of prongs B1  
NOT slower vibrations / frequency decreases / less vibrations
- (iii) pitch C1  
lower pitch / octave lower ignore lower/less sound NOT louder/quieter A1
- [Total: 8]**






- 5 (a) thermometer B1
- (b) reduce heat loss/transfer B1  
accept keeps heat in/insulates
- (c) balance OR scales, condone scale / weighing machine, accept measuring cylinder B1  
find mass of empty beaker/container/apparatus, accept measure volume of water B1  
find mass of beaker/container/apparatus + water, accept look up density of water B1  
subtract the two masses, accept use  $M = D \times V$  B1  
note: allow weight/weigh instead of mass, ignore if subtraction gives negative mass
- (d) bubbles (ignore "of air")  
(water) vapour accept "steam" or equivalent  
temperature/thermometer reading stops rising  
level of water decreases ignore evaporation } any 2 B2
- [Total: 8]**

- 6 (a) (i) refraction B1  
accept refracted ray, ignore bends
- (ii) 45 (°) condone no/incorrect unit B1
- (b) (i) refracted down at first surface B1  
refracted down at 2<sup>nd</sup> surface B1
- (ii) X marked above point where candidate's blue light hits screen B1
- [Total: 5]**

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- 7 (a) (i) focal length indicated  $\pm 0.2$  cm
- (ii) either principal focus clearly indicated
- (b) diminished B1  
 inverted B1  
 image distance less B1
- (c) any correct ray with appropriate refraction either at centre line or at both surfaces B1

[Total: 6]

- 8 (a) clockwise from top:
-  right B1
-  left B1
-  right OR accept left if top compass is left B1
- sloping away from letter N any angle from  up to  B1
- (b) no effect B1  
 no effect B1  
 attracts B1  
 attracts B1

[Total: 8]

- 9 (a) resistor B1
- (b) (i) 6.0 V OR 6 V, unity penalty applies B1
- (ii) 6.0 V OR 6 V, unity penalty applies unless penalised in (i), no e.c.f. from (i) B1
- (iii) 250 mA OR 0.25 A, unit penalty applies unless penalised in (i) or (ii) B1
- (c)  $(R =) V/I$  C1  
 6/0.25 OR 6/250 C1  
 24 OR 0.024 A1  
 $\Omega$  OR ohm(s) OR  $k\Omega$  (note: if value calculated, unit must agree with value) B1

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- (d) (i) decreases  
(ii) increases  
(iii) unchanged  
accept no effect/none
- B1

[Total: 11]

- 10 (a) motors correctly connected in parallel across output  
(b)  $V_1/V_2 = N_1/N_2$  in any form  
suitable substitution e.g.  $18/240 = N_1/4800$   
360  
(c) will run at reduced speed NOT will not work  
accept will work/turn slowly
- B1  
C1  
C1  
A1  
B1

[Total: 5]

- 11 (a) (i) 210 and 122 and 72  
(ii) 40–60 (s)  
45–55 (s)  
(b) background (radiation) OR any suitable example of background radiation  
accept radiation in the environment
- B1  
C1  
A1  
B1

[Total: 4]

- 12 (a) 84  
(b) 128  
(c) (i) 84 or candidate's (a)  
(ii) orbits OR shells OR outside nucleus  
(d) 208  
82
- B1  
B1  
B1  
B1  
B1

[Total: 6]