

MARK SCHEME for the October/November 2013 series

0625 PHYSICS

0625/22

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 AND 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 this incorrect value forward to subsequent stages of working, the candidate may be given marks indicated by e.c.f. provided the subsequent working is correct, bearing in mind this 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.
- 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.
- 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 the 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.

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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) 7.02 7.13 6.97 B1
- (b) evidence of adding three times C1
7.04 e.c.f. (a) A1
- (c) distance / length of slope B1
- (d) oil axles (accept oil wheels) }
steeper slope / raise plank } any 1 B1 [5]
push trolley }
- 2 (a) speed × time
OR
area under graph C1
8 × 50 C1
400 (m) A1
- (b) half candidate's (a)
OR
 $\frac{1}{2} \times \text{base} \times \text{height}$ C1
200 (m) e.c.f. from (a) A1
- (c) 600 (m) e.c.f. from (a)(b) B1
- (d) (i) equation using candidate's (c)/60 C1
10 e.c.f. (c) C1
m/s B1
- (ii) horizontal straight line at 10 m/s e.c.f. (i) M1
from 0 s – 60 s, not beyond A1 [11]

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- 3 (a) (i) food
coal
oil/diesel/petrol/etc.
gas } any 1 B1
- (ii) waves
wind
hydro (electric)
tides
geothermal
sun (light) / solar
biofuel
wood } any 1 B1
- (iii) waves
tides / tidal
hydro (electric) } any 1 B1
- (b) fossil fuels will run out/not renewable
fossil fuels increasingly expensive to extract
fossil fuels cause pollution/climate change/global warming } any 2 B1 + B1 [5]
- 4 (a) (i) tick under boy lying down M1
- (ii) larger area (of contact with floor) A1
- (b) (i) greater/more/stronger/higher than B1
- (ii) becomes less / decreases / falls B1 [4]
- 5 (a) 31 ± 2 (mm) C1
- 31 ± 0.2 (mm) A1
- (b) (i) number of waves per second/unit time B1
- (ii) reference to (vertical) displacement/distance/height/depth
half peak to trough distance / distance from mean position B1
A1
- (c) reflects / 3rd box ticked B1 [6]

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6 (a) Mark both parts together

(i)(ii) glycerol highest BP and water highest thermal capacity B1

1st explanation, needs to be comparative:
glycerol stops rising at higher temperature than water

OR

290 > 100 – both numbers must be seen B1

2nd explanation:

more energy to raise temperature (in 1 minute)

OR

4 < 8; water must be stated to score mark B1

(b) (i) conduction B1

(ii) convection B1
radiation B1

(iii) arrows indicating air moving up above heater B1
complete convection current indicated B1 [8]

7 (a) cell OR battery B1

rheostat / variable resistor / resistance B1

lamp / light / bulb B1

switch B1

(b) all 5 components shown in series B1
correct symbol for ammeter B1

(c) 2nd box ticked B1 [7]

8 (a) A and B both B1

(b) C B1

(c) D B1

(d) (i) attract c.a.o. B1

(ii) no effect / nothing c.a.o. B1 [5]

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- 9 (a) (i) at least 1 complete circle drawn C1
at least two circles not touching each other and centred on hole A1
at least 4 concentric circles not touching each other B1
- (ii) iron filings
OR
compass (needle) M1
- sprinkle / tap card
OR
move around wire / tap compass A1
- (b) (i) break circuit when current too high/large
OR
break circuit when overloaded
OR
prevent wires/circuit overheating/damage to circuit / electrocution B1
- (ii) $V = IR$ in any form
OR
 V/R C1
- 12/4 C1
- 3.0 (A)
OR
3 (A) A1
- nothing happens to circuit breaker
e.c.f. allow correct deduction based on candidate's current B1 [10]
- 10 (a) (i) normal correct B1
- (ii) reflected ray correct B1
- (iii) both angles i and r in correct place B1
- (b) bottom box $i = r$ ticked B1
- (c) (i) ray continued to upper mirror B1
reflected at correct angle B1
- (ii) parallel
OR
same (direction) B1 [7]

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- 11 (a) (i) protons and neutrons
two of each M1
A1
- (ii) easier to get inside body OR can be breathed in
reference to ability of gas to diffuse/spread/move in air } any 2 B1 + B1
danger to internal organs / damages cells }
- (b) (i) C B1
- (ii) B or D any 1 B1
- (iii) A B1
- (iv) C B1 [8]
- 12 (a) radioactive materials/sources
OR
any named radioactive material B1
- (b) to prevent access by (unauthorised) people / can only be opened by key holder B1
- (c) to reduce/prevent escape of radiation/radioactive emissions C1
to reduce/prevent escape of beta or gamma radiation A1 [4]