

**MARK SCHEME for the May/June 2009 question paper
for the guidance of teachers**

0625 PHYSICS

0625/02

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 must be read in conjunction with the question papers and the report on the examination.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

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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 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.

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- 1 (a) 35
- (b) vehicles/time in any form, letters words or numbers C1
 700/35 e.c.f. (a) C1
 20 e.c.f. (a) A1 [4]
- 2
- | | | | |
|---------|-------|---------------------------------|----------|
| work | ----- | force of gravity on a body | |
| | ----- | how big the body is | |
| mass | ----- | power of a given force | |
| | ----- | weight ÷ mass | |
| weight | ----- | amount of matter in a body | |
| | ----- | force × distance moved | |
| density | ----- | mass ÷ volume | |
| | ----- | the acceleration due to gravity | B1×3 [3] |
- 3 (a) 1500 B1
- (b) second box ticked (use ✓ + × = 0 for extras) B1
- (c) constant speed B1
- (d) award B1 from each of any 2 lines:
- | | |
|--|---------|
| <u>increased</u> wind/air resistance OR headwind OR roof rack) | |
| rough(er) ground OR flat tyre OR <u>increased</u> road resistance/friction) | B1 + B1 |
| brakes applied) | |
- IGNORE increased speed/changed car shape/increased load
 IGNORE driver decided to stop [5]
- 4 (a) 88 – 92 B1
- (b) his (a) B1
- (c) 840 e.c.f. (b) B1
- (d) left level up and right level down B1
 L at 80 and R at 150 B1 [5]

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- 5 (a) (i) rapid/rapid heat transfer/gain OR rapid reading/response
NOT sensitivity/temperature transfer
- (ii) strength OR reduce chance of breaking OR to magnify the thread
ignore any mention of safety B1
- (iii) sensitivity or equiv. (e.g. idea of large movement of thread) B1
- (b) mercury OR alcohol B1
- (c) 0 and 100 B1
°C on at least 1 temperature B1 [6]
- 6 (a) (i) decreasing OR getting lower/quieter/softer M1
- (ii) amplitude/length of wave decreased OR waves got smaller
NOT wavelength decreased A1
- (b) (i) nothing OR constant M1
- (ii) waves equally spaced OR wavelength/period/T constant A1
- (c) (i) 12 – 14 B1
- (ii) 1. 300 (waves, oscillations, vibrations) every second B1
2. 1/300 (s) OR 0.0033 OR 0.003 with indication of recurring 3 B1
3. 1/300 × 12 OR 12/300 C1
0.04 (s) e.c.f. A1
- (d) (i) yes/✓)
)
- (ii) yes/✓) -1 e.e.o.o. B2
)
- (iii) no/✓) [11]

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- 7 (a) (i) 1. normal correct, by eye
2. i correctly labelled
- (ii) $i = r$ in any recognisable form accept incidence = refraction
NOT $\sin i = \sin r$ B0 for refraction, refraction, reflaction B1
- (iii) V B1
- (iv) none B1
- (b) be reasonably generous:
correct inversion M1
stem approx. parallel to card edge A1 [7]
- 8 (a) (i) iron (rod) B1
- (ii) plastic (rod) B1
- (b) S S N B1
- (c) – somewhere on or near rod D, near end C
condone extra + or – signs unless contradict B1
- (d) one needle pointing N, by eye C1
both needles pointing N, by eye A1 [6]

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- 9 Apply max 1 un. pen. in (a) and (b) together. Apply at first instance of unit penalty.
- (a) (i) 6 V B1
(ii) 50 mA OR 0.05 A B1
- (b) $R = V/I$ in any form, letters, words, numbers OR V/I C1
6/50 OR 6/0.05 e.c.f. (a) OR 0.12Ω (0.12 Ω gets 2, 0.12 gets 1) C1
120 Ω c.a.o. accept V/A instead of Ω A1
- (c) (i) increase resistance/ohms OR add another resistor C1
OR decrease e.m.f./voltage/p.d.
double resistance/ohms OR add another R (in series)
OR halve e.m.f./voltage/p.d. OR use 3 V cell/battery
OR remove one cell/battery OR use only 1 cell/battery A1
- (ii) idea of breaking the circuit OR removing battery B1
OR make voltage zero OR switch off
- (d) (i) infinite OR very large (if figure quoted, must be ≥ 25 A) B1
NOT just "higher"
- (ii) idea of damage but NOT "blows up" C1
ammeter – coil burnt out OR pointer bent)
battery – overheats OR runs flat quickly) any 1 A1
circuit – overheat/burn out/insulation melts)
NOT it trips out [11]
- 10 (a) XY would move up/anticlockwise/motion reversed/pan moves down B1
- (b) (i) 1. sensible choice of F scale) B1
) both lost if scales reversed
sensible choice of I scale) B1
2. 4 points correctly plotted ($\pm \frac{1}{2}$ small square) –1 e.e.o.o. B2
– B0 if ridiculous scale on either axis (e.g. non-linear, 3, 7, 9 etc.)
– can award both marks if scales interchanged but otherwise O.K.
– if any blob clearly >1 square diameter, then –1 for each (max 2)
3. reasonable straight line through his points, including 0,0 B1
- (ii) 0.036 – 0.038 OR his correct value ± 0.0005 (B0 if ridiculous scale) B1
- (c) (electric) motor OR ammeter OR galvanometer OR voltmeter B1 [8]
NOT generator/electronic balance

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- 11 For (a), (b) and (c), mark the names, not the box
- (a) CATHODE in bottom left box B1
- (b) UP & DOWN in top middle box B1
- (c) GLOWS in bottom right box B1
- (d) battery shown connected across heater filament, any recognisable symbol ignore extra wires if it would work B1
- (e) electrons NOT beta particles NOT positive electron B1
- (f) vacuum ticked (use ✓ + × = 0 for extras) B1 [6]
- 12 (1) electron(s) electromagnetic radiation/waves/rays B1 + B1
 OR e (ignore any prefix or suffix) NOT just rays etc.
- ~ 8000 units OR very large zero/nothing B1 + B1
 NOT small/almost nothing
 NOT – (dash)
- negative allow – (dash) no charge OR zero/neutral B1 + B1
 NOT negligible
 NOT – (dash)
- idea of not very (penetrating) idea of extremely (penetrating) B1 + B1
 OR stopped (but if a substance is mentioned, it must be appropriate, not air) OR not stopped (but if a substance is mentioned, it must be appropriate)
- NOT “not penetrating” NOT very/strongly/highly penetrating
 NOT slowly penetrating NOT very fast penetrating [8]