

**Physics B**

General Certificate of Secondary Education **B652/01**

Unit 2: Modules P4, P5, P6

**Mark Scheme for June 2010**

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| Question |     | Expected Answers  | Marks    | Additional Guidance   |
|----------|-----|---|----------|---|
| 1        | (a) | rub it with a cloth / duster / other insulator (1)  | 1        | <b>allow</b> named insulator e.g. wool / cotton / silk / nylon / etc (1)<br><b>allow</b> rub unless contradiction e.g. rub with steel (1)<br><b>ignore</b> ref to charge on cloth / plastic   |
|          | (b) | 2 (1)   | 1        | <b>allow</b> correct answer ringed ticked or underlined if answer line is blank (1)   |
|          | (c) | makes circuit to <b>earth</b> (1)   | 1        | <b>allow</b> becomes <b>earthed</b> or is <b>earthed</b> (1)<br><b>allow</b> ground as alternative to earth (1)<br><b>allow</b> reference to current / charge <b>passing through</b> body (1)   |
|          | (d) | <b>any one from:</b><br>printer (1)<br>photocopiers (1)<br>dust precipitator / suitable description (1)<br>paint spraying / spraying cars (1) | 1        | <b>ignore</b> collector / filter<br><b>not</b> just painting / painting cars<br><br><b>allow</b> cling film (1)<br><b>allow</b> <u>electrostatic</u> loudspeakers (1)<br><b>allow</b> duster (1)<br><br><b>not</b> balloons<br><b>not</b> defibrillator |
|          |     | <b>Total</b>  | <b>4</b> |   |

| Question     |     | Expected Answers  | Marks    | Additional Guidance   |
|--------------|-----|---|----------|---|
| 2            | (a) | earth (1)   | 1        | <b>allow</b> correct answer ringed ticked or underlined if answer line is blank (1) |
|              | (b) | <p style="text-align: right;">(2)</p>                               | 2        | <b>all</b> correct (2)<br>one or two correct (1)                                    |
|              | (c) | 2.4 (ohms) (2)<br><b>but</b> if answer is incorrect<br>$12/5 =$ (1) | 2        | <b>ignore</b> units   |
| <b>Total</b> |     |   | <b>5</b> |   |

| Question |     | Expected Answers   | Marks    | Additional Guidance   |
|----------|-----|--|----------|---|
| 3        | (a) | measure the speed / flow of blood (1)<br>breaking kidney stones (1)  | 1        | <b>allow</b> breaking gallstones (1)<br><b>allow</b> cleaning using ultrasound (1)<br><b>allow</b> muscle or ligament treatment (1)<br><b>allow</b> treating cancer (1)<br><br><b>not</b> body scans / pregnancy scans                                |
|          | (b) | (very) high frequency sound / above 20 000 Hz (1)<br><br><b>above</b> threshold / range of human hearing (1) | 1        | <b>allow</b> high or very high pitch (1)<br><b>not</b> just high<br><br><b>not</b> just impossible to hear<br><b>not</b> just a longitudinal wave   |
|          | (c) | region where <b>particles</b> are (close(er)) together (1)   | 1        | <b>allow</b> clear diagrams showing marking point (1)<br><b>allow</b> high pressure / concentration / density of <b>particles</b> (region) (1)<br><b>ignore</b> where waves are close together<br><b>ignore</b> shorter wavelength / higher frequency |
|          |     | <b>Total</b>   | <b>3</b> |   |

| Question |     | Expected Answers          | Marks    | Additional Guidance   |
|----------|-----|---------------------------|----------|---|
| 4        | (a) | electromagnetic waves (1) | 1        | <b>allow</b> higher level answers such as similar wavelength / frequency / speed / travel in vacuum (1)<br><b>ignore</b> general wave properties<br><b>ignore</b> penetrative properties<br><b>ignore</b> reference to cause / treat cancer |
|          | (b) | smoke detector (1)        | 1        | <b>allow</b> smoke alarm (1)<br><b>not</b> fire alarm<br><b>allow</b> emergency exit signs (1)<br><b>allow</b> treatment of cancer (1)<br><b>allow</b> old fashioned luminous paint (1)<br><b>allow</b> heart pacemaker (1)                 |
|          | (c) | (i)                       | 1        | <b>allow</b> neutron (1)<br><b>ignore</b> centre or middle<br><b>not</b> proton   |
|          |     | (ii)                      | 2        | <b>ignore</b> reference to nucleus<br><b>ignore</b> any other reference to motion   |
|          |     | <b>Total</b>              | <b>5</b> |   |

| Question |     | Expected Answers  | Marks    | Additional Guidance  |
|----------|-----|---|----------|--|
| 5        | (a) | uranium (1)   | 1        | <b>allow</b> correct answer ringed ticked or underlined if answer line is blank (1)  |
|          | (b) | chain reaction in bomb is uncontrolled / out of control / ORA (1) | 1        | <b>allow</b> correct idea of differential speed / quicker (assume bomb is referred to if 'it' is mentioned) (1)<br><b>ignore</b> explosion |
|          | (c) | put it inside a reactor (1)                                       | 1        | <b>allow</b> make it absorb neutrons / bombard with neutrons (1)<br><b>ignore</b> place near to radioactive source                         |
|          |     | <b>Total</b>  | <b>3</b> |  |

| Question |     | Expected Answers                                       | Marks    | Additional Guidance   |
|----------|-----|--|----------|---|
| 6        | (a) | an athlete long jumping (1)<br>golf ball in flight (1) | 2        | deduct 1 mark for each additional box ticked - minimum mark 0 |
|          | (b) | trajectory (1)   | 1        |   |
|          | (c) | weight (1)   | 1        | <b>allow</b> gravity / gravitational force (1)                |
|          |     | <b>Total</b>   | <b>4</b> |   |

| Question |     | Expected Answers | Marks  | Additional Guidance |  |
|----------|-----|------------------|--|---------------------|--|
| 7        | (a) | (i)              | (bi)convex / converging (1)  | 1                   | <b>allow</b> positive lens (1)   |
|          |     | (ii)             | <b>all</b> rays drawn converging to a point (1)<br><br><b>but</b><br><br><b>all</b> rays meeting on principal axis (2) | 2                   | minimum of two rays<br>rays must be continuation of the incident rays<br><b>allow</b> dotted lines<br><b>ignore</b> rays inside lens<br><b>ignore</b> rays after focus |
|          |     | (iii)            | principal focus labelled (1)   | 1                   | <b>allow</b> correct position of F to left of lens - measured (1)<br><b>allow</b> ecf for F on principal axis drawn from diverging rays (1)                            |
|          | (b) |                  | focal length shorter / less / closer (1)   | 1                   | if no answer on answer line<br><b>allow</b> point marked on diagram less than focal length of answer (a) (iii) (1)   |
|          |     | <b>Total</b>     | <b>5</b>   |                     |  |

| Question     |     | Expected Answers  | Marks    | Additional Guidance   |
|--------------|-----|---|----------|---|
| 8            | (a) | Space Shuttle landing at Kennedy Space Centre (1)   | 1        | <b>allow</b> correct answer ticked or underlined (1)<br>more than one answer ringed scores 0  |
|              | (b) | Moon / moon (1)   | 1        |   |
|              | (c) | <b>any two from:</b><br>communications / tv (1)<br>military / spying / weapons (1)<br>(scientific) research / telescope / space exploration (1)<br>GPS (1)<br>mapping / exploration (1) | 2        | <b>allow</b> Sky / mobile phone (1)<br><b>allow</b> star wars (1)<br><b>allow</b> ISS / Hubble (1)<br><br><b>allow</b> sat nav / TomTom (1)<br><b>allow</b> taking pictures of Earth (1)<br><b>ignore</b> unqualified taking pictures<br><b>not</b> weather |
| <b>Total</b> |     |   | <b>4</b> |   |

| Question     |     | Expected Answers  | Marks    | Additional Guidance   |
|--------------|-----|---|----------|---|
| 9            | (a) | <b>any two from:</b><br>sound is a wave (1)<br>waves overlap (1)<br>waves interfere (1) | 2        | <b>allow</b> waves add / subtract / AW (1)<br><b>allow</b> higher level answers e.g. (Tracey) constructive interference (2)<br>Donna - destructive interference (2)<br>there is constructive and destructive interference (2)<br><br><b>allow</b> sound waves overlap / interfere (2) |
|              | (b) | straight (1)<br>medium (1)  | 2        |   |
| <b>Total</b> |     |   | <b>4</b> |   |



| Question |     | Expected Answers   | Marks    | Additional Guidance   |
|----------|-----|--|----------|---|
| 10       | (a) | 48 (2)<br><br><b>but</b> if answer is incorrect<br>(14+18) x 3/2<br>or correct average speed of 16m/s<br>or (14 +18) / 2 (1) | 2        |   |
|          | (b) | vector / velocity has <b>direction</b> (as well as magnitude)<br>/ AW (1)  | 1        | ORA eg. scalar / speed is just magnitude or <b>no direction</b> |
|          |     | <b>Total</b>   | <b>3</b> |   |

| Question |     | Expected Answers | Marks    | Additional Guidance   |
|----------|-----|------------------|----------|---|
| 11       | (a) | E                | 1        | <b>allow</b> correct answer ringed ticked or underlined if answer line is blank |
|          | (b) | C                | 1        | <b>allow</b> correct answer ringed ticked or underlined if answer line is blank |
|          | (c) | D                | 1        | <b>allow</b> correct answer ringed ticked or underlined if answer line is blank |
|          | (d) | B                | 1        | <b>allow</b> correct answer ringed ticked or underlined if answer line is blank |
|          |     | <b>Total</b>     | <b>4</b> |   |

| Question     |  | Expected Answers | Marks    | Additional Guidance                       |
|--------------|--|------------------|----------|---|
| 12           |  | <p>(2)</p>       | 2        | all correct (2)<br>one or two correct (1) |
| <b>Total</b> |  |                  | <b>2</b> |   |

| Question     |     | Expected Answers  | Marks    | Additional Guidance   |
|--------------|-----|---|----------|---|
| 13           | (a) | potential divider (1)   | 1        | allow voltage divider (1)<br>allow potentiometer (1)  |
|              | (b) | potential difference (1)  | 1        | allow voltage / volts / number less than 12 V (1)<br>not higher voltage / volts<br>ignore current / power<br>ignore $V_{out}$ |
|              | (c) | using a variable resistor / other device such as LDR or thermistor in place of $R_1$ or $R_2$ (2)<br><br><b>but</b><br>change or replace resistors $R_1$ or $R_2$ (1) | 2        | allow add variable resistor / LDR / thermistor (1)<br><br>allow change resistance (1)<br><br>ignore changing input voltage    |
| <b>Total</b> |     |   | <b>4</b> |   |

| Question |     | Expected Answers  | Marks    | Additional Guidance  |
|----------|-----|---|----------|--|
| 14       | (a) | motor (1)<br>any acceptable device with motor in it (1) | 2        | e.g. food mixer / CD or DVD player / vacuum (cleaner) or hoover / drill / microwave / washing machine / fridge / freezer etc |
|          | (b) | 50 (Hz) (1)   | 1        |  |
|          |     | <b>Total</b>  | <b>3</b> |  |

| Question |     | Expected Answers  | Marks    | Additional Guidance  |
|----------|-----|---|----------|--|
| 15       | (a) | 200 (2)<br><br><b>but</b> if answer is incorrect<br><br>$(N_s) = N_p \times V_s / V_p$<br>4000 x 11 / 220 (1) | 2        |  |
|          | (b) | idea of more turns in secondary / fewer in primary coil (1)   | 1        | <b>allow</b> correct references to diagram e.g. 'more turns on right' (1)<br><b>allow</b> coils as alternative to turns<br><b>not</b> bigger coils |
|          |     | <b>Total</b>  | <b>3</b> |  |

| Question |     | Expected Answers               | Marks    | Additional Guidance   |
|----------|-----|--------------------------------|----------|---|
| 16       | (a) | diode (1)                      | 1        | <b>allow</b> LED (1)  |
|          | (b) | voltage / pd (1)<br>signal (1) | 2        | <b>not</b> state<br><b>allow</b> voltage / potential / pd / state / level (1) |
|          | (c) | keeps alarm on / AW (1)        | 1        |   |
|          |     | <b>Total</b>                   | <b>4</b> |   |

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