

Physics B

General Certificate of Secondary Education

Unit **B651/01**: Unit 1: Modules P1, P2, P3 (Foundation Tier)

Mark Scheme for January 2012

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Annotations

| Annotation | Meaning |
|---|---------------------------------------|
|  | correct response |
|  | incorrect response |
|  | benefit of the doubt |
|  | benefit of the doubt not given |
|  | error carried forward |
|  | information omitted |
|  | ignore |
|  | reject |
|  | contradiction |

Subject-specific Marking Instructions

- / = alternative and acceptable answers for the same marking point
- (1) = separates marking points
- allow = answers that can be accepted
- not = answers which are not worthy of credit
- reject = answers which are not worthy of credit
- ignore = statements which are irrelevant
- () = words which are not essential to gain credit
- = underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
- ecf = error carried forward
- AW = alternative wording
- ora = or reverse argument

| Question | | Answer | Marks | Guidance |
|--------------|-----|---|----------|--|
| 1 | (a) | °C (1) | 1 | if answer line is blank allow correct answer ticked circled or underlined |
| | (b) | (idea of) different liquid / substance / material (1) (idea of a) different mass or weight of water / liquid (1) | 2 | allow different volume of water / different amount of water / use less water / use more water additional marking points allow adding insulation or named insulator (around beaker) allow correct reference to time e.g. heat it for longer allow different room temperature / change in room temperature |
| Total | | | 3 | |

| Question | | | Answer | Marks | Guidance |
|----------|-----|------|--|-------|--|
| 2 | (a) | (i) | idea of surface (layer) or outer part or top part cooked / heated / browned (1) (IR) reflected (onto toast) (1) | 2 | allow outside part cooked or heated or browned or toasted allow particles in surface or outer parts gain kinetic energy / k.e. allow heats the outside and then the middle or toasts from outside to inside ignore heating elements radiate IR onto toast ignore conduction and convection allow heat or energy reflected ignore bounce ignore idea of (shiny) sides reradiating IR back onto bread |
| | | (ii) | remote controls / burglar alarms / security sensors or systems / mobile phones / PDA / (short distance) data links (1) | 1 | allow TV remote ignore just phone allow examples e.g. automatic door openers / thermal imaging / night photography / radiant heater / fibre optic communications ignore just communications ignore other forms of cooking |
| | (b) | | 0.75 (2) but if answer is incorrect $36000 \div 48000$ (1) | 2 | allow 75% (2) if % clearly shown allow other units eg 0.75 N (1) 0.75 % scores (1) allow 75 alone (1) but if working is clearly shown ($36000 \div 48000 \times 100$) and answer is 75 (2) |

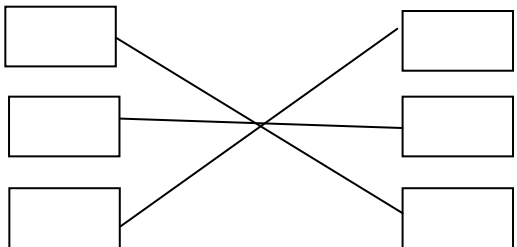
| Question | | Answer | Marks | Guidance |
|----------|-----|---|----------|---|
| | (c) | <p>any two from: double glazing (1)</p> <p>loft or roof or fibre glass or mineral wool insulation / insulation boards (1)</p> <p>cavity-wall (insulation) / foam in cavity wall (1)</p> <p>carpets or curtains / draught insulators (1)</p> | 2 | <p>ignore just wall insulation but allow insulation in walls</p> <p>allow draught excluder</p> <p>not reflective foil</p> |
| | | Total | 7 | |

| Question | | Answer | Marks | Guidance | |
|----------|-----|--|---|--|---|
| 3 | (a) | (causes) suntan or sunburn or <u>skin</u> cancer (1) | 1 | <p>allow cataracts</p> <p>allow skin ageing</p> <p>allow higher level answers e.g. melanoma / mutations in skin cells</p> <p>allow damages skin cells</p> <p>allow burns (the skin)</p> <p>ignore cancer on its own / death on own / mutations on own / harms or damages skin on own</p> | |
| | (b) | (i) | 105 (minutes) (1) | 1 | |
| | | (ii) | 210 minutes longer or three times as long (1) | 1 | <p>allow answer of x 2 answer to (b)(i)</p> <p>allow 210 (minutes) (1)</p> <p>allow error if method shown but mistake made with the number subtracted</p> <p>eg $315 - 100 = 215$ (minutes) (1)</p> <p>allow ecf from (b)(i)</p> <p>eg answer to (b)(i) is 90 then $(270-90 =) 180$ (1)</p> <p>eg answer to (b)(i) 15 then $(45-15=) 30$ (1)</p> |
| | | | Total | 3 | |

| Question | | Answer | Marks | Guidance | |
|----------|-----|--|----------------|--|--|
| 4 | (a) | portable / convenient / idea that more than one device can run from a router (1) | 1 | allow available 24 hours a day / can use at any time allow idea of can use anywhere (there is coverage at any time) allow can use it outside / at a distance from the power supply or from a long distance allow examples of convenience e.g. can walk around the house with the device | |
| | (b) | (i) | analogue (1) | 1 | if answer line is blank allow correct answer ticked circled or underlined |
| | | (ii) | D (1) | 1 | if answer line is blank allow correct answer ticked circled or underlined |
| | (c) | | reflection (1) | 1 | if answer line is blank allow correct answer ticked circled or underlined |
| | | | Total | 4 | |

| Question | | Answer | Marks | Guidance |
|--------------|-----|--|----------|--|
| 5 | (a) | <p>sound waves travel faster than EM waves <input type="checkbox"/></p> <p>EM waves all travel at the same speed <input checked="" type="checkbox"/></p> <p>high frequency EM waves travel faster than low frequency EM waves <input type="checkbox"/></p> <p>low frequency EM waves travel faster than high frequency EM waves <input type="checkbox"/> (1)</p> | 1 | allow correct answer indicated if boxes contain no ticks zero mark if more than one box ticked |
| | (b) | D (1) | 1 | if answer line is blank allow correct answer ticked circled or underlined |
| | (c) | quick(er) / more secure / more difficult to intercept (1) | 1 | allow idea that light signals can be seen over long(er) distances |
| Total | | | 3 | |

| Question | | Answer | Marks | Guidance |
|--------------|-----|--|----------|--|
| 6 | (a) | food (1) water (1) oxygen (1) | 3 | allow named example e.g. glucose allow fluid(s) / something to drink allow air / atmosphere additional marking points: allow (suitable) temperature / pressure (1) allow idea of protection from radiation (1) |
| | (b) | any two from: weather (forecasting) (1) spying / military (1) surveying / scanning / photography (1) communications / TV / radio / mobile telephone (1) GPS / satnav (1) | 2 | allow forecast ignore phone hacking allow named examples e.g. Google Earth allow receive or send information or signals allow as an additional marking point space or Hubble telescope (1) |
| Total | | | 5 | |

| Question | | Answer | Marks | Guidance |
|----------|-----|--|-------|---|
| 7 | (a) |  <p style="text-align: right;">(2)</p> | 2 | 3 correct scores (2) 1 or 2 correct scores (1) |

| Question | Answer | Marks | Guidance |
|----------|--|----------|---|
| (b) | rocks / soil / cosmic rays or cosmic radiation / building materials or named building materials / isotopes of carbon (1) | 1 | <p>allow <u>nuclear</u> testing or <u>nuclear</u> or <u>atomic</u> bombs or <u>nuclear</u> weapons / <u>nuclear</u> accidents / examples of medical use / radon / <u>nuclear</u> or <u>radioactive</u> waste (1)</p> <p>ignore nuclear power / nuclear plants ignore nuclear fallout unless qualified ignore merely buildings or equipment or hospitals or industry ignore radioactive materials ignore food / drink / animals / plants ignore simple references to the Sun e.g. from Sun (0) cosmic rays / gamma from Sun (1) solar flares (1) alpha / beta from Sun (0) not X-rays or microwaves or other e.m. waves any incorrect response (in a list) negates the mark</p> |
| (c) | <p>any three from: tongs / (handling) tools (1)</p> <p>gloves / (protective) clothing (1)</p> <p>mask / goggles (1)</p> <p>keep a distance (1)</p> <p>labelled storage / idea of a suitable container to block radiation (1)</p> <p>idea of limiting time / exposure (1)</p> <p>idea of monitoring / badges / sensors (1)</p> <p>showering / decontaminating (1)</p> | 3 | <p>allow named examples e.g. lead apron</p> <p>ignore eye wear / specs</p> <p>allow keep (immediate) area clear / no direct contact</p> <p>allow stand behind a screen (1)</p> |
| | Total | 6 | |

| Question | | Answer | Marks | Guidance |
|----------|-----|---|----------|--|
| 8 | (a) | shower / 7 (kW)... idea of high(est) power or most power or most kW (1) | 1 | both needed for mark allow more energy / more power / more kW / more electricity ignore needs a lot of power or energy / power is 7 kW |
| | (b) | red kettle / 4.5 (mins) long(est) time (1) | 1 | both needed for mark allow longer / longest (time) but ignore longest to switch on |
| | (c) | 16.8 scores (3) but if final answer is incorrect 1.4 x 12 (2) or 7 x 0.2 x 12 (2) or 7 x 0.2 or 1.4 or 168 (1) | 3 | allow 17 (3) if answer is incorrect when several different calculations are offered including the correct one no working mark can be awarded allow 84 (1) but 84 x 0.2 (2) 2.4 (1) but 2.4 x 7 (2) 7 x 12 / 0.2 x 12 (1) allow 1.4 x 0.12 or 7 x 0.2 x 0.12 = 0.17 (2) |
| | | Total | 5 | |

| Question | | Answer | Marks | Guidance |
|----------|--|--|----------|--|
| 9 | | light (1) electricity (1) direct (1) more / greater or more / greater power or more / greater energy / AW (1) | 4 | allow sunlight / light energy ignore Sun's energy not heat allow electrical energy but not just electric(al) or energy allow DC / dc allow more / greater electricity |
| | | Total | 4 | |

| Question | | | Answer | Marks | Guidance |
|--------------|-----|------|--|----------|--|
| 10 | (a) | (i) | (distance) tape measure or surveyors tape / trundle or metre wheel (1) (time) stopclock / stopwatch (1) | 2 | allow ruler or metre rule or metre stick (as distance is only 18m in this case) allow laser measuring device allow timer ignore just watch or clock |
| | | (ii) | 4 m/s (2) but if answer is incorrect 18 ÷ 4.5 (1) | 2 | |
| | (b) | (i) | accelerates <input checked="" type="checkbox"/> stays stationary <input type="checkbox"/> slows down gradually (decelerates gradually) <input type="checkbox"/> moves at a constant speed <input type="checkbox"/> slows down rapidly (decelerates rapidly) <input type="checkbox"/> (1) | 1 | if answer line blank allow correct answer ringed ticked or underlined in list |
| | | (ii) | stays stationary <input type="checkbox"/> slows down (decelerates) more than in B <input checked="" type="checkbox"/> slows down (decelerates) at the same rate as in B <input type="checkbox"/> slows down (decelerates) less than in B <input type="checkbox"/> moves at a constant speed <input type="checkbox"/> (1) | 1 | if answer line blank allow correct answer ringed ticked or underlined in list |
| Total | | | | 6 | |

| Question | | | Answer | Marks | Guidance |
|----------|-----|------|---|----------|--|
| 11 | (a) | (i) | petrol or diesel (1) | 1 | allow lpg ignore fossil fuels not oil |
| | | (ii) | kinetic / ke / KE (1) | 1 | ignore movement |
| | (b) | (i) | 9000 N (1) | 1 | if more than one answer ringed zero but if no answer ringed allow the correct answer written down |
| | | (ii) | 405000 J (1) | 1 | if more than one answer ringed zero but if no answer ringed allow the correct answer written down |
| | (c) | | braking brakes have been pressed /activated / hit (1) thinking hits the brakes / presses the (brake) pedal (1) | 2 | allow once the brakes are on / foot is on brake (pedal) ignore once the truck has braked allow actually braking but ignore just braking on its own |
| | (d) | (i) | crumple zones / air bags / brakes (1) | 1 | allow named parts of car that absorb energy e.g. bumper / wings / bonnet / wing mirror |
| | | (ii) | idea that they have been (over) stretched (1) | 1 | allow strained allow idea of loss of elasticity ignore they no longer work properly ignore damaged / weakened / deformed |
| | | | Total | 8 | |

| Question | | Answer | Marks | Guidance |
|----------|--|---|----------|---|
| 12 | | <p>downward direction / towards Earth / fall because of: weight or gravity (1)</p> <p>upward direction / against movement due to: resistive force / drag / frictional force (1)</p> <p>and any one from: resistive / drag / frictional force on A greater than on B / ora (1)</p> <p>resistive / drag / frictional force greater with greater (surface) area / ora (1)</p> | 3 | <p>assume answers refer to paper case B unless otherwise stated</p> <p>allow A has greater (surface) area / ora</p> |
| | | Total | 3 | |

| Question | | Answer | Marks | Guidance |
|----------|-----|--|----------|--|
| 13 | (a) | idea of force (applied) and movement or distance (1) | 1 | both needed allow use off $w = f \times d$ (1) ignore energy is being used up ignore metres / m and newtons / N |
| | (b) | (i) gravitational potential (energy) / potential (energy) / GPE / gpe / PE / pe (1) | 1 | not gravity |
| | | (ii) (Marlon) is higher / has greater mass / has greater weight / is heavier / ora (1) | 1 | allow more distance above ground but ignore just more distance allow (Marlon) has greater kinetic energy or ke / ora allow (Marlon) has a faster run up / greater speed / greater acceleration / ora ignore more power |
| | | Total | 3 | |

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