



PHYSICAL SCIENCE

0652/21

Paper 2 Core Theory

October/November 2016

MARK SCHEME

Maximum Mark: 80

Published

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| Question | Answer | Marks |
|-----------------|---|--------------|
| 1(a) | BC ; CD ; | 2 |
| 1(b) | D ; | 1 |
| 1(c) | evidence that $s = \text{area under the graph}$ (accept use of vt for this mark) ; attempt to measure triangle ; $= 40 \pm 2.5 \text{ (m/s)}$; | 3 |
| 1(d)(i) | change (per unit time) in the speed ; | 1 |
| 1(d)(ii) | steady change / change in speed of 9.8 m/s ; each second ; | 2 |

| Question | Answer | Marks |
|-----------------|---|--------------|
| 2(a)(i) | CH_2 / one carbon and 2 hydrogen atoms ; | 1 |
| 2(a)(ii) | same general formula / same functional group / gradation of or similar physical properties ; | 1 |
| 2(a)(iii) | $\text{C}_4\text{H}_9\text{OH}$; | 1 |
| 2(b) | $ \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H} - \text{C} - \text{C} - \text{OH} \\ \quad \\ \text{H} \quad \text{H} \end{array} $ | 1 |

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| Question | Answer | Marks |
|-----------------|---|--------------|
| 2(c)(i) | condenser ; | 1 |
| 2(c)(ii) | cool vapour / liquid / remove energy released as vapour condenses ; | 1 |
| 2(c)(iii) | ethanol ; lowest boiling point ; | 1 |
| 2(c)(v) | goes up / increases / OWTTE ; | 1 |

| Question | Answer | Marks |
|-----------------|---|--------------|
| 3(a) | A small cross centred on the plumbline ; | 1 |
| 3(b) | sheet swings back to its original position ; the weight provides a restoring <u>moment</u> / force ; | 2 |
| 3(c) | Suspend the plate (and plumbline) from the second hole ; mark the position of the plumbline (this mark can be awarded in either in 1st or 2nd hanging) ; centre of mass is at the intersection of the two lines ; | 3 |

| Question | Answer | Marks |
|-----------------|--|--------------|
| 4(a) | magnesium + water / steam → magnesium oxide + hydrogen ; | 1 |
| 4(b)(i) | reaction which gives out (heat) energy ; | 1 |
| 4(b)(ii) | energy needed to break bonds / mention of activation energy / energy needed to start the reaction ; | 1 |
| 4(c) | light / burning splint / flame ; pops / popping sound / explodes ; (Use of a glowing splint gets no marks) | 2 |

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| Question | Answer | Marks |
|-----------------|---|--------------|
| 4(d) | no reaction/no change/nothing ; copper is unreactive/less reactive than magnesium or hydrogen/ low in reactivity series/OWTTE ; | 2 |

| Question | Answer | Marks |
|-----------------|---|--------------|
| 5(a) | Wavelength correctly marked ; | 1 |
| 5(b) | amplitude ; frequency ; hertz ; refraction ; | 4 |
| 5(c) | At least 1 wave clearly reflected towards the left and upwards ; angle of incidence = angle of reflection ; 3 (or more) wavefronts drawn and wavelength constant = to incident wavelength ; | 3 |

| Question | Answer | Marks |
|-----------------|--|--------------|
| 6(a)(i) | any two from – malleable or ductile ; conduct <u>heat</u> ; | 2 |
| 6(a)(ii) | Any two from – solution of a salt ; molten salt ; graphite ; semiconductor ; (accept electrolyte for 1 mark as an alternative to solution of a salt or a molten salt) | max 2 |

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| Question | Answer | Marks |
|-----------------|---|--------------|
| 6(b)(i) | copper ; | 1 |
| 6(b)(ii) | colour / melting point / boiling point / density / hardness / expansivity ; | 1 |
| 6(c)(i) | zinc sulfate ; | 1 |
| 6(c)(ii) | $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$;; | 2 |

| Question | Answer | Marks |
|-----------------|--|--------------|
| 7(a)(i) | 0.4 (A) ; | 1 |
| 7(a)(ii) | <u>Use of</u> $V = I R$; $\rightarrow R_{total} = 9 / 0.4 = 22.5 (\Omega)$; | 2 |
| 7(a)(iii) | Indication that the other two resistor values are added ($10.5 + 7.5$) ; $\rightarrow R = 4.5 (\Omega)$; | 2 |
| 7(b)(i) | 2 A circled ; | 1 |
| 7(b)(ii) | 4.5 Ω circled ; | 1 |

| Question | Answer | Marks |
|-----------------|---|--------------|
| 8(a)(i) | Na^+ ; 10 ; 17 ; | 3 |
| 8(a)(ii) | Full outer shell / 8 electrons in outer shell / noble gas structure ; | 1 |
| 8(a)(iii) | argon ; | 1 |

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| Question | Answer | Marks |
|-----------------|--|--------------|
| 8(b)(i) | 3 hydrogen atoms ; lone pair between nitrogen and each hydrogen ; | 2 |
| 8(b)(ii) | 3 before H ₂ AND 2 before NH ₃ ; | 1 |
| 8(c) | 78 OR 79 ; | 1 |

| Question | Answer | Marks |
|-----------------|--|--------------|
| 9(a) | There is a current ; the iron rod is magnetised ; steel bar is attracted to the iron rod / moves towards the iron rod / the spring is compressed ; | 3 |
| 9(b)(i) | iron is easily (magnetised and) <u>demagnetised</u> / temporary magnet ; | 1 |
| 9(b)(ii) | to push rod B back into the wall ; | 1 |

| Question | Answer | Marks |
|-----------------|--|--------------|
| 10(a) | bromine formed / bromine displaced ; iodine formed / iodine displaced ; | 2 |
| 10(b) | chlorine is less reactive than fluorine ; chlorine is more reactive than bromine and iodine ; | 2 |
| 10(c) | no reaction / no change / nothing / remains colourless ; | 1 |
| 10(d) | have 7 electrons in their outer shell ; | 1 |

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| Question | Answer | Marks |
|-----------------|--------------------------------------|--------------|
| 11(a)(i) | 47 ; | 1 |
| 11(a)(ii) | 64 ; | 1 |
| 11(b)(i) | top line: 111 ; bottom line: 48 ; | 2 |
| 11(b)(ii) | cadmium / Cd ; | 1 |