OCR
Oxford Cambridge and RSA

GCSE

Further Additional Science B

Unit **B761/02:** Modules B5, C5, P5 (Higher Tier)

General Certificate of Secondary Education

Mark Scheme for June 2014

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

Annotation	Meaning of annotation
BP	Blank Page – this annotation **must** be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.

Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/ = 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 i	bone (1)	1	**if more than one answer then scores 0** **allow** named bone e.g. ankle bone (1)
ii	heart (1)	1	**if more than one answer then scores 0**
b	urea is made in the liver (shown by the increase in concentration leaving liver) (1) urea removed or excreted by the kidney (shown by the drop in concentration) (1) (not produced or excreted by the) lungs as no change in concentration (1)	3	**ignore** concentration of urea increases in the liver **allow** urea is filtered out by the kidney (1) **allow** idea that concentration of urea decreases in the kidneys (1) **allow** urea concentration not affected by lungs (1) **allow** idea that nothing happens in lungs (1) **ignore** remains at a high concentration in the lungs
	Total	**5**	

Question			Answer	Marks	Guidance
2	a		**any two from** idea that oxygen through outer surface or skin is nearly constant all year (1) idea that oxygen through outer surface or skin peaks in March (1) idea that oxygen through lungs is lower in the winter / colder months or higher in summer / warmer months (1) idea that peak uptake by lungs is higher than by outer surface or skin / ora (1) idea that uptake by lungs is higher than through outer surface or skin from March to September / ora (1) idea that between October and February rate of uptake is greater through outer surface or skin than through the lungs (1) idea that amount of oxygen taken in is the same at the end of February and/or during October for through outer surface or skin and lungs (1)	2	**need to know whether referring to outer surface or lungs** **If candidate gives a pattern not covered by mark scheme, check graph and if correct award the mark** **allow** uptake through skin is highest in March (1) **allow** peak uptake by lungs is in March / April or spring (1) **allow** December or January is the month with the lowest uptake by both lungs and outer surface or skin (1) **allow** April is the month with the highest **total** uptake (1)

Question	Answer	Marks	Guidance
b	idea that skin needs to be permeable / needs to be wet (to absorb oxygen) (1) in dry areas they would lose too much water (1)	2	**allow** need to live near water to keep skin moist (1) **allow** to prevent it drying up (1) **allow** they would dehydrate (1)
c	idea that carbon dioxide (in the blood) detected by the brain (1) idea that higher carbon dioxide levels would stimulate breathing (1)	2	**allow** higher level answers such as chemoreceptors / medulla (1) **ignore** incorrect parts of brain **allow** higher carbon dioxide levels make them breathe faster (1)
	Total	**6**	

Question	Answer	Marks	Guidance
3 a	to break them down into smaller molecules (1) so that they can be absorbed (into the blood) or pass through gut into blood (1)	2	**allow** food molecules are too large (1) **but** food molecules are too large to be absorbed (2) **allow** so the molecules are small enough to be absorbed (2)

Question	Answer	Marks	Guidance
b	**[Level 3]** **Answer includes full details of how stomach digests protein including the role of acid** **AND** **shows an appreciation that mucus prevents the cells of the stomach being digested or attacked by acid.** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** **Answer includes full details of the digestion of protein in the stomach** **OR** **limited details of digestion** **AND** **suggests how mucus works or a consequence of too little mucus**. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** **Answer includes limited details of digestion** **OR** **suggests how mucus works or a consequence of too little mucus**. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to A** **Indicative points include:** **functions-** • protease is an enzyme or a protein or a (biological) catalyst • protease digests proteins • amino acids / polypeptides produced • lock and key idea / active site idea **action of acid-** • stomach acids aid protease function • acid provides a low pH / pH approx 2 • optimum pH for protease action **mucus-** • stomach cells are made of protein • stomach could be digested by protease • stomach could be destroyed by acid • mucus lines the stomach and protects it • idea of lack of mucus causes ulcers **ignore** acid kills bacteria **ignore** mucus catch bacteria **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**8**	

Question	Answer	Marks	Guidance
4 a i	larger animals have a higher blood pressure **because** the blood has to be pumped **further** around the body /ora (1)	1	**allow** larger animals have a higher blood pressure so that the blood can reach all parts of the body or the whole body (1) **allow** idea that bigger mammals need to circulate blood around a larger surface area (1)
ii	(range bars show) a wider range of values for mean pressure (than in other animals) (1)	1	**allow** it has a big range or the range is about 40 to 62 / the blood pressure can go as low as about 40 / the blood pressure can go as high as about 62 (1) **allow** reference to mean that is farthest away from line of best fit / off the line (1) **allow** it is the same as the (rhesus) monkey (1)
b i	95(%) (2) **but if answer incorrect then** $\frac{38}{40} \times 100$ (1)	2	
ii	**any two from** fish have a single circulation (1) mammals are double (1) in fish the blood has to go through two sets of capillaries before it gets back to the heart (1)	2	**if not identified assume answer refers to trout** **allow** correct description of single circulatory system (1) **allow** correct description of double circulatory system (1) **ignore** open / closed circulatory system
	Total	**6**	

Question	Answer	Marks	Guidance
5 a i	0.1 (1)	1	
ii	2.4 (dm^3) (1)	1	**allow** 2 400 cm^3 if correct unit specified **allow ecf** from **(a)(i)**
b	M_r of Na_2CO_3 is 106 and moles = 0.5 (1) concentration = 0.5/2.0 (1)	2	**allow** M_r of Na_2CO_3 is 46 + 12 + 48 and moles = 0.5 (1)
c	$CaCO_3$ (1)	1	**more than one formula loses the mark but if equation is attempted then** $CaCO_3$ on LHS (1) **allow** Ca and CO3 gives $CaCO_3$ (1)
	Total	**5**	

Question	Answer	Marks	Guidance
6 a	H^+ / SO_4^{2-} / HSO_4^- (1)	1	**allow** H_3O^+ ignore incorrect formulae if H^+ or SO_4^{2-} or HSO_4^- is present ignore reactants in an equation
b i	same amount of acid / same number of hydrogen ions (1)	1	**allow** same amount of magnesium (1) **allow** same volume (and concentration) of acid (1) **allow** same amount of reactants (1)
ii	**any three from:** ethanoic acid is a weaker acid / hydrochloric acid is a stronger acid (1) some reference to the reacting particle being a hydrogen ion or H^+ (1) ethanoic acid has fewer (reacting) particles / ethanoic acid has less crowded particles /lower concentration of reacting particles / ethanoic acid has reacting particles that are further apart from each other / ora (1) ethanoic acid has fewer collisions (per second) / hydrochloric acid has more collisions(per second) (1)	3	**assume answer refers to ethanoic acid if unclear** **allow** ethanoic acid is a weak acid and hydrochloric acid is a strong acid / ethanoic acid does not completely ionise or dissociate but hydrochloric acid does (1) **ignore** ethanoic acid is less acidic / hydrochloric acid is more acidic **allow** hydrochloric acid has more (reacting) particle / hydrochloric acid has more crowded particles / higher concentration of reacting particles / hydrochloric acid has reacting particles that are closer together (1)
	Total	**5**	

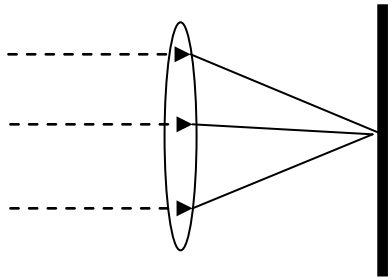
Question	Answer	Marks	Guidance
7 a	any value or range within 400 – 500 ^{o}C (1) any value or range between 1 – 10 atmospheres (1)	2	 **allow** atmospheric pressure (1)
b	(rate of reaction) increases / faster reaction (1) (position of equilibrium) does not change (1)	2	**allow** reaches equilibrium quicker (1) **allow** higher level answers involving collision theory e.g. more frequent or more successful collisions (1) **allow** no effect (1)
	Total	**4**	

Question	Answer	Marks	Guidance
8 a	**[Level 3]** **Explains that the conclusion is only partly supported by the evidence using both sets of results** **AND** **Constructs one correct ionic equation with state symbols** Quality of written communication does not impede communication of the science at this level (5 – 6 marks) **[Level 2]** **Explains that the conclusion is only partly supported by the evidence using both sets of results** **OR** **Attempts one ionic equation with correct formulae but state symbols or balancing could be wrong or missing AND explains how one result either supports or does not support the conclusion** Quality of written communication partly impedes communication of the science at this level (3 – 4 marks) **[Level 1]** **Attempts one ionic equation with correct formulae but state symbols or balancing could be wrong or missing** **OR** **Explains how one result either supports or does not support the conclusion** Quality of written communication impedes communication of the science at this level (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to A*.** **Indicative scientific points at level 3 must include:** **Balanced ionic equation** • $Pb^{2+}(aq) + 2Br^{-}(aq) \rightarrow PbBr_2(s)$ • $Pb^{2+}(aq) + 2I^{-}(aq) \rightarrow PbI_2(s)$ • $Ba^{2+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s)$ **Relevant scientific points at all levels could include explanations** • conclusion partly supported because white precipitate with barium chloride indicates sulfate ions are present • conclusion not supported because iodide ions should give a yellow precipitate with lead nitrate • conclusion not supported because a cream precipitate with lead nitrate indicates a bromide **allow** equation with chloride ion if answer uses chloride ion **allow** solid or ppt for precipitate **Use the L1, L2, L3 annotations in scoris. Do not use ticks.**

Question	Answer	Marks	Guidance
b	(idea that there is a collision between) ions or (a reaction involving) ions (1) high collision frequency / many collisions per second / high chance of collision (1)	2	 **allow** higher collision frequency between ions (2) **alternatively or if no ions mentioned in answer** **allow** idea that the reaction involves collision between positive and negative ions (1) that will attract each other (1)
	Total	**8**	

Question	Answer	Marks	Guidance
9 a	 carbohydrate **and** sodium (1)	1	**if answer line is blank allow correct answers circled, underlined or ticked in list** **both** needed **allow** salt for sodium
b	mass of salt is 3.23 g (2) **but if answer is incorrect then** idea that salt contains 39% Na / idea that 58.5 g of salt contains 23 g of sodium / idea that 23 g of sodium is found in 58.5 g of salt (1)	2	**allow** 3.22 to 3.26 (2) **allow** $\frac{58.5 \times 1.27}{23}$ (1)
	Total	**3**	

Question	Answer	Marks	Guidance
10 a	13 (m/s) (2) **but if answer is incorrect** (0 +) 0.25 x 52 (1)	2	
b	20 (s) (2) **but if answer is incorrect** $\frac{320 \times 2}{32}$ or $\frac{320 \times 2}{(10 + 22)}$ or $\frac{320 \times 2}{32}$ or $\frac{640}{32}$ or $\frac{640}{(10 + 22)}$ (1)	2	**allow** 320=16 x time (1) **allow** 320 = 32/2 x time (1) **allow** time = 320/16 (1)
c	trial **A** 600(N) or 500 + 100 (1) trial **B** 400(N) or 500 -100 (1) (so) trial **A** has a **greater** forward force or overall driving force or resultant force / ora (1) (so) trial **A** is faster / higher speed / trial **B** is slower (1)	4	**look for net forces on the diagrams** **ignore** in trial **A** wind gives him more force **allow** cyclist **A** speeds up **more** (1)
	Total	**8**	

Question	Answer	Marks	Guidance
11 a	any two (straight) rays meeting at (centre of) film and refracted inside or on surface of lens (1)	1	
b	real (1)	1	**allow** upside down / inverted / diminished (1) **if more than one answer all must be correct e.g. real and magnified scores (0), mirrored image, upside down (0)**
c	move the lens nearer the insect / move lens away from the insect (1)	1	**allow** moves lens forwards / move lens backwards (1) **allow** lens moves in / lens moves out (1) **allow** idea that lens must be the correct distance from the insect (1) **ignore** turning lens **ignore** lens moves up / down **ignore** zoom the lens **ignore** lens must be close to the insect **ignore** change camera settings
d	2.5 (2) **but if answer is incorrect** 12.5 / 5 scores (1)	2	**ignore** units
	Total	**5**	

Question	Answer	Marks	Guidance
12	**[Level 3]** **Reference to large number and high speed of particles** **AND** **the change in momentum of colliding particles creating forces.** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** **Reference to large number or high speed of particles** **OR** **reference to idea of conservation of momentum of particles creating forces.** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** **Simple reference to momentum** **OR** **simple reference to forces created by collisions.** Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted up to grade A*** **Indicative scientific points may include:** **Level 3:** • particle collisions with walls means a change in momentum (provides force) • frequent particle collisions with walls • change in momentum provides force • large numbers of high speed gas particles needed **Level 2:** • momentum of gases = momentum of rocket / AW • large numbers of gas particles needed • high speed of gas particles needed / particles have more (kinetic) energy **Level 1:** • (exhaust) gases have momentum / AW • the rocket has momentum / AW • force forward or force upward = force backwards or force downwards • idea that force created because particles collide with rocket walls **Use the L1, L2, L3 annotations in Scoris; do not use ticks**.
	Total	**6**	

Question	Answer	Marks	Guidance
13 a	2.29×10^8 (m/s) (2) **but if answer is incorrect** $\frac{3 \times 10^8}{1.31}$ scores (1)	2	**allow** 229 000 000 / 229 007 633.6 / 229 007 634 / 229 007 633 (2) **allow** 2.3×10^8 or 230 000 000 (2)
b	**any two from** higher refractive index gives smaller critical angles (1) (the higher the refractive index) the more (internal) reflections will occur / AW (1) (the higher the refractive index) the more likely that TIR will happen / AW (1)	2	
c	2.8 / 2.82 times greater scores (2) **OR** 3 x 0.020372 = 0.061116 which is close to diamond (2) **BUT if answer is incorrect** diamond: 0.05741 or quartz 0.020372 (1) **OR** $\frac{0.05741}{0.02037}$ (1)	2	**allow** 2.81 times greater (2) **allow** $\frac{0.05741}{3}$ = 0.019136667 which is close to quartz (2) **allow** diamond: 0.06 or quartz: 0.02 (1)
	Total	**6**	

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