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 2017

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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.

Annotations used in scoris

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

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

MARK SCHEME

Question	Answer	Marks	Guidance
1 a	pituitary (gland) (1)	1	
b	inhibit FSH (1) so no ovulation / no egg release (1)	2	**allow** reduce FSH / no FSH (1) **allow** does not stimulate the egg to mature (1) **not** releases an egg (that is not fertilised) / reduce or stops the production of eggs / controls the production of eggs **ignore** references to the uterus lining / menstruation / periods / LH **allow** inhibits FSH which releases or matures an egg (2) **if no other mark awarded** **allow** mimics pregnancy / tricks the body into thinking it is pregnant / acts as though the egg has been fertilised (1)
	Total	**3**	

Question	Answer	Marks	Guidance
2 a		2	1 mark for each correct line **ignore** 1st row of table (answer given in question)

Replacement body part	Biological	Mechanical	Inside body	Outside body	
kidney dialysis machine		(✓)		(✓)	
artificial heart valve		✓	✓		(1)
ovary transplant	✓		✓		(1)

b i	**any four from** less likely to wear out or break / **not** likely to wear out or break / lasts longer (1) **no** reaction to materials (1) do **not** need to wait (for a donor) (1) can be made to be the correct size (1) (exact) tissue match (1) **no** rejection (1) do **not** need to use **immune-suppressant** (drugs) (1)	4	**ignore** references to cost / just save a life **allow** do not need to be replaced / others types of transplants need to be replaced (1) **allow** does **not** recognise it as foreign / **no** antibodies produced / antibodies will **not** attack it / immune system will not attack it(1) **allow** idea that you need to wait for a donor for (biological) replacement / quicker (as own (stem) cells are used) (1) **ignore** close tissue match **allow** prevents rejection / body will accept transplant (1) **ignore** reduces the chance of rejection **ignore** just do **not** need medication

ii	(**no** mark for no) **any two from** **not** using embryo (cells) / **not** harming potential life / saving (patient's) life (1) reduces need for donors / donors can be used for other patients (1) idea that they are their stem cells so can consent to using them (whereas an embryo cannot) (1)	2	**if some objections or some concerns then ignore these but if just if yes then 0 marks for the question** **allow** idea that adult stem cells **cannot** create life or grow into a person (1) **ignore** not using a baby **allow** idea that it only affects the person having the stem cells (1) **allow** idea that adults can make decisions about their own life / it is their decision (1) **ignore** just they are their own stem cells
	Total	**8**	

Question	Answer	Marks	Guidance
3 a	produces (small) electric current (1) stimulates muscle contraction / causes muscle contraction (1)	2	**allow** shocks the heart / causes electrical impulses or pulses (1) **allow** electronic for electric **allow** stimulates heart beat / maintain regular heart beat (1) **allow** increases or speeds up heart rate or heart beat (1) **allow** any muscular part or chambers of the heart to contract e.g. causes the atrium to contract (1) **ignore** references to relaxing **ignore** valves contracting **ignore** reference to nodes
b	idea that it allows the blood to flow more easily (1) so blood is less likely to form a blood clot (1)	2	**allow** idea that aspirin 'thins' the blood (1) **allow** blood less likely to agglutinate (1) **allow** stops a blood clot/agglutination (1) **ignore** reference to cholesterol / blocked arteries
c i	B (1)	1	
ii	E (1)	1	
iii	D (1)	1	
iv	100 (milliseconds) (1)	1	**allow** answer in range 90 -110 (milliseconds)
	Total	**8**	

Question	Answer	Marks	Guidance
4	**[Level 3]** Describes jobs of all four parts **AND** describes movement at a hinge joint. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Explains the jobs of some of the parts **AND** describes movement at a hinge joint. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Explains the jobs of some of the parts **OR** describes movement at a hinge joint. 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 may include:** **movement of joint** • backwards and forwards / up and down / left and right / one direction / extend and retract / move like a lever / move in one plane / more than 90° / (less than) 180° / AW **ignore** references to other joints e.g. ball and socket **explanations of the functions of the parts** • **synovial membrane** contains synovial fluid / produces synovial fluid • **synovial fluid** acts as a lubricant / shock absorber / reduces friction **ignore** stops leaks • **cartilage** reduces friction / stops bones rubbing together / cushions joint / acts as shock absorber/ allows bones to move smoothly against each other • **ligament** holds bones together / keeps bones in place / connects bones/ holds the joint together **Use the L1, L2, L3 annotations in RM; do not use ticks.**
	Total	**6**	

Question	Answer	Marks	Guidance
5 a	mass of sodium ion = 3.14 (g) (2) **BUT if answer incorrect then** (M_r of NaC*l* =) 58.5 (1) or (% of Na in NaC*l* =) 39 (%) (1) **or** (number of moles NaCl =) $\frac{8}{58.5}$ **or** 0.136 (1) or $8 \times \frac{23}{23 + 35.5}$ (1)	2	**allow** full marks for correct answer with no working out or incorrect working out **allow** any inclusive value between 3.1 and 3.15 (2) **allow** any inclusive percentage between 39 to 39.4 (1)
b	no - the answer is more than the GDA (1)	1	**allow** no – there is too much salt or sodium (ions) (1) **allow** no – goes over the guidelines (1) **allow** no-it's more than 2.49(g) (1) **allow ecf** from incorrect answer to (a)
	Total	**3**	

Question	Answer	Marks	Guidance
6	conclusion for **A** is correct but for **B** it is incorrect (1) **A** contains hydrogen ions since universal indicator goes red **and** sulfate because barium chloride goes white (1) **B** is **not** a chloride since it does **not** go white with lead nitrate (1)	3	**if not all marks awarded check table for marking points** **allow only A** is correct **/ B** is **not** supported **/ A** is correct but **B** contains different ions (1) **allow B** should produce a white precipitate (1) **allow B** is not a chloride since goes yellow with lead nitrate (1) **allow B** contains iodide ions (rather than chloride ions as precipitate is yellow) (1)
	Total	**3**	

Question	Answer	Marks	Guidance
7	**Level 3** **Complete description of the method and apparatus used** **AND** **Detailed explanation of why the rate of mass change decreases with time** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **Level 2** **Complete description of the method and apparatus used** **OR** **Detailed explanation of why the rate of mass change decreases with time** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **Level 1** **Incomplete description of the method and apparatus used** **AND** **simple explanation for why the total mass decreases** 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. (0marks)	6	**This question is targeted at grades up to A.** **Indicative scientific points may include:** **Apparatus** • use of balance /measurement of mass • suitable container for reaction mixture e.g. conical flask, beaker **not** test tube or measuring cylinder • use of stopwatch/ reference to time • measure total mass of flask and contents at regular intervals • complete diagram of apparatus as below (glass wool plug not needed)  **Explanation** • gas is given off so mass decreases (ignore other products being given off) • mass stops changing as reaction stops / reaction stops as (sodium) nitrite/ (sulfamic) acid/ limiting factor is used up / reaction stops when 0.35-0.37 (g) loss or 84-86 (s) • rate of mass change decreases with time since concentration of reactants decreases • rate of mass change decreases with time since fewer collisions per second **allow** mass for weight throughout **ignore** any incorrect named gases given off **Use the L1, L2, L3 annotations in RM; do not use ticks.**
	Total	**6**	

Question	Answer	Marks	Guidance
8 a	**any two from:** **more** hydrogen ions / ora (1) **more** particles in a smaller or the same volume / ora (1) **more** collisions (per second) / ora (1)	2	**assume answer refers to hydrochloric acid unless otherwise stated** **allow fully** ionised / ora (1) **allow more** crowded particles /ora (1) **allow more** frequent collisions/ more successful collisions/ ora (1) BUT more hydrogen ions in a smaller or same volume (2)
b i	$0.0025 / 2.5 \times 10^{-3}$ (1)	1	
ii	$0.00125 / 1.25 \times 10^{-3}$ (1)	1	**allow ecf** from (i) i.e. answer to (i) x 0.5
iii	0.03 (dm^3)	1	**allow** 30 cm^3 if unit quoted **allow ecf** from (ii) i.e. answer to (ii) x 24
c i	CH_2O (1)	1	**allow** any order of symbols
ii	39.5 (1)	1	
	Total	**7**	

Question	Answer	Marks	Guidance
9 a	vanadium pentoxide / vanadium(V) oxide / V_2O_5 (1)	1	**if both name and formula given both must be correct** **allow** vanadium oxide with the correct formula
b	350 – 600 ^oC (1) 1 – 10 atmospheres / atmospheric pressure (1)	2	**if range of numerical values given must be completely within range in mark scheme** **if no other marks scored allow** 1 mark for high temperature or low pressure (1)
c	**any one from** increases rate of reaction (1) allows a lower temperature to be used (1)	1	 **allow** speeds up (the reaction) (1) **not** increases yield **allow** saves energy (1) **ignore** cheaper
	Total	**4**	

Question	Answer	Marks	Guidance
10	the average mass of an atom of an element (1) compared to (1/12th) the mass of one atom of carbon-12 (1)	2	**ignore** the average mass of a particle of an element **not** the average mass of an element **not** compared to mass of carbon
	Total	**2**	

Question	Answer	Marks	Guidance
11 a	geostationary (orbit) (1)	1	**allow correct answer circled, underlined or ticked but answer line takes precedence**
b	**[Level 3]** **Answer gives both correct relationships between speed AND required force (to keep it in a stable orbit).** Quality of written communication does not impede communication of the science at this level. **(5 – 6 marks)** **[Level 2]** **Answer gives one correct relationship between speed and required force (to keep it in a stable orbit).** Quality of written communication partly impedes communication of the science at this level. **(3 – 4 marks)** **[Level 1]** **Answer indicates a correct effect of changing speed on orbit** **OR** **a simple appreciation that the speed and height have to be matched.** Quality of written communication impedes communication of the science at this level. **(1 – 2 marks)** **Level 0: (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted up to grade A*** **Indicative scientific points may include:** **Level 3 :** • As speed increases centripetal force or gravitational force increases/ ORA • As speed increases it moves away from the Earth • As speed decreases it moves towards the Earth **Level 2 :** • As speed increases centripetal force or gravitational force increases/ ORA **OR** • As speed increases it moves away from the Earth **OR** • As speed decreases it moves towards the Earth **Level 1:** • idea that height and speed have to be matched e.g if closer speed needs to increase/ ora • speed change causes orbit to change e.g falls to Earth or moves away from the Earth **Use the L1, L2, L3 annotations in RN; do not use ticks.**

c	**advantage** **any one from:** people can go up to it / repair any damage / install new instruments (1) idea of good quality images / pictures are clearer / more detailed images (1) fast orbit so more images in short time (1) **disadvantage** idea that it does not spend much time in one area (1)	2	

d	(wave) **X** (1) (because) reflected by **ionosphere** / AW (1) (Wave) **Z** (1) (because) there is absorption / reduced signal strength / scattering / AW (1)	4	**answers can be in any order** second mark of this statement is dependent on first **allow** bounce off the ionosphere (1) **not** refracted in the ionosphere second mark of this statement is dependent on first
	Total	**13**	

Question	Answer	Marks	Guidance
12	**any four from** idea that light slows when entering prism / light speeds up when leaving prism (1) light bends towards normal when entering prism / light bends away from normal when leaving prism (1) violet (light) refracts **more** / ora (1) violet (light) has short**er** wavelength / ora (1) violet (light) has a high**er** frequency / ora (1) violet (light) has a higher **refractive index** (1) violet (light) has **bigger** changes in speed / ora (1)	4	 **allow** violet (light) bends more / ora (1) **ignore** reference to energy **allow** violet light travels more slowly ora (1) **allow** violet (light) slows **more** when entering the prism ora (2)
	Total	**4**	

Question	Answer	Marks	Guidance
13 a i	13.4 (m/s) (1)	1	**if table blank allow answer on the lines but answer in table takes precedence**
ii	1.4 (m/s) (1)	1	**allow** ecf from ai (answer to ai -12)
b	5.23 (s) (2) **but if answer is incorrect or incomplete then:** $\frac{2 \times 110}{13 + 29}$ (1)	2	**allow** 5.238 or 5.24 or 5.2 (2) **allow** $\frac{220}{42}$ or $\frac{110}{21}$ (1)
	Total	**4**	

Question	Answer	Marks	Guidance
14	drop distance = 200 (m) (4) **if drop distance is incorrect or incomplete then:** time = 4 (s) (3) **or** **if drop distance is incorrect or incomplete then:** $t^2 = 16$ **or** $80 = \frac{10t^2}{2}$ (2) **if the above is incorrect or incomplete then:** evidence of vertical initial velocity = 0 (m/s) (1)	4	 allow examples of initial velocity =0 e.g u=0 (1)
	Total	**4**	

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