

GCSE

Further Additional Science B

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

General Certificate of Secondary Education

Mark Scheme for June 2015

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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.

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Annotations used in scoris

Annotation	Meaning
	correct response
	incorrect response
BOD	benefit of the doubt
NBOD	benefit of the doubt not given
ECF	error carried forward
	information omitted
I	ignore
R	reject
CON	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

Question	Answer	Marks	Guidance
1 a i	protease (1)	1	allow pepsin (1) allow protase (1)
a ii	amino acids (1)	1	allow polypeptides / peptides (1)
b	idea of pH too high or pH not low (enough) (1) idea that (stomach) enzymes only work well in acid conditions or at low pH (1)	2	allow pH goes up (1) ignore makes it less acid allow optimum pH for enzyme activity not achieved / enzymes are denatured (1) ignore takes longer for enzymes to digest food (1) allow acid lowers the pH to provide optimum conditions for enzymes to work (2)
c	any two from: villi to increase surface area / villi provide large surface area (1) (very) long so more time for absorption / long so everything gets absorbed (by the end) (1) thin (lining) or permeable or semi-permeable lining so food molecules can pass through (quickly) or be absorbed (quickly) (1) many capillaries or capillary network to take digested food away or to maintain a concentration gradient (1)	2	answer must include adaptation and explanation e.g. is very long = 0 allow microvilli? allow a value around 7m allow long so more digested food absorbed (1) allow thin walls or walls one cell thick so food molecules can pass through (quickly) (1) ignore thin membrane allow blood vessels for capillaries ignore veins or arteries ignore moist surface / flexible / references to lymphatic system
Total		6	

Question	Answer	Marks	Guidance
2 a i	<p>A+ (1)</p> <p>if A is correct then</p> <p>any one from:</p> <p>agglutination or reacted or clumping with anti(body) A (1)</p> <p>no agglutination with Anti-B (1)</p> <p>if + is correct then</p> <p>agglutination or reacted or clumping with anti-Rhesus (1)</p>	3	<p>allow A positive / A Rhesus positive (1)</p> <p>ignore just A or just +</p> <p>not anti-A+ or anti-A positive</p> <p>allow clotting with anti(body) A (1)</p> <p>allow no clotting with Anti-B (1)</p> <p>allow clotting with anti-Rhesus (1)</p>
a ii	<p>agglutination or reaction or clumping occurs</p> <p>because</p> <p>of the B antibodies reacting with the B antigens in the donor blood (1)</p>	1	<p>process and reason required for 1 mark</p> <p>allow clotting</p> <p>ignore reject(ion) or not reject(ion)</p>
b i	<p>irregular heartbeat = C</p> <p>fast heartbeat = A</p> <p>slow heartbeat = B (1)</p>	1	<p>all correct for 1 mark</p>
b ii	<p>impulses or current being sent from SAN or sino-atrial node or pacemaker cells (1)</p>	1	<p>allow atrial contraction / ventricles relaxing / blood is beginning to flow from atria to ventricles (1)</p> <p>ignore just heart contracting / blood entering the atria</p> <p>not aorta contracting</p>
	Total	6	

Question	Answer	Marks	Guidance
3	<p>[Level 3] Makes at least three comparisons that include information about other artificial hearts, transplants, rejection and immune-suppressive drugs. Quality of written communication does not impede communication of the science at this level. (5–6 marks)</p> <p>[Level 2] Makes two comparisons that include information about rejection or need to match tissues. Quality of written communication partly impedes communication of the science at this level. (3–4 marks)</p> <p>Level 1 Makes two comparisons. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to A*</p> <p>Indicative scientific points about immune-suppressive drugs</p> <ul style="list-style-type: none"> • may need to take less for immune-suppressive drugs as not all plastic • may need more immune-suppressive drugs because animal tissue will not be as close a match of human tissue <p>Indicative scientific points ideas for comparison with other artificial hearts may include:</p> <ul style="list-style-type: none"> • smaller so can fit inside the body • contains animal tissue (others don't) • person could be more mobile as not attached to machine or in hospital • not temporary / limits the number of times surgery required • less likely to be rejected because it has plastic and tissue <p>allow more chance of rejection as placed inside the body allow both need a power supply allow battery on outside so easy to change</p> <p>Indicative scientific points for comparison with transplant may include:</p> <ul style="list-style-type: none"> • no need to wait for a donor or someone to die • does not have to be suitable match • made of animals tissue not human tissue • idea could be made the right size / need donor to be similar age or size • no need for batteries with donor heart • donor heart lasts longer <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
Total		6	

Question	Answer	Marks	Guidance
4 a i	0.80 (1)	1	accept any number in the range 0.75 to 0.85 to 2 decimal places allow 0.8 (1)
a ii	any one from: idea the foetus grows at different rates / the foetus has growth spurts (for head size) (1) idea that the growth between one day and the next is so small that problems could not be detected (1) measurement for one day does not allow you to make a comparison for that foetus (1) one particular day could be an anomaly (1) measurements could be taken from scans which could be inaccurate (1) the position of the baby in the womb could affect the measurement taken (1)	1	

Question	Answer	Marks	Guidance
b i	<p>any three from:</p> <p>amniocentesis (1)</p> <p>description of amniocentesis (1)</p> <p>chromosomal analysis (1)</p> <p>idea that the chromosome number will be different (1)</p>	3	<p>allow ultrasound to look at the features of the foetus (1) ignore just blood tests / just sampling / ultra scan</p> <p>descriptions include: sample the amniotic fluid / insert needle into amniotic sac or amniotic fluid / take cells from (around) foetus (1) ignore insert needle into foetus / insert needle into placenta</p> <p>allow counting chromosomes / looking for damaged chromosomes (1) ignore looking at cells</p> <p>ignore genes will be different</p> <p>if idea of looking for extra chromosomes or that there are 47 chromosomes (2)</p> <p>as an extra marking points allow CVS / chorionic villus sampling (1) allow triple test / combined test (1) allow description of the combined test (1)</p>

Question	Answer	Marks	Guidance
b ii	<p>for identify problems with foetus (1)</p> <p>but identify problems with foetus and can decide about abortion (2)</p> <p>idea of putting their mind at rest (1)</p> <p>idea that parents are prepared for a child with (genetic) disorder (1)</p> <p>but idea that parents are prepared for a child with (genetic) disorder and can decide about abortion (2)</p> <p>against may lead to decision about abortion (1)</p> <p>could be used to identify sex of foetus (1)</p> <p>may harm the foetus / may lead to miscarriage (1)</p> <p>idea that testing is not 100% accurate (1)</p>	2	<p>allow parents deserve to know what their child will be like (1)</p> <p>allow so they know their child will have Downs syndrome (1)</p> <p>allow ethical reasons e.g. 'against God' / 'against human nature' / foetus has the 'right to live' / religious reasons e.g. baby will be how God wants it to be / foetus has no say (1)</p>
Total		7	


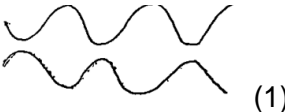
Question	Answer	Marks	Guidance
5 a	calcium carbonate runs out (1) but calcium carbonate is the limiting reactant (2)	2	allow calcium carbonate runs out first (2) allow calcium carbonate is not in excess (2) ignore the hydrochloric acid is in excess
b	0.36 (g) (1)	1	allow ± 0.01
c	0.005 or 5×10^{-3} (2) if answer incorrect then $\frac{120}{24000}$ (1)	2	
	Total	5	

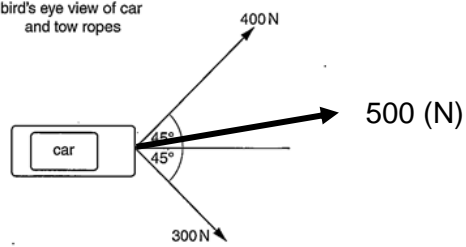
Question	Answer	Marks	Guidance
6 a	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O} \rightarrow \text{CuSO}_4 + 5\text{H}_2\text{O}$ formulae (1) balancing (1)	2	balancing mark is conditional on correct formulae but allow one mark for balanced equation with minor errors of subscripts, superscripts, etc. e.g. $\text{CuSo}_4 \cdot 5\text{H}_2\text{O} \rightarrow \text{CUSO}^4 + 5\text{H}_2\text{O}$ allow $\text{CuSO}_4 \cdot 5\text{H}_2\text{O} + \text{heat} \rightarrow \text{CuSO}_4 + 5\text{H}_2\text{O}$ (1) not and or & for + allow = instead of \rightarrow allow correct multiples e.g. $2\text{CuSO}_4 \cdot 5\text{H}_2\text{O} \rightarrow 2\text{CuSO}_4 + 10\text{H}_2\text{O}$
b	mass of anhydrous copper sulfate = 0.96(g) (1) mass of water = 0.54(g) (1)	2	If no other mark allow 96 and 54 / 9.6 and 5.4 (1)
c	yes / no (no mark) evidence from copper sulphate table supporting the prediction e.g. when you go from 1g to 2g the mass goes from 0.36g to 0.72g (which doubles) (1) evidence from sodium carbonate table not supporting the prediction e.g. when you go from 1g to 2g the mass goes from 0.63g to 1.00g (which does not double) (1)	2	allow ecf from (b)
Total		6	

Question	Answer	Marks	Guidance
7 a	CH (1)	1	allow HC (1)
b i	CH_3O (2) if formula incorrect then any two from $\frac{38.7}{12} \frac{9.7}{1} \frac{51.6}{16}$ or 3.225: 9.7: 3.225 (1)	2	allow any order
ii	$\text{C}_2\text{H}_6\text{O}_2$ (1)	1	allow any order
Total		4	

Question	Answer	Marks	Guidance
8 a	atmospheric pressure (1)	1	allow low pressure / pressure of 1 to 3 atmospheres (1) ignore just 'pressure' ignore standard or normal pressure
b	any two from: idea that high temperature reduces yield of sulfur trioxide / ora (1) idea that increasing temperature increases rate of reaction / ora (1) so 450°C is a compromise or optimum temperature (1)	2	ignore cost allow idea that high temperature moves equilibrium to the left / ora (1) allow from 350°C to 450 °C the rate increases (1) allow higher level answers referring to collision frequency ignore enzymes
c	rate of reaction increases percentage yield unchanged (1)	1	both required
	Total	4	

Question	Answer	Marks	Guidance
9	<p>Level 3 Candidate mixes barium chloride and sodium sulfate solution, filters the mixture <u>and</u> washes and dries the precipitate AND writes a correct ionic equation. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>Level 2 Candidate mixes barium chloride and sodium sulfate solution, filters the mixture <u>and</u> washes or dries the precipitate OR writes a correct ionic equation. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 Candidate mixes barium chloride and sodium sulfate solutions <u>and</u> filters the mixture Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit. (0marks)</p>	6	<p>This question is targeted at grades up to A/A*.</p> <p>Indicative scientific points at levels 2 and 3 may include:</p> <ul style="list-style-type: none"> • mixing of solutions • filtration • washes precipitate / residue • dries precipitate • drying in an oven or on window sill • $\text{Ba}^{2+} + \text{SO}_4^{2-} \rightarrow \text{BaSO}_4$ <p>any two correct points about the procedure AND a correct ionic equation scores 5</p> <p>Indicative scientific points at level 1 include:</p> <ul style="list-style-type: none"> • mixing or reacting of solutions • filtration • correct word or symbol equation or description of reactants and products <p>marks can be scored from labelled diagrams</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
		6	

Question	Answer	Marks	Guidance
10 a	<p>constructive interference description or diagram (1)</p> <p>destructive interference description or diagram (1)</p>	2	<p>peak + peak or in phase or in sync (1)</p> <p>trough + trough or in phase (1)</p>  <p>(1)</p> <p>ignore just waves add together</p> <p>peak + trough or out of phase (1)</p>  <p>(1)</p> <p>ignore just waves cancel each other out</p> <p>if no other mark awarded allow mention of constructive and destructive (interference) (1)</p>
b	<p>published works / talks to others / lectures / letters / conferences / AW (1)</p> <p>and any one from</p> <p>to check results or findings (1)</p> <p>to be credited with the discovery (1)</p> <p>so other can build on the idea or evidence (1)</p> <p>to try to repeat experiments (1)</p>	2	<p>allow marks from anywhere in the answer</p> <p>ignore modern communications</p> <p>allow demonstration / met up or wrote down their findings (1)</p> <p>allow peer review (1)</p> <p>allow to maximise the validity of results (1)</p> <p>allow to compare idea or results or evidence (1)</p> <p>allow so scientists can learn from their ideas (1)</p>
Total		4	

Question	Answer	Marks	Guidance
<p>11 a</p>	<p>500 (N) (2)</p> <p>in a direction between horizontal and 400N line (1)</p>	<p>3</p>	<p>award marks for answers given on a vector diagram e.g.</p>  <p>(3)</p> <p>if 500(N) not seen allow $400^2 + 300^2$ or 250 000 (1)</p>
<p>b</p>	<p>any one from:</p> <p>velocity has (magnitude and) direction (1)</p> <p>speed has magnitude only / speed has no direction (1)</p>	<p>1</p>	<p>allow velocity is speed with direction (1)</p> <p>not acceleration</p>
<p>c</p>	<p>14 (m/s) (2)</p> <p>but if incorrect</p> <p>6 + (0.5x16)</p> <p>or</p> <p>6 + 8 (1)</p>	<p>2</p>	
<p>Total</p>		<p>6</p>	

Question	Answer	Marks	Guidance
12 a	<p>advantages</p> <p>Meteostat - (high altitude so) large area covered or see most of the Earth or see most of the weather (1)</p> <p>Meteostat – (geostationary so) provides constant monitoring (of one area) (1)</p> <p>POES – (low orbit so) better (quality) pictures or see the weather clearly (1)</p> <p>POES – (more orbits so) more information (1)</p> <p>disadvantages</p> <p>Meteostat - (orbits around equator so) can't view the poles (1)</p> <p>POES – (many orbits so) idea of intermittent photography (1)</p> <p>POES – (low orbit so) limited area of Earth covered (1)</p>	3	<p>to score three marks answer must refer to both orbits</p> <p>allow idea of longer term forecast (1)</p> <p>allow higher definition (1)</p> <p>allow more coverage (1)</p> <p>allow more frequent weather updates (1)</p> <p>allow idea of lower definition (1)</p> <p>allow short time spent studying one area (1)</p>
b	gravity (1)	1	<p>allow gravitational force or gravitational pull (1)</p> <p>ignore forward force / driving force</p> <p>not gravitational potential energy / GPE</p>
c	idea of greater (gravitational) force (1)	1	<p>allow more gravity or stronger gravity (1)</p> <p>allow gravitational attraction is greater (1)</p> <p>allow greater or stronger centripetal force (1)</p>

Question	Answer	Marks	Guidance
d	any two from: same height (above Earth) (1) same (accelerating) force (1) same speed (1) satellite stays above same area of Earth (1)	2	allow reverse arguments if about elliptical orbits ignore stops it flying off allow not affected by other forces / same force of gravity / same gravitational attraction (1) allow constant position (above the Earth) or stays in the same place (above Earth) (1)
e	(microwaves / signal) sent or transmitted to satellite or (microwaves / signals) sent from satellite to satellite (1) (microwaves / signals) sent or (re)transmitted back to Earth (1)	2	assume the 'sent from' is 'sent from Earth' not reflected / bounced / pinged / rebound allow back to TV receiver (on Earth) (1) not reflected / bounced / pinged / rebound
	Total	9	

Question	Answer	Marks	Guidance
13	<p>[Level 3] Quantitative comparison of acceleration AND time calculated for both cyclists. Quality of written communication does not impede communication of the science at this level. (5–6 marks)</p> <p>[Level 2] Quantitative comparison of acceleration OR time calculated for both cyclists. Quality of written communication partly impedes communication of the science at this level. (3–4 marks)</p> <p>[Level 1] Answers are limited to a simple statement about average speeds OR acceleration OR time. Quality of written communication impedes communication of the science at this level. (1–2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to A*</p> <p>Indicative scientific points at levels 2 and 3 may include:</p> <ul style="list-style-type: none"> • accelerations are 0.2 m/s^2 and 0.4 m/s^2 • the difference in acceleration is 0.2 m/s^2 • times are both 10 s <p>and relates calculations to statements</p> <p>Indicative scientific points at level 1 may include:</p> <ul style="list-style-type: none"> • average speeds are the same • average speed is 3 m/s • Jared’s acceleration is twice Sam’s acceleration / Jared’s acceleration is greater than Sam’s acceleration / ora • one correct acceleration e.g. 0.2 m/s^2 or 0.4 m/s^2 • time is the same (even if incorrect time) • time is 10s (but not clear this is for Sam and Jared) <p>allow ecf for comparison statements</p> <p>for 1 mark allow acceleration is 0.2 or 0.4 (no unit given) or allow time = $\frac{\text{distance}}{\text{average speed}}$</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
Total		6	

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