

GCSE

Further Additional Science B

Unit **B761/01**: Modules B5, C5, P5 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2016

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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.

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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

MARK SCHEME

Question	Answer	Marks	Guidance
1 a	AB positive and AB negative (1)	1	both answers needed either order allow positive AB and negative AB (1) allow ab positive and ab negative (1)
b i	4 (1)	1	
b ii	<p>The supply of O positive would have lasted longer than the other blood groups. <input type="checkbox"/></p> <p>There was less supply of group B positive blood than group B negative. <input type="checkbox"/></p> <p>The banks would have run out of O positive blood in 3 days. <input type="checkbox"/></p> <p>The supply of blood group O negative and B negative was the same. <input checked="" type="checkbox"/></p>	1	more than one tick = 0
c	<p>any one from: during an operation (1)</p> <p>treat haemophiliac / sickle cell anaemia / other named inherited disorders (1) blood loss during childbirth(1) treat anaemia (1)</p>	1	<p>allow for organ transplants (1) ignore blood clot allow unable to produce own blood (in leukaemia) (1)</p> <p>ignore they haven't got enough blood in their bodies</p>
d	<p>any two from: closed - blood transported in blood vessels(1) closed – has veins / arteries / capillaries (1) closed –idea that organs are bathed in tissue fluid (1) open – organs are bathed in blood (1)</p>	2	<p>it refers to closed system unless qualified. allow open-doesn't have blood vessels / closed- does have blood vessels (1) allow only tissue fluid / plasma leaks out (1) allow open- blood flows through the body freely (1) allow low blood pressure in open / high blood pressure in closed (1)</p>
	Total	6	

Question	Answer	Marks	Guidance
2 a	humerus (1)	1	
b	compound / open(1) the bone is sticking out of the skin / skin has been cut or broken (1)	2	ignore complex fracture ignore cuts through muscle
	Total	3	

Question	Answer	Marks	Guidance
3 a	<p>Level 3 Answer includes a full explanation that does refer to molecule size <u>AND</u> diffusion <u>OR</u> the role of carbohydrase. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>Level 2 Attempts a simple explanation that does refer to molecule size <u>OR</u> solubility <u>OR</u> the role of carbohydrase. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 Attempts a simple explanation that may not refer to molecule size or the role of carbohydrase or solubility. 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 C Indicative scientific points at Level 3 may include:</p> <ul style="list-style-type: none"> • sugar molecules are smaller than starch molecules so they can diffuse out of the visking tubing / ora • starch molecules are not broken down in tube A so no sugar present to be absorbed into the water • carbohydrase breaks down / digests starch in tube B into sugar. <p>Indicative scientific points at Level 2 may include:</p> <ul style="list-style-type: none"> • sugar molecules are smaller than starch molecules/ora • starch molecules are too large to get through holes • starch molecules are made up of many sugar molecules joined together • starch is insoluble / sugar is soluble • carbohydrase/enzyme is needed to make sugar • carbohydrase/enzyme breaks down starch into sugar. <p>Indicative scientific points at Level 1 may include:</p> <ul style="list-style-type: none"> • starch cannot get out of the visking tubing • sugar can get out of /released from the visking tubing • sugar only present if there is carbohydrase. • digestion changes starch to sugar <p>Reference to diffusion without molecular size (maximum of level 2)</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>

Question	Answer	Marks	Guidance
b	any two from there would be no sugar in either tube (1) lipase will not breakdown starch (1) lipase breaks down/acts on fats or lipids (1) carbohydrases breakdown/act on starch (1) enzymes are specific (to one substrate) (1)	2	ignore yes or no ignore lipase will not react with starch allow lipase only breakdown or act on fats (2) ignore lipase breaks down fatty (acid) allow carbohydrases only breakdown/act on starch (2) ignore carbohydrases react with starch
	Total	8	

Question	Answer	Marks	Guidance
4 a i	700 (cm ³) (2) but if incorrect 2500 -1800 (1)	2	
a ii	any two from: increase (1) but sweat more (on hot days) (2) idea that water lost from skin is needed to cool you down (1)	2	 allow idea that more may be drunk (so need to lose more) (1)
b	100 (cm ³) (1)	1	

Question	Answer	Marks	Guidance
c i	kidney (1)	1	not bladder / liver
c ii	<p>for any one from</p> <p>idea that somebody can benefit from the death of a person (1)</p> <p>idea that donors want to donate so their loss of life is allowing another person to live (1)</p> <p>against any one from</p> <p>idea that the donor may (need to) die before the organ is available(1)</p> <p>idea that relatives may not want to donate organs from their loved ones (1)</p> <p>idea that it is difficult to decide who gets the organ (1)</p>	2	<p>allow saving a life (1)</p> <p>allow donors can help another person (when they die) (1)</p> <p>allow issues involved in using live donors, such as paying people for kidneys (1)</p> <p>allow idea of needing to consider religious beliefs e.g. bodies need to be left intact after death (1)</p> <p>allow just 'playing God' / not letting natural selection happen (1)</p>
	Total	8	

Question	Answer	Marks	Guidance
5 a	burette (1)	1	allow correct answer ticked , underlined or circled if answer line left blank
b i	2 (1)	1	
ii	30 (cm ³) (1)	1	
iii	60 (cm ³) (1)	1	allow ecf i.e. 2 x answer to part (ii) (1)
	Total	4	


Question	Answer	Marks	Guidance
6 a	No (no mark) D is not the steepest gradient (1) D is the slowest reaction (1)	2	If yes no mark allow A has the steepest gradient (1) allow A is the fastest (1) allow with D it takes longer for the mass to be lost / ora (1)
b	reactant not in excess / reactant that is all used up (at the end of the reaction) / reactant that is used up (first) (1)	1	ignore only lasts a limited time allow runs out (first) / reactant that controls how much product is made (1) allow it will run out (first) (1)
c	$\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$ formulae (1) balancing (conditional on correct formulae) (1)	2	allow any correct multiple, including fractions e.g. $2\text{CaCO}_3 + 4\text{HCl} \rightarrow 2\text{CaCl}_2 + 2\text{CO}_2 + 2\text{H}_2\text{O}$ (2) allow = or = instead of \rightarrow not and or & balancing mark is dependent on the correct formulae but allow 1 mark for a balanced equation with a minor error in subscripts or case e.g. $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$ (1)
d	idea that peer review is scientists checking each other's work (1) then any one from important as it allows work to be replicated (1) provides information to others (1)	2	allow to ensure results are accurate (1) allow so work can be developed further (1) allow Idea of avoiding plagiarism (1)
Total		7	

Question	Answer	Marks	Guidance
7 a	a gas or carbon dioxide is given off (1)	1	not if incorrect gas e.g. hydrogen is given off ignore references to evaporation
b	1.60 (g) (1)	1	allow 1.6 (g)
c i	molar mass of copper carbonate is 124 (g/mol) (1)	1	
ii	% by mass is 51.6 (%) (1)	1	allow 52 (%) (1) allow ecf from part (i)
	Total	4	

Question	Answer	Marks	Guidance
8	<p>Level 3 Describes differences and similarities between the reactions of hydrochloric acid and ethanoic acid with reference to pH AND reaction with magnesium. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>Level 2 Describes at least one difference AND one similarity OR two similarities OR two differences between the reactions of hydrochloric acid and ethanoic acid. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 Describes one difference OR similarity between the reactions of hydrochloric acid and ethanoic acid. 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 E.</p> <p>Indicative scientific points may include:</p> <p>Differences</p> <ul style="list-style-type: none"> • pH of hydrochloric acid is lower than pH of ethanoic acid ora • hydrochloric acid releases more H⁺ than ethanoic acid (at the same concentration) • reaction with magnesium is faster with hydrochloric acid ora • hydrochloric acid makes magnesium chloride and ethanoic acid makes magnesium ethanoate • hydrochloric acid releases more energy than ethanoic acid. <p>Similarities</p> <ul style="list-style-type: none"> • both react with magnesium to make hydrogen • make the same volume of hydrogen • both reactions are exothermic • both form a colourless solution • both bubble or fizz. <p>allow higher level answers e.g. dissociation or collision theory</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
		6	

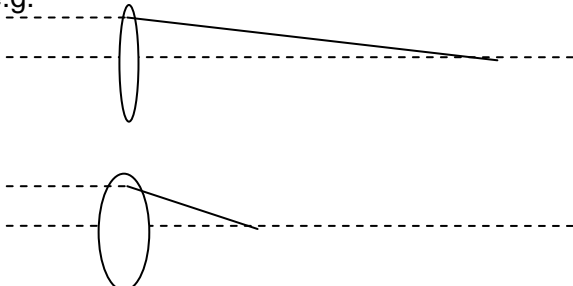
Question	Answer	Marks	Guidance
9 a	increasing the temperature – reduces percentage of ethanol (1) increasing the pressure – increases the percentage of ethanol (1)	2	allow ora
b	reversible reaction – idea of reaction that goes both ways (1) the symbol \rightleftharpoons shows that the reaction is reversible (1)	2	allow returns to original reactants (1) ignore reaction can be undone
Total		4	

Question	Answer	Marks	Guidance
10 a	trajectory (1)	1	answer line takes precedence more than one answer indicated = 0 marks
b	as angle increases the distance increases (1) and then decreases (1)	2	allow just distance increases and then decreases (1) allow quantitative answers e.g. greater angle increases the distance / ball travels further up to 40 degrees or 45 degrees or 50 degrees (1) greater angle decreases the distance / ball doesn't travel as far after 44 degrees or 50 degrees (1)
c	peak at 45 degrees (1) take a reading between 40 degrees and 50 degrees (1)	2	allow answer in the range of 44 degrees – 46 degrees (1) allow take reading at 45 degrees (1) allow take readings at 1 degree intervals / AW (1) allow test between 40 and 50° (1) ignore change angles 5° at a time
d	(The horizontal distance travelled at 80 degrees is) 16.1 (m) (1) (The horizontal distance travelled at 90 degrees is) 0 (m) (1)	2	allow answer in the range 15.1 – 17.1 (m) (1) allow answer in range of 0 – 1 (m) (1)
Total		7	

Question	Answer	Marks	Guidance
11 a	idea of light and dark bands / dots / AW (1) or appropriate diagram e.g. 	1	minimum of three bands or dots required for the mark ignore curved lines
b	any two from the light or waves overlap (1) waves can add together (1) waves can subtract from each other (1)	2	allow constructive interference (1) allow destructive interference (1) allow waves cancel each other out (1)
Total		3	

Question	Answer	Marks	Guidance
12 a	0 (m/s) (2) but if answer incorrect 4.8 – (0.4 x 12) (1) or 4.8 – 4.8 (1)	2	allow 0.4 x 12 on its own (1)
b	7.2 (m) (2) but if answer incorrect $\frac{4.8 \times 3}{2}$ (1)	2	allow 2.4 x 3 or $\frac{14.4}{2}$ or 14.4 (1)
c	20 (N) (1)	1	answer line takes precedence
	Total	5	

Question	Answer	Marks	Guidance
13	<p>Level 3: Answer recognises that there is greater particle speed creating more collisions. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>Level 2: Answer recognises that there is greater particle speed</p> <p><u>OR</u></p> <p>there are more collisions. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1: Describes how gas particles produce a pressure</p> <p><u>OR</u></p> <p>Describes why there is greater pressure when warmer. 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 up to grade C</p> <p>Indicative scientific points may include:</p> <p>Level 3:</p> <ul style="list-style-type: none"> • faster particles / particles have more energy AND • more collisions. <p>allow higher level answers in terms of KE</p> <p>Level 2:</p> <ul style="list-style-type: none"> • faster particles / particles have more energy OR • more collisions. <p>ignore particles move about more</p> <p>Level 1:</p> <ul style="list-style-type: none"> • (gas) particles are moving • (gas) particles hit the sides of the bottle • more pressure when warmer • more bubbles (released) when warmer can push liquid out with more force. <p>allow bigger bubbles</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
Total		6	

Question	Answer	Marks	Guidance
14 a	real (image) (1) on a screen / on a sensor / on a film (1)	2	allow upside down (1) allow diminished / enlarged (1) allow on back of camera (1) ignore digital / jpeg / raw format
b	a straight line (shown on either diagram) from incident ray to principal axis (1) comparison of diagrams show that thicker lens has a shorter focal length (1)	2	ignore line in lens ignore lines below principal axis e.g.  (2) allow on diagram angle of line for thicker lens is more acute than thin lens (1)
Total		4	

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