scienmmoeengtz0xxm

Markscheme

November 2024

Integrated Sciences

On-screen examination

14 pages

The following are the annotations available to use when marking responses.

Annotation	Explanation
	Correct point, place at the point in the response where it is clear that the candidate deserves the mark. For use in analytically marked questions only.
	Omission, incomplete
CON	Contradiction
	Valid part (to be used when more than one element is required to gain the mark)
	Error carried forward
	Dynamic annotation, it can be expanded to surround work
	Horizontal wavy line that can be expanded
	Highlight tool that can be expanded to mark an area of a response

Annotation	Explanation
	Not good enough
	The candidate has given a response but it is not worthy of any marks
	Text box used for additional marking comments
	Seen; must be stamped on all blank response areas and on duplicate pages of concatenated responses
	Vertical wavy line that can be expanded
	Words to that effect
	Award 1, 2, 3, 4 marks. For use in holistically marked questions only

Marking instructions

1 Mark positively. Give candidates credit for what they have achieved and what is correct. Do not deduct marks for incorrect responses. Do not deduct marks for spelling errors.

2 Follow the markscheme provided and award only whole marks.

3 Each marking point appears on a separate line.

4 The maximum mark for each subpart is indicated in the "Total" column.

5 Where a mark is awarded a tick should be placed in the text at the precise point where it is clear the candidate deserves the mark.

6 Each marking point in a question part should be awarded separately unless there is an instruction to the contrary in the Notes column.

7 A question subpart may have more marking points than the total allows. This will be indicated by the word "***max***" in the Answer column. Further guidance may be given in the Notes column.

8 Additional instructions on how to interpret the markscheme are in bold italic text in the Answer column.

9 Alternative wording may be indicated in the Answer column by a slash (/). Either alternative is equally acceptable but the candidate cannot be rewarded for both as they are associated with the same marking point.

10 Alternative answers are indicated in the Answer column by "***or***". Either alternative is equally acceptable but the candidate cannot be rewarded for both as they are associated with the same marking point.

11 If two related points are required to award a mark, this is indicated by "***and***" in the answer column.

12 Words in brackets ( ) in the Answer column are not necessary to gain the mark.

13 Words that are underlined are essential for the mark.

14 In some questions a reverse argument is also acceptable. This is indicated by the abbreviation *ORA (or reverse argument)* in the Notes column. Candidates should not be rewarded for reverse arguments unless *ORA* is given in the Notes column.

15 If the candidate's response has the same meaning or is clearly equivalent to the expected answer the mark should be awarded. In some questions this is emphasized by the abbreviation *WTTE (or words to that effect)* in the Notes column.

16 When incorrect answers are used correctly in subsequent question parts the follow through rule applies. Award the mark and add ECF (error carried forward) to the candidate response.

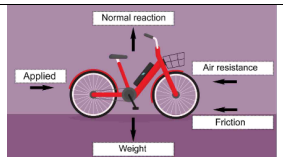
17 The order of marking points does not have to be the same as in the Answer column unless stated otherwise.

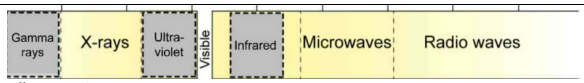
18 Marks should not be awarded where there is a contradiction in an answer. Add CON to the candidate response at the point where the contradiction is made.

19 Do not penalize candidates for errors in units or significant figures unless there is specific guidance in the Notes column.

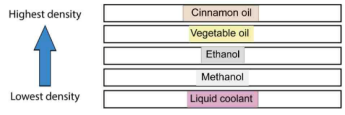
20 Questions with higher mark allocations will generally be assessed using a level response method using task specific clarifications developed with reference to the criteria level descriptors. A candidate's work should be reviewed to determine holistically the mark for each row of the holistic grid and a mark awarded for each row.

Question		Answers	Notes	Total	
1	a	<table><tr><td>Molecular component</td><td>Function</td></tr><tr><td>Proteins</td><td>Used for muscle growth and repair</td></tr><tr><td>Carbohydrates</td><td>Provide short-term energy</td></tr><tr><td>Fats</td><td>Provide long-term energy stores</td></tr></table>	*Do not award a mark if two answers in the same row: one correct and one incorrect.*	3	A
	b	Watermelon		**1**	A
	c	***Accept any two reasonable suggestions, for example [max 2]*** • wash hands • cook meat • cover food • use fresh or not spoiled food • wash vegetables ***Accept any two reasonable, correctly linked justifications, for example [max 2]*** • (wash hands) removes bacteria • (cook meat) kills bacteria • (cover food) protects from (airborne) bacteria • (use fresh or not spoiled food) likely to contain lower levels of bacteria • (wash vegetables) to remove surface bacteria		**4**	A
	d	Refrigeration: Decrease in temperature would not allow bacteria to reproduce Dehydration: Reduction of water would reduce places for bacterial growth	*WTTE* *Accept some bacteria do not live in lower temperatures*	**2**	A
	e	$C_6H_{12}O_6$ --> 2 C_2H_5OH + 2 CO_2 Correct reactants Correct products	*Accept ratio of 2:4:4 if all are seen, do not accept "?"*	**2**	A
	f	Yeast feeds on the sugar contained within the dough Producing (carbon dioxide) gas (and alcohol) As gas / CO_2 is formed and gets trapped in the dough, the dough rises	*Accept glucose breaks down*	**3**	A

2	**a**	 Normal and weight in correct location Air resistance and friction in correct location		**2**	A
	b	600		**1**	**A**
	c	750/30 = 25 miles (Converted to) 40 (km)		**2**	A D
	d	Group 2 ***or*** alkaline earth metals		**1**	A
	e	[Ne] $3s^2\ 3p^1$ ***or*** 2,8,3 [He] $2s^2\ 2p^2$ ***or*** 2, 4		**2**	A
	f	***Accept any two reasonable suggestions, for example [max 2]*** • reduces risk of vascular disease • improves health of heart • Improves physical performance • provides your cells with maximum oxygen and nutrition • improves mental health	*WTTE*	**2**	A

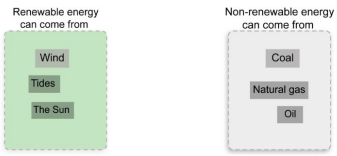
3	**a**	 all correct		**1**	A
	b	***Accept any two reasonable control variables, for example [max 2]*** • same plant or type of seed • same volume of water • same strength of light ***or*** intensity of light ***or*** brightness of light • type of soil • mass of soil	*Do not accept water or seed only* *Do not accept amount* *Do not accept number of seeds as the information provided states the number of seeds (one)*	**2**	B
	c	14.5±0.5		**1**	C
	d	x axis Time ***and*** y axis Height units correct on both axes: days and cm one mark for one point plotted correctly two marks for all plotted correctly		**4**	C
	e	0.707 0.7 (cm per day)	*Accept 7.1 mm*	**2**	C
	f	***Red light:*** More/longer/thinner leaves ***or*** pale green/thin stem ***Green light:*** Less/fatter/shorter leaves (than red) ***or*** Green/thicker stem ***Blue light:*** Very green/thick stem ***or*** Least/fatter/shorter leaves (than red)		**3**	C

	g	Plant grown in red light ***and*** height or number of leaves Healthy plants are those that grow fastest or have the most leaves for photosynthesis ***or*** Plant grown in green light ***and*** has the highest biomass or total area of leaves is the highest So most effective for photosynthesis ***or*** Plant grown in blue light ***and*** had the thickest stem and greenest colour Most chlorophyll for photosynthesis		**2**	C
	h	***Accept any three points from the list [max 3]*** • all colours together in white light • so would be able to compare to whether a single colour light is better than all of them combined • different colours could be needed for different aspects of plant growth		**3**	C
	i	The tallest plants ***or*** grow at a faster rate ***or*** Biggest/longest leaves ***or*** Biggest biomass ***or*** biggest surface (area) of leaves		**1**	B

4	**a**	The change of direction of light at a boundary due to a different optical density		**1**	A
	b	Less dense ***and*** more dense Towards ***or*** More dense ***and*** less dense Away from		**2**	B
	c	How does changing the angle of incidence Affect the angle of refraction As light passes from air to water	*Do not award mp 3 unless any other mark is awarded*	**3**	B
	d	For glass, the angle of refraction is smaller This means it has been refracted by a bigger amount Therefore, the hypothesis is valid	*ORA* *ORA* *Do **not** award the third mark unless the second mark is awarded*	**3**	C
	e	Measured 5 angles in each material/density Only had two materials/densities Need to have at least 3 more materials with different densities		**3**	C
	f	 The highest (cinnamon oil) and lowest (liquid coolant) in the correct position All correct	*Award one mark only for all in correct order but reversed (arranged in order of angle not density)*	**2**	C
	g	Methanol		**1**	C

5			**17**	B

	1	**2**	**3**	**4**	**Notes**
V	Either IV ***or*** DV identified	IV identified as salinity of water ***and*** DV identified as angle of refraction ***or*** IV identified as salinity of water or DV identified as angle of refraction and 1 appropriate CV is identified	IV identified as salinity of water ***and*** DV identified as angle of refraction ***and*** one appropriate CV identified	IV identified as salinity of water ***and*** DV identified as angle of refraction ***and*** two appropriate CVs identified	**IV:** Salinity of water or concentration of salt in water **DV:** Angle of refraction **CV:** measured or monitored: angle of incidence, volume of water in the refraction cup, temperature of solution, distance of light from refraction cup, wavelength of light
E	Some equipment is suggested	equipment to measure salt added ***and*** refraction cup to measure angle of refraction	scales to measure salt added ***and*** refraction cup to measure angle of refraction ***and*** equipment to monitor or control one CV	scales to measure salt added ***and*** refraction cup to measure angle of refraction ***and*** protractor to control angle of incident ***and*** equipment to monitor or control one additional CV	
D	Reference to different values of salinity ***or*** different number of trials	Five different IV setting specified ***or*** plans for three trials	Five different IV setting specified ***and*** plans for three trials		
M	Attempt at method but detail is insufficient to follow	Method described and could be followed but detail is incomplete or incorrect	Complete method is described, includes full details on how the salinity is changed, the angle of incidence is controlled and could easily be followed		Mass of salt dissolved in a specific volume of water must be specified for a complete method
P	plans to calculate the average	plans to calculate the average ***and*** plan to graph IV vs DV to find trend			
S	Safety issue linked to hot raybox ***or*** using an electrical item near water				

6	**a**	 Two correctly placed All correctly placed		**2**	A
	b	***Accept any two similarities, for example [max 2]*** • both methods use a generator • both methods have a turbine • both expensive to set up ***Accept any two differences, for example [max 2]*** • turbine powered by steam in coal-fired power station ***and*** turbine powered by wind • raw materials required ***and*** no raw materials required • can be turned on or off ***and*** no control of wind needed to run it • waste or pollutants generated by coal ***and*** wind is clean energy	*Do **not** accept both generate electricity*	**4**	D
	c	***Accept any two points, for example [max 2]:*** • selling the resources or increase incomes • increased training or education for individuals • job opportunities • increased communication links • increased facilities e.g. hospitals, supermarkets, schools • pollution • loss of biodiversity or deforestation • people forced to leave homes • traditional way of life lost ***Accept any reasonable, correctly linked implication, for example [max 2]*** • roads increase communication links • roads can destroy local land • roads can increase transmission of disease		**4**	D

7			**14**	D

The global implications of plastic waste for aquatic systems		
Mark	**Descriptor**	**Notes**
1	A statement	Examples of statements • impact aquatic wildlife though ingestion of plastic • animals can get tangled in plastic waste • plastic waste can lead to chemical pollution • plastic waste can cause coastal pollution • waste can cause coral destruction Examples of support • marine animals often mistake plastics for food, leading to internal injuries, malnutrition and even death/impact food chain • larger plastic items can entangle marine animals, causing suffocation, drowning, and severe injuries • plastics can release harmful chemicals, into the water, impacting marine life and human health • the costs of cleaning up plastic pollution are significant, burdening governments and communities/tourism is reduced • biodiversity is reduced
2	A statement with further support ***or*** Two statements	
3	Two statements with further support for one	
4	Two statements with further support for both	

<table>
<tr><th colspan="3">Benefits and limitations of each solution to reduce waste for local society (education campaign & waste capture)</th></tr>
<tr><th>Mark</th><th>Descriptor</th><th>Notes</th></tr>
<tr><td>1</td><td>A benefit or limitation of one solution</td><td rowspan="4">Educational campaign
Benefits
• increase of awareness through educational campaign or behaviour of people will change
• increased community engagement
• no need to train people

Limitations
• it can be difficult to achieve a change in behaviour through an educational campaign
• not everyone will be involved
• it takes a lot of time.
• requires a lot of money to use media
• plastic waste will not reduce dramatically

Catching nets
Benefits
• large scale removal of plastic
• can target specific areas with the most plastic waste
• requires less investment.

Limitations
• it does not cover all areas.
• still need to dispose of the plastic after it is captured
• need to maintain the catching nets or replace if broken.
• cost a lot of money if the net breaks, then pollution increases and impact the environment</td></tr>
<tr><td>2</td><td>A benefit and limitation of one solution</td></tr>
<tr><td>3</td><td>A benefit and limitation of one solution and a benefit or limitation of another solution</td></tr>
<tr><td>4</td><td>A benefit and limitation of both solutions</td></tr>
</table>

A comparison of the financial implications for each solution for five years		
Mark	**Descriptor**	**Notes**
1	A statement	Examples of statements • educational campaign can cost a lot of money over 5 years • there should be a budget for the 5 years. • bins replacing will be required on a regular basis. nets are cheaper than an educational campaign • requires skilful people to work with the catching nets/Lot of training and work contracts. Examples of support • TV adverts and printing posters can be very expensive • if local government change then need to continue with the educational campaign budget. • providing bins might be very costly • maintaining the nets is an on-going cost • local government need to hire people to work on the process.
2	A statement with further support ***or*** Two statements	
3	Two statements with further support for one	
4	Two statements with further support for both	

Conclusion **(Concluding appraisal)**		
Mark	**Descriptor**	**Notes**
1	A concluding opinion	Justification should give an opinion and connect to at least one solution
2	A concluding appraisal with justification	