Rewarding Learning

General Certificate of Secondary Education
2013

Double Award Science: Biology

Unit B2

Higher Tier

[GSD42]

WEDNESDAY 5 JUNE, AFTERNOON

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

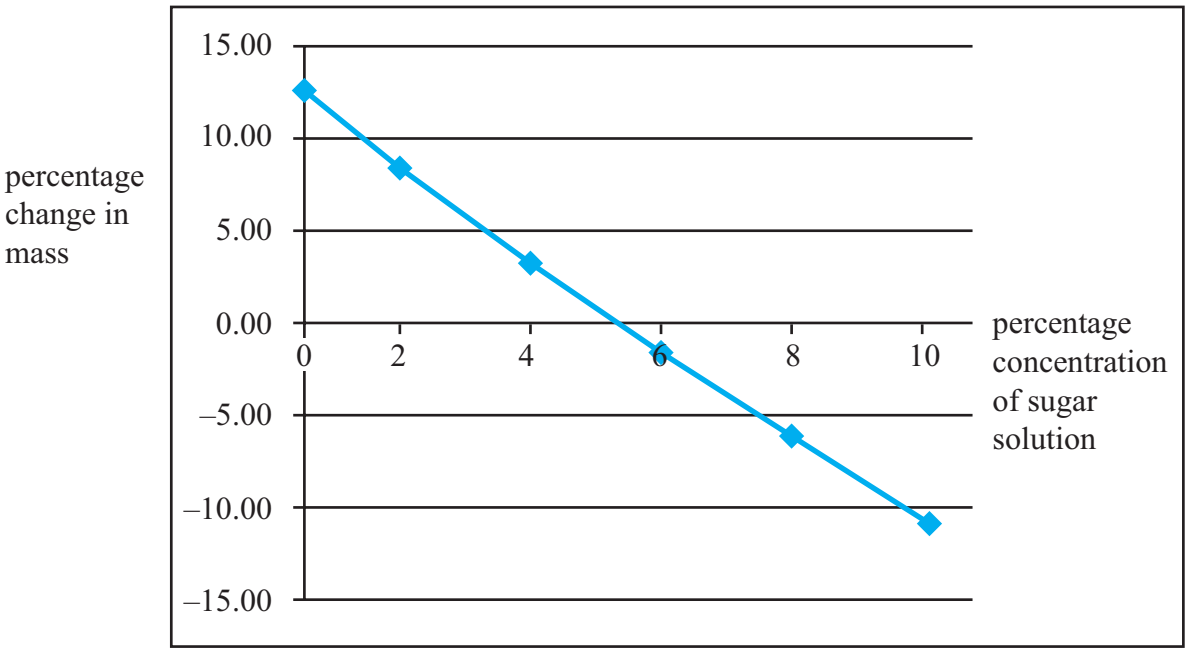
The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

					AVAILABLE MARKS
1	(a)	(i)	Blood passes through the heart twice; for one circuit of the body;	[2]	
		(ii)	X – pulmonary artery; Y – hepatic vein;	[2]	
	(b)	(i)	Cholesterol/fat/atheroma	[1]	
		(ii)	Lack of or NO oxygen/glucose; Less respiration/less energy; Heart (muscle) cells die/heart **muscle** dies; Any **two**	[2]	
		(iii)	10 times the risk;	[1]	
		(iv)	Reduce the risk from 4 to 2 times/half the risk/50% less;	[1]	
	(c)		Brain;	[1]	10
2	(a)	(i)	Change in mass = –0.7; Percentage change in mass = **(–0.7/6.7)**; × **100 = –10.4%)**/–10.44%	[3]	
		(ii)	**Initial/Starting** masses were different/easier to compare;	[1]	
	(b)	(i)	Plotted correctly (5 or 6 points = [2]; 3 or 4 points = [1]); Line drawn;	[3]	



		(ii)	Concentration of sugar solution from graph = 5.4%; – **from their graph** Explanation: No change in **mass**/concentration of sugar solution inside the carrot = same as concentration of sugar solution outside/ no movement of water/no osmosis	[2]	9

				AVAILABLE MARKS
3	**(a)**	**(i)**	Aseptic; [1]	
		(ii)	To **destroy** bacteria present on the loop/sterilise; [1]	
		(iii)	To prevent bacteria escaping from Petri dish/prevent bacteria from getting in from the air; [1]	
		(iv)	To stop **pathogens/harmful/dangerous** bacteria growing; [1]	
	(b)	**(i)**	Antibiotic C; largest area with no growth of bacteria/largest clear area/killed most bacteria; [2]	
		(ii)	Antibiotics treat **bacterial** infections; flu is caused by a **virus**; [2]	8

4 **(a)** To prevent evaporation from surface of water/of water **from the flask/**beaker/water can **only** be lost through the leaves; [1]

(b) **Indicative content:**

- Record the mass of the apparatus containing the plant **initially/at start**
- Leave for a given time
- Record mass at end/change in mass
- **Divide** change in mass **by time** (to work out rate)
- A named variable constant – temperature/humidity/wind speed/same (type/species) plant
- Repeat with reduced surface area/remove leaves/use plant with less/larger/smaller leaves
- Repeat for reliability/to obtain averages
- Keep **another** variable constant – temperature/humidity/wind speed/light/same type/species of plant

Response	Mark
Candidates must use appropriate specialist terms throughout to describe how they would use this apparatus and explain in logical sequence how to compare the rate of water uptake for a plant with a large surface area and then a reduced surface area (using **five or more** of the above points). They use good spelling, punctuation and grammar and form and style are of a high standard.	[5]–[6]
Candidates use some appropriate specialist terms to describe how they would use this apparatus and explain in logical sequence how to compare the rate of water uptake for a plant with a large surface area and then a reduced surface area (using **three or four** of the above points). They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates give some explanation of how they could use this apparatus, using **at least one** of the above points. However they are not presented in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1]–[2]
Response not worthy of credit.	[0]

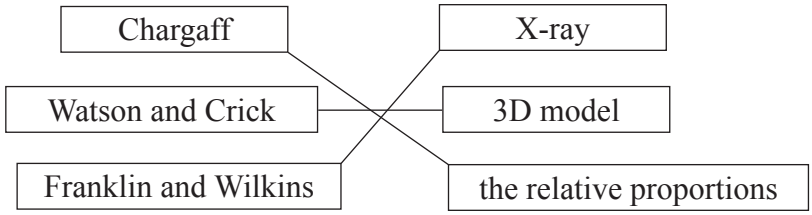
[6]

			AVAILABLE MARKS
	(c)	Must have increase/decrease **with correct link to surface area** Greater water uptake/loss in mass for plant with larger surface area of leaves; or converse **more** evaporation/**more** transpiration of water/**more** stomata/**more** pores; or converse [2]	
	(d)	Line on graph = greater gradient; still starts at zero; [2]	
	(e)	Humidity/wind; [1]	12
5	**(a)**	To destroy any existing bacteria/sterilise broth; (microbes, microorganisms ok) [1]	
	(b)	No bacteria in the broth/broth uncontaminated; bacteria trapped in swan neck/get trapped in bend/can't travel against gravity; [2]	
	(c)	(Louis) **Pasteur**; [1]	4
6	**(a)**	Dark moths are camouflaged/poor camouflage for pale moths/not easily seen; dark moth survives or not eaten/not predated upon; reproduces/mating/produce offspring; passes on dark allele/passes on gene; **or** Allow: – **pale** more easily seen – eaten – don't reproduce – don't pass on gene [4]	
	(b)	Increase/goes up; [1]	
	(c)	Die out/become extinct/endangered; – must refer to population not just individual [1]	6
7	**(a)**	Use a condom/abstinence/don't share needles/don't use dirty needles/ use sterilised needles; Athlete's foot; Bacteria; Airborne droplet infection/in the air/breathing in/airborne/sneezing/ coughing; [4]	
	(b)	Blood clotting – prevents microorganisms from entering (a cut); (Ignore blood loss) Mucous membrane – traps microbes/microbes get stuck/catches microbes; Phagocytosis – engulfs/surrounds; and digests/breaks down microorganisms; [4]	

				AVAILABLE MARKS
	(c)	Any **four** from: • Antibodies are specific/are complementary to A • Cause the bacteria (A) to clump together • Prevents microorganisms dividing/reproducing/moving around body/ spreading/immobilises/allows action of phagocytes • Antibodies not a match for (antigens on) B/don't fit B, not specific for B • Antibodies attach to **antigen** [4]		
	(d)	**(i)** Any **two** from: • larger number **antibodies** produced/brings above threshold for immunity • antibodies remain for longer/takes longer to drop below threshold for immunity/gives long term immunity/it's long lasting antibodies/ immunity • antibody levels rise quicker [2]		
		(ii) Jenner; [1]		15
8	**(a)**	**(i)** Lining shed/breaks down/leaves body; [1]		
		(ii) Uterine wall starts to thicken/build up; [1]		
	(b)	Day 10–14 shaded; Only Day 9 + 15 shaded in addition to 10–14; [2]		
	(c)	**(i)** Mistake in counting days/irregular cycle/described/ovulation may not always occur on day 14; [1]		
		(ii) Religious reasons/object to taking tablets/latex allergy/no side effects/ ethical/moral; [1]		
	(d)	**(i)** Circle around number 21 chromosomes **or** one No. 21; [1]		
		(ii) Has two X chromosomes/XX/no Y chromosome; [1]		
		(iii) Risk of miscarriage/she would not have an abortion/against abortion/ care + love baby anyway; [1]		
	(e)	**(i)** Arrow from placenta towards baby; [1]		
		(ii) Useful – glucose/amino acids/antibodies/fatty acids/glycerol/vitamins/ minerals/water/hormones; [1]		
		(iii) Urea/carbon dioxide; [1]		
		(iv) Increases surface area; [1]		13

AVAILABLE MARKS

9 (a)



3 correct = [2], 1 correct = [1] [2]

(b) (i) Circle around nucleotide (1 base, 1 sugar, 1 phosphate linked together); [1]

(ii) Need to keep strands parallel/distance between strands not uniform/ too big/won't fit in space; [1]

(c) (i) Double helix; [1]

(ii) C = 30%;
T = 20%; [2]

(d) Indicative content

- **Gene** for insulin removed (from human chromosome)
- Plasmid removed from bacterium
- Plasmid cut open
- Insulin **gene** inserted
- Plasmid reinserted into bacterium
- Bacteria multiply/clone/mitosis

Response	Mark
Candidates must use appropriate specialist terms throughout to describe the steps involved in genetic engineering of insulin (using **five or more** of the above points). They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
Candidates use some appropriate specialist terms to describe the steps involved in genetic engineering of insulin (using **three or four** of the above points). They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates give some description of the steps involved in genetic engineering of insulin. However they are not presented in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1]–[2]
Response not worthy of credit.	[0]

[6] 13

Total **90**