

## Mark Scheme

Q1.

Question number	Answer	Notes	Marks
(a) (i)	molar;	Allow premolar	1
(ii)	C, enamel		1
(iii)	Any three from: <ul style="list-style-type: none"> <li>contains ridges/crevices;</li> <li>larger surface area/more in contact with food;</li> <li>food trapped;</li> <li>provides nutrients for bacteria/reference to bacteria digesting/using food/producing acid;</li> <li>more difficult to clean/reference to location in mouth (making tooth more difficult to reach);</li> </ul>	Reject cusp	Max 3
(b) (i)	Any two from: <ul style="list-style-type: none"> <li>(both) decrease;</li> <li>highest % of cases in 1983/lowest % cases in 2013;</li> <li>(%) 15 year old children with tooth decay always higher/(%) 12 year old children with tooth decay lower;</li> <li>(%) 15 year old children falls less overall/(%) 12 year old children falls more overall;</li> </ul>		Max 2
(ii)	clean/brush/floss teeth (more regularly / properly)/(more/regular) visits to dentist/reference to fluoride in toothpaste/drinking water/less sugary foods in diet;	Allow better dental hygiene	1
<b>Total question = 8 marks</b>			

Q2.

Question number	Answer	Notes	Marks
(a)	C hypothalamus;  A does not control sweating B does not control sweating D does not control sweating		1
(b)	B motor;  A transmits impulse from sensory to motor C alternative name for A with same function D transmits impulse to brain		1
(c)	<ul style="list-style-type: none"> <li>• (sweat) evaporates from (the surface of) the skin;</li> <li>• using heat from body/blood;</li> <li>• cools body/reduces body temperature;</li> </ul>		3
(d)	<ul style="list-style-type: none"> <li>• runs in families;</li> <li>• must be faulty/mutated gene/chromosome/allele;</li> <li>• which transfers/passes on information to offspring;</li> </ul>		3
(e)	obesity / high sugar intake / high BMI;		1
(f)	<ul style="list-style-type: none"> <li>• exercise/activity of individual varies;</li> <li>• greater rate of aerobic respiration;</li> <li>• heat given off as by-product/increased body temperature;</li> <li>• external temperature varies;</li> <li>• hotter more sweating/cooler less sweating;</li> <li>• mass of individual varies;</li> <li>• volume of water in the body/fluid intake varies;</li> </ul>	Allow reverse argument for mps 2 and 3	5
			Total 14

Q3.

Question number	Answer	Notes	Marks
(a)	any three from <ul style="list-style-type: none"> <li>oesophagus (1)</li> <li>stomach (1)</li> <li>small intestine/ileum/duodenum (1)</li> <li>large intestine/rectum (1)</li> </ul>		3
(b) (i)	protease/pepsin/trypsin (1)		1
(ii)	<ul style="list-style-type: none"> <li>chewing/grinding/mastication (1)</li> <li>(mix with) saliva (1)</li> <li>digestion of starch (1)</li> <li>to maltose (1)</li> </ul>		4
(c)	any three from <ul style="list-style-type: none"> <li>provides bulk (1)</li> <li>helps peristalsis (1)</li> <li>prevents constipation (1)</li> <li>reduces risk of bowel cancer (1)</li> </ul>		3
Total for question = 11 marks			

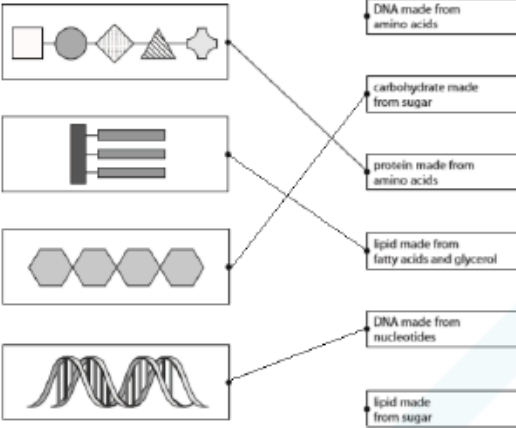
Q4.

Question number	Answer	Notes	Marks
(a) (i)	line labelled X to mouth;		1mark
(ii)	line labelled Y to stomach;		1mark
(iii)	line labelled Z to pancreas;		1mark
(b)	any 4 of <ul style="list-style-type: none"> <li>reduced surface area;</li> <li>so unable to absorb calcium;</li> <li>required for bones/compact bone;</li> <li>calcium passes from bone;</li> <li>causes them to weaken/soften/lose density;</li> </ul>		4marks
(c)	<ul style="list-style-type: none"> <li>large intestine absorbs water;</li> <li>not enough absorbed;</li> </ul>		2marks
Total 9 marks			

Q5.

Question number	Answer	Notes	Marks
(a) (i)	<ul style="list-style-type: none"> <li>suitable scales;</li> <li>axes labelled;</li> <li>correct plots;;</li> </ul>	Number of teeth on X axis, number of students on Y axis	4
(ii)	<ul style="list-style-type: none"> <li><math>\frac{13}{30}</math>;</li> <li><math>\times 100</math>;</li> <li>43.3(%)</li> </ul>	Allow 43(%)	3
(b)	<ul style="list-style-type: none"> <li>wisdom teeth/molars not developed;</li> <li>jaw too small to accommodate extra teeth;</li> </ul>		2
(c)(i)	<ul style="list-style-type: none"> <li>sugar coats/left in teeth/forms plaque;</li> <li>bacteria use sugar (for respiration/energy);</li> <li>convert sugar to lactic acid;</li> <li>acid dissolves/erodes/breaks down enamel;</li> </ul>	Allow feed on Allow release acid	4
(c)(ii)	any two from <ul style="list-style-type: none"> <li>regular brushing of teeth/use fluoride toothpaste/flossing;</li> <li>visit dentist regularly;</li> <li>add fluoride to tap water</li> </ul>		2
			Total 15

Q6.

Question number	Answer	Notes	Marks
(a)	<p>(i)</p> 	Do not allow more than one line from each structure	3
(b)	<b>D</b> stomach;		1

(c)	(i)	3/three		1								
	(ii)	not washing equipment/transfer of food containing protein into distilled water;	Allow any valid alternative	1								
	(d)	<table><tr><th>Hazard</th><th>Reducing risk</th></tr><tr><td></td><td></td></tr><tr><td>Broken glass - cuts</td><td>Clear up breakages using a dustpan and brush/keep equipment away from edge of tables;</td></tr><tr><td>Biuret reagent - irritant</td><td>Wear goggles/wash hands after use/don't use if skin is sensitive;</td></tr></table>	Hazard	Reducing risk			Broken glass - cuts	Clear up breakages using a dustpan and brush/keep equipment away from edge of tables;	Biuret reagent - irritant	Wear goggles/wash hands after use/don't use if skin is sensitive;	Ignore wear gloves	1
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Biuret reagent - irritant	Wear goggles/wash hands after use/don't use if skin is sensitive;											
		Ignore wear gloves	1									

Total question = 8 marks

Q7.

Question number	Answer	Notes	Marks
(a) (i)	<ul style="list-style-type: none"> <li>eat too much;</li> <li>too little exercise;</li> <li>increased fat storage;</li> </ul>		3
(ii)	<ul style="list-style-type: none"> <li>heart disease/attacks/strokes;</li> <li>causes joints in legs to develop arthritis;</li> </ul>		2
(b) (i)	C (pancreas); A is for excretion B is site of insulin action D produces other hormones		1
(ii)	B (liver); A is for excretion C is site of production D produces other hormones		1
(c) (i)	$26378 - 22092 = 4286;$ $\frac{4286 \times 100}{22092}$ $= 19.4\%;$		3
(ii)	$0.9 \times 3.8 = 3.4(2) \text{ million};$		1
(d)	any three from <ul style="list-style-type: none"> <li>less blood flows;</li> <li>death of tissues;</li> <li>increased risk of infection;</li> <li>less white blood cells to deal with infection;</li> </ul>		3
Total 14 marks			

Q8.

Question number	Answer	Notes	Marks
(a) (i)	<b>C</b> green vegetables and red meat		1
(ii)	<ul style="list-style-type: none"> <li>• (iron) needed for production of haemoglobin(1)</li> <li>• (haemoglobin/red blood cell) binds to/transport oxygen(1)</li> <li>• oxygen needed for (aerobic) respiration/energy(1)</li> <li>• for growth of fetus(1)</li> </ul>		4
(b) (i)	Any four from: <ul style="list-style-type: none"> <li>• take temperature of water (at the start) (1)</li> <li>• reference to measuring mass of food(1)</li> <li>• place food on holder(1)</li> <li>• burn food(1)</li> <li>• reference to time (for burning food)(1)</li> <li>• take temperature of water after burning/once food is completely burnt/measure change in temperature(1)</li> </ul>	Allow amount for mass  Allow food is heated/set alight	4
(ii)	Any three from: <ul style="list-style-type: none"> <li>• add a lid(1)</li> <li>• reference to stirring/even heat distribution(1)</li> <li>• insulate the copper can/move food closer (to the can/water) (1)</li> <li>• reference to preventing heat loss(1)</li> </ul>	Allow cover the beaker	3
<b>Total for question = 12 marks</b>			

Q9.

Question number	Answer	Notes	Marks
(a) (i)	1 = humerus; 2 = radius; 3 = ulna; 4 = fingers/phalanges;		4
(ii)	circle at the elbow to include all three bones;	accept a circle around relevant bones in the fingers	1
(iii)	<ul style="list-style-type: none"> <li>ball and socket;</li> <li>gliding/sliding;</li> </ul>	reject named examples	2
(b)	<ul style="list-style-type: none"> <li>assists/allows uptake of calcium (salts from gut);</li> <li>(calcium) needed for bone growth;</li> <li>hard bone/compact bone;</li> </ul>		3
Total 10 marks			

Q10.

Question number	Answer	Notes	Marks
(a) (i)	<ul style="list-style-type: none"> <li>axes labelled (1)</li> <li>suitable scale (1)</li> <li>axes correct way round (1)</li> <li>correct plots (1)</li> <li>lines labelled/key given (1)</li> </ul>		5
(ii)	any two from <ul style="list-style-type: none"> <li><u>volume</u> of water (1)</li> <li>mass of carbohydrate/aspirin (1)</li> <li>temperature (1)</li> <li>time interval between each reading (1)</li> </ul>	Allow type of aspirin Allow amount as an alternative to mass Ignore concentration	2
(iii)	pH (1)		1
(b)	<ul style="list-style-type: none"> <li>(aspirin) dissolves/reduces pH more quickly (1)</li> <li>(when combined) with sucrose (1)</li> <li>so will act more quickly/relieves pain faster (1)</li> </ul>		3



Q11.

Question number	Answer	Notes	Marks
(a)	$\frac{14}{100} \times 250 = 35$ ;	Ecf one mark for correct answer from wrong numbers	1
	$35 \div 10 = 3.5$	Full marks for correct final answer of 3.5	1
(b) (i)	$4 \times 3.5 = 14$ (units);	ecf from 7a	1
	$14 - 3 = 11$ (hours);	Full marks for correct final answer of 11 hours	1
(ii)	Any two from: <ul style="list-style-type: none"> <li>• alcohol is a depressant;</li> <li>• (alcohol) affects the nervous system/brain;</li> <li>• slows reactions/increases reaction <u>time</u>;</li> </ul>		Max 2
(c)	Any five from: <ul style="list-style-type: none"> <li>• less/no bile produced;</li> <li>• less/no emulsification of fat;</li> <li>• surface area of fat remains low;</li> <li>• less fat digested/broken down (by lipase);</li> <li>• pH of small intestine remains low/acidic;</li> <li>• enzymes denatured/reduced enzyme activity;</li> <li>• reduced/no digestion by protease / carbohydrase/fewer proteins/carbohydrates digested/broken down;</li> <li>• more fat egested;</li> </ul>	Allow trypsin for protease and amylase for carbohydrase	Max 5
<b>Total question = 11 marks</b>			

Q12.

Question number	Answer	Mark
(a)	A graph showing: <ul style="list-style-type: none"> <li>vertical axis scale half grid and linear (1)</li> <li>lines drawn connecting points (1)</li> <li>horizontal axis labelled hours and vertical axis labelled grams (1)</li> <li>points plotted correctly (1)</li> <li>key for amylase Q/amylase P (1)</li> </ul>	5

Question number	Answer	Mark
(b)(i)	An explanation that makes reference to the following points: <ul style="list-style-type: none"> <li>starch digested/broken down to glucose (1)</li> <li>therefore causes water to enter tubing (1)</li> <li>by osmosis (1)</li> </ul>	3

Question number	Answer	Mark
(b)(ii)	An explanation that makes reference to the following points: <ul style="list-style-type: none"> <li>substrate/starch concentration reduced (1)</li> <li>less for enzymes to digest (1)</li> </ul>	2

Question number	Answer	Mark
(b)(iii)	An explanation that makes reference to the following points:  <i>concentration</i> amylase will change the rate of reaction (1)  <i>pH</i> enzyme activity changes with pH (1)	2

Question number	Answer	Mark
(c)	To ensure that the mass is not affected by water	1

Question number	Answer	Mark
(d)	Salivary glands (1) Pancreas (1)	2

Question number	Answer	Mark
(e)	A description that makes reference to three of the following points: <ul style="list-style-type: none"> <li>Benedict's test (1)</li> <li>heat sample (1)</li> <li>brick red/orange colour shows presence of glucose (1)</li> </ul>	3

Q13.

Question number	Answer	Notes	Marks
(a)	$\frac{30\,000}{100} \times 40$ ;  12 000;	Full marks for final correct answer  ecf	1  1
(b)	a microorganism/named microorganism that causes disease;		1
(c)	It cannot be transmitted from one person to the next		1
(d)	<ul style="list-style-type: none"> <li>• use a sample of people/use two groups of people;</li> <li>• feed each sample/group of people a different diet/feed one group a diet with vitamin B and the other without vitamin B;</li> <li>• monitor health/compare (health) of two groups;</li> </ul>		1  1  1
(e)	<ul style="list-style-type: none"> <li>• breakdown of cartilage/cartilage not formed properly/damaged;</li> <li>• bones rub together/more friction between bones/less shock absorption;</li> </ul>		1  1
<b>Total question = 9 marks</b>			

Q14.

Question number	Answer	Mark
(a)(i)	An answer that makes reference to any two of the following points: <ul style="list-style-type: none"> <li>• maintenance of (1)</li> <li>• a constant internal environment (1)</li> <li>• despite external changes (1)</li> </ul>	2

Question number	Answer	Mark
(a)(ii)	Liver	1

Question number	Answer	Mark
(b)	A description that makes reference to any three of the following points: <ul style="list-style-type: none"> <li>• in diet/food as protein (1)</li> <li>• protein is digested (1)</li> <li>• resulting amino acids are absorbed (1)</li> <li>• non-essential amino acids produced by body (1)</li> </ul>	3

Question number	Answer	Mark
(c)(i)	An explanation that makes reference to the following points: <ul style="list-style-type: none"> <li>• more protein in diet A (1)</li> <li>• therefore more urea in urine (1)</li> <li>• 14.3 g versus 2.1 g (1)</li> <li>• excess amino acids converted to urea then excreted (1)</li> </ul>	4

Question number	Answer	Mark
(c)(ii)	Does not come from the breakdown of excess amino acids	1

Question number	Answer	Mark
(d)	Body tissue/muscle increases	1

Q15.

Question number	Answer	Notes	Marks
(a) (i)	A (psychrophiles);  B is incorrect as the temperature of a fridge is not between 12 and 45 degrees C is incorrect as the temperature range is too high for a fridge D is incorrect as the temperature range is too high for a fridge		1
(ii)	increase in growth/maximum growth; (near) optimum/best temperature;	Allow optimum growth.	1 1

(b)	(i)	measure diameter/area of inhibition/of the clear zone/area of no bacterial growth; greater the diameter, the more effective the antibiotic;	Allow observe size of the clear zone.	2
	(ii)	<p>wash hands/work surface after carrying out procedure; reduces transfer of bacteria;</p> <p>Heat inoculating loop/spreader; To kill bacteria/to prevent contamination;</p> <p>do not open dish following incubation/seal the Petri dish (prior to incubation); reduces risk of bacteria being transferred to student/infection;</p> <p>do not incubate over 25°C; prevents growth of pathogenic bacteria;</p> <p>Sterilise/clean all equipment before/after use; Reduces cross contamination;</p> <p>Seal petri dish/do not open lid of petri dish too far/reduce exposure of contents of dish to air; Reduces contamination by airborne bacteria/to prevent bacteria escaping;</p>	Max 4 if no explanation given.	6 max
Total question = 11 marks				



Q16.

Question number	Answer	Notes	Marks																																								
	<table><tr><th colspan="5">Region of alimentary canal</th></tr><tr><th>Feature</th><th>mouth</th><th>stomach</th><th>Small intestine</th><th>large intestine</th></tr><tr><td>starts protein digestion</td><td></td><td>✓;</td><td></td><td></td></tr><tr><td>starts carbohydrate digestion</td><td>✓;</td><td></td><td></td><td></td></tr><tr><td>has a pH 2</td><td></td><td>✓;</td><td></td><td></td></tr><tr><td>has villi</td><td></td><td></td><td>✓;</td><td></td></tr><tr><td>absorbs most water</td><td></td><td></td><td></td><td>✓;</td></tr><tr><td>connects with bile duct</td><td></td><td></td><td>✓</td><td></td></tr></table>	Region of alimentary canal					Feature	mouth	stomach	Small intestine	large intestine	starts protein digestion		✓;			starts carbohydrate digestion	✓;				has a pH 2		✓;			has villi			✓;		absorbs most water				✓;	connects with bile duct			✓			6
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Q17.

Question number	Answer	Notes	Marks
(a) (i)	C; (lipase)		1
(ii)	A; (carbon, hydrogen, oxygen)		1
(iii)	C; (liver)		1
(b)	<ul style="list-style-type: none"><li>show effect of enzyme (1)</li><li>show that bile salts on their own don't break down fat (1)</li></ul>	Ignore control	2
(c)	<ul style="list-style-type: none"><li>create alkaline/optimum pH (1)</li><li>for enzyme to work quickly (1)</li></ul>	Allow increases/adjusts pH	2
(d)	<ul style="list-style-type: none"><li>increase rate of digestion (1)</li><li>with no bile salts change occurred after 15 minutes/digested more slowly in tube A (1)</li><li>occurred after 5 minutes with bile salts present/digested more quickly in tube B (1)</li></ul>		3

Q18.

Question number	Answer	Notes	Marks
(a) (i)	<ul style="list-style-type: none"> <li>allows protein to stay longer in stomach/gut (1)</li> <li>gives time for full digestion (1)</li> </ul>		2
(ii)	<ul style="list-style-type: none"> <li>diet largely/entirely milk when young (1)</li> <li>changes to solids when older (1)</li> </ul>		2
(iii)	<ul style="list-style-type: none"> <li>biuret test (1)</li> <li>add reagent to solid (1)</li> <li>blue to lilac/pale purple (1)</li> </ul>		3
(b) (i)	<ul style="list-style-type: none"> <li>temperature (1)</li> <li>volume of milk (1)</li> <li>volume/concentration of chymosin (1)</li> </ul>		3
(ii)	$\frac{238 + 232 + 241 + 229}{4} (1) = 235 (1)$		2
(iii)	not included when calculating mean (1)		1
(iv)	bubbles of different sizes/volume of CO <sub>2</sub> variable (1)		1
Total for this question = 14 marks			

Q19.

Question number	Answer	Notes	Marks
(a) (i)	175.9 + 178.5 + 166.3 + 167.6 ÷ 4; 172.1;		1
Clip with table		Full marks for correct final answer Reject 172	1
(ii)	Height increases with age (for males / females / both); Males are taller/females are shorter (at all ages);  Females increase in height greater compared with males between the ages of 12 and 18; Greatest height increase between ages 12 to 14;		Max 2
(iii)	Use more students in each age group; Use a greater age range of students; Use ages with 1 year gap/13,15,17;	Allow other valid improvements Ignore repeats	1



(b)	(i)	$71 \div 1.46^2$ ;		1
	Clip with table	33/33.3;	Full marks for final correct answer One mark for correct calculation with incorrect figures	1
	(ii)	student Y is obese;	ECF from b(i)	1
	CLIP (b)(i) with (b)(ii)	higher risk of diabetes/heart disease/arthritis/cancers;	Allow other medical condition linked to obesity	1
Total question = 10 marks				