Q1. (2018)

2			C ✓	**1**	2.1	

Q2. (2018)

3			C ✓	**1**	1.1	

Q3. (2018)

4			C ✓	**1**	2.2	

Q4. (2018)

5			B ✓	**1**	2.2	

Q5. (2018)

8			A ✓	**1**	2.1	

Q6. (2018)

10			B ✓	**1**	2.2	

Q7. (2018)

13			B ✓	**1**	2.1	

Q8, (2018)

A)

	(b)	**(i)**	**First check answer on answer line** **If answer = 1000 (x) award 2 marks** 10 0.01 ✓ 1000 (x) ✓	**2**	**1.2** **2.2**	

B)

		(ii)	5(μm)✓	**1**	**2.2**	**ALLOW** +/- 1 μm tolerance

Q9. (2018)

A)

21	**(a)**		can control temperature (easier)/ can be set to a specific / constant temperature ✓ limited fire risk✓	**2**	**2 x2.2**	**IGNORE** reference to ease of measurement **ALLOW** less risk of burns **ALLOW** ORA

B)

	(b)		for 60^0C / high temperatures: idea that (membranes break down) at 60^0C releasing more DNA / DNA is extracted easily ✓ against 60^0C / high temperatures: increased risk of DNA breaking down at 60^0C / more DNA destroyed at 60^0C / DNA not preserved at 60^0C ✓	**2**	**2 x 2.2**	 **ALLOW** idea that enzymes destroying DNA are denatured so less DNA destroyed Answers must make it clear which temperature they are referring to. **ALLOW** ORA

C)

	(c)		wear face mask / goggles to prevent protease/ethanol/chemicals being inhaled / entering eyes✓ gloves / use tongs prevent ethanol/protease/chemicals being in contact with skin✓ turn Bunsen off as ethanol is flammable✓	2	2 x 2.2	**ALLOW** use tongs as solution/ tube may be hot **IGNORE** reference to lab coats / glass breakages

D)

	(d)	(i)	**First check answer on answer line** **If answer = 33.1 (mg) award 2 marks** 99.2 / 3 **OR** 33.067 / 33.07✓ = 33.1 (mg) ✓	2	1.2 2.2	

E)

		(ii)	(yes because) idea that there is a greater mean / yield / mass produced (of DNA)✓ there is less range/variation in results✓	2	2 x 3.1b	**ALLOW** ECF **ALLOW** examples of data from table to indicate less range/variability

Q10. (2019)

1			A	1	1.1	

Q11.(2019)

2			B	1	1.1	

Q12.(2019)

12			B	1	2.1	

Q13. (2019) – 16d

16	(d)		(yes) smallest (size of cell) 8 µm/0.8 thousands of a millimetre ✓ (size is) greater than 0.02 thousands of a millimetre / 0.2 µm ✓	2	2.2	If answer is no award zero marks

Q14. (2020) – 16d

A)

	(d)	(i)	provide energy / release energy / produce ATP ✓	1	1.1	

B)

		(ii)	carbon dioxide ✓ water ✓	2	1.1	**ALLOW** correct answers in either order **ALLOW** correct formulae in either order **IGNORE** oxygen and glucose when shown as reactants **IGNORE** energy

C)

		(iii)	exothermic ✓	1	1.1	

Q15. (2020) – 20b

	(b)		fatty acids are obtained by breaking down/digesting larger molecules ✓ idea (originates) from lipids ✓	2	2.1	**ALLOW** using lipase / enzyme **ALLOW** triglycerides **ALLOW** lipids/fats/oils

Q16. (2021)

12			C✓	1	2.1	

Q17. (2021)

15			B✓	1	2.2	

Q18. (2021) – 16b

		(iv)	**Any 2 from:** (Chloroplasts) photosynthesise ✓ Contain chlorophyll ✓ Idea of absorb light ✓	2	2 x 2.1	 **ALLOW** photosynthesis needs chlorophyll = 2 marks

Q19. (2021)

22	(a)	(i)	Photosynthesis ✓	1	2.1	

Q20. (2022)

2	A ✓	1	1.1	

Q21. (2022) – 23b

	(b)		**Independent variable (max 2)** • Change the temperature ✓ • Method of maintaining/changing the temperature e.g. water bath/Bunsen burner ✓ **Observations to be made (max 2)** • Record the time it takes (for the indicator) to change colour ✓ • To colourless ✓ • Reference to use of a stop clock ✓ **Variables to be controlled (max 2)** • Volume/mass of milk ✓ • Concentration of enzyme ✓ • Volume/mass of enzyme ✓ • Type of milk ✓	5	5 x 3.3a	Marks can be credited if scored in the incorrect section as long as the explanation is clear **IGNORE** heater **ALLOW** see which flask turns colourless first = 2 **IGNORE** amount/quantity throughout **ALLOW** use the same milk **DO NOT ALLOW** temperature

Q22. (2023)

13	B	1	2.2	**ALLOW** -8.8%

Q23. (2023)

A)

19	**(a)**	**(i)**	5 correct data plots ✓✓	**2**	**2 x 2.2**	3 or 4 correct data plots = 1 mark **ALLOW** +/- half a square

B)

		(ii)	Line of best fit through most points increasing and decreasing ✓	**1**	**2.2**	**DO NOT ALLOW** dot to dot line **ALLOW** line of best fit for their plotting **IGNORE** any extrapolation of line

C)

	(b)		**Any two from:** As pH increases amount, oxygen collected increases, then decreases ✓ The optimum pH is between 6-8/pH 8 ✓ Above and/or below pH 6-8/pH 8, enzyme starts to denature ✓	**2**	**2 x 3.2b**	 **IGNORE** temperature

D)

	(c)		The experiment is completed three times for each pH. → makes the data more accurate Use a measuring cylinder, not a beaker to measure the volume of enzyme. → allows the identification of any anomalous results Place the mixture of catalase and hydrogen peroxide in a water bath. This will keep the temperature the same for each pH. → makes the data more valid ✓✓	**2**	**2 x 3.3b**	Three lines correct = 2 marks One/two line correct = 1 mark **DO NOT ALLOW** more than 1 line from each box

E)

	(d)		Repeat the experiment using pH 6.5, 7, 7.5, 8 and 8.5.✓	**1**	**3.3b**	**DO NOT ALLOW** more than 1 box ticked

Q24. (2023)

21	**(a)**		Amino acids ✓ Enzymes ✓ Fatty acids and glycerol✓ Sugar ✓ Respiration✓	**5**	**1.1** **1.1** **1.1** **2.1** **1.1**	 Either order

Q25. (2024)

17	(a)		**Any 4 from:** (Aerobic) respiration ✓ Glucose (used) ✓ Oxygen (used) ✓ Carbon dioxide and water (made) ✓ When oxygen levels are low ✓ Anaerobic respiration (can also produce ATP) ✓ (Anaerobic respiration) produces lactic acid ✓	4	4 x 1.1	**DO NOT ALLOW** aerobic respiration if lactic acid produced **DO NOT ALLOW** an incorrect reactant **DO NOT ALLOW** an incorrect reactant **DO NOT ALLOW** an incorrect product **DO NOT ALLOW** anaerobic respiration if oxygen is named as a reactant **DO NOT ALLOW** an incorrect product **ALLOW** glucose used in either aerobic or anaerobic respiration but only credit once **IGNORE** make/produce energy / mitochondria / oxygen debt

Q26. (2024)

18	(a)		**Reagent** / **Colour**		2	2 x 1.2	**DO NOT ALLOW** more than one tick in each column

Reagent		**Colour**	
Benedict's		Black	
Biuret	✓	Purple	✓
Iodine		Red	
			✓✓

Q27. (2024)

A)

22	(a)		**Any three from:** Use a (measuring) balance ✓ Measure the mass of the beetroot cube at the start of the experiment ✓ Measure the mass of the beetroot cube at the end of the experiment ✓ Reference to blotting/drying the outside of the cubes ✓	3	3 x 3.3a	**ALLOW** use scales **ALLOW** weight for mass **ALLOW** weight for mass **IGNORE** any references to measuring concentrations/volumes or making the cubes the same mass **ALLOW** one mark for simply measuring the mass/weight of the cubes, if no other mark scored

B)

	(b)		**Any two from:** Beetroot cubes come from the same plant ✓ Volume of the solution ✓ Ensure the cubes are submerged ✓ Temperature (of the solution) ✓ Size/surface area/volume of cubes ✓ Time (in the solution) ✓ Type of sugar ✓	**2**	**2 x 2.2**	 **ALLOW** same type/variety/species of beetroot **IGNORE** amount of solution/how much solution **IGNORE** mass of cubes

C)

	(c)		**Any three from:** *Repeatable:* (The student/they should) repeat the experiment/take repeat readings ✓ *Reproducible:* Another student/person conducts the experiment ✓ Use different equipment / use a different method ✓ *In either section once only:* To see if the results are the same/similar / make sure there are no anomalies ✓	**3**	**3 x 2.2**	**Maximum two marks awarded in each section** **ALLOW** use a different beetroot **IGNORE** compare the results **ALLOW** reference to small range bars being more repeatable

D)

	(d)		**Any two from:** Water moves in (to the beetroot/cubes/cells) ✓ By osmosis ✓ The solution/outside the beetroot has a lower concentration (than inside the beetroot) **ORA** ✓	**2**	**2 x 2.1**	 **DO NOT ALLOW** sugar solution moves in by osmosis **ALLOW** sugar solution has a higher/less negative water potential (than the beetroot tissue/cells) **ORA** **ALLOW** The solution/outside the beetroot is more dilute **ORA**
						ALLOW correct references to concentration of water / water moving down its concentration gradient