Markscheme

(paper 1B SL)

Question			Answers	Notes	Total
Section A					
1	a		• Accept any answer between 6 and 7 (Relative light intensity);		1
	b		• Photosynthetic rate is around 1.6 in the 600ppm group AND • Photosynthetic rate is around 2.4 in the 1400ppm group .	Accept answer 0.1 above or 0.1 below answer stated	1
	c		• Light energy is absorbed by chlorophyl and used to split water molecules (OR photolysis); • (At high light intensity) Light saturation occurs as all the available chlorophyll molecules are engaged; • Other factors like CO_2 concentration or temperature become limiting;		2
	d		• Increase chlorophyll concentration; • Larger leaves to increase the surface area for light absorption; • Optimize leaf arrangement (OR orientation) for light capture;		1

2	a		• Magnification = Image size / actual size; • Magnification = 2cm / 10um; • Magnification = 20000um / 10um = x2000;	Ensure correct units are used. Award one mark for working and one for correct answer.	2
	b		• Resolution is the ability to distinguish between two separate points as distinct entities; • Increasing magnification enlarges the image but does not inherently improve resolution; • Resolution is limited by the wavelength of light and the numerical aperture of the microscope lens; • If magnification is increased beyond the resolution limit, the image may appear larger but will become blurry;		2
	c		• An electron microscope provides much higher resolution than light microscope; • Use of higher power objective lens; • Use of specific stains to enhance the contrast of mitochondrial structures; • Use of fluorescent dyes to highlight specific structures within the mitochondrion;		1
	d		• Kidney cells are metabolically active and require a large amount of ATP for cellular processes (such as active transport); • Mitochondria are the site of aerobic respiration and ATP production, so their abundance reflects the cells high energy needs;		1

3	a	i	The highest activity level is (8 Kj/hour) at 12:00;	Information in parenthesis is not required to earn mark.	1
		ii	• Body temperature at 12:00 is 35 degrees Celsius, whereas it is 25 degrees Celsius at 20:00 AND • The body temperature at 12:00 is 10 degrees Celsius higher than at 20:00	.	1
	b		• Ectotherms regulate body temperature through behavioral adaptations; • For example, basking in the sun to increase temperature OR seeking shade to cool down;		1
	c		• Endothermic organisms need to maintain a constant internal body temperature; • This requires constant supply of energy in the form of food to fuel cellular respiration; • Heat is a by-product of cellular respiration;		2

4	a		• Zone A has higher species richness than zone B; • Zone A has a higher species evenness compared to zone B;		2
	b		• **Human activities** – deforestation, logging, or agricultural expansion could reduce species richness and evenness in one region; • **Natural disturbances** – fires, storms or disease outbreaks could differentially affect regions; • **Habitat fragmentation** – fragmentation due to roads or urban development could impact species distribution; • **Climate change** – temperature or precipitation patterns could affect species differently in each region;	Award maximum on point from each category.	2
	c		• Higher species richness increases ecosystem resilience and stability by providing more functional roles (OR niches occupied) and redundancy; • *Example* – if one species is lost, others can fill its niche, maintaining ecosystem functions; • While important, evenness alone does not guarantee stability if species richness is low;		2
	d		• National parks; • Rewilding; • Nature reserves; • Reclamation (projects);		3