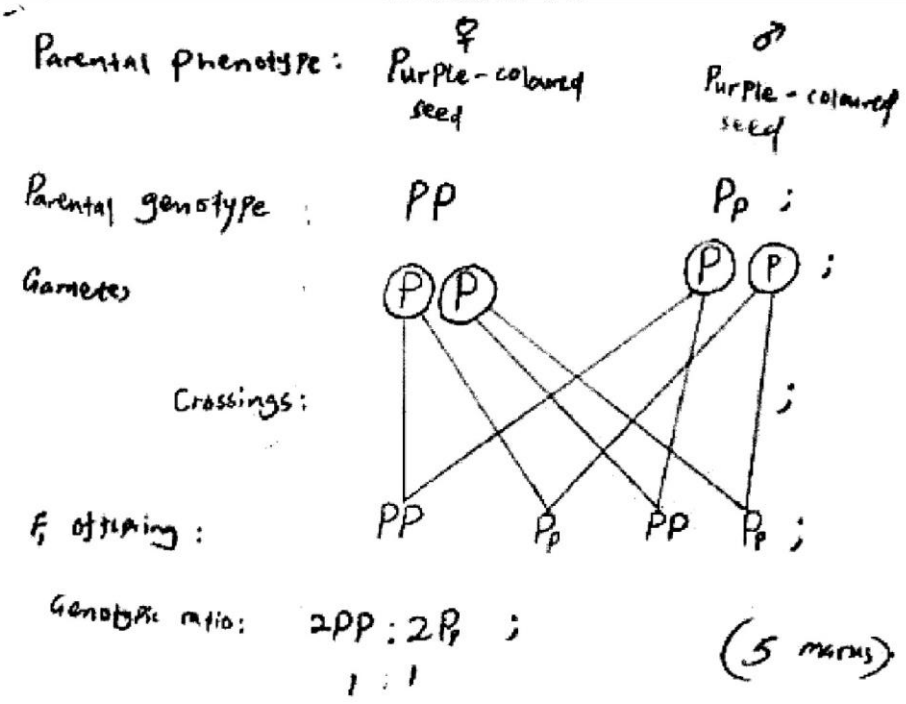
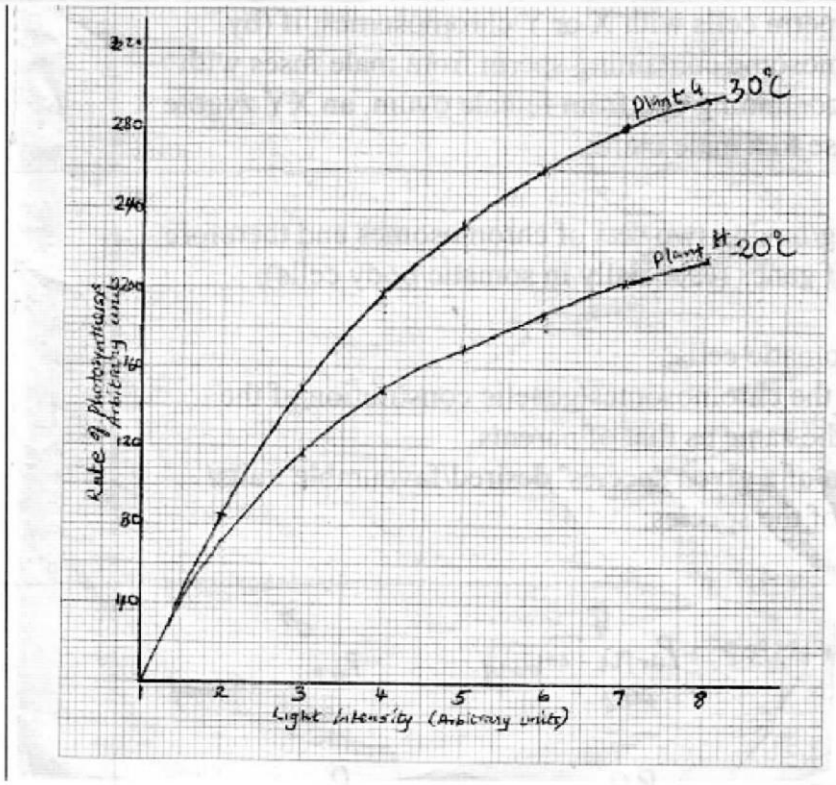
4.5.2 Biology Paper 2 (231/2)

1. (a)	i. E – Nucleolus; F – Nuclear pore/nucleopore;	(1 mark) (1 mark)
	ii. Facilitates movement of materials in and out of the nucleus;	(1 mark)
	iii. Nuclear material in the bacterial cell is not enclosed within a membrane /prokaryotic, while in animal cell it is enclosed/ eukaryotic;	(1 mark)
(b)	i. Chloroplast; ii. Lysosome;	(1 mark) (1 mark)
(c)	i. Feeding (food vacuole); ii. Osmoregulation (contractile vacuole); iii. Excretion/removal of wastes;	(2 marks)
2. (a)	Presence of carbonic anhydrase enzyme; which speeds up the conversion of carbon (IV) oxide to weak carbonic acid; which dissociates into hydrogen carbonate ion/ (HCO_3^-) (that diffuses out of the red blood cells into the blood plasma);	(2 marks)
(b)	The body needs high amount of energy; (for the exercise/muscle activity) hence high respiration rate (more oxygen intake); releasing more carbon (IV) oxide (in the blood plasma);	(3 marks)
(c)	The high rate of respiration (during physical exercises coupled with normal cellular metabolism) results in the production of more carbon (IV) oxide/faster accumulation of lactic acid; lowering the blood plasma pH/making it more acidic (compared to when one is at rest);	(2 marks)
(d)	Haemoglobin;	(1 mark)
3. (a)	The cell is turgid; its cell sap was hypertonic (compared to the solution in which it was placed); by osmosis, water moved into the cell across its cell semi-permeable membrane, (swelling and becoming turgid);	(3 marks)
(b)	The red blood cell lacks the cell wall; water molecules move across its semi-permeable membrane by osmosis; into its hypertonic medium (inside the cell),cell contents/cytoplasm swelling and bursting/ haemolyses;	(3 marks)
(c)	Would haemolyse; due to lowering of the osmotic pressure of the blood below normal;	(2 marks)

4.	a) Male produces sperm cells with X or Y chromosomes; if (by chance), Y chromosome containing sperm from male fuses with X chromosome containing egg from female ovum, an XY zygote results, giving rise to a male child;	(2 marks)
	b) i. State of being/having two sets of chromosomes and therefore two copies of genes (especially in somatic/body cells); ii. Mitosis; iii. Body cells/somatic cells; iv. Ensures that the chromosomes/genetic constitution of the offspring is the same as that of parents; Ensures perpetuation of a given species' desired/favourable traits/ qualities/continuity of the species; c) Testosterone;	(1 mark) (1 mark) (1 mark) (2 marks) (1 mark)
5.		(5 marks)
	b) – Higher yields; – Enhanced resistance to diseases/pests; – Early/faster maturity; – Enhanced resistance to harsh climatic conditions (drought/ extremes in temperature); Any two	(2 marks)
	c) Chances of recessive/defective genes being combined increase, hence weaker offspring;	(1 mark)

6.	 a) Plotting, all points- (2 marks) Labeling axis, X and Y, - (2marks) Scale, X and Y, – (2 marks) Smooth curves – (2 marks)	(8 marks)
	b) To investigate/compare the effect of (varying) light intensity/ temperature on the rate of photosynthesis;	(1 mark)
	c) Rate of photosynthesis is higher in plant G (than H); (Photosynthesis being an enzymatic process), enzymes were subjected to favourable/optimal temperatures (of 30°C); hence more activated, unlike in plant H where temperatures were lower (20°C);	(3 marks)
	d) (i) 1- 4 units Rapid increase in rate of photosynthesis increases with the increase in light intensity; due to increase in light energy for photosynthesis/formation of more ATP molecules; (ii) 4 – 8 units Slower/gradual increase in the rate of photosynthesis as the light intensity increases; because other factors become limiting/ some chlorophyll molecules start bleaching;	(2 marks) (2 marks)
	e) i) Slight increase/no significant increase/remains constant; ii) The optimum light intensity has been exceeded/some chlorophyll could be destroyed;	(1 mark) (1 mark)
	f) Internal factor – Chlorophyll/enzyme concentration; External factor – Carbon (IV) oxide concentration/amount of water;	(1 mark) (1 mark)

7.	**a) Climate change** – Promote(regular) rainfall/precipitation/prevent desertification; – Act as wind breakers; – Keep earth temperatures cool/reduce global warming; – Keeps biogeochemical cycles going e.g. hydrological, carbon, nitrogen, phosphorous, sulphur cycles;	(3 marks)
	b) Biodiversity – Conserve diverse flora/ fauna; – Conserve genetic variety; – Prevent extinction of rare species; – Source of research/employment; – Aesthetic/attracting tourism in foreign exchange; – Have impact on culture/religion/politics; – Food and shelter for other organisms and man; – Source of oxygen;	(6 marks)
	c) Biotechnology – Manufacture of medicines/directly used as medicinal; – Source of food/food products; – Provide fuel (when regulated); – Provide paper and related by-products (when regulated); – Provide timber (when regulated); – Products used in other industries e.g. tannin, wax, rubber, oil, honey;	(4 marks)
	d) Water conservation – Increased ground water/high water tables; – Adds into rivers/lakes/permanency in existing water bodies/ reservoirs; – Water towers/water catchment;	(3 marks)
	e) Pollution – Minimize soil pollution/ensuring cover against surface run-off/ wind erosion/denudation; – Trees/vegetation clean the soil surface by absorbing nutrients from decomposed matter e.g. sewage; – Large scale clean-up of polluted air/dust; – Muffle noise pollution;	(4 marks)

8.	– Has the **eyelid;** which protects the cornea from mechanical/ physical/chemical damage; – **Eye lid;** protects the eye from bright light by reflex action; – **Sclera/Sclerotic layer;** – which contains (inelastic) collagen fibres which protects/maintains shape of the eyeball; – **Cornea;** – transparent to allow light pass through/has convex shape to refract light towards the retina; – **Conjunctiva** – (thin) epithelium for protection of cornea/has goblet cells for secretion of mucus for lubrication/ transparent to allow light pass through; – **Choroid/choroid layer;** – rich in blood vessels/highly vascularised, supplying the retina with nutrients/oxygen/ remove metabolic wastes/covered with (black) pigment cells to prevent reflection of light within the eye; – **Ciliary muscles;** have (contractile) muscles that contract/relax to alter the shape of the lens during accommodation; – **Lens**;– transparent to allow light pass through/elastic to allow adjustment of the shape of lens/ biconvex to refract light/focus light onto retina; – **Iris;** – has radial and circular muscles to alter diameter/size of the pupil, hence controlling the amount of light entering the eye/contain pigments that absorb light and stop it getting through to the retina; – **Vitreous homour;** – clear/transparent to allow light pass through/is a fluid that refracts light rays onto the retina/ maintain shape of the eye balls supports the eye; – **Retina;** contains cones, rods/photoreceptors to perceive light; – **Optic nerve;-** has sensory neurons/nerve cells that transmit impulses to the brain; – **Fovea (centralis);** – (most sensitive part of retina) contains numerous/high concentration of cones for visual acuity/ accurate vision; – **Pupil** ;– a hole/an aperture/opening in the iris, lets in light; – **Suspensory ligaments;**-are fibrous/inelastic fibres that hold lens in position; – **Aqueous humour** – is clear/transparent to allow light to pass through/is a fluid/liquid (exerting hydrostatic pressure) to maintain the shape of the eyeball/refract light rays onto the lens/cornea/contain glucose for nourishment; – **Blind spot** – a point where the optic nerve leaves the eye to the brain/passage of blood vessels since has no photoreceptors;	(20 marks)