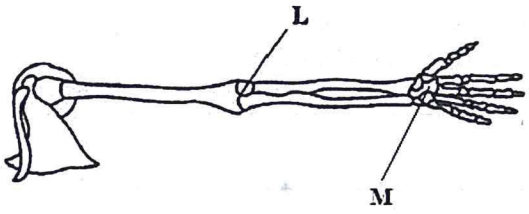
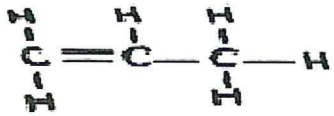
4.8.2 General Science Paper 2 (237/2)

SECTION A: BIOLOGY (34 marks)

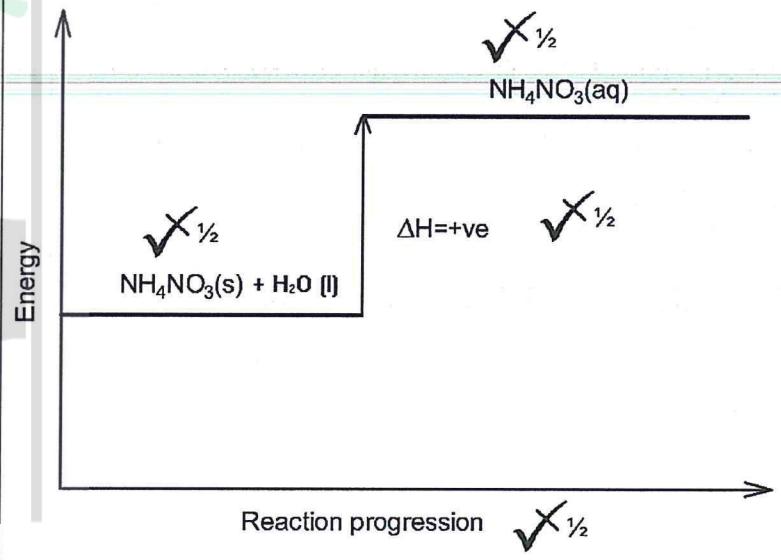
1.	- Leaves modified into thorns/needles to minimize loss of water/transpiration; - Have thick waxy cuticle to reduce the rate of transpiration; - Curl surface to reduce surface exposed to transpiration; - Have sunken stomata which accumulate water to reduce diffusion rate/reduce the surface area for transpiration; - Have reversed stomata rhythm to reduce the rate of transpiration during the day; - Some have shiny silvery hairs on the surface to reflect away excess heat; 5 x1	(5 marks)
2.	- Ovary; - Testes; 2x1	(2 marks)
3.	(a) Progesterone - Maintains pregnancy; - Produces estrogen; 2x1	(2 marks)
	(b) Ovulation in females - Stimulates secretion of testosterone in males; - Stimulates corpus luteum to secrete progesterone; 2x1	(2 marks)
4.	(a) **E** – Centromere; **F** – Chromatids;	(1 mark) (1 mark)
	(b) 46;	(1 mark)
	(c) Homologous chromosomes;	(1 mark)
5.	(a) A gene that is masked in the presence of a dominant allele (in heterozygous state);	(1 mark)
	(b) Genetic constitution of an organism;	(1 mark)
6.	(a) G – Larval stage; H – Pupa stage; (b) That of a grasshopper is incomplete metamorphosis i.e. lacks the pupa stage; (c) – Ecdysone hormone/moulting hormone; - Moulting stimulating hormone; - Juvenile hormone; 1x1	(1 mark) (1 mark) (1 mark) (1 mark)

7.	(a) Growth – Permanent and irreversible increase in the amount of living matter in an organism; (b) Development – Is the progressive change in the form, shape, behavior and complexity of an organism;	(1 mark) (1 mark)
8.	(a) (i) Homologous structures; (ii) Structures have similar basic form or common embryonic origin but modified to perform different functions in different organisms.	(1 mark) (1 mark)
	(b) (i) Comparative anatomy; (ii) Divergent evolution/Adaptive radiation;	(1 mark) (1 mark)
9.	(a) (i) Sensory neuron; (ii) Has a laterally positioned cell body;	(1 mark) (1 mark)
	(b) J – Insulates the axon to speed up impulse transmission; K – Transmit impulses away from this cell body to other neurons;	(1 mark) (1 mark)
10.	(a) Appendicular skeleton; (b) Hinge joint; (c)  	(1 mark) (1 mark) (1 mark)

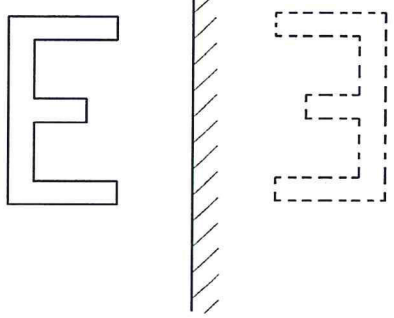
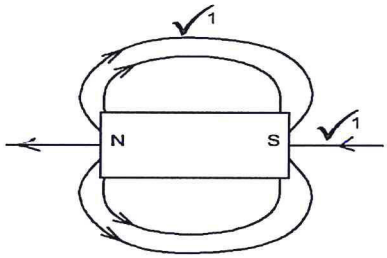
SECTION B: CHEMISTRY (33 marks)

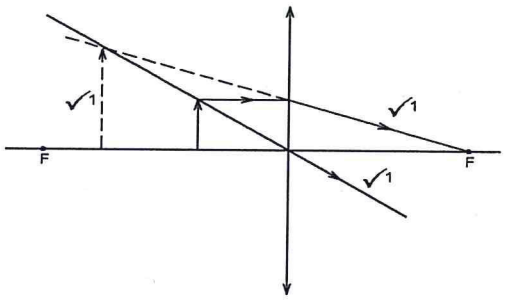
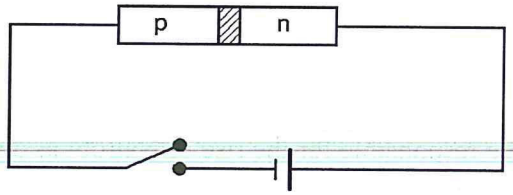
11.		(1 mark)
	a) 1, 2 – dicholopropane ✓1	(1 mark)
	b) Addition reaction ✓1	(1 mark)
12.	a) (i) Allotropes✓1	(1 mark)
	(ii) - Monoclinic / Beta Sulphur ✓1/2 - Rhombic ✓1	(1 mark)
	b) Carbon✓1	(1 mark)
13.	a) $CaCO_{3(s)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + CO_{2(s)} + H_2O_{(l)}$ ✓1	(1 mark)
	b) X✓1- The gradient of the graph is steeper because of increased surface area. ✓1	(2 marks)
	c) - Concentration - Temperature - Catalyst - Pressure (in the case of gases) **(Any 1 correct – 1 mark)**	(1 mark)
14.	a) Bauxite ($Al_2O_3.2H_2O$) Mica ($K_2Al_2Si_6O_6$) Corundum (Al_2O_3) **(Any 2 correct @ 1 mark)**	(2 marks)
	b) – to lower the melting point of aluminium oxide.	(1 mark)

	c) - Duralumin is stronger than Aluminium - Duralumin is harder than Aluminium / Duralumin is stronger than Aluminium **(Any 2 correct @ 1 mark)**	(2 marks)
15.	$4E_{(s)} + 3O_{2(g)} \rightarrow 2A_2O_{3(s)}$ Moles of Oxygen $= \left(\frac{11.5}{24}\right) = 0.4791$ ✓1 Moles of **E** $= \left(\frac{4}{3} \times 0.4791\right) = 0.6388$ ✓1 R.A.M. of **E** $= \left(\frac{17.25}{0.6388}\right)$ ✓1/2 $= 27.00$ ✓1/2 **OR** $11.5dm^3 = 17.25g$ $72\ dm^3 = ?$ $\left(72 \times \frac{17.25}{11.5}\right)$ ✓1 $= 108g$ ✓1/2 $4A = 108$ ✓1/2 $A = \frac{108}{4}$ ✓1/2 $= 27$ ✓1/2	(3 marks)
16.	a) **C** b) **C** does not form scum with hard water hence does not waste soap.	(1 mark) (1 mark)
17.	a) The volume of a fixed mass of gas is directly proportional to the temperature at constant pressure.	(1 mark)
	b) As the volume decreases, there is increases bombardment of molecules against the walls of the container, ✓1/ hence increased pressure. ✓1	(2 marks)

18.	a) Carbon(IV) oxide; Nitrogen, Water vapour, SO_2 **(Any 2 correct @ $^1/_2$ mark)**	(1 mark)
	b) Vanadium(V) oxide	(1 mark)
	c) $2SO_{2(g)} + O_{2(g)} \rightarrow 2SO_3(g)$	(1mark)
	$H_2S_2O_7$	(1 mark)
19.	a) A solution whose concentration / molarity is known	(1mark)
	b) R.F.M. NaOH = 40 moles of NaOH = $\left(\frac{1\times250}{1000}\right)$ ✓$^1/_2$= 0.25 ✓$^1/_2$ mass of NaOH = (0.25 x 40) ✓$^1/_2$ =10g✓$^1/_2$ **OR** $\left(\frac{250\times40}{1000}\right)$ ✓$1^1/_2$= 10g✓$^1/_2$	(2 marks)
20.	a) The heat change that occurs when reactants are converted to products.	(1 mark)
	b) 	(2 marks)

SECTION C: PHYSICS (33 marks)

21.	 Image dist=object distance ✓ image size = object size ✓ image laterally inverted ✓	(3 marks)
22	Rod A and B acquired opposite charges upon rubbing i.e. A- Negatively charged and B – Positively charged	(1 mark)
23	**a)**  - Correct Direction - 1 mark - Correct pattern - 1 mark	(2 marks)
	b) The magnetic field lines are most concentrated at the poles/concentration of magnetic field lines is greatest at the poles)	(1mark)
24.	The direction of vibrations of particles of the medium is parallel to the direction of sound energy.	(1 mark)
25.	(a) The work done in moving a unit charge from point X to point Y. (a) (i) Voltage is directly proportional to current/ Graph is straight and therefore Ohm's law is obeyed. (ii) The temperature of the lamp is changing or cross sectional area is decreasing or length is increasing.	(1 mark) (2 marks) (1 mark)
26.	- The resistance of the coil/number of turns in the coil//voltage – The time taken	(1 mark) (1 mark)
27.	Due to refraction of light ; velocity of light changes at the interface.	(2 mark)

28.	(a)  (b) Size of image = 4.7- 5.7 ± 0.5cm	(3 marks) (1 mark)
29.	900 = no. of units x rate Rate = $\frac{900}{\frac{5\times100\times4\times30}{1000}}$ = sh. 15.00 per kWh	(3 marks)
30.	Voltage to be measured is connected across the Y-plates The displacement of the spot is then measured Voltage = No. of displacement x sensitivity	(1 mark) (1 mark)
31.	- Anode is made of a good conductor such as copper. – Use of cooling fins. – Circulating oil through channels in the anode.	(1 mark) (1 mark) (1 mark)
32.	- Alpha particles – They are heavier compared to the beta particles	(1 mark) (1 mark)
33.	(a) Z is the depletion layer/potential barrier/energy gap (b)  ✓1 (positive terminal connected to n-type, negative terminal connected to P-type) (c) Electrons and holes in their respective regions are attracted away from the junction by the external voltage.	(1 mark) (1 mark) (1 mark)