Biology (130 MARKS)

Answer <u>each</u> of the questions 1, 2 and 3.

<u>Question 1. (52 Marks) *All* Items, (a), (b), (c), etc. (7 × 6 + 1 × 10marks)</u>

(a)	**any *two* from**: water/ salt/ urea…	(2 × 3)	**[6]**
(b)	**motor function, any *one* from**: carry messages from the brain(spinal cord) (CNS)/ to muscles (effectors) (glands)	(3)	
	sensory function, any *one* from: carry messages to the brain(spinal cord) (CNS)/ from sensory organs (sensors) (ear) (eye) (nose) (skin) tongue)	(3)	**[6]**
(c)	fused/ fixed/ immovable/	(3)	
	no movement	(3)	**[6]**
(d)	A: lens	(3)	
	any *one* from: controls (changes) (alters) the shape (thickness) of the lens/ focuses	(3)	**[6]**
(e)	**any *one* from**: nucleus/ chromosomes/ genes/ mitochondria/ plasitds	(3)	
	protein	(3)	**[6]**
(f)	put tube **B** over the small animal	(3)	
	suck tube **A**	(3)	**[6]**
(g)	**any *two* from production of**: bread/ beer (lager) (stout)/ miso/ vinegar/ soy sauce/ wine/yoghurt/ antibiotics (penicillin)/ hormones (insulin)/ vaccines/ interferon/ biological detergents/ pesticides/ GM (genetically modified organisms)/ bio-fuels (methane)…/ spirits (vodka)…	(2 × 3)	**[6]**
(h)	Fat	(4)	
	test: rub food onto paper	(3)	
	translucent (greasy) spot	(3)	**[10]**
	note: if a wrong food type is given by the candidate e.g. ‘starch’ then they lose the first 4 marks. If they then give the correct test for the food that they have named e.g. ‘iodine’ and ‘blue-black’ award the (2 × 3)		

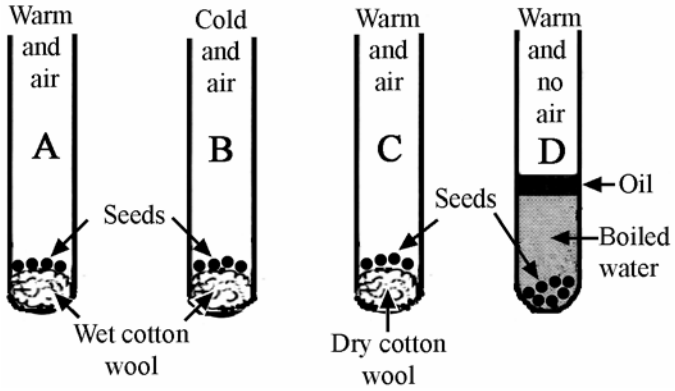
Question 2. (39 marks) *All* items, (a), (b) and (c).

(a) (*i*) List

any *three* from: water (moisture)/ oxygen (air)/ suitable temperature (warm) (heat)/ period of dormancy over/ light (3 × 3) **[9]**

(*ii*) Describe

assume that seed dormancy is over, the investigation deals with environmental factors (conditions) only
A has water, oxygen (air) and warm (15-20^{0}C)
B has water, oxygen (air) and cold (4^{0}C)
C has **no water**, oxygen (air) and warm (15-20^{0}C)
D has water, **no oxygen (air)** and warm (15-20^{0}C)
note 'cold' alone gets no marks, refrigerate/ 4^{0}C is needed



(3)

show or state (3)
A is required in all answers
only seeds in **A** germinate
any *two* from B, **C**, or **D** can act as a **suitable control** (2 × 3) **[12]**
(matched) for the ***two* conditions** selected by the candidate.

note only *two* conditions are investigated. In their answer the candidate may **not list** all three e.g. if water and air are selected and **A**, **C** and **D** are given and 'warm' is not given award the marks.
if 'light' is a selected condition then a **way** of keeping seeds light-free, from the start, is required in the answer
[no diagram deduct 3 marks]

(b) (*i*) Give

any *one* from: produces bile / helps digest (breakdown) (emulsify) fats or a named fat (3) **[3]**

(*ii*) Identify

enzyme: amylase (3)
substrate: starch (3) **[6]**

(*iii*) Give

any *one* from: absorption/ food (nutrients) into the blood/ transports (3) **[3]**

(*iv*) Describe

burn a peanut (crisp) (cracker) (3)
temperature of water rises/ thermometer shows increase (3) **[6]**
accept equivalent experiments

Question 3. (39 marks) *All* items, (a) and (b).

(a)	(*i*) Complete	**missing reactant**: oxygen (O_2) **missing product**: carbon dioxide (CO_2)	(3) (3)	**[6]**
	(*ii*) State	**test for CO_2**: CO_2 (carbon dioxide) lime water goes milky **or** **test for water**: cobalt chloride/ copper sulphate add water turns pink/ turns blue **note**: colour must be matched with reagent **note**: if the candidate gives oxygen, O_2, as a **product** in (*i*) they get no marks for it in (*i*), **allow** in (*ii*) (3) for 'relights' and (3) for 'glowing splint' i.e. in this case test for O_2 can get (2 × 3)	(3) (3) (3) **or** (3) (3) (3)	**[9]**
(b)	Name	oxygen (O_2)	(3)	**[3]**
	Name	carbon dioxide (CO_2)	(3)	**[3]**
	How?	brighter (more) light/ increase (more) CO_2	(3)	**[3]**
(c)	(*i*) Explain	burning releases carbon dioxide (CO_2) **or** **any *one* from**: deforestation results in less carbon dioxide (CO_2) being used/ less photosynthesis/ burning forests releases CO_2	(3) **or** (3)	**[3]**
	(*ii*) Suggest	**any *one* from**: acidification of rivers (lakes) (seas) / melting of polar ice (glaciers)/ rise in sea levels / drought/ greenhouse effect/ disruption of aquatic food chains/ climate change (hotter) (colder) (more or less rain) (more or less wind)/ changes in ocean currents/ extinction of species/ global warming… **note**: 'damages the ozone layer' gets no marks	(3)	**[3]**
	(*iii*) Suggest	**any *one* from**: carbon dioxide (CO_2) is taken in by plants/ used in photosynthesis/ more leaves/ less fuel is burnt for heating…	(3)	**[3]**
	(*iv*) How?	**Allow any *one* from**: plant more trees (reforestation)/ by increasing photosynthesis/ by increasing photosynthesis/ burn less fuel/ turn down thermostats/ better heat insulation of houses (correct example)/ heat pump/ bio-fuel/ solar panels… **note** allow 6 marks for 'burn less fuel only it has not appeared in (*iii*) above	(6)	**[6]**

Chemistry (130 MARKS)

Answer <u>each</u> of the questions 4, 5 and 6.

<u>Question 4. (52 marks) *All* items, (a), (b), (c), etc. (7 × 6 + 1 × 10marks)</u>

(a) two dots (**X**s) in inner circle and eight dots (**X**s) in 'middle' circle (3)
one dot (**X**) in outer circle (3) **[6]**

(b) oil (3)
any *one* from: will not rot (decay)/ bacteria (fungi) (microbes) (micro-organisms) cannot break them down (3) **[6]**
accept: can not be decomposed (broken down) for 3 marks

(c) graduated (measuring) cylinder (3)
any *one* from: burette/ pipette/ gas (graduated) syringe (3) **[6]**

(d) **any *two* from**: soft (can be cut with a knife)/ low density(float on water)/ shiny (lustrous) when cut/ tarnish(form oxide) (reacts) with air/ burn in air/ coloured flames/ react with water/ hydrogen produced with water/ hydroxides formed with water/ silver' (white metals)/ very reactive/ one electron in outer orbit… (2 × 3) **[6]**

note general properties of most metals like electrical and thermal conductivity, ductility, malleability, etc get no marks, specific properties of **alkali** metals are required.

(e) shared (3)
electrons (3) **[6]**

(f) **any *one* from**: alum/ copper sulphate/ salt/ sugar/ silicon/ iodine/ diamond… (3)
any *one* from: crystalline solids have definite (geometric) shapes/ particles in crystals are in regular(geometric) order/ texture e.g. salt and sugar 'feel' different to flour/ crystals affect light/ shiny / sparkle… (3) **[6]**

(g) **any *one* from**: $Ca(OH)_2$/ $CaCO_3$/ NaOH/ Na_2CO_3/ $NaHCO_3$/ NH_3…
any *one* from: sodium hydroxide (caustic soda)/ sodium carbonate (washing soda) sodium hydrogen (bi) carbonate (bread soda)/ ammonia… (3)
accept any *one* from: the named household substances: toothpaste/ oven cleaner/ antacid (named antacid)/ baking powder… (3) **[6]**
do not accept: bleach/ shampoo
note: accept names **only** for the second 3 marks

(h) **A** condenser (3)
Y (3)
Water/ H_2O (2)
salt/ sodium chloride/ NaCl… (2) **[10]**

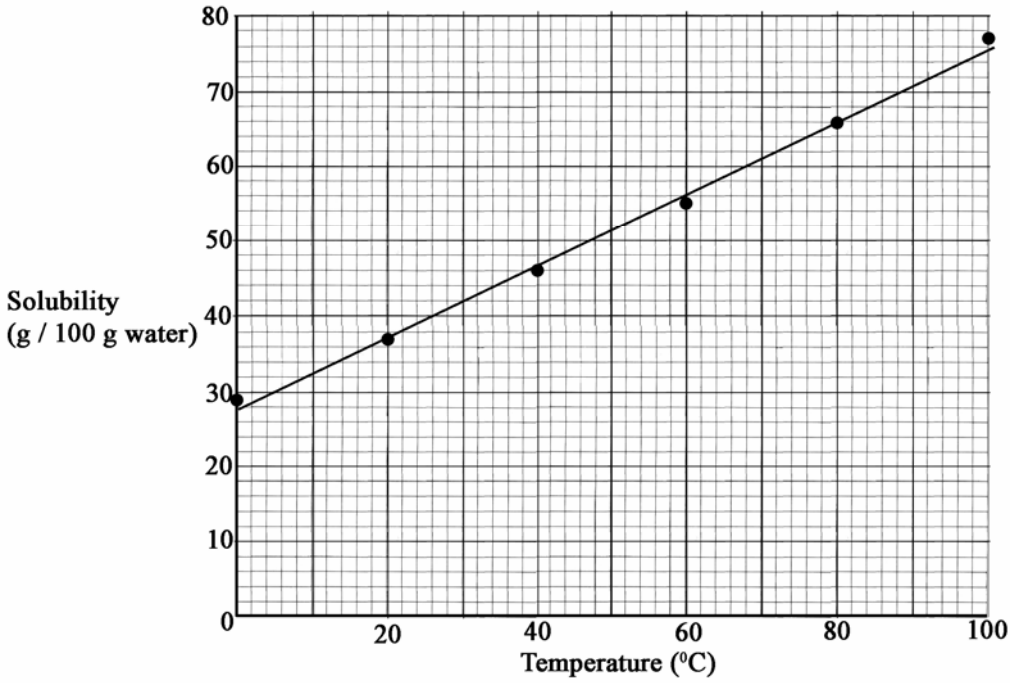
Question 5. (39 Marks) *All* items, (a), (b), (c), etc.

(a) Distinguish

any *one* from: **concentrated** a lot in a small amount of solvent (water)/ **dilute** a small amount in a lot of solvent (water) (3) **[3]**

allow 3 marks for concentrated can be made dilute by adding solvent (water)

Plot



suitable scales drawn on both axes (3)
points plotted (a minimum of four points) (3)
line drawn (it is actually a curve, so accept a curve or a straight line) (3) **[9]**

Use

61 **accept** 58 to 64 i.e. +/- 3 (3) **[3]**

What?

accept solubility is proportional to temperature for 3 marks solubility increases with temperature (3) **[3]**

(b) Explain

element: allow (3) for 'only one type of atom' **or** 'can't be made simpler'
allow (6) for all atoms have the same atomic number (nuclear charge)

element: cannot be broken down into simpler substances (3)
compound: two or more elements chemically combined (3)
(3) **[12]**

(c) Describe

any *one* from: pH (universal) indicator/ pH meter (probe) (3)
any *one* from: match colour/ read pH (3) **[6]**

Name

any *one* from: battery acid/ sulphuric acid/ vinegar/ lemon (orange) juice/ sour milk/ carbonated drinks (named carbonated drink)… (3) **[3]**

Question 6. (39 marks) *All* items, (a), (b) and (c).

(a)	Give	HCl, **accept** formulae(s) of other acids	(3)	**[3]**
	Give	calcium carbonate **accept** any named carbonate **or** bi(hydrogen) carbonate	(3)	**[3]**
	What?	denser (heavier) than air	(3)	**[3]**
	What?	both red (pink)/ blue to red (pink)	(3)	**[3]**
	Give	**any *two* from**: fire extinguishers/ fizzy drinks/ photosynthesis/ 'dry ice'/ 'stage effects'…	(2 × 3)	**[6]**
(b)	(*i*) Describe	**test**: add soap	(3)	
		shake	(3)	
		result: **any *one* from**: water in flask **A** (hard water) does not form a lather easily with soap / forms a scum with soap	(3)	
		any *one* from: flask **B** contains water that forms a lather easily with soap/ does not form a scum with soap/ contains soft water	(3)	**[12]**
	(*ii*) What?	**any *one* from**: compounds of calcium (magnesium)/ calcium **or** magnesium ions (salts)/ formulae(s) **or** names of compounds of calcium and magnesium, **except carbonates**, e.g. $CaCl_2$, $Ca(HCO_3)_2$, calcium chloride, calcium hydrogen carbonate…/ lime	(3)	**[3]**
(c)	(*i*) Name	**any *one* from**: screening/ settling/ filtration/ UV 'light'/ chlorination/ fluoridation/ pH adjustment/ softening/ distillation…	(3)	**[3]**
	(*ii*) Give	**any *one* from (matched)**: **Screening**: takes out large solids **settling**: solids sink **filtration**: solids are removed **UV** (ultraviolet) irradiation: stops certain dangerous microbes multiplying **chlorination**: to kill bacteria (microbes) **fluoridation**: help prevent tooth decay **pH adjustment**: stop damage to metal pipes **softening**: removing dissolved calcium/ magnesium **distillation**: removing dissolved solids	(3)	**[3]**

Physics (130 MARKS)

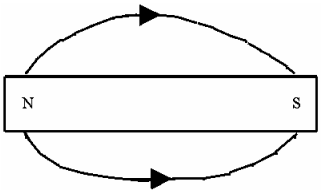
Answer <u>each</u> of the questions 7, 8 and 9.

<u>Question 7. (52 marks) *All* items, (a), (b), (c), etc. (7 × 6 + 1 × 10marks)</u>

(a)	(*i*) heat the ball, it does not pass through the ring	(3)	
	(*ii*) let the ball cool, now passes through the ring	(3)	**[6]**
(b)	(*i*) ice is less dense than water	(3)	
	(*ii*) ice is more dense than ethanol	(3)	**[6]**
(c)	bulb **A** lights	(3)	
	the diode with **A** is in forward bias (allows current to flow) (+ end of diode connected to + pole of battery)	(3)	**[6]**
	note allow 3 marks for a correct reason for why **B** does not light if a correct reason for why **A** does light is not given		
(d)	**magnetic effect any *one* from**: electromagnets/ door bells/ remote opening of doors/central locking in cars/ phones/ speakers/ electric motors/ any named device incorporating an electric motor/ read (write) heads on audio (video) recorders computer drives/ remote switching e.g. starter motor in car electrical meters…	(3)	
	chemical effect any *one* from: electroplating/ chromium plating/ silver plating/cold galvanising/ refining of copper/ refining of aluminium/ production of sodium hydroxide/ production of hydrogen/ charging a battery…	(3)	**[6]**
	accept 'electrolysis' for 3 marks		
(e)	light moves faster than sound	(6)	**[6]**
(f)	**advantage any *one* from**: no 'greenhouse gas 'emissions/ no carbon dioxide (CO_2) emissions/ supply of nuclear fuel for many centuries/ can produce large amounts of energy/ cleaner supply of electricity…	(3)	
	disadvantage any *one* from: devastation if a reactor erupts/ very long term storage of wastes/ wastes are radioactive(dangerous)/ mining for nuclear fuel damages the environment / transport of nuclear fuel is hazardous/ terrorist threat reprocessing nuclear fuel is hazardous (can damage the environment)/…	(3)	**[6]**
(g)	water is a poor conductor of heat	(3)	
	any *one* from: hot water rises/ water is heated by convection(current)	(3)	**[6]**
	note 'heat rises' alone gets no marks		
(h)	**weather conditions**:		
	any *two* from: cloudy/ windy/ rain…	(2 ×3)	
	explanation:		
	any *one* from: air rises/ water vapour condenses (cools)/ air moves in	(4)	**[10]**

Question 8. (39 marks) *All* items, (a), (b), (c), etc.

(a) Draw



two magnetic field lines shown, **one on each side** of the bar magnet. (2 × 3) **[6]**
[if direction is not given *or* given incorrectly for a magnetic field line award no marks for that 'line']

What? poles/ north and south (3) **[3]**

(b) Calculate

note
(*i*) if no calculation is performed allow 3 marks for 'work = force × distance', award no marks for units in this case.
(*ii*) allow 2 marks for (8 × 20) or (8000 × 20), if the units are matched allow the 3 marks for the unit
(*iii*) unit alone gets no marks

160 000 (3)
J (Nm) (3)
or **or**
160 (3)
kJ (kNm) (3) **[6]**

Identify

any *one* from: kinetic to heat/ kinetic to sound/ kinetic to electrical/ kinetic to chemical/ kinetic to potential
note: the last three are included to allow for 'hybrid' cars (2 × 3) **[6]**
[allow 3 marks for a correctly named energy provided it is on the correct side of 'to' or of an arrow]

(c) Define

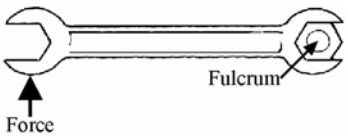
accept turning effect **or** turning power for 3 marks
force (weight) multiplied by its distance from the fulcrum (3) (3) **[6]**

Calculate

$30 \times \mathbf{F} = 40 \times 3$ (3)
$\mathbf{F} = 4$ N ('N' not required) (3) **[6]**
note (*i*) allow 5 marks for (40 × 3)/30 if it is the only statement
(*ii*) '4' alone merits 6 marks

Give

e.g. spanner and nut
accept **any** correct **everyday** example of a lever



fulcrum shown correctly (3)
one force shown correctly (3) **[6]**
[no diagram deduct 3 marks]

note: if fulcrum **and** force are not shown in the diagram allow (3) for a correct example of an application of a lever shown

note if no diagram is given allow 3 marks for **any *one* from**: correct named application e.g. 'door'/ correct fulcrum named e.g. 'hinge'/ correct position of a force e.g. 'handle'

Question 9. (39 marks) *All* items, (a) and (b).

(a) (*i*) What? refraction (3) **[3]**

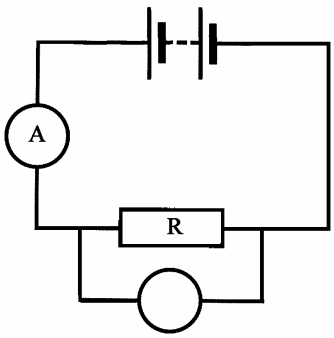
(*ii*) Pick **R** (3) **[3]**

(*iii*) Give **any *one* from**: lenses/ spectacles/ magnifying glass/ microscope/ binoculars/ telescopes/ camera lenses/ prisms/ projectors/ dispersion (rainbow) (spectrum)/ diascope/ endoscope/ periscope/… (3) **[3]**

(*iv*) Name **any *one* from**: reflection (bouncing off) (mirror)/ gravity (3) **[3]**

(b) What? current/ Amperes (Amps) (3) **[3]**

Enter



A correctly shown in series with **R** and the battery (3) **[3]**

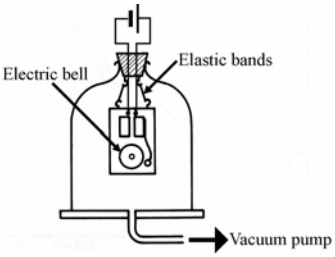
Use 12, **accept** 11.5 to 12.5 i.e. +/- 0.5 (6)

Ω **or** Ohms (3) **[9]**

allow 3 any correct ratio from the graph e.g. $\frac{1.2}{0.1}$ **or** $\frac{1.8}{0.15}$ etc

note if an incorrect ratio is given but it is used correctly in a calculation allow 3 marks e.g. $\frac{6}{5} = 1.2$

(c) Describe



show or state

battery/ cell/ source of electricity (3)

bell in jar (container) (3)

vacuum pump/ air removed (3)

bell is less loud (can't be heard) (3) **[12]**

[no diagram deduct 3 marks]

[if the candidate does not score 12 marks for the above but has 'elastic bands'/ sound insulation between bell and container award 3marks]

accept equivalent experiments, look four equivalent points

acceptable sources of sound include: mobile phone, alarm clock, kitchen timer. Look for an equivalent point e.g. 'dial' for the phone for the first 3 marks