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Junior Certificate Examination 2001

Science

Higher Level

Marking Scheme

Introduction

In considering this marking scheme the following points should be noted.

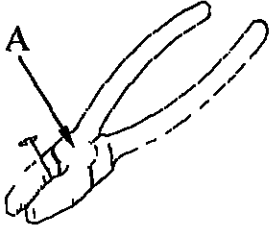
- 1 Words or expressions separated by a solidus, /, are alternative answers which are equally acceptable for the award of the assigned mark
- 2 Words or expressions in round brackets, (), are alternatives to parts of an acceptable answer.
3. In some instances acceptable partial answers are given in square brackets, [], after the full answer to the particular item. In such cases, the marks indicated within the brackets cannot be awarded in addition to any marks already awarded for the item
- 4 Marks given in square brackets in the right hand column are the totals for parts of questions as shown on the examination paper
- 5 The descriptions, methods and definitions in the scheme are not exhaustive and alternative valid answers are acceptable
- 6 The detail required in any answer is determined by the context and manner in which the question is asked and by the number of marks assigned to the item in the examination paper. In any instance, therefore, the detail required may vary from year to year

Outline Marking Scheme

Section A	Q 1	(a) 2×3 , (b) 2×3 , (c) 2×3 , (d) 1×6 , (e) 2×3 , (f) 1×6 , (g) 2×3 , (h) 2×3 , (i) 1×6 , (j) 2×3
	Q 2	(a) 2×3 , (b) 2×3 , (c) 2×3 , (d) 2×3 , (e) 2×3 , (f) 2×3 , (g) 2×3 , (h) 2×3 , (i) 2×3 , (j) 2×3
	Q 3	(a) 2×3 , (b) 2×3 , (c) 2×3 , (d) 2×3 , (e) 1×6 , (f) 2×3 , (g) 2×3 , (h) 2×3 , (i) 2×3 , (j) 2×3
Section B	Q 4	(a) 2×3 , 4×3 , 2×3 (b) 2×3 , 2×3 , 4×3
	Q 5	(a) 2×3 , 2×3 , 3×3 , 1×3 (b) 3×3 , 3×3 , 2×3
Section C	Q 6	(a) 1×3 , 2×3 , 2×3 , 3×3 (b) 1×3 , 2×3 , 1×3 . (c) 1×6 , 2×3
	Q 7	(a) 1×6 , 1×3 , 3×3 , 1×3 (b) 3×3 , 2×3 (c) 1×6 , 1×3 , 1×3
	Q 8	(a) 1×3 , 1×3 , 1×3 , 1×3 (b) 1×3 , 1×3 , 2×3 (c) 1×3 , 1×3 , 4×3 , 2×3
Section D	Q 9	(a) 2×3 , 1×3 , 2×3 , 1×3 , 1×3 , 1×3 (b) 1×3 , 1×3 , 1×3 , 1×3 , 1×3 , 3×3
	Q 10	(a) 2×3 , 2×3 , 2×3 (b) 3×3 , 2×3 , 1×3 (c) 3×3 , 3×3 Any two parts
Section E	Q 11	(a) 2×3 , 3×3 , 1×3 (b) 2×3 , 1×3 , 2×3 , 1×3 (c) 3×3 , 3×3 Any two parts
	Q 12	(a) 3×3 , 3×3 (b) 2×3 , 4×3 Any one of four (i) - (iv).
	Q 13	(a) 2×3 , 4×3 (b) 2×3 , 4×3 (c) 2×3 , 1×3 , 2×3 , 1×3 Any two parts
	Q 14	(a) 1×3 , 1×3 , 3×3 , 1×3 (b) 1×3 , 1×3 , 1×3 , 3×3 .
	Q 15	(a) 1×6 , 1×6 , 2×3 . (b) 6×3

SECTION A (144 MARKS)
Each of the questions 1, 2 and 3

Question 1 **Any eight parts** **[8 × 6 marks]**

- (a)  Fulcrum shown at A or perimeter of jaws of pliers (3)
- Any one of:**
 makes pull stronger (bigger) / greater force / force magnified / better (stronger) grip / leverage / lever (3) [6]
- (b) Force / newtons / N / weight (3)
 Area / (centi)metres squared / m² / cm² (3) [6]
- (c) Water boils **OR** Boiling point (3)
 At higher temperature Increases (3) [6]
- (d) Better insulator / poorer conductor / better at keeping heat in / keeps you warmer (3)
 [Conduction / insulation / heat / warm alone – allow 3 marks] (6) [6]
- (e) $P = IV / I = \frac{P}{I} / \frac{100}{200}$ (3)
 0.5 / 1/2 (3) [6]
 [0.5 / 1/2 alone - allow 2 × 3 marks]
- (f) Gas / exhaust / emissions (6) [6]
 [Rockets – allow 3 marks]
- (g) 2 × 2 × 10 (3)
 40 (3) [6]
 [40 / £0.4 alone – allow 2 × 3 marks]
- (h) Two outside rays shown moving away (diverging) from lens axis (3)
 Central ray undeviated (3) [6]
- (i) Electric / electrostatic / static (6) [6]
 [Attractive – allow 3 marks]
- (j) Bulb goes out (3)
 Circuit is broken (3) [6]

Question 2**Any eight parts****[8 × 6 marks]**

- (a) Hydrogen (3)
H₂ (3) [6]
- (b) Water / named solvent (3)
Any substance soluble in the named solvent. e.g. salt, sugar, coffee, in water (3) [6]
- (c) Two or more atoms (3)
Combined (3) [6] **OR** Smallest particle (3)
That can exist / of element / of compound (3) [6]
- (d) **Any two of:** nitrogen / oxygen / argon / neon / helium / krypton / hydrogen / xenon / radon (2 × 3) [6]
[2 correct symbols – 2 × 3 marks]
- (e) Filtration (3)
Sand and water / sand and salt / any insoluble solid and liquid (soluble solid) mixture (3) [6]
- (f) Reaction (change) of metal (3)
With air (water) (chemicals) (surroundings) / oxidation / loss of electrons / to form a compound (ore) / which is unwanted (3) [6]
[Rusting – allow 3 marks]
- (g) Ionic / electrovalent (3)
Soluble in water / conducts electricity / high melting (boiling) point / hard / brittle (3) [6]
- (h) Nucleus / centre (3)
Outside (around) nucleus / orbits / shells / clouds / orbitals (3) [6]
- (i) Endothermic (3)
Ammonium chloride (nitrate) / ice / sherbet (3) [6]
- (j) **Any two of:** fizzy drinks / fire extinguishers / dry ice (uses of dry ice) / greenhouse effect / photosynthesis (2 × 3) [6]

Question 3**Any eight parts****[8 × 6 marks]**

- (a) A ball and socket (3)
B hinge (3) **[6]**
- (b) Response / reaction / growth (3)
Gravity (3) **[6]**
- (c) C uterus / womb (3)
D ovary (3) **[6]**
- (d) Chromosomes (3)
Nucleus (3) **[6]**
- (e) Horse chestnut / chestnut (3)
[Conker – allow 3 marks] (6) **[6]**
- (f) Named producer – named herbivore e.g. grass – rabbit (3)
Named herbivore – named carnivore e.g. rabbit – fox (3) **[6]**
- (g) Wind / air (3)
Animal / self (explosive) / water (3) **[6]**
[Allow wind / air for second part if first part is incorrect]
- (h) Collecting / trapping (3)
Small animals / insects / organisms (3) **[6]**
- (i) Red (3)
Carry (transport) oxygen (haemoglobin) (iron) (3) **[6]**
- (j) **Any two of:** light / minerals / space / water / food / territory / shelter /
mates (reproductive partners) (2 × 3) **[6]**

Question 5 [48 marks]

(a)	<u>Give</u>	Any two of: iron filings (steel) (cobalt) (nickel) attracted (stick) / can attract another magnet / can repel another magnet / rests in (turns to) north-south position / points in particular direction / poles at end	(2 × 3)	[6]
	<u>What</u>	Space (region) (area) Where forces exist	(3) (3)	[6]
	<u>Draw</u>	North or south (N or S) poles shown Two field lines drawn, one on each side Direction (north to south) of field shown	(3) (3) (3)	[9]
	<u>Give</u>	Any one of: door catch / cutlery holder / lift nails / lift pins / hold items on fridge / seal fridge door / electric motors / bell / switch / etc	(3)	[3]
(b)	<u>Give (i)</u> <u>(ii)</u> <u>(iii)</u>	Refraction Dispersion Spectrum	(3) (3) (3)	[9]
	<u>Use</u>	Two (three) projectors (beams) / lamp box with two (three) openings / screen (wall) Two (three) named filters: yellow and blue / cyan and red / magenta and green / red, blue and green Lights overlap making white light OR Newton (colour) disc Spin (rotate) White OR Spectrum Prism White	(3) (3) (3) (3) (3) (3) (3) (3) (3)	[9]
		[No labelled diagram – deduct 3 marks] [Note: a diagram must have at least one label to merit marks]		
	<u>Name</u>	Any one of: infrared (IR) / microwaves / radar / radio / TV	(3)	[3]
	<u>Name</u>	Any one of: ultraviolet (UV) / X-rays / gamma rays	(3)	[3]

SECTION C - CHEMISTRY (48 marks)

Either question 6 or question 7

Question 6

[48 marks]

- | | | | | | |
|-----|-------|--------------------|---|-----|------------|
| (a) | (i) | <u>Name</u> | Pipette | (3) | [3] |
| | (ii) | <u>What</u> | Read burette before addition of acid | (3) | |
| | | | Read burette after addition of acid | (3) | [6] |
| | (iii) | <u>Why</u> | To show (find) (see) | (3) | |
| | | | Neutralisation (endpoint) (colour change) | (3) | [6] |
| | (iv) | <u>Write</u> | HCl | (3) | |
| | | | NaOH / Na ₂ CO ₃ / NaHCO ₃ | (3) | |
| | | | NaCl | (3) | [9] |
| | | | [No equation / incorrect equation – deduct 3 marks] | | |
| | | | Any one of the equations below merits (3 × 3) | | |
| | | | HCl + NaOH → NaCl + H ₂ O | | |
| | | | HCl + Na ₂ CO ₃ → NaCl + H ₂ O + CO ₂ | | |
| | | | HCl + NaHCO ₃ → NaCl + H ₂ O + CO ₂ | | |
| (b) | (i) | <u>What</u> | Solid material falls (sinks) to bottom / becomes clear | (3) | [3] |
| | (ii) | <u>Why</u> | Kills / destroys | (3) | |
| | | | Germs / micro-organisms / bacteria / protozoa / etc | (3) | [6] |
| | | | [Sterilise / prevent disease – allow 3 marks] | | |
| | (iii) | <u>Give</u> | Protects teeth / helps prevent tooth decay | (3) | [3] |
| (c) | (i) | <u>Distinguish</u> | Temporary hardness can be removed by boiling / permanent hardness can not be removed by boiling | (6) | [6] |
| | (ii) | <u>Name</u> | Calcium / Ca / magnesium / Mg | (3) | |
| | | | Hydrogen carbonate / HCO ₃ ⁻ / HCO ₃ | (3) | [6] |

SECTION D – BIOLOGY (48 marks)

Either question 8 or 9

Question 8 [48 marks]

- (a) (i) D / iris (3)
- (ii) A / retina (3)
- (iii) B / optic nerve (3)
- (iv) C / lens (3) [12]
[In each case, only accept correct name when letters are not given]
- (b) (i) Hormones (3) [3]
- (ii) Blood (3) [3]
- (iii) **Gland – any one of:**
pituitary / thyroid / pancreas / adrenals / testes / ovaries / gonads (3)
Matching chemical:
growth / thyroxin / insulin / adrenalin / testosterone / oestrogen / progesterone / etc (3) [6]
- (c) (i) **Any one of:** movement (named activity) / heat / growth / repair / nerve action (3) [3]
- (ii) Oxygen (3) [3]
- (iii) Germinating seeds / living organisms (3)
Vacuum flask / insulated container (3)
Thermometer in flask (container) (3)
Temperature rises (3) [12]
Accept equivalent expts
[No diagram – deduct 3 marks]
- (iv) **Animal - any one of:** worm / fish / insect / amoeba (3)
Matched 'breathing' : skin / gills / spiracles / membrane (skin) (3) [6]

Question 9 [48 marks]

- (a) (i) Production of food (glucose) (starch) (energy) (3)
Using light / in a green plant (3) [6]
- (ii) Destarched / kept in dark (3) [3]
- (iii) Boil / hot (3)
Alcohol (3) [6]
- (iv) Iodine (3) [3]
- (v) Starch (3) [3]
- (vi) **Any one of:** carbon dioxide / chlorophyll / water / heat (3) [3]
- (b) (i) D / petal (3)
- (ii) B / anther / stamen (3)
- (iii) C / stigma / carpel (3)
- (iv) A / ovule / ovary / carpel (3) [12]
[In each case, only accept correct name when letters are not given]
- What Sperm / male gametes / sex cells / pollen tube / tube nucleus (3) [3]
- Define Sperm / male gamete (3)
Fuse (join) (enter) (combine) / form a zygote / become a single cell (3)
With egg / female gamete (3) [9]

Question 11 – Horticulture**Any two parts****[36 marks]**

- (a) **Name** **Any two of:** nitrogen (N) / phosphorous (P) / potassium (K) / sulphur (S) / any correct element (2 × 3) [6]
- Outline** Plant with vermiculite (perlite) (culture solution) containing essential nutrients (3)
 Plant with vermiculite (perlite) (culture solution) with a nutrient missing (water only) (3)
 Plant becomes unhealthy (stunted) (small) (etc) (3) [9]
- What** Raises pH (3) [3]
- (b) **Name** A: scion (3)
 B: stock (3) [6]
- Name** Cambium (3) [3]
- Give** **Any two of:** bind joint / wax (seal) joint / use splint (2 × 3) [6]
- State** **Any one of:**
 propagate plants difficult to grow in other ways / increase disease resistance / repair / produce dwarf varieties / improve pollination / substitute one part of a plant with another / improve adaptability to soil (climate) / etc (3) [3]
- (c) **Name** **Any two of:** bent / fescue / rye (2 × 3)
- Give** **Any one of:**
bent – fine leaves / putting (golf) greens
fescue – fine leaves / putting greens / can cut (mow) often
rye – broad leaves / hard-wearing / tough / playing fields (3) [9]
- What** Soil cover (layer) (3)
- Name** **Any one of:**
 bark (waste woody stems and branches) chips / compost / card / gravel / newspaper / plastic / leaves / straw / peat / etc (3)
- Give** **Any one of:**
 reduces water loss / prevents growth of weeds / some decay to form humus / slugs (pests) / disease / blow away / cost / appearance (3) [9]

Question 12 – Materials Science**Both parts****[36 marks]**

- (a) **Name** (i) Plastic / named plastic, e.g. nylon, urea formaldehyde (3)
(ii) Metal / brass (3)
(iii) Ceramic / baked clay (3) [9]

Give Plastic – any one of:

light switch / bulb holder / jug / handle / radio / TV / video
/ computer / printer / telephone / etc. (3)

Metal – any one of:

door handle / tap / water pipe / hinge / pot / pan / wire /
cooker / fridge / washing machine / etc. (3)

Ceramic – any one of: cup / mug / plate / vase / dish / etc (3) [9]

(b) **Any one of the following (i), (ii), (iii), (iv)**

(i) Plastics

- Explain** Monomers: small / single / unit (3)
Polymers: big / chain / long / joined (3) [6]

Describe State or show:

C clamp plastic strip at one end (3)

Add weight(s) to the free end (3)

Measure downward movement of free end / scale (3)

Repeat using a second (different) plastic (3) [12]

(ii) Metals

Why Unreactive (3)

Name Any one of: gold / silver / copper / iron (3) [6]

Describe State or show:

Ore mixed with charcoal (3)

Wrap in foil / crucible / suitable container (3)

Heat (3)

Separate copper from waste / pour into water (3) [12]

(iii) Textiles

- Name** Any one of:
cotton / linen / wool / polyester / nylon / orlon / etc (3)
- Give** Any one of: weave / knit (3) [6]
- Describe** **State or show:**
- Two pieces of cloth of the same mass (weight) (3)
- Soak in water (3)
- Squeeze gently / hang and allow to drip for a while / weigh (3)
- Heavier is more absorbent / any appropriate observation (3) [12]

(iv) Timber

- Explain** Moisture (water) removed (reduced) / dried (3)
- Give** Exposure to air / kiln (3) [6]
- Name** Any one of:
fibreboard (MDF) (Medite) / chipboard / plywood / hardboard /
block board (batten board) (lamin board) (strip core board) (3)
- State** **Fibreboard and hardboards:** wood reduced to fibres (3)
mixed with glue (3)
pressed / heated (3)
- OR** **OR**
- Chipboard:** wood is chipped (3)
mixed with glue (3)
pressed / sheets (3)
- OR** **OR**
- Plywood:** wood is cut to make thin sheets (veneers) (3)
veneer with grain at right angles to layer below (3)
veneers glued (3)
- OR** **OR**
- Strip core boards:** wood is cut into strips (3)
strips are glued (3)
veneer glued onto each side (3) [12]

Question 13 – Food

Any two parts

[36 marks]

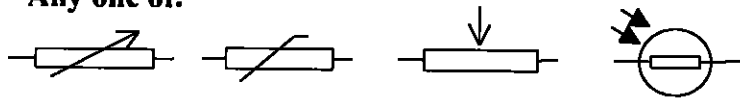
- (a) Why **Any one of:** growth / repair / energy / build new cells / source of amino acids / make enzymes / protection (3) [3]
- Name **Any one of:** meat / fish / eggs / cheese / beans / peas / nuts / milk (3) [3]
- Describe To food (3)
Add sodium hydroxide* **OR** Add Millon's (3)
Add copper sulphate* Heat (3)
Purple (violet) (pink) (lilac) Red (3) [12]
[*Instead of these two compounds accept biuret]
- (b) Why **Any two of:** to preserve the grass / nutritious / easy to store / easy to make / can be stored for a long time / silage making does not need fine weather / to provide winter feed for livestock (2 × 3) [6]
- Outline **State or show:**
Chop the grass / add acid (sugar) (enzymes) (3)
Pack grass tightly into container (3)
Seal container / make container air tight (3)
Leave for two weeks (3) [12]
- (c) What Use of living things (organisms) (3)
To make useful substances (named useful substance) (food) / in industry (3)
- Give **Production of any one of:** wine / beer / spirits / cheese / yoghurt / silage / antibiotics / vitamins / insulin / vaccines / enzymes / steroids / factor 8 / human growth hormone / yeast / insecticides / malt / amino acids / fructose syrups / mycoprotein / etc (3) [9]
- State Time is allowed / the antibiotic breaks down (3)
Before the food is sold (eaten) (3)
OR
Food is tested (3)
For antibiotics (3) [6]
- Give **Any one of:** micro-organisms (fungi) (bacteria) grow on the food / oxidation / changes (enzyme action) within the food itself / not preserved (3) [3]

Question 14 – Electronics

Both parts [36 marks]

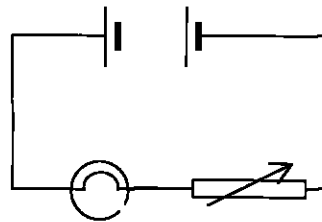
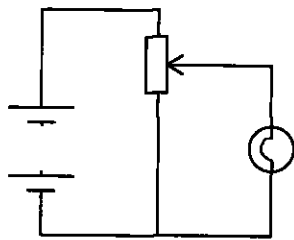
(a) State Resistance (current) (voltage) can be changed (varied) (3)

Give Any one of:



(3) [6]

Draw



Battery / cell shown

(3)

Variable resistor wired correctly

(3)

Bulb wired correctly

(3)

What Any one of: change (brightness) (temperature) (current) (resistance)

(3) [12]

(b) Name Transistor

(3) [3]

What Emitter

(3) [3]

What LED lights

(3)

Give Current flows through base / voltage between base and emitter / base current

(3)

Transistor 'turns on' / collector current

(3)

Current flows through LED

(3) [12]

Question 15 – Energy Conversions Both parts [36 marks]

- (a) (i) Kinetic / motion / mechanical (6) [6]
- (ii) **Any one of:**
kinetic (mechanical) (motion) → electrical
(magnetic) (heat) (sound) /
magnetic → electrical /
electrical → heat (6) [6]
- (iii) **Any two of:**
coal / oil / natural gas / peat / tidal / hydro / biomass
/ solar (sun) / nuclear / geothermal / waves (2 × 3) [6]
- (b) Explain Current through coil / coil energised / switch closed (3)
Armature attracted (3)
Hammer hits gong (3)
Circuit broken / contact broken (3)
Armature springs back (3)
Circuit remade / cycle repeats (3) [18]