

**AN ROINN OIDEACHAIS AGUS EOLAÍOCHTA**

**Junior Certificate Examination 2002**

**Science**

**Ordinary 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.
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.

<b>SECTION A – Core (144 MARKS)</b>
-------------------------------------

**Any 12 parts                      [12 × 12 marks]**

- |        |   |     |              |
|--------|---|-----|--------------|
| 1. (a) | Retort stand / stand  | (3) |              |
|        | Holding / supporting  | (3) |              |
|        | Wire gauze / gauze  | (3) |              |
|        | For spreading heat / heating / supporting / on a tripod   |     |              |
|        | On a ring / on a stand  | (3) | [12]         |
| <hr/>  |   |     |              |
| (b)    | Ruler / metre stick / measuring tape / tape   | (3) |              |
|        | Opisometer / curvimeter / trundle wheel / thread and ruler  | (3) |              |
|        | Width / breadth / height / B / W / H  | (3) |              |
|        | 8 × 6 / 48  | (3) | [12]         |
| <hr/>  |   |     |              |
| (c)    | Radiation   | (3) |              |
|        | Convection  | (3) |              |
|        | Conduction  | (3) |              |
|        | Expands   | (3) | [12]         |
| <hr/>  |   |     |              |
| (d)    | Mercury   | (3) |              |
|        | Pluto   | (3) |              |
|        | <b>Any two of:</b> Suitable atmosphere, e.g. oxygen (air) / suitable temperature / water / not too near the sun / not too far from the sun / not too hot / not too cold |     | (2 × 3) [12] |
| <hr/>  |   |     |              |
| (e)    | Electric current / current / flow of electrons / electricity  | (3) |              |
|        | Voltage / potential difference / emf / volts / V  | (3) |              |
|        | Safety / protect against shock / prevent overload / break circuit / prevent fire  | (6) | [12]         |
| <hr/>  |   |     |              |
| (f)    | A = condensation  | (3) |              |
|        | B = freezing  | (3) |              |
|        | C = evaporation   | (3) |              |
|        | D = melting   | (3) | [12]         |
| <hr/>  |   |     |              |
| (g)    | Seawater = mixture  | (3) |              |
|        | Hydrogen = element  | (3) |              |
|        | Rust = compound   | (3) |              |
|        | Any other example of an element (not hydrogen) [Accept symbol]  | (3) | [12]         |
| <hr/>  |   |     |              |
| (h)    | Filtration / filtering  | (3) |              |
|        | Funnel  | (3) |              |
|        | To trap soil / to filter / filtering / to let the water through / to separate the soil and water / etc.   | (3) |              |
|        | Water   | (3) | [12]         |

- (i) **ATOM:** Smallest part (particle) / made up of protons (3)  
of an element / and electrons (3)  
A = electron (3)  
B = nucleus / proton / neutron (3) [12]
- 

- (j) Water (3)  
Any correct example of a solution (3)  
Sugar / solute / heat / solute relevant to example given (3)  
Water / solvent / solvent relevant to example given (3) [12]
- 

- (k) A = testis / testes / testicle (3)  
B = penis (3)  
Sperm / male sex cell / gamete / hormones / testosterone (6) [12]  
[Semen – allow 3 marks only]
- 

- (l) **Protein Source:** Meat / fish / eggs / nuts / etc. (3)  
**Protein Function:** Growth / repair (3)  
**Fat Source:** Cheese / butter / oils / chips / meat / etc. (3)  
**Fat Function:** To provide energy / for insulation / for protection (3) [12]
- 

- (m) **Any two of:**  
Burning of fossil fuels, e.g. coal, oil, and other fuels, e.g. petrol, diesel / burning / exhaust fumes / CFCs / acid rain / SO<sub>2</sub> / NO<sub>2</sub> / offensive smell / slurry smell / etc. (2 × 3)  
[Accept sources of pollution, e.g. cars]  
**Any two of:**  
Decrease of oxygen / fish kills / death of other aquatic animals or plants / makes water undrinkable / poisons water / causes illness / etc. (2 × 3) [12]
- 

- (n) A = lamina / leaf blade / leaf (3)  
B = petiole / stalk / stem (3)  
Iodine (3)  
Blue black / blue / black (3) [12]
- 

- (o) Fungus (3)  
Virus (3)  
**Any one of:**  
Making of (yoghurt) (cheese) (silage) (etc.) / research / antibiotics / etc. (3)  
**Any one of:**  
Cause food spoilage / cause disease / correctly named disease / etc. (3) [12]
-

<b>SECTION B – PHYSICS (72 marks)</b>
---------------------------------------

Any two questions [2 × 36 marks]

**Question 2 [36 marks]**

- (a) 37 (3)  
Hotness (3)  
Mercury (3)  
100 (3) [12]

- (b) **Insulator:**  
Any substance (material) / keeps (3)  
which does not allow heat (energy) to flow through / heat in (out) / warm (3)  
[Named example – allow 3 marks]

**Any two correct examples:**

Lagging jacket / attic insulation / cavity wall / double glazed windows /  
curtains / carpets / handles of saucepans / suitable material / etc. (2 × 3) [12]

(c) **State or show (4 × 3)**

- Name of apparatus (3)  
Appearance before heating (3)  
Heating (3)  
Result (3) [12]

[No labelled diagram – deduct 3 marks]

[A diagram must have at least one label to merit marks]

**Question 3 [36 marks]**

- (a) Body / bar / object / metre stick / handle (3)  
Fulcrum / axis (3)
- Any two correct examples of levers:**  
Scissors / nutcracker / door / hinge / tap / etc. (2 × 3) [12]
- (b) A – Axles and wheels: NOT USEFUL (3)  
B – Brake blocks and wheels: USEFUL (3)  
C – Bicycle tyre and road: USEFUL (3)  
D – Links of chain: NOT USEFUL (3) [12]
- (c) **State or show (4 × 3)**
- Measuring cylinder / overflow can (3)  
Water in cylinder / fill the can (3)  
Lower in stone (3)  
Rise in water level = volume of stone /  
volume of water = volume of stone (3) [12]

**[No labelled diagram – deduct 3 marks]**

**Question 4 [36 marks]**

- (a) Energy (3)  
Vibrating (3)  
Echo (3)  
Vacuum (3) [12]

- (b) Cell / battery / power supply (3)  
Switch (3)  
Lamp / bulb (3)  
Closes circuit / completes circuit / breaks circuit /  
allows current (electricity) to flow / switches on (off) the bulb (3) [12]

(c) **State or show (4 × 3)**

- |                           |                                  |          |
|---------------------------|----------------------------------|----------|
| Magnet                    | Sheet of paper                   | (3)      |
| Cover with sheet of paper | Magnet on paper                  | (3)      |
| <b>OR</b>                 |                                  |          |
| Sprinkle iron filings     | Plotting compasses around magnet | (3)      |
| Tap the sheet / result    | Draw field lines / result        | (3) [12] |

**[No labelled diagram – deduct 3 marks]**

<b>SECTION C – CHEMISTRY (72 marks)</b>
---

**Any two questions [2 × 36 marks]**

**Question 5 [36 marks]**

- (a) Chimney (3)
- Base [Accept stand] (3)
- Turn the collar / turn the gas tap / adjust gas flow / open (close) air hole (3)
- Any one of:**  
Safety glasses / point test-tube away / wear lab. coat / hair tied back / test-tube not more than 1/3 full / visible flame in bright sunlight / etc. (3) [12]
- (b) Sodium (3)
- Oxygen (3)
- Copper (3)
- Nitrogen [Accept sodium] (3) [12]
- (c) (i) **Compound:**
- Elements (3)
- Chemically joined (3)
- (ii) Iron sulphide / FeS (3)
- (iii) **Any one of:**  
New substance formed / energy taken in (given out) / difficult to reverse (3) [12]



**Question 6 [36 marks]**

**(a)**

**(i) Indicator:**

Colour (3)

Shows whether a substance is an acid or a base / change in pH (3)

**(ii) pH less than 7 = orange juice (3)**

pH greater than 7 = toothpaste (3) **[12]**

**(b) Screening (3)**

Fluoridation (3)

Chlorination (3)

Settling (3) **[12]**

**(c) State or show (4 × 3)**

Cobalt chloride / anhydrous copper sulphate Cold surface (3)

Dry / blue (white) Droplets form (3)

**OR**

Expose to air Cobalt chloride / anhydrous copper sulphate (3)

Colour change Colour change (3) **[12]**

**[No labelled diagram – deduct 3 marks]**

**Question 7 [36 marks]**

- (a) (i) Foam / carbon dioxide / halon / powder (3)
- (ii) Water is a conductor / electrocution / electric shock / dangerous (3)
- (iii) **Any two of:**  
Air (oxygen) / heat / fuel (named fuel) (2 × 3) [12]
- (b) (i) Relights (3)
- Glowing splint (3)
- (ii) **Any two of:**  
Nitrogen / carbon dioxide / helium / water vapour /  
radon / ozone / CFCs / etc. [except hydrogen and oxygen] (2 × 3) [12]
- (c) Solid X = calcium carbonate / marble chips / limestone /  
washing soda / any carbonate (3)
- Liquid Y = hydrochloric acid / HCl / acid (3)
- Lime water (3)
- Heavier / more dense (3) [12]

**SECTION D – BIOLOGY (72 marks)**

**Any two questions [2 × 36 marks]**

**Question 8 [36 marks]**

- (a) A = petal / corolla (3)
- B = sepal / calyx (3)
- Pollen / male gamete / male sex cell / sperm (3)
- Egg / ovum / female gamete / female sex cell / seeds / fruit (3) [12]

- (b) **Any two of:**  
Wind / animal / self / water / specific method, e.g. parachute (2 × 3)
- Any two of:**  
Warmth (heat) (temperature) / oxygen (air) / light (2 × 3) [12]

- (c) **State or show (4 × 3)**
- Slide (3)
- Thin skin / sliver of onion / prepared (3)
- Place slide on stage / platform / under microscope (3)
- Focus / view / examine (3) [12]

**[Labelled diagram not necessary]**

**Question 9 [36 marks]**

- (a) (i) A = lung (3)
- B = alveolus / airsac (3)
- (ii) Ribs / ribcage (3)
- (iii) Keep air tubes (trachea) (windpipe) open (3) [12]
- 
- (b) (i) Plasma (3)
- (ii) Red blood corpuscles (3)
- (iii) Platelets (3)
- (iv) White blood cells (3) [12]
- 
- (c) (i) A = kidney (3)
- (ii) B = bladder (3)
- (iii) Urine / water and salts (3)
- (iv) **Any one of:**  
Sweat / carbon dioxide / water / salts / urea / urine (3) [12]  
**[must be different to part (c iii)]**

**Question 10 [36 marks]**

(a) 

Rose leaves
-------------

 → 

Greenfly
----------

 → 

Ladybird
----------

 (3 × 3)

Habitat = woodland / hedgerow / hedge / garden / field / any terrestrial habitat  
[Place names not accepted] (3) [12]

(b) Any two of:

(i) Gravel / sand / silt / clay (2 × 3)

(ii) **Any correct mineral (or symbol):**  
Nitrogen / nitrate / phosphorus / phosphate / etc.  
[Any attempt – allow 3 marks] (3)

(iii) **Any valid reason:**  
Holds particles together / binds soil particles / releases nutrients / improves structure (aeration) (drainage) / holds moisture (3) [12]

(c) **State or show (4 × 3)**

Medium 

Flask of lime water	(3)
---------------------	-----

Soil 

<b>OR</b>	Soil in muslin bag	(3)
-----------	--------------------	-----

Petri dish / dish 

Leave for a few days	(3)
----------------------	-----

Examine 

Lime water turns cloudy	(3) [12]
-------------------------	----------

[No labelled diagram – deduct 3 marks]

Any two questions [2 × 36 marks]

**Question 11 - Earth Science** [36 marks]

- (a) (i) Group / collection / cluster (3)  
of stars (3)
- (ii) Milky Way (3)
- (iii) Star (3) [12]
- (b) (i) Reference to  $\frac{1}{4}$  day (3)  
Reference to 4 years (3)
- (ii) A day / 24 hours (3)
- (iii) Seasons / named seasons (3) [12]
- (c) **State or show (4 × 3)**
- Rain gauge (3)
- Partly buried in ground / leave for a time (3)
- Check / collect (3)
- Measure rainfall (3) [12]
- [No labelled diagram – deduct 3 marks]

**Question 12 – Horticulture**

**[36 marks]**

- (a) (i) **Any two of the following:**  
Aeration / drainage / mixes soil layers / decomposes / adds humus /  
fertilizer / improves texture / raises pH / loosens soil (2 × 3)
- (ii) Any vegetable or garden plant (3)
- (iii) Any pest which attacks **the named plant** (3) **[12]**
- (b) Any woody shrub, e.g. griselinia, escallonia, privet, blackcurrant, etc. / hazel /  
willow (3)
- Any non-woody plant, e.g. geranium, pelargonium, busy lizzie / house  
plants / greenhouse plants (3)
- Dormancy:**  
Seed does not germinate / resting period (3)
- Until conditions are suitable (3) **[12]**
- (c) **State or show (4 × 3)**
- Find mass of fresh soil (3)
- Dry soil (3)
- Find mass of dried soil (3)
- Loss in mass = mass of water in soil (3) **[12]**

**[No labelled diagram – deduct 3 marks]**

**Question 13 - Materials Science**

**[36 marks]**

- (a) (i) Nylon (3)
- (ii) Wool (3)
- (iii) Aluminium (3)
- Any correct use, e.g. windows, cans, etc. (3) [12]

- (b) (i) Wash at forty degrees (40 °) / cool wash (3)
- (ii) Bleach can be used (3) [6]

(c) **A - PLASTICS**

- (i) Crude oil / oil (3)
- (ii) Any named plastic, e.g. perspex, polythene, PVC, etc. (3)
- (iii) **State or show (4 × 3)**
- Two different plastics (3)
- Nail / sharp implement (3)
- Scratch / mark each plastic (3)
- Compare (3) [18]

**[No labelled diagram – deduct 3 marks]**

**B - TEXTILES**

Spinning (3)

Weaving (3)

**State or show (4 × 3)**

Two different textiles held or clamped (3)

Rub with file / turn file (3)

Same length of time / same number of turns for each (3)

Compare (3) [18]

**[No labelled diagram – deduct 3 marks]**



**C - METALS**

- (i) Ore (3)
- Any one of:**  
Smelting / electrolysis / heating and adding acid (3)
- (ii) **State or show (4 × 3)**
- Support / clamp piece of metal (3)
- Add weights to end (3)
- Measure bend (3)
- Repeat with other metal (3) [18]
- [No labelled diagram – deduct 3 marks]**

**D - TIMBER**

- (i) **Any named softwood:** e.g. pine, spruce, fir, larch, etc. (3)
- (ii) **Any correct use [must match timber named]** (3)
- (iii) **State or show (4 × 3)**
- Clamp / support pieces of wood (3)
- Add weight parallel to grain (3)
- Add similar weight at right angles to grain (3)
- Measure bend / compare (3) [18]
- [No labelled diagram – deduct 3 marks]**

**Question 14 - Food**

**[36 marks]**

- (a) (i) Pasteurisation / drying / canning / refrigeration (3)
- (ii) Fish / meat (3)
- (iii) Removal / taking out / drying / absence of (3)
- Water / fluid / liquid (3) [12]

- (b) (i) Correct amounts (quantity) (3)
- Nutrients / 2 named nutrients / food group (type) (3)
- (ii) Prevents constipation / helps food to pass through gut / aids digestion (3)
- (iii) Fat / lipid / oil (3) [12]

(c) **State or show (4 × 3)**

- Heat (boil) milk to 90 °C (70 °C – 90 °C) / under boil (3)
- Cool milk to 30 °C / lukewarm (3)
- Add starter culture / natural yoghurt (3)
- Incubate (3) [12]

**[No labelled diagram – deduct 3 marks]**

**Question 15 - Electronics**

**[36 marks]**

**(a)** Diode (3)

**Any correct use**, e.g. to allow current to flow in one direction, convert a.c. to d.c.,  
rectifier (3)

Lights up (3)

Forward (3) **[12]**

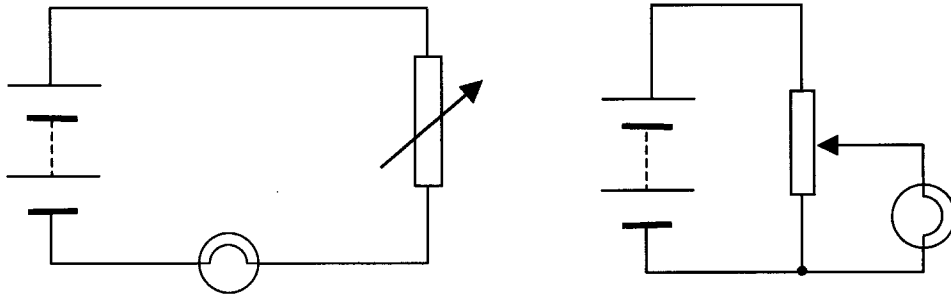
**(b)** A = light-emitting diode / LED (3)

**Any correct use**, e.g. clocks, on/off lamps, etc (3)

B = light-dependent resistor / LDR (3)

**Any correct use**, e.g. burglar alarm, switching on street lights,  
light meter, etc. (3) **[12]**

**(c)**



Correct symbol bulb (3)

Correct symbol variable resistor (3)

Correct symbol battery / cell / power supply (3)

Complete circuit (3) **[12]**

**Question 16 - Energy Conversions**

**[36 marks]**

- (a) **Electric kettle:** Electrical to heat (3)
- Dropping ball:** Potential to kinetic (3)
- Battery:** Chemical to electrical (3)
- Burning coal:** Chemical to heat (3) **[12]**

- (b) Electric motor / motor (3)
- Magnet (3)
- Spins / rotates (3)
- Kinetic (3) **[12]**

- (c) **State or show (4 × 3)**
- Wrap wire around nail (3)
- Connect wires to switch and battery / complete circuit (3)
- Switch on current (3)
- Paper clips attracted (3) **[12]**

**[No labelled diagram – deduct 3 marks]**