



Coimisiún na Scrúduithe Stáit
State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2004

SCIENCE

ORDINARY LEVEL

Marking Scheme

GUIDELINES TO EXAMINERS ON CANCELLED, REPEATED OR EXCESS ANSWERS

CANCELLED ANSWERS

SECTION A If an answer is cancelled and a second answer given you should accept the cancellation and award marks for the uncanceled answer. If neither answer is cancelled then accept the first answer offered only and mark accordingly. If the only answer offered is cancelled ignore the cancelling and mark as normal.

For answers to “describe an experiment” in SECTION B, C, D and E multiple attempts should be dealt with as follows:

If candidates answer a question or part of a question only once and then cancel, you should ignore the cancelling and mark in the usual way.

If candidates answer a question or part of a question more than once and then cancel one attempt, you should ignore the cancelling and mark all the answers whether cancelled or not, however count only the marks gained in respect to the highest scoring answer. The disallowed marks should be enclosed in square brackets.

EXCESS ANSWERS

SECTION A Mark all parts but count only the marks for the twelve highest scoring parts. Disallowed marks should be enclosed in square brackets.

SECTION B, C D, AND E Mark all questions but count only the marks awarded to the two highest scoring question in each section. Disallowed marks should be enclosed in square brackets.

Care should also be taken with options in Q.13 (Materials Science).

DEDUCTION OF MARKS FOR OMITTED DIAGRAM

Assign marks in the usual way. Then use square brackets to deduct the marks.

Junior Certificate Examination

SCIENCE

Ordinary Level Paper

Structure

Five sections A, B, C, D, E.

Section A:		1 question 15 parts in each question (attempt any 12 parts)
Section B:	Physics	3 questions (attempt any 2 questions)
Section C:	Chemistry	3 questions (attempt any 2 questions)
Section D:	Biology	3 questions (attempt any 2 questions)
Section E:	Applied Sc.	6 questions (attempt any 2 questions)

Grades

Grade	Marks	
	<i>Without LS</i>	<i>With LS</i>
A	306 - 360	245 - 288
B	252 - 305	202 - 244
C	198 - 251	158 - 201
D	144 - 197	115 - 157
E	90 - 143	72 - 114
F	36 - 89	28 - 71
NG	0 - 35	0 - 27

Summary of Marking Scheme

SECTION A: CORE (144 MARKS)

Question 1 Answer any 12 parts (a), (b), (c), etc.

(a), (b), (c) etc. 4×3

SECTION B: PHYSICS (72 MARKS)

Answer any TWO questions.

Question 2

(a), (b) & (c), 4×3

Question 3

(a), (b) & (c), 4×3

Question 4

(a), (b) & (c), 4×3

SECTION C: CHEMISTRY (72 MARKS)

Answer any TWO questions.

Question 5

(a), (b) & (c), 4×3

Question 6

(a), (b) & (c), 4×3

Question 7

(a), (b) & (c), 4×3

SECTION C: BIOLOGY (72 MARKS)

Answer any TWO questions.

Question 8

(a), (b) & (c), 4×3

Question 9

(a), (b) & (c), 4×3

Question 10

(a), (b) & (c), 4×3

SECTION E: APPLIED SCIENCE

(72 MARKS)

Answer any TWO questions.

Question 11

(a), 4×3 ; (b), $6 + 2 \times 3$; (c), 4×3

Question 12

(a), (b) & (c), 4×3

Question 13

(a), 4×3 ; (b), 2×3 ; (c), 6×3

Question 14

(a), (b) & (c), 4×3

Question 15

(a), (b) & (c), 4×3

Question 16 (a), 6×3 ; (b), 6×3

SECTION A: CORE**(144 MARKS)****Any 12 parts (a), (b), (c), etc.**

1 (a)	Conical Flask	(3)	
	Tongs	(3)	
	Tripod	(3)	
	Test tube / Boiling tube	(3)	[12]

(b)Any **two** of:

Mercury / Venus / Mars / Jupiter / Saturn / Uranus / Neptune / Pluto	(2 × 3)	
Spin / Rotate / Turn / Move	(3)	
Light is a Form of Energy	(3)	[12]

(c)

Thermometer	(3)	
Measuring Temperature / Temperature qualified to indicate measurement	(3)	
Mercury / Alcohol	(3)	
Expands / Rises (up the tube) / Moves up	(3)	[12]

(d)

Dispersion / Refraction	(3)	
Prism	(3)	
Yellow	(3)	
Blue	(3)	[12]

(e)

Repel / Moves away	(3)	
Attract / Moves towards / Sticks to	(3)	
Not magnetic / Magnets won't be attracted to it	(3)	
Any correct use of a magnet (must be qualified)	(3)	[12]

(f)			
	Atoms	(3)	
	Protons	(3)	
	Neutrons	(3)	
	Electrons	(3)	[12]

(g)			
	Filtration / Filtering	(3)	
	Sand	(3)	
	Funnel	(3)	
	Decanting / Distillation / Evaporation	(3)	[12]

(h)			
	Bunsen / Burner	(3)	
	Heating / Valid example (i.e. qualified)	(3)	
	Any two <u>valid</u> safety precautions e.g. Never leave unattended / Keep clear of Flammables / Don't touch chimney while lighting / Safety flame (2×3) [12]		

(i)			
	Gas	(3)	
	Solid	(3)	
	Liquid	(3)	
	Liquid	(3)	[12]

(j)			
	Heat	(3)	
	Carbon Dioxide (CO ₂) / Water (H ₂ O) / Foam / Dry powder / Halon	(3)	
	[Accept sand / fire blanket]		
	Any two valid ways e.g. Use a fireguard / Fire proofing / Unplug appliances at night / Keep flammable substances away from fire / Never leave appliances unattended etc. / Fire alarm / Smoke alarm (2×3) [12]		
	[Accept specified electrical precaution]		
	[Accept having a fire extinguisher only once]		

- (k) Woodland / Seashore / Hedgerow etc. (3)
Any **correctly matched** named plant (3)
Any **correctly matched** named animal (3)
Oil / Litter / Sewage / Effluent etc. / specified source (qualified) (3) [12]

Matching of plant and animal to the named habitat is required

[If no habitat is specified or the answer offered is not a habitat only the last 3 marks are available]

-
- (l)
- Testes (3)
Ovary (3)
Ear (3)
Kidney (3) [12]

-
- (m)
- Calcium (Ca) / Magnesium (Mg) (3)
Healthy bones and teeth (3)
Meat / Fish / Eggs / Cheese / Nuts etc. (3)
Growth / Repair / Maintenance (3) [12]

-
- (n)
- Shoot [Accept stem, leaves and flowers all named] (3)
Root (3)
Any **correct use** of leaf / flower / stem (3)
Absorbs water (minerals) / Food storage / Anchorage (3) [12]

-
- (o)
- Animal Product:** Honey (3)
Wool (3)
- Plant Product:** Mahogany (3)
Paper (3) [12]
-

SECTION B: PHYSICS (72 Marks = 2 ×36 marks)

Question 2 [36 marks]

- (a) Expansion (3)
- Conduction (3)
- Insulation (3)
- Convection (3) [12]

- (b) Any **two correct examples** of levers e.g.
Scissors / Crowbar / Pliers etc. (2×3)

- B (3)
- Gravity (3) [12]

(c) **State or Show (4×3)**

Method 1

- Glass / Gas Jar Filled with Water
- Cover with cardboard
- Invert
- Result / Conclusion

Method 2

- Can with small volume of water (3)
- Heat / Boil (3)
- Seal the can (3)
- Result / Conclusion (3)

Points have to be in the context of a valid experiment to merit marks

Method 3

- Plastic bottle (3)
- Suction pump (3)
- Evacuate (3)
- Result / Conclusion (3)

Points have to be in the context of a valid experiment to merit marks

No labelled diagram – deduct 3 marks

Question 3 [36 marks]

- (a) Energy (3)
- Substance (3)
- Echo (3)
- Vibrations (3) [12]

- (b) Mirror (3)
- Reflected (or properly explained) (3)
- Submarine / See over walls, crowds / Any correct use (including military) (3)
- Shadow (only) (3) [12]

- (c) Graduated / Measuring cylinder (3)
- 20 (3)
- 30 [Accept 29] (3)
- 10 [Accept 9] (3) [12]

Question 4 [36 marks]

- (a) Volts (3)
Kilowatt-hour (3)
Ampere (3)
Watt (3) [12]
- (b) Live (3)
Neutral (3)
Earth (3)
Fuse (3) [12]
- (c) $6 / 1.5 \times 4$ (3)
66 cent / € 0.66 (3)
Safety / To prevent shock / Electrocutation (3)
Any other **valid electrical safety precaution** e.g.
Never overload sockets / Replace damaged cables (flexes / appliances) /
Turn off appliances / Trip switches / Don't use wet hands / Insulation /
Fuses etc. (3) [12]

SECTION C :CHEMISTRY (72 Marks = 2 ×36 marks)

Question 5 [36 marks]

- (a) Coal (3)
Energy (3)
Non-Renewable (3)
Carbon Dioxide (3) [12]
- (b) Temporary (3)
Permanent (3)
Temporary (3)
Nicer taste/ Contains minerals / Used for brewing / Good for teeth / Tanning /
Specified health benefit (3) [12]
- (c) Black/Brown (3)
Hydrogen peroxide (H₂O₂) (3)
Glowing splint (taper) (3)
Breathing / Burning / Respiration / Welding / Steel production / Steel cutting (3) [12]
[Accept diving, space travel, climbing, rockets etc – if suitably be qualified]

Question 6 [36 marks]

- (a) Vinegar (3)
Sodium Hydroxide (3)
Litmus (3)
Sodium Chloride (3) [12]
- (b) Alkali (3)
Sodium (3)
Soft / Alkali (3)
Oxide (3) [12]
- (c) Distillation (3)
(Liebig) Condenser (3)
Y (3)
Alcohol (3) [12]

Question 7 [36 marks]

- (a) Chemical (3)
Physical (3)
Mixture (3)
Compound [Accept mixture, chemical] (3) [12]

- (b) Oxygen (O₂) / Air (3)
Moisture (water) (3)
Oiling / Painting / Greasing / Galvanising / Keep dry / Electroplating / Tin plating /
Coating must be qualified (3)
Alloy (3) [12]

- (c) **State or Show** (4×3)

EVAPORATION/DISTILLATION

- Mixture in Evaporating dish / Beaker / Container (3)
Heat (3)
Water boils off / Evaporate (3)
Salt remains in evaporating dish (container) (3) [12]

Points have to be in the context of a valid experiment to merit marks

No labelled diagram – deduct 3 marks

SECTION D :BIOLOGY **(72 Marks = 2 ×36 marks)**

Question 8 [36 marks]

- (a) Any two of:
- Support / Protection / Movement / Shape / Blood cell production (2 × 3)
 - Flexible / Rubbery / Limp / Soften / Less calcium / Weakens (3)
 - Nothing / Stays the same / No change (3) [12]
- (b)
- Pregnancy (3)
 - Womb (3)
 - Menstrual (3)
 - Menstruation (3) [12]
- (c)
- Milky / Cloudy / White (3)
 - Carbon dioxide (3)
 - Lungs (3)
 - Oxygen (3) [12]

Question 9 [36 marks]

- (a) Cheese (3)
Athlete's Foot (3)
Mushroom (3)
AIDS (3) [12]
- (b) Petal (3)
Carpel (3)
Stamen (3)
Sepal (3) [12]
- (c) Leaf (3)
Starch / Glucose / Carbohydrate / Sugar (3)
Carbon dioxide (3)
No light / Needs sunlight (3) [12]

Question 10 [36 marks]

- (a) Kidney [Accept skin] (3)
Heart (3)
Digestive System (3)
Skin (3) [12]

- (b) Any **two** of:
Red Blood Cell (Corpuscle) / White blood Cell / Platelet (2 × 3)
Plasma (3)
Oxygen / Antibodies / Food (named food type) / Hormones / Named hormone /
Names waste (3) [12]

- (c) **State or Show (4×3)**
- | | | |
|--|--------------------------|----------|
| Plant* / Leafy seedling* / Daffodil* / Celery stalk* | Seedling in test tube | (3) |
| Coloured solution | Water and layer of oil | (3) |
| Leave (implied / stated) | Leave (implied / stated) | (3) |
| Result / Conclusion | Result / Conclusion | (3) [12] |

* **Must be in suitable container**

Points have to be in the context of a valid experiment to merit marks

No labelled diagram – deduct 3 marks

SECTION E :APPLIED SCIENCE (72 Marks = 2 ×36 marks)

Question 11 [36 marks]

- (a) 24 (3)
4 (3)
365¼ (3)
28 (3) [12]

- (b) Rainfall / Rain (3)
Wind speed (3)
Water / Moisture (3)
Hygrometer / Wet & dry Bulb Thermometer (3) [12]

- (c) **State or Show (4×3)**

Method 1

- Two surfaces / Containers (3)
Same amount of water droplets / Same volume of water (3)
Different temperatures (3)
Compare / Result / Conclusion (3) [12]

Points have to be in the context of a valid experiment to merit marks

No labelled diagram – deduct 3 marks

Method 2

- Surface (container) containing water (3)
At a known (particular) temperature (3)
Repeat at different temperature with identical sample (3)
Compare / Result / Conclusion (3) [12]

Points have to be in the context of a valid experiment to merit marks

No labelled diagram – deduct 3 marks

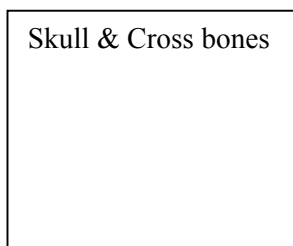
Question 12 [36 marks]

- (a) Germination (3)
Dormancy (3)
Hydroponics (3)
Cutting (3) [12]
- (b) Sand / Silt / Clay / Gravel / Stones / Rocks / Water/ Minerals / Air / Humus /
Nutrients (3)
Aeration / Drainage / Add Humus / Mix / Improve texture / Make more fertile /
Loosen (3)
Carnations / Roses / Dahlia etc. (3)
Place in water / Add nutrients (food/named nutrient) / Crush end of woody stems /
Spray with mist / Keep away from direct sunlight (3) [12]
- (c) **State or Show (4×3)**
- Compost / Soil in seed tray / Suitable medium (3)
Sow / Scatter 100 seeds (3)
Leave for a time (3)
Count the number which germinate (3) [12]

Question 13 [36 marks]

- (a) Metal (3)
- Plastic (3)
- Textile (3)
- Timber (3) [12]

- (b) Irritant / Harmful (3)



(3) [6]

- (c)

A: PLASTICS

- (i) Insulation / Drinking cups / Packaging / Ceiling tiles (3)
- (ii) Oil / Crude oil (3)

- (iii) **State or Show (4×3)**

Nail / Sharp implement / Ball bearing (3)

Scratch / Mark one plastic (3)

Repeat with second plastic (3)

Comparison / Result (3) [18]

No labelled diagram – deduct 3 marks

B: TEXTILES

- (i) Fibres (3)
- (ii) Fabrics (3)
- (iii) **State or Show (4×3)**
- Stretch / Clamp / Fix Textile (3)
- Apply abrasive (wearing device) / File (3)
- Repeat with second textile (3)
- Comparison / Result (3) [18]

No labelled diagram – deduct 3 marks

C: METALS

- (i) Gold / Silver / Copper / Platinum / Rhodium (3)
- (ii) Jewellery etc. (Must be Matched) (3)
- [Allow a correct use for an incorrect metal named in (i) for 3 marks]
- (iii) **State or Show (4×3)**
- Add weight to one metal / Apply force (3)
- Measure bend (3)
- Repeat with second metal (3)
- Comparison / Result (3) [18]

No labelled diagram – deduct 3 marks

D: TIMBER

(i) Hard (3)

(ii) Soft (3)

(iii) **State or Show (4×3)**

Add weight to timber parallel to grain / Apply force (3)

Measure bend (3)

Repeat with second timber at right angle to grain (3)

Comparison / Result (3) **[18]**

No labelled diagram – deduct 3 marks

Question 14 [36 marks]

- (a) Butter (3)
Glucose / Orange (3)
Orange (3)
Bran / Orange (3) [12]
- (b) Colouring / Flavouring / Sweetener / Antioxidant / Stabilizers / Emulsifiers / or specified effect of one of these additive groups (3)
Allergies / Hyperactivity / Destroys vitamins / Sickness must be qualified [Accept 'may cause cancer'] (3)
Smoking / Freezing / Salting (Curing) / Canning Drying / Cold storage (3)
Milk / Fruit juices / Beer (3) [12]
- (c) **State or Show (4×3)**
- Heat milk to 70 °C-90 °C / Heat to below boiling (3)
Cool to 30 °C / Lukewarm (3)
Add bacteria (natural yogurt) / Starter / Culture (3)
Incubate / Leave in flask / Leave at 30 °C / Leave at this temperature (3) [12]

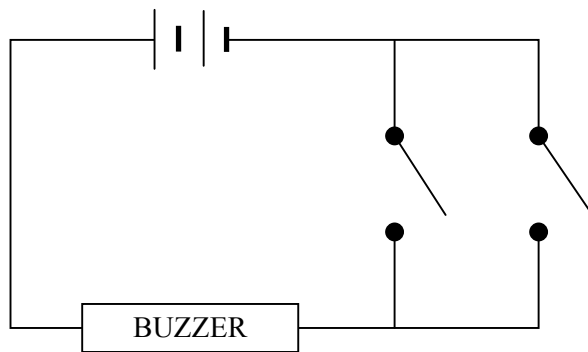
No labelled diagram – deduct 3 marks

Question 15 [36 marks]

- (a) Diode (3)
One-way flow of current / Rectifier (3)
No (3)
Reverse (3) [12]

- (b) Protect diode / Limit current / Prevent LED from blowing (3)
No (3)
2 way switch (3)
Landing / Stairs / Hallway (3) [12]

- (c) Battery / Cell (3)
Buzzer (3)
In series (3)
2 switches in parallel (3) [12]



[Allow two way switching system as in part (b) of paper]

Question 16 [36 marks]

- (a) Kinetic to Heat / Kinetic to Sound (3)
Kinetic to Sound (3)
Chemical to Light / Chemical to Heat (3)
Light to Chemical (3)
Potential to Kinetic / Kinetic to Sound / Kinetic to Heat (3)
Chemical to Heat / Chemical to Light (3) [18]
- (b) Motor (3)
A = Magnet (3)
B = Coil (3)
C = (Carbon) Brushes / Graphite / Carbon (3)
Spins / Rotates / Turns (3)
Washing machine / Hairdryer / Dishwasher / Drill / Mixer (3) [18]