



Junior Cycle Final Examination

Sample Paper D Solutions

# Science

Common Level

Time: 2 hours

360 marks

Examination number

Centre Stamp

**Section A****150 marks****Question 1****15 marks**

(a)

Element	Compound	Mixture
Diamond (C)	Baking soda ( $\text{NaHCO}_3$ )	Air
Iron (Fe)	Sugar ( $\text{C}_6\text{H}_{12}\text{O}_6$ )	Ink
Uranium (U)	Salt (NaCl)	Concrete
	Water ( $\text{H}_2\text{O}$ )	Milk
	Dry ice ( $\text{CO}_2$ )	

(b) Water is classified as a compound as it contains two elements, hydrogen and oxygen, chemically bonded together.

**Question 2****15 marks**

Plant structure	Plant part	Function
Turnip	Root	Anchors plant Absorbs nutrients from soil Stores food
Beans	Seed	Germinates into new plant
Cabbage	Leaf	Photosynthesis
Seedling	Stem	Holds plant upright Transports water and nutrients
Dandelion	Flower	Reproduction

**Question 3****15 marks**

- (a) At 18.00. It is the time of the day when people come home from work and start using electrical appliances in the home, e.g. cooker.
- (b) At night-time. People are asleep and not using electricity.
- (c) As electricity consumption increases, so too does the production of carbon dioxide. For example, at 18.00 when the electricity consumption increases, the number of tonnes of  $\text{CO}_2$  produced per hour also increases.
- (d) Any two of the following:
- Burning of fossil fuels
  - Car exhaust fumes
  - Respiration

**Question 4**

**15 marks**

(a)

	Layer name	Description
1	Crust	Outermost layer of the earth
2	Mantle	It is made of solid rock. The upper mantle is made up of magma. Magma is a mixture of hot molten or semi-molten rock.
3	Outer Core	It is a thick liquid made up of molten iron and nickel.
4	Inner core	It is made of iron and nickel but they are in a solid state.

*Note: In the first print run of Junior Cycle Science Exam Papers (Sample Paper D, Question 4 (a)), it was stated that Layer 3 was the inner core. It should be the outer core. We apologise for this error.*

(b) Nitrogen

**Question 5**

**15 marks**

(a)

Device	% Efficiency
Tumble dryer	$\frac{2600}{3800} \times 100 = 68.42\%$
Mobile phone	$\frac{102}{180} \times 100 = 56.67\%$

(b) Yes, Pdraig made the right decision because this machine is more energy efficient, and over time it will save him more money.

**Question 6**

**15 marks**

(a) Bull breed B. They produce more milk at a quicker speed.

(b)

Product	Bull breed
Low-fat yoghurt	A
Greater quantities of cheese	B

(c) Bull breed A

(d) It is safer to deal with an animal that has a better temperament.

**Question 7**

**15 marks**

(a)

Molecule	Elements
Hydrogen sulfide (H <sub>2</sub> S)	Hydrogen and sulfur
Sulfur trioxide (SO <sub>3</sub> )	Sulfur and oxygen
Nitrogen dioxide(NO <sub>2</sub> )	Nitrogen and oxygen

(b) Carbon = 6, Hydrogen = 12 and Oxygen = 6

*Note: In the first print run of Junior Cycle Science Exam Papers (Sample Paper D, Question 7 (b)), the chemical formula of glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>) was not included. We apologise for this error.*

(c)

Description	Compound
Contains 8 hydrogen atoms	Aspirin (C <sub>9</sub> H <sub>8</sub> O <sub>2</sub> )
Contains 6 atoms in total	Baking soda (sodium hydrogen carbonate, NaHCO <sub>3</sub> )
Contains 5 oxygen atoms	Vitamin C (C <sub>6</sub> H <sub>7</sub> O <sub>5</sub> )
Has the chemical name iron oxide	Rust (Fe <sub>2</sub> O <sub>3</sub> )

Note: In the first print run of Junior Cycle Science Exam Papers (Sample Paper D, Question 7 (c)), the second row of the table reads 'Contains 3 atoms in total'. It should read 'Contains 6 atoms in total'. We apologise for this error.

### Question 8

15 marks

- (a) Carbon dioxide
- (b) Photosynthesis
- (c) Photosynthesis by green plants and a carbon dioxide scrubber. A carbon dioxide scrubber is a piece of equipment that absorbs carbon dioxide (CO<sub>2</sub>). It is used to treat exhaust gases from industrial plants.
- (d) Any two of the following:
- Burning of fossil fuels
  - Decomposing plants and animals
  - Respiration

### Question 9

15 marks

- (a) Iron
- (b) Iron
- (c) Gold
- (d) Sodium
- (e) Solid, liquid
- (f) They are only made up of the one type of atom.

### Question 10

15 marks

- (a) The Sun's light is reflected off the moons and in the direction of the Earth. Therefore, we can see these moons from the Earth.
- (b) Europa, Io, Callisto, Ganymede
- (c) Gravity is the force by which a planet or other body draws objects towards its centre.
- (d) Io, Ganymede, Europa, Callisto

## Question 11

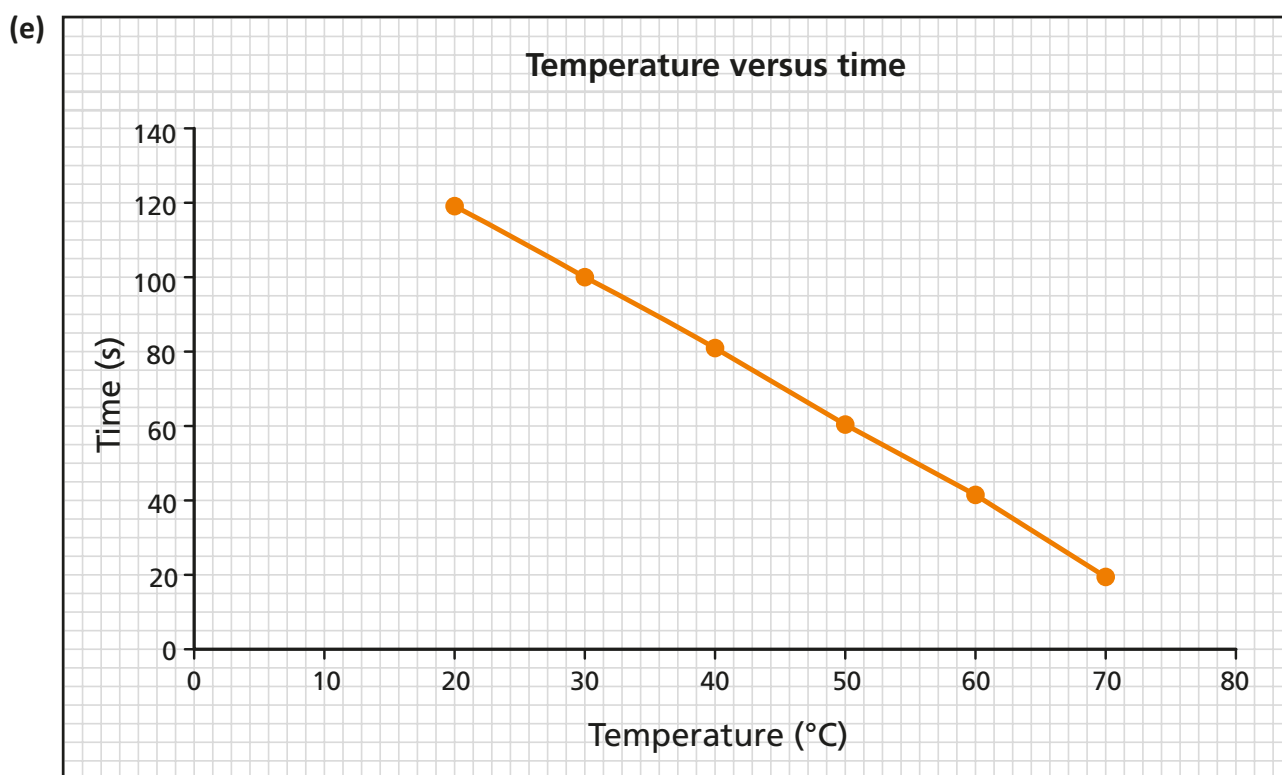
30 marks

- (a) As the temperature of the water increases, the time taken for the sugar cube to dissolve decreases.
- (b) They will have to be careful when dealing with hot water so they do not get burned. They will have to clean up any spills if they occur to ensure that no one slips.

(c)

Temperature (°C)	Average
20	119
30	100
40	81
50	60
60	41.3
70	19

- (d) It is important to carry out more than one trial and get the average in order to ensure that the results are accurate.



- (f) As the temperature increases, the time taken for the sugar cube to dissolve decreases.
- (g) At this temperature water is a solid and the sugar cube would not be able to dissolve in ice.

**Question 12****30 marks****(a)** Windy conditions are normal and as a result could be harnessed to produce energy.**(b)** Renewable**(c)** The missing terms appear in the following order:

- Wind
- Windmills
- Turbines
- Generators
- Transformer
- Distribution
- Voltage

**(d)** For:

- Renewable source of energy
- Readily available in Ireland
- Reduces the need to use fossil fuels that damage the environment

Against:

- Can damage health
- Negatively affects tourism
- Devalues property
- Damages the local economy

**Question 13****30 marks****(a)**

Contact forces	Non-contact forces
Push Reaction Friction Upthrust Twist (torsion)	Weight Magnetism Electrostatic

**(b)** Iron nail, electrical wire, battery, switch**(c)** Chemical energy transforms into electrical energy that transforms into magnetic energy.**(d)**

Number of turns	10	20	30	40	50
Weight of iron picked up (N)	56	188	324	598	792

**(e)** Yes, this hypothesis is supported. At 10 turns, 56 N of iron was picked up. At 50 turns, 792 N of iron was picked up.

**Question 14****30 marks**

- (a) What causes skin cancer?
- (b) Hypothesis A. There are more cases of skin cancer because people are going on more holidays. The data in Figures 1 and 2 show that from 2003 to 2008 the number of holidays taken and the instances of skin cancer increased. Figure 3 shows that in 2006 ozone levels increased. This did not cause a drop in the number of skin cancer cases that year.
- (c) Any three of the following:
- Seek the shade, especially between 10 a.m. and 4 p.m.
  - Don't get sunburned.
  - Avoid tanning and never use sunbeds.
  - Cover up with clothing, for example, a broad-brimmed hat and UV-blocking sunglasses.

(d)

SPF	Average
4	71.6
8	133.3
15	276
30	672.3
50	1933.3

- (e) Any two of the following:
- The same white bead
  - The same brand of sun cream
  - The same distance from the UV light
  - The same intensity of UV light
  - The same thickness of colourless plastic film
- (f) The higher the SPF, the longer it takes the beads to go purple, and therefore the greater protection provided by the sun cream against UV rays.

**Question 15****45 marks**

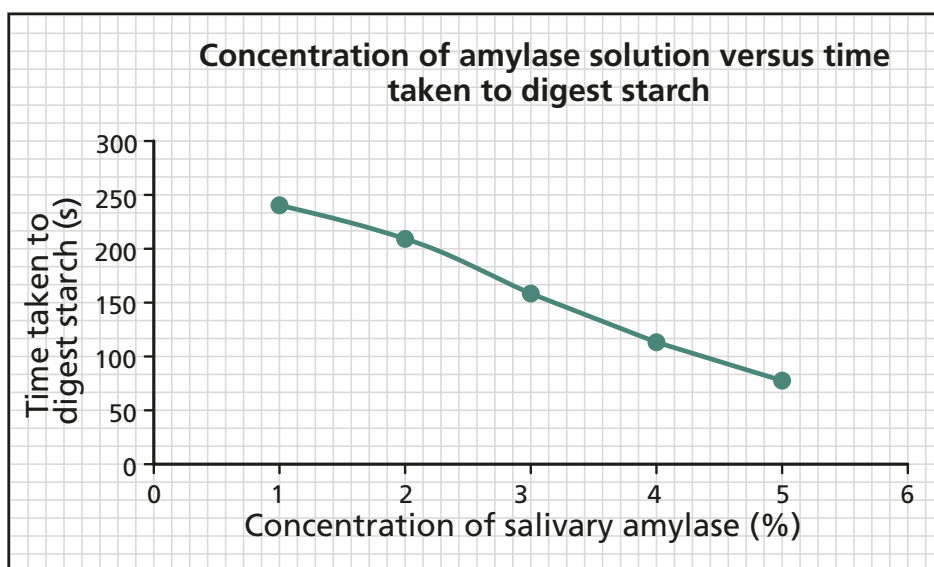
- (a) It suggests that developing the cowpox virus makes a patient immune to contracting the smallpox virus. James had previously been infected by the cowpox virus, so when he was exposed to the smallpox virus he did not contract it.
- (b) Edward Jenner was given this title because of his investigations into developing vaccinations for dangerous illnesses.
- (c) Any three of the following:
- Measles
  - Meningitis
  - Mumps
  - Pertussis
  - Poliomyelitis
  - Rubella
  - Tetanus
  - Tuberculosis
  - Yellow fever

- (d) Jenner tried out an idea without knowing exactly what would happen to James. He could have become really ill or died as a result of this experiment.
- (e) The percentage of people vaccinated between 1996 and 2003 decreased. From 2003 to 2007 the percentage of people started to increase again. In 1996 approximately 93% of people were vaccinated. In 2003 this dropped to approximately 81%. In 2007 this had risen to 85%. The increases in the percentage of people vaccinated might have been caused by public awareness campaigns promoting vaccination.
- (f) As the percentage of those getting vaccinated decreased, the number of cases of measles increased. This happened because people who were not vaccinated were left exposed and contracted measles.
- (g) It stopped people becoming very unwell with a disease that can be easily prevented with a vaccine.

**Question 16**

**45 marks**

- (a) Amylase in the mouth acts on starch to break it down to maltose.
- (b) The concentration of the amylase solution
- (c) The rate at which the starch is broken down to maltose
- (d) Any two of the following:
  - The temperature
  - The volume of starch solution
  - The same volume of iodine
- (e) The following is a suggested method for this investigation:
  - Make up five different solutions of salivary amylase (1%, 2%, 3%, 4% and 5%).
  - Place 2 cm<sup>3</sup> of starch solution in each dropping well using a pipette.
  - Place 1 drop of iodine in each well, also using a pipette.
  - Add salivary amylase to each well and start the stop clock.
  - Record the time taken for the blue/black colour to disappear.
- (f) Quantitative
- (g)



- (h) 140 seconds
- (i) As the concentration of the salivary amylase increases, the time taken to digest the starch decreases.