

## Junior Cycle Final Examination

Sample Paper B Solutions

# Science

Common Level

Time: 2 hours

360 marks

Examination number

Centre Stamp

## (a) <sub>□</sub>

Living things	Non-living things
Frog	Pencil
Seaweed	Glass of water
Goat	Car
Fly	Fire
Daisy	Rock
Tree	Chopped wood

#### (b) Organism

(c) Frog – It moves, it responds to its surroundings, it respires, it excretes, it grows, it reproduces, it feeds.

(d) Rock – It does not move, it does not respond to its surroundings, it does not respire, it does not excrete, it does not grow, it does not reproduce, it does not feed.

#### Question 2

(a)	Date	Present reading (kWh)	Previous reading (kWh)	Units used (kWh)
	March	31047	29361	1686
	June	32275	31047	1228
	September	33314	32275	1039
	December	35497	33314	2183

- (b) The household used the greatest amount of electricity in December. This is because it is in winter and they would have had the lights and heating on for longer as the days are shorter and colder.
- (c) Any three of the following:
  - Use energy-efficient light bulbs.
  - Insulate the attic.
  - Insulate the hot water tank with a lagging jacket.
  - Turn off appliances when they are not being used.

(a)

(d)

Description	Celestial body
Emits light	Star
Earth's natural satellite	Moon
Has a tail consisting of gas and dust	Comet
Orbits stars and reflects light	Planet
Large part of its surface is covered in water	Earth

(b) Venus is the most similar. The diameter of each only differs by 800 km. The distances from the Sun differ by the least amount (40 million km) and they are similar in the time taken to travel one orbit of the Sun in comparison to other planets.

(c) Neptune, Mercury, Mars, Venus, Earth, Uranus, Saturn, Jupiter

Planet	Terrestrial planet	Gas giant
Mercury	$\checkmark$	
Venus	$\checkmark$	
Earth	$\checkmark$	
Mars	$\checkmark$	
Jupiter		$\checkmark$
Saturn		$\checkmark$
Uranus		$\checkmark$
Neptune		$\checkmark$

#### **Question 4**

#### 15 marks

(a) Any three of the following:

- A student is on his phone and is not paying attention to the Bunsen burner flame behind him on the desk.
- A student using the Bunsen burner does not have her hair tied up.
- There is flammable material close to the Bunsen burner flame.
- The teacher is not paying attention to what is happening in the class.
- The school bag on the floor is a trip hazard.
- A student is eating in the laboratory.
- The water spill could cause a student to slip and fall.
- A student is holding a test tube in his hand while heating it directly over a Bunsen burner. He could get burned.

- (b) Risk of harm from each hazard in part (a) could be reduced by:
  - Paying attention to the flame and putting mobile phones away.
  - Tying back hair.
  - Placing all material not currently needed at the back of the laboratory.
  - The teacher moving around the room.
  - Placing bags at the back of the laboratory.
  - Never eating in the laboratory.
  - Mopping up spills immediately.
  - Using tongs to hold test tubes.
- (c) You should wear gloves when handling this material.

#### **Question 5** 15 marks (a) **Composition of the Earth's crust** 50 45 of each element 40 35 30 25 20 15 10 % 5 0 Aluminium Oxygen Silicon Iron Calcium Magnesium and Trace amounts potassium and sodium of other elements

- (b) Oxygen
- (c) The most abundant element in each is oxygen. The second most abundant element in each is silicon. They have very similar amounts of calcium present in their crusts.
- (d) The Moon has a much larger percentage of magnesium present. The Earth has potassium and sodium present in its crust but the Moon does not.

(a)	Action	Type of force
	Tightening a tap	Twist
	Riding a bicycle	Push
	Rolling Play Dough	Push and pull
	Turning a screw	Twist
	Wringing out water from a wet sponge	Twist
	Flicking through the pages of a book	Push and pull
	Opening a lock on a door	Twist
	Towing a trailer on a car	Pull

(b) Contact force: Two objects have to be in contact for the force to occur, e.g. push and pull or friction. Non-contact force: Two objects do not have to be in contact for the force to occur, e.g. gravity or magnetic forces.



#### **Question 7**

(a) The LED is lighting.

- (b) A voltmeter
- (c) The same LED, the same electrical wires, the same size electrodes and the same lemon
- (d) Copper and magnesium
- (e) There is no difference in the voltage.

#### **Question 8**

(a) The concentration of the sugar solution

(b)



15 marks

15 marks

E

(c) Amy's results do not support her conclusion. The highest concentration of sugar solution (25%) had no pollen grains growing. The concentration of sugar solution that had the highest number of pollen grains that started to grow was the 10% sugar solution.

#### Question 9

- (a) It agrees with the Principle of Conservation of Energy. It shows that 100 J of energy were inputted and that 100 J of energy were outputted (33 + 6 + 6 + 55 = 100). It shows that no energy was lost in the conversion; it was just changed from one form to another.
- (b) It agrees with the Principle of Conservation of Energy. It shows that 100 J of energy were inputted and that 100 J of energy were outputted (13 + 13 + 13 + 61 = 100). It shows that no energy was lost in the conversion; it was just changed from one form to another.
- (c) It keeps body temperature constant at 37 °C so enzymes (metabolism) work optimally regardless of the environmental temperature.

#### **Question 10**

(a)

	Sunrise	Sunset	Length of day
Cork	5.12 a.m.	21.55 p.m.	16 hours 43 mins
Dublin	4.58 a.m.	21.58 p.m.	17 hours
Belfast	4.48 a.m.	21.03 p.m.	16 hours 15 mins

(b) Dublin

(c) Daytime varies with latitude. The three cities have different latitudes, so this will affect the length of the day in each city.



15 marks

### **Section B**

#### Question 11

- (a) She was concerned that people would be postponing treatment until public funding was available.
- (b) Infertility is the inability to become pregnant, to impregnate, or to carry a pregnancy to full term.
- (c) 18.59%
- (d) It is an effort to ensure that potential parents do not think they can select the sex of their child. They will only be permitted to select the sex of their child if there is a significant risk of a child being born with a severe genetic disease.
- (e) Gametes are sex cells (egg and sperm).
- (f) Yes. As stated in the article, childhood cancer patients may not plan to start a family until well after the 10-year storage limit has passed. This would mean that the stored gametes could potentially be destroyed before they need to access them.

#### Question 12

#### 30 marks

- (a) Any two of the following:
  - Acid rain may cause the pH of rivers and lakes to become more acidic, affecting fish and aquatic life.
  - Acid rain affects plants and may remove nutrients in the soil that plants need to grow.
  - Acid rain can also destroy buildings and statues. Building structures made of marble and limestone are mostly affected by acid rain as the acid dissolves the calcium compounds in the structures.
- (b) Carbon dioxide is the most acidic gas as it required the greatest number of alkali drops to change the indicator back to green (neutral).
- (c) Acid rain causes the pH in the lakes to decrease, damaging aquatic life and killing fish. As the effects of acid rain take a long time to reverse, fish stocks have decreased over time.
- (d) Acidic gases produced by the burning of fossil fuels (sulfur oxides) and car exhausts (nitrogen oxides) dissolve in rain water to produce acid rain. More of these gases are produced in industrially developed countries than in less industrial countries. Therefore, acid rain levels in industrially developed countries are higher, and as a result there is more damage done by acid rain.
- (e) Three ways we can reduce acid rain pollution in the future:
  - Reduce the burning of fossil fuels.
  - Use renewable energy, such as solar energy and wind energy.
  - Avoid using the car when possible. By using public transport, carpools, bikes, and even your feet, you're helping to reduce vehicle emissions.

#### **Question 13**

#### 30 marks

- (a) Fossil fuel is a general term for fuel formed from decayed plants and animals. Examples include crude oil, coal and natural gas.
- (b) It is the fourth highest country in terms of percentage gross electricity generation from fossil fuels.

- (c) Three concerns about using fossil fuels:
  - They are non-renewable so they will run out.
  - Burning fossil fuels releases pollutants that cause acid rain into the atmosphere.
  - Burning fossil fuels produces carbon dioxide, which is one of the main gases linked to global warming.
- (d) Between 1990 and 2030 the graph shows a decrease in the use of coal, peat and oil for the generation of energy.
- (e) Any two of the following:
  - Wind
  - Solar
  - Tidal

(f)	Advantage	They are cleaner and will not cause acid rain or global warming. They can also be used over and over again and will not run out like fossil fuels.
	Disadvantage	They could be restricted by the amount of sunlight available for solar energy or the wind speeds for wind energy.

#### 30 marks

(a) For every action, there is an equal and opposite reaction. The air trapped inside the balloon pushes out the open end, causing the balloon to move forward. The force of the air escaping is the 'action'; the movement of the balloon forward is the 'reaction'.





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- (c) Initially there is an increase in speed, but as time progresses the rocket slows down and eventually comes to a complete stop.
- (d) 8.5 m/s
- (e) Any two of the following:
  - Change the shape of the nose of the rocket.
  - Change the length of the rocket.
  - Change the number of wings the rocket has.

- (a) The concentration of the fertiliser used will affect the growth of the geranium plant. The more concentrated the fertiliser, the more the plant will grow. (Or any other prediction, correct or incorrect.)
- (b) The following is a suggested method for this investigation:
  - Fill 100 pots with the same mass of sterile potting compost.
  - Plant a geranium plant in each pot.
  - Dissolve different amounts of the fertiliser in the same volume of water to make up three different concentrations of the fertiliser. As a control just use water on its own.
  - Pour the low concentration solution into 25 pots, the medium concentration solution into 25 pots, the high concentration solution into 25 pots, and the water into 25 pots.
  - Record the growth of the plants.
  - Get the average and plot the results.



- (d) Wash hands completely after handling the potting compost.
- (e) Any two of the following:
  - The size of the pot
  - The type of plant
  - The volume of water used
  - The same amount of light
  - The same ruler
  - The same temperature
- (f) A control group is an essential part of an experiment because it allows you to eliminate and isolate variables.
- (g) Water on its own without any fertiliser added to it
- (h) A low concentration of fertiliser will have the greatest effect on the growth of a geranium plant.
- (i) Muiris could write an article for a horticultural journal and share his results through that. He could also publicise his results on social media or write a blog about his experiment.



(b)

Substance the ice cube was covered with	Time taken for the ice cube to melt (mins)
Uncovered ice cube	100
Salt	40
Flour	130

- (c) The ice cube covered in salt melted in the shortest time. The ice cube covered in the flour took the longest time to melt.
- (d) The salt stops ice forming. It does this by reducing the freezing point of water on the road surface. This means that temperatures would have to drop lower than 0 °C before the water on the road would form ice.
- (e) Any two of the following:
  - Same volume of each liquid
  - Same size beaker
  - Same room conditions
- (f) Results collected are accurate and a correct conclusion can be drawn from the investigation.
- (g) Graduated cylinder



(i) It is during the daytime and the temperature of the laboratory will be higher.