



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Cycle Final Examination 2019 Solutions

Science

Common Level

Monday 10 June Afternoon 2:00 – 4:00

360 marks

Examination number				

Centre stamp

Section A**150 marks****Question 1****15 marks****(a)** From the top:

- Nucleus
- Cytoplasm
- Cell membrane

(b) Nucleus**(c)** Microscope**Question 2****15 marks****(a)** $4 \times 8 \times 2 = 64 \text{ cm}^3$ **(b)** $\text{Mass/Volume} = 128 \text{ g}/64 \text{ cm}^3 = 2 \text{ g/cm}^3$ **(c)** Glass C – the more dense an object is, the more it will sink. The less dense the object, the more it will float.**Question 3****15 marks****(a)**

- Air currents cause clouds to move onshore = 2
- Water falls to the Earth as precipitation = 3
- Heat from the Sun converts liquid water into water vapour = 1
- Plants lose water through the process of transpiration = 4

(b)

- Choose to have a shower rather than a bath. Showers use only half the amount of water required for a bath.
- When brushing your teeth or shaving, turn off the tap and save water.
- Fix any dripping taps or leaking toilets in your home to avoid wastage.
- Run your washing machine and dishwasher with full loads. This saves water and money on energy bills.
- Use a watering can instead of a hose to water your plants to save water and aim for the root, not the leaves.
- Use a bucket and sponge to wash your car. Using a hose to wash your car uses a large amount of water.
- Use a water butt to harvest rainwater from gutters. Collect rainwater to use in your garden instead of using drinking water from the tap.

Question 4

15 marks

(a)

- Carbon = 1
- Hydrogen = 4
- Oxygen = 4

(b) The same amount of carbon, hydrogen and oxygen atoms are present before and after the reaction has taken place, hence the mass will be conserved during the reaction. The atoms are just arranged in different ways.

(c) In a chemical change a new substance is formed. In a physical change no new substance is formed. A chemical change is difficult to reverse, a physical change is easy to reverse.

Question 5

15 marks

(a) 3

(b) Both 6 and 7 do not suffer from sickle cell anaemia themselves, however their offspring (10) does. This would indicate that both 6 and 7 were carriers of sickle cell anaemia (had the recessive gene for sickle cell anaemia) and when they reproduced, the offspring inherited the gene for sickle cell anaemia from both parents and now suffers from this disease.

(c) Eye colour = genetically controlled

How to cycle a bike = not genetically controlled

(d) The function of a red blood cell is to carry oxygen.

Question 6

15 marks

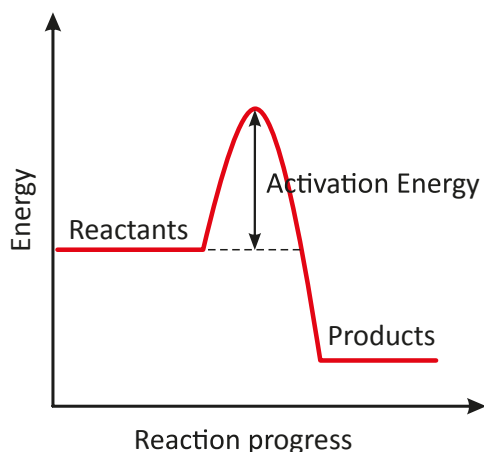
(a) Methyl orange indicator

(b) Red

(c) 7

(d) Exothermic

(e)



Question 7

15 marks

- (a) Stop clock
- (b) Speed = distance/time = $100/40 = 2.5$ m/s
- (c) Constant
- (d) The slope between points C and D is steeper than it is between points A and B. This indicates that the speed between points C and D is greater.
- (e) The cyclist started to decelerate (slow down) at point D to a stop at point E.

Question 8

15 marks

- (a) Burning of fossil fuels, farming, driving petrol and diesel cars
- (b) Loss of land to the sea/ocean and greater risk of flooding
- (c) Polar bears are white in colour to blend in (camouflage) with their surroundings. They have a layer of blubber under their skin to keep warm (insulate them) in the cold environment.
- (d) The population will decrease as they will have nowhere to live if ice sheets melt.
- (e) Freezing

Question 9

15 marks

- (a)
 - A = Mouth
 - B = Trachea
 - C = Lung
- (b) When a person breathes in, the lungs expand with air. The rib cage moves upwards and out and the diaphragm moves down. In the alveoli gas exchange occurs. Oxygen will enter the blood in the alveoli and carbon dioxide is removed.

Question 10

15 marks

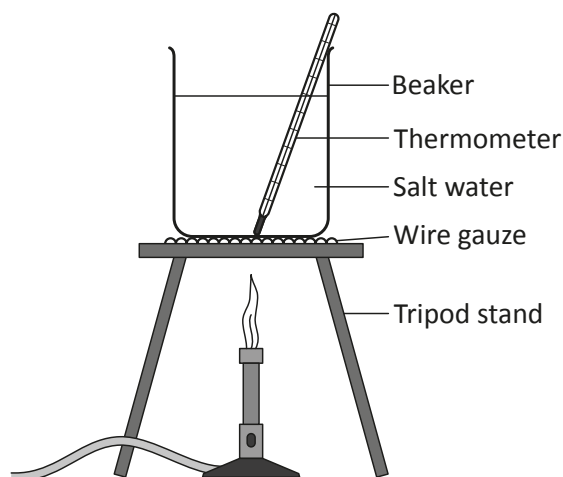
- (a) Solar System
- (b) Galaxy
- (c) A

B, the brightness levels for planet B were lower because planet B was a larger planet and therefore blocked more of the light from the star.

Question 11

30 marks

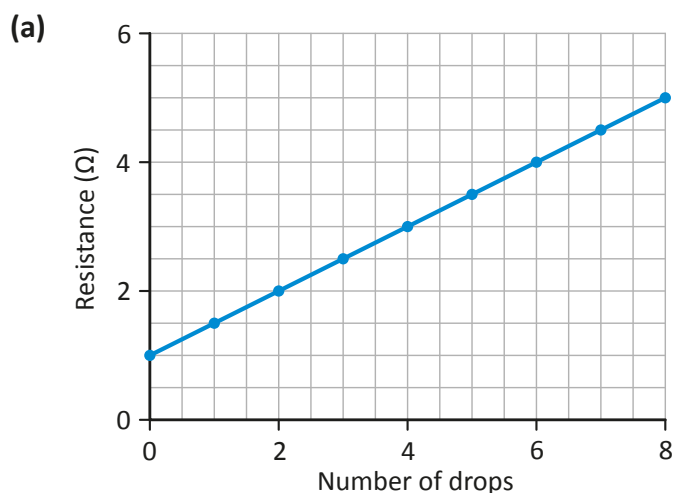
- (a) The greater the mass of salt added to water the greater the boiling point of water, as more energy will be required to change the water from liquid to gas when a larger mass of salt is added.
- (b) Boiling point – is the point where a substance changes from liquid state to gaseous (gas) state.
- (c) Mass balance
- (d)



- (e) $103 + 105 + 104 + 106 + 107 = 525/5 = \underline{105}$
- (f) To ensure that their results were accurate and to ensure that they could make an accurate conclusion for the investigation.
- (g) Yes the results support the hypothesis. When no salt is added the boiling point of water is $100.6\text{ }^{\circ}\text{C}$. As the mass of salt added increases so does the boiling point. The greatest mass of salt added is 8 g . The water with this amount of salt added had the highest boiling point at $109.6\text{ }^{\circ}\text{C}$.

Question 12

30 marks



- (b) The greater the concentration (the greater the number of drops of food colouring) the greater the resistance (or the less the amount of light that passes through the solution).
- (c) Ohmmeter
- (d) Pipette
- (e)
- Camera lens = The lens used in a camera works on the principle of optics (light). The set of convex lenses provides the camera with an image outside of the camera.
 - Television, mobile phones and radio signals all occur due to radio waves.
 - Wi-Fi and Bluetooth signals are transmitted using microwaves.
 - An MRI machine uses a very strong magnetic field to create an image of the inside of the body to help doctors see if there is something wrong with a patient.
- (f) Left ventricle
- Red indicates that this tube carries oxygenated blood (blood with oxygen) and blue indicates that the tube carries deoxygenated blood (blood without oxygen).

Question 13

30 marks

(a) Dishwasher (2,300 W)

(b)

Appliance	Useful form of energy	Unwanted form of energy	Voltage (Power/Current)
Coffee maker	Heat	Sound	$1380/6 = 230 \text{ V}$
Television	Light and sound	Heat	$115/0.5 = 230 \text{ V}$
Blender	Kinetic	Heat and Sound	$345/1.5 = 230 \text{ V}$
Dishwasher	Heat and Kinetic	Sound	$2300/10 = 230 \text{ V}$

- (c) The higher the power rating the higher the current.
- (d) Sustainability means living in way that meets the needs of our society (for example in terms of food, fuel, electricity) without threatening the needs of future societies.
- (e)
- Ensure that electrical appliances have a high efficiency rating.
 - Use renewable energy sources.
 - Do not have appliances in standby mode.
 - Turn off electrical appliances when they are not being used.
 - Turn off lights when they are not required.
- (f) Solar and wind

Question 14

30 marks

- (a) Grains and vegetables
- (b) Using a group of mice who were not fed the fatty acids as a control group
- (c) Researchers found that there was a decrease in anxiety and depressive-like behaviour when fatty acids were consumed.

(d) Yes – I agree with using animals such as mice in scientific research as it is better to test ideas out on animals such as mice, and not humans when you are starting out in the study. If the treatment is dangerous it is better for mice to be harmed rather than humans.

No – I disagree with using animals such as mice in scientific research as the research may cause harm and pain to those animals and we should not cause harm or pain to any living organism.

(e) Exposure to hazardous substances in the air, water, soil, and food

Natural and technological disasters

Climate change

(f) Bacteria can be used to produce antibiotics that can be used to treat certain diseases. Bacteria can be used to make yoghurt and cheese from milk. Probiotics contain living cultures of bacteria to help keep the gut healthy.

(g) Sexual reproduction means combining genetic material from **two** parents.

Asexual reproduction produces offspring genetically identical to the **one** parent.

(h) Natural selection is the process by which the members of a species who are best suited to their environment are the most likely to survive and reproduce. Any useful changes that take place in a species will be passed on to future generations. Natural selection explains evolution. Evolution is the gradual change in inherited characteristics of a species over time. Evolution can lead to new species.

Question 15

45 marks

(a) Oxygen

(b) As its availability is being seriously threatened in the next 100 years and it should only be used for important things and not for filling birthday balloons. Using it in balloons could cause it to be used up quicker.

(c) Humans could recycle their old smart phones. They could return them when they purchase a new smart phone. Humans could also research and find another substance to replace Indium (In) in smart phones.

(d) The diagrams show that both Aluminium and Chlorine are made from the same type of atoms. Elements are substances that are made from the same type of atom.

(e) Aluminium – it has a regular shape and the particles (atoms) are tightly packed and do not move past each other.

(f) Aluminium: Chlorine

1:3

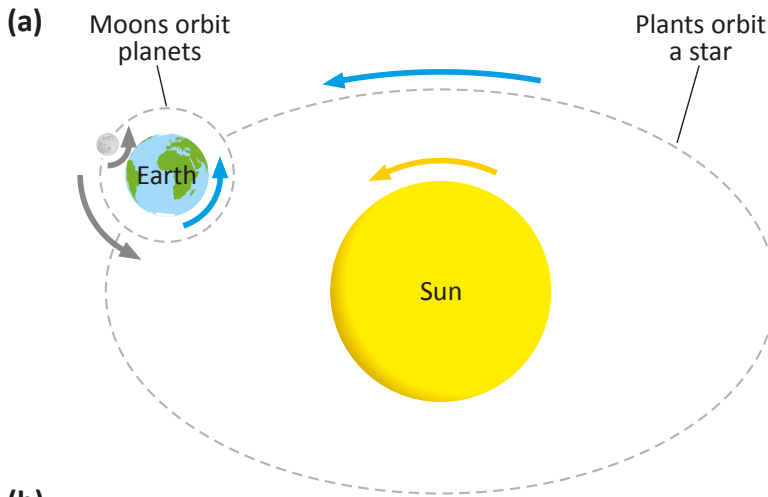
Aluminium Chloride – AlCl_3

(g) Element 1 is most likely to be a metal as it has a high melting and boiling point and it can conduct electricity.

Element 2 is a liquid at room temperature as below $-7\text{ }^\circ\text{C}$ it is a solid, between $-7\text{ }^\circ\text{C}$ and $59\text{ }^\circ\text{C}$ it is a liquid and over $57\text{ }^\circ\text{C}$ it is a gas. As room temperature is $20\text{ }^\circ\text{C}$ which means that Element 2 is a liquid at this temperature.

45 marks

Question 16



(b)

- Place a tick under the first image
- It is a waning gibbous.



- (c) Only one side of the Moon is visible from Earth because the Moon rotates on its axis at the same rate that the Moon orbits the Earth.
- (d) Asteroids are lumps of rock that orbit the Sun. They are too small to be classified as planets. Asteroids are thought to have been left over from the formation of the universe. They vary in size, shape and composition.
- (e)
- The temperature of the surface of the Moon increases to just under 500 K and decreases to just under 200 K in a regular pattern approximately every 30 hours. The temperature increases as the Moon is exposed to the Sun's light and decreases as the Moon is not in the Sun's light.
 - The deeper inside the Moon's surface the more constant the temperature remains. At 30 cm below the surface the temperature remains constant at just over 300 K. At 15 cm below the surface the temperature changes show the same pattern as the surface level to a lesser extent. This could again be explained by the position of the Moon in relation to the Sun. When the Moon is in direct sunlight the temperature increases, when it is not in direct sunlight it decreases.
- (f)
- C
 - In this model both Earth and Venus have the same mass (8 Kg). However the weight of Venus (72 N) is less than that of the Earth (80 N) indicating that the force of gravity is less on Venus as it has less of a pull on the same mass.
- (g) The force of gravity on the Earth is much higher than that of the force of gravity on the Moon as Earth is a larger body of mass than the Moon and will therefore have a greater pull (gravity) on objects.