



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Cycle Final Examination 2026

Science

Common Level

Monday 8 June Morning 9:30 – 11:30

360 marks

Examination Number

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Date of Birth

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For example, 3rd February
2005 is entered as 03 02 05

Centre Stamp

Instructions

There are two sections in this examination paper.

Section A	150 marks	10 questions
Section B	210 marks	6 questions

Answer **all** parts of **all** questions.

You may ask the superintendent for a copy of the *Formulae and Tables* booklet. You must return it at the end of the examination. You are not allowed to bring your own copy into the examination.

Not all the questions carry equal marks. The number of marks for each question is stated at the top of the question.

Write your answers in the spaces provided in this booklet. You are not required to use all of the space provided. There is extra space at the end of Section A and at the back of the booklet. Label any extra work clearly with the question number and part.

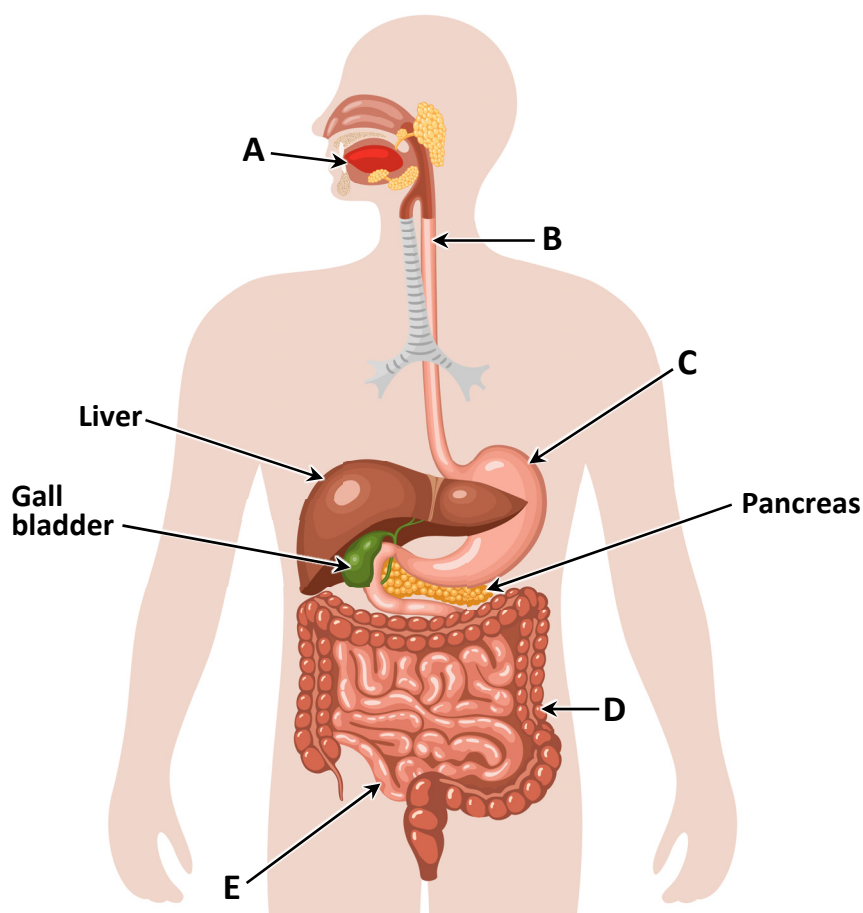
This examination booklet will be scanned and your work will be presented to an examiner on screen. Anything that you write outside of the answer areas may not be seen by the examiner.

Write your answers in blue or black pen. You may use pencil for graphs and diagrams only.

Question 1

(15 marks)

The diagram below shows the human digestive system and its associated organs.



Complete the table below by matching the letters in the diagram to the parts of the digestive system.

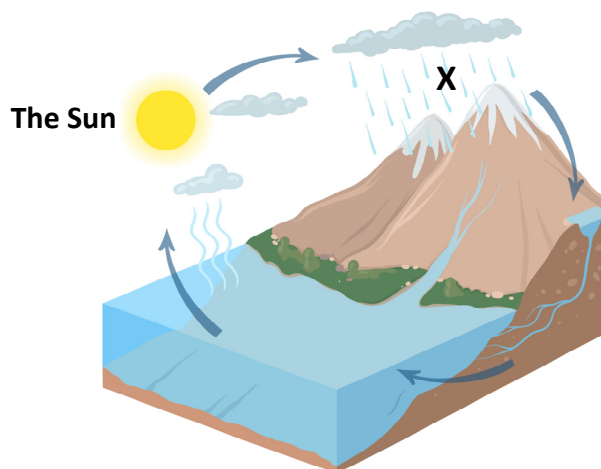
Part of digestive system	Letter
Small intestine	
Large intestine	
Mouth	
Oesophagus	
Stomach	

Question 2

(15 marks)

The diagram shows a model of the water cycle.

The arrows represent some of the processes involved in the water cycle.



Answer questions (a) — (d) by putting a tick (✓) in the correct box.

(a) Which process changes water from a liquid to a gas?

Condensation ☐

Precipitation ☐

Evaporation ☐

Transpiration ☐

(b) Which process causes clouds to form?

Condensation ☐

Precipitation ☐

Evaporation ☐

Transpiration ☐

(c) Which process is represented by the letter **X** on the diagram?

Condensation ☐

Precipitation ☐

Evaporation ☐

Transpiration ☐

(d) Which process occurs when water vapour moves out of the leaves of a plant into the atmosphere?

Condensation ☐

Precipitation ☐

Evaporation ☐

Transpiration ☐

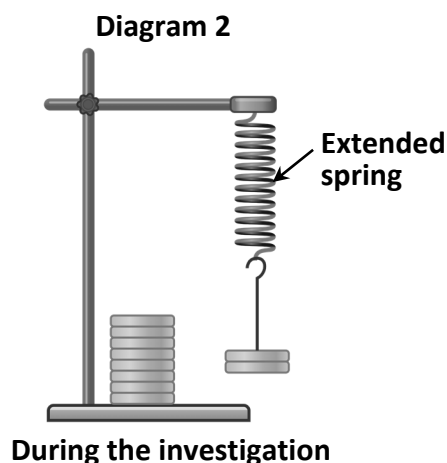
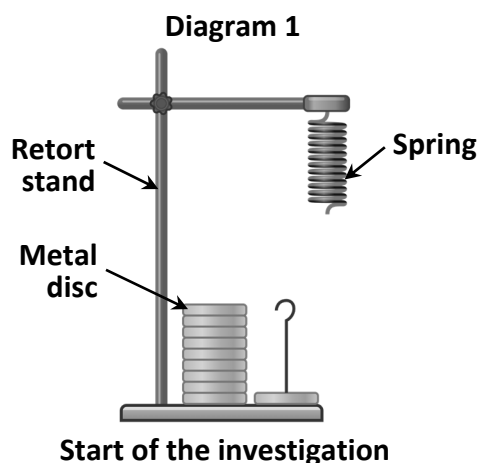
(e) Explain the role of the Sun in the water cycle.

You should refer to examples of changes of state in your answer.

Question 3

(15 marks)

A student investigated the relationship between the extension of a spring and the force applied to it. Diagram 1 shows the arrangement of the apparatus used by the student at the start of the investigation. Diagram 2 shows the arrangement of the apparatus during the investigation.



- (a) Which form of energy is stored in an extended spring? Put a tick (✓) in the correct box.

Chemical ☐

Potential ☐

Sound ☐

Each metal disc had a mass of **100 grams**.

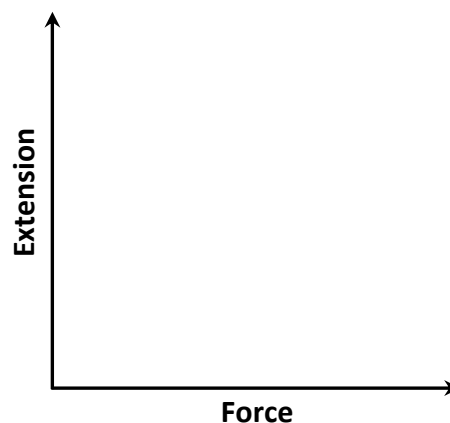
- (b) Name an instrument which could have been used to measure the mass of a metal disc.

- (c) Calculate the force (weight) of one metal disc.
Include the unit for your answer. (Acceleration due to gravity = 9.8 m/s^2)

Calculation:

As the number of metal discs added to the spring increased, the extension of the spring increased.
The student concluded that the extension of the spring was directly proportional to the force applied.

- (d) Using the axes provided, draw a sketch of a graph to show this relationship.



Question 4

(15 marks)

The article below is from an online news website. Read it and answer the questions that follow.

Modernised spacesuits revealed for Artemis Moon landings

The United States National Aeronautics and Space Administration (NASA) has designed new space suits. These suits will be used in their Artemis missions to the Moon marking humankind's first return to the Moon since 1972.

The space suits are designed to keep astronauts safe in the harsh environment of space. They have improved flexibility compared to previous suits. The suit includes lights, a high definition camera, communication systems and in-suit nutrition and excretion systems. The suit will be able to withstand the extreme temperatures on the surface of the Moon, allowing astronauts to perform spacewalks for at least eight hours.



Adapted from www.nrp.org

- (a) The article describes some of the modern features of the spacesuits. State two of these features.

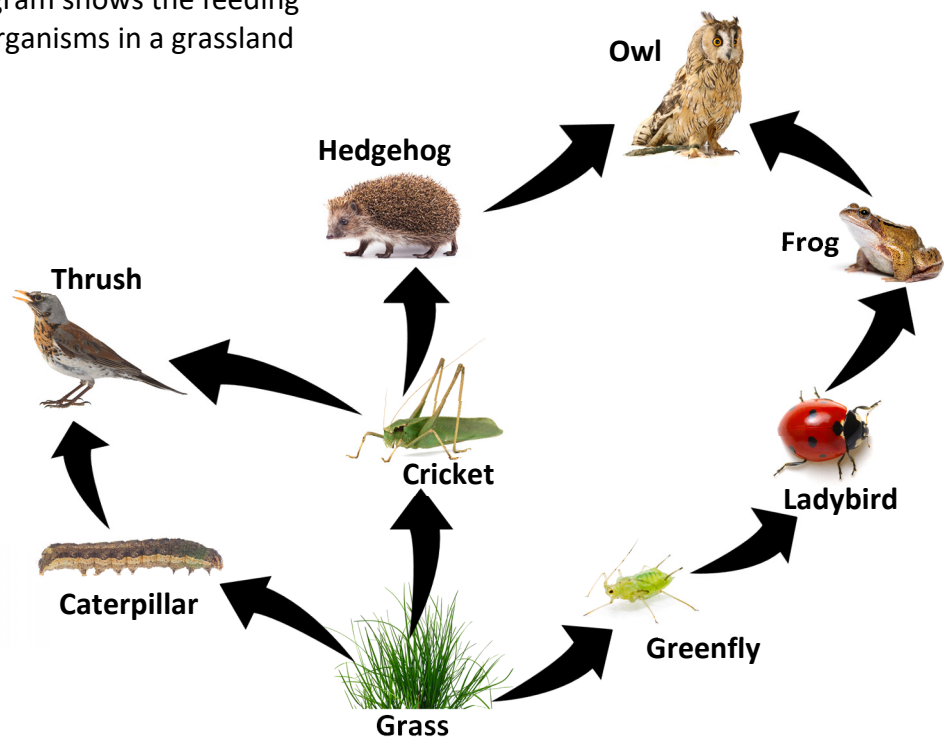
- (b) The article mentions the 'harsh environment of space'. Describe an aspect of space exploration which makes it hazardous for humans.

- (c) State two benefits of space exploration for society.

Question 5

(15 marks)

The food web in the diagram shows the feeding relationships between organisms in a grassland habitat.



- (a) Identify a primary consumer from the food web.

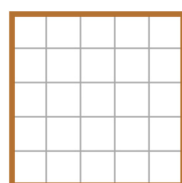
- (b) What do the arrows in the food web represent?

- (c) The thrush is in competition for food with another organism in the food web. Identify this organism.

- (d) Write out a food chain containing at least three feeding (trophic) levels from the food web.

- (e) Which piece of apparatus could be used to capture greenfly in a grassland habitat?
Put a tick (✓) in the correct box.

Quadrat

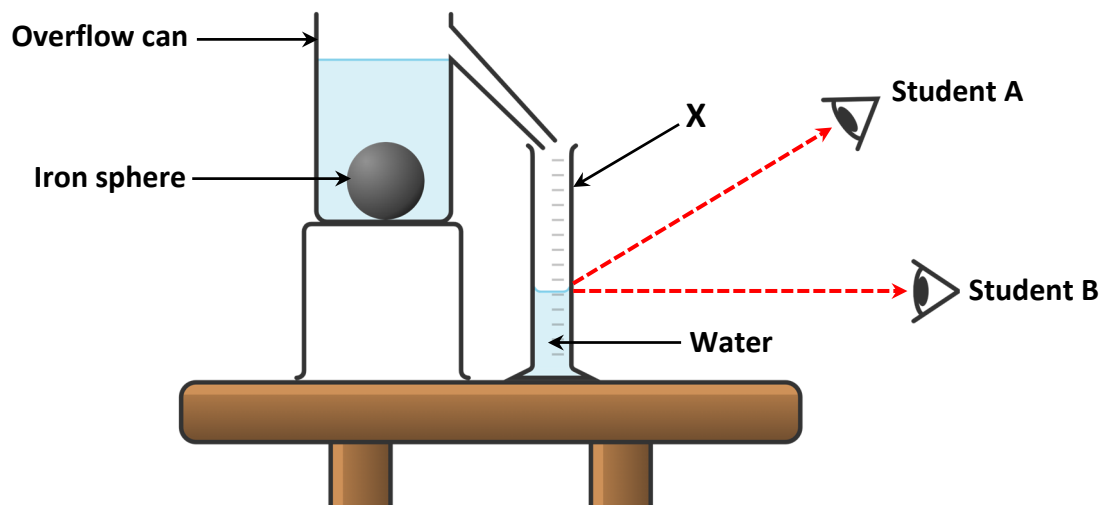

☐

Pooter


☐

Question 6**(15 marks)**

The diagram shows the arrangement of equipment used by two students, **A** and **B**, to determine the volume of a solid sphere made of iron.



- (a) Identify instrument **X** which was used to measure the volume of water displaced from the overflow can.

- (b) Which student, **A** or **B**, took a more accurate reading from instrument **X**?

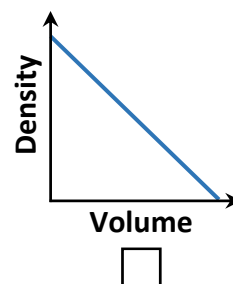
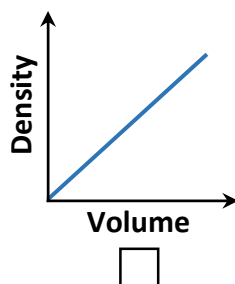
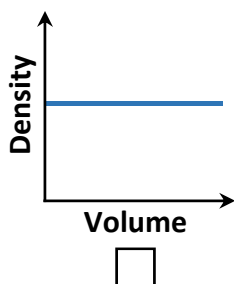
The volume of the sphere was 50 cm^3 . The mass of the sphere was 395 g.

- (c) Calculate the density of the sphere. Include the unit for your answer.

Calculation:

Another student calculated the density of other solid objects made of iron. Each object had a different volume.

- (d) Which graph shows the relationship between volume and density as the volume of a solid iron object increases? Put a tick (✓) in the correct box.



Question 7

(15 marks)

(a) The passage below describes the universe.

The following words are missing from the passage:

comet

solar system

galaxy

Write the missing words in the spaces provided.

The universe includes space and all the matter and energy that space contains.

The universe is believed to have formed 13.8 billion years ago.

A collection of billions of stars is called a _____.

The Sun and all of the objects which orbit it are collectively called the

_____.

An example of an object which orbits a star is a _____.

(b) (i) State the name of a scientific model which describes the origin of the universe.

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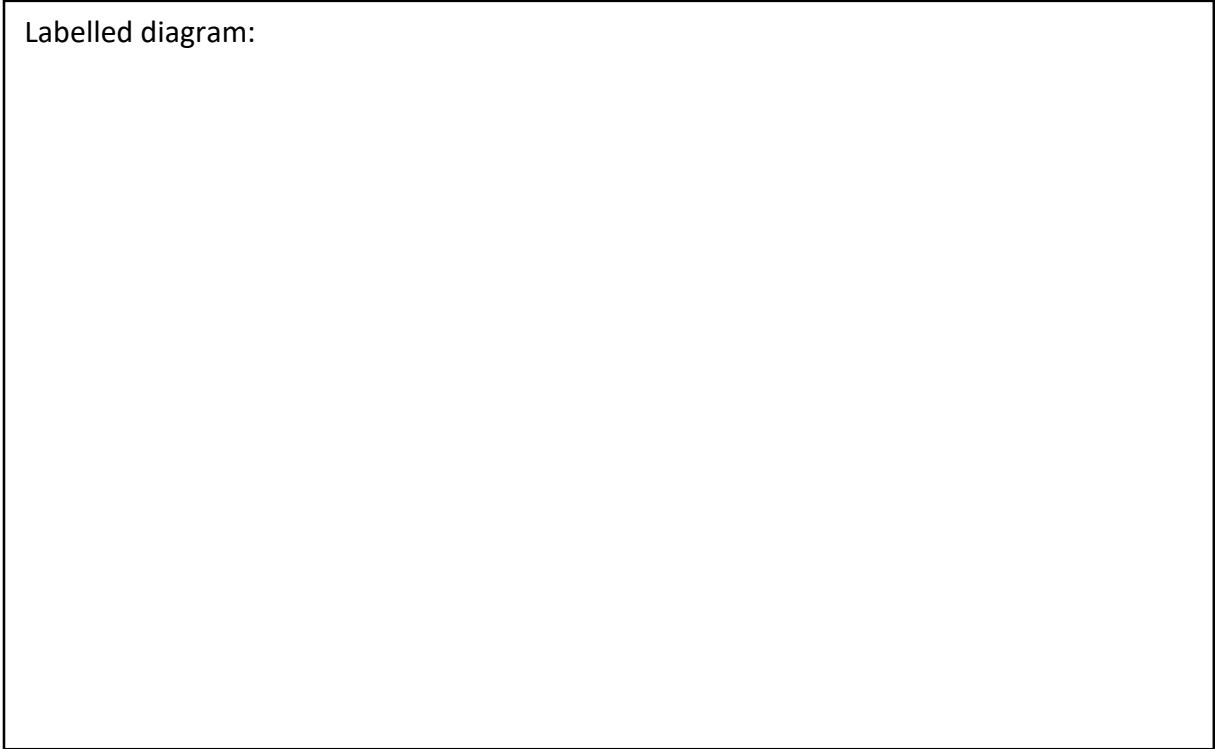
(ii) Outline two pieces of evidence to support the model you have named.

Question 8**(15 marks)**

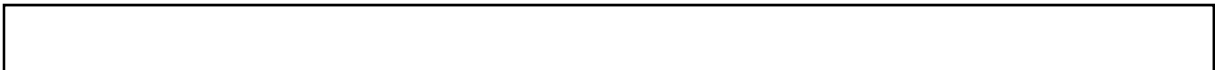
During your studies, you designed and built a device that transforms energy from one form to another in order to perform a function. You also examined ways to improve the efficiency of your device.

- (a)** Draw a labelled diagram of the device you designed and built.

Labelled diagram:



- (b)** Identify the main energy conversion that took place when your device was in use.



- (c)** Put a tick (✓) in the box beside the statement which correctly finishes the following sentence:

If a device is described as efficient, this means that

it works very quickly. ☐

it uses very little energy. ☐

it wastes very little energy. ☐

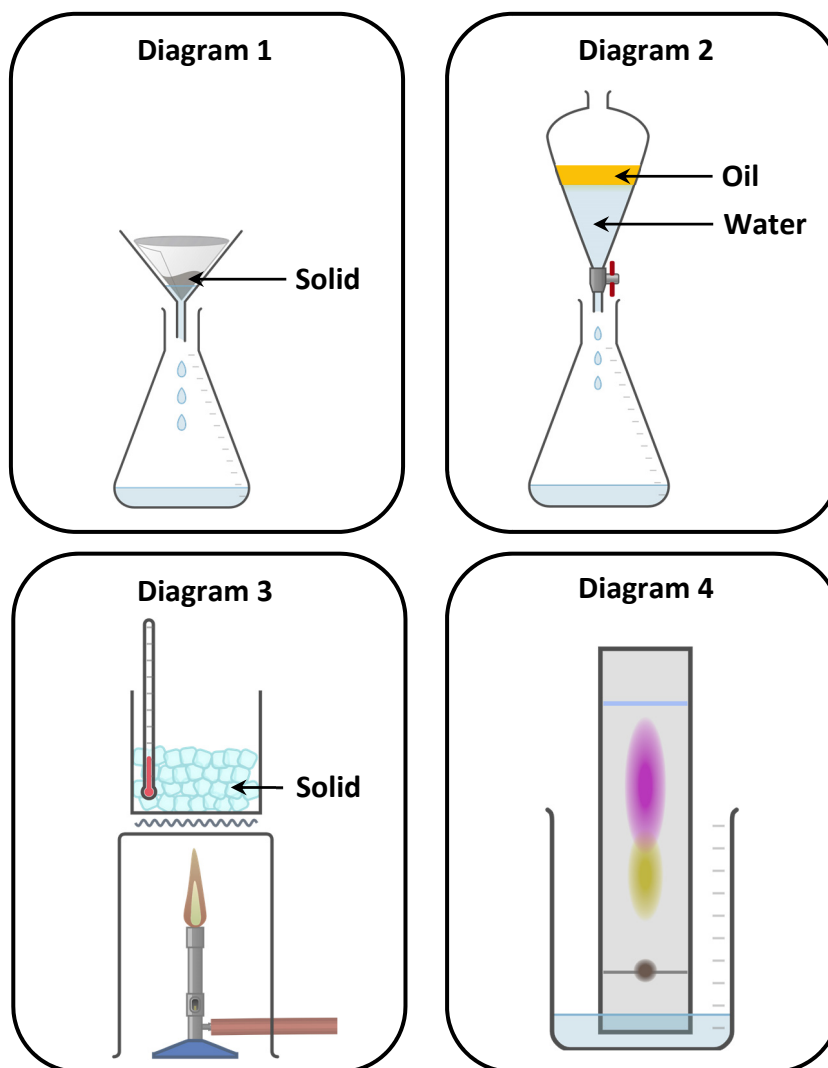
Question 9**(15 marks)**

The work of a scientist involves planning and conducting experiments.

In order to do this, suitable laboratory equipment must be considered.

The diagrams below show pieces of laboratory equipment which have been assembled in order to carry out a range of experiments.

Match each diagram with the correct experiment in the table below.



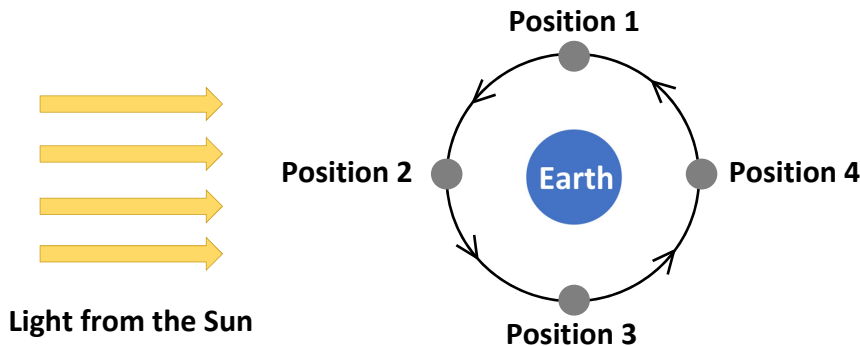
Experiment	Diagram number
To investigate the temperature at which a solid melts	
To separate an insoluble solid from a liquid	
To separate two liquids, one of which is insoluble in the other	
To separate a mixture of coloured inks	

Question 10

(15 marks)

The diagram shows the position of the Moon on four days during one lunar cycle. The positions are numbered **1, 2, 3** and **4**. The diagram is not drawn to scale.

The photograph shows the view of the Moon from Dublin in September 2024.



Answer questions **(a)** — **(e)** by putting a tick (✓) in the correct box.

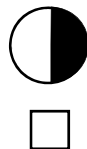
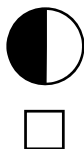
(a) Identify the position of the Moon when the photograph was taken.

Position 1 ☐ Position 2 ☐ Position 3 ☐ Position 4 ☐

(b) Identify the position of the Moon when a solar eclipse could occur.

Position 1 ☐ Position 2 ☐ Position 3 ☐ Position 4 ☐

(c) Which diagram below shows how the Moon would appear from Earth at position **3**?



(d) Starting at Position **1**, identify the position of the Moon after approximately 15 days.

Position 1 ☐ Position 2 ☐ Position 3 ☐ Position 4 ☐

(e) The distance of the Moon from Earth varies during the lunar cycle.

What effect does this have on our observation of the Moon from Earth?

An apparent change in the rotation of the Moon. ☐

An apparent change in the diameter of the of the Moon. ☐

[illegible]

Question 11

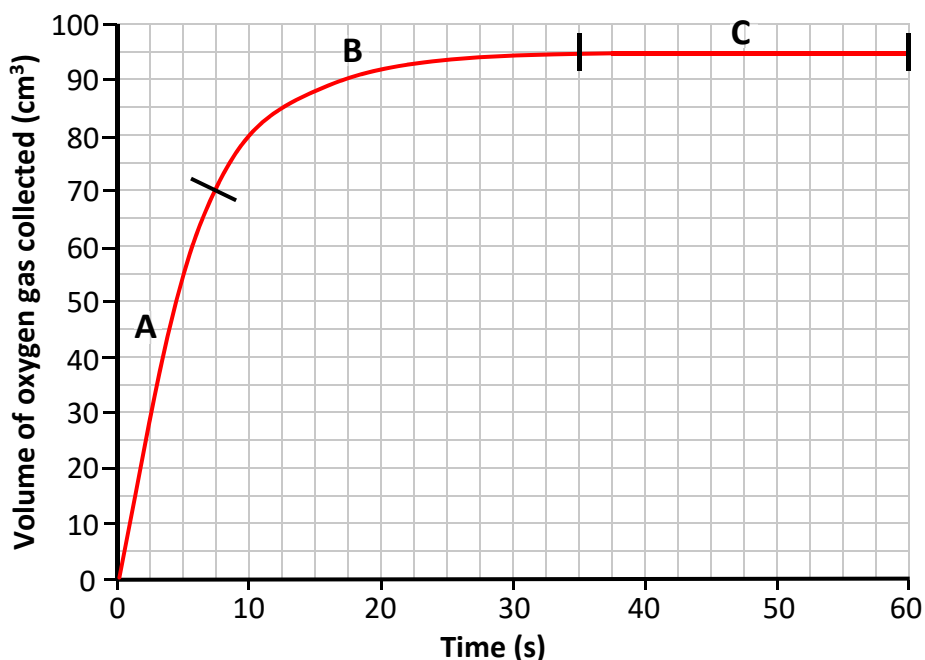
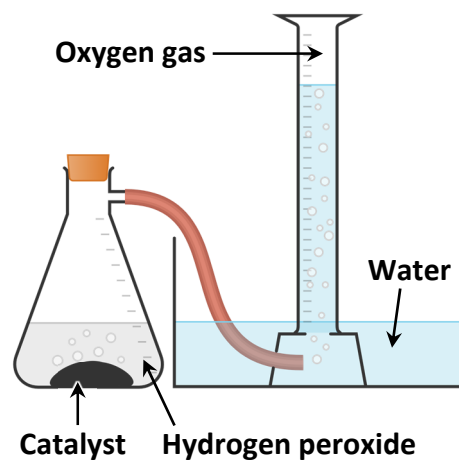
(30 marks)

Hydrogen peroxide decomposes slowly to produce oxygen gas. The rate of decomposition of hydrogen peroxide can be increased by using a catalyst.

The rate of decomposition of hydrogen peroxide was investigated using the apparatus on the right.

100 cm³ of hydrogen peroxide was placed in a flask with 1.0 g of a suitable catalyst at room temperature (20 °C). The volume of oxygen gas collected was recorded every 10 seconds for 60 seconds.

The results are shown in the graph below. The letters **A**, **B** and **C** represent different stages of the reaction.



- (a) Which letter, **A** or **B** or **C**, represents the stage of the reaction when oxygen gas was being produced at the fastest rate?

- (b) What volume of oxygen gas was collected after 10 seconds?

- (c) On the graph above, draw a dashed line (---) to show the result you would expect if the investigation was repeated exactly as before, but using a hydrogen peroxide solution of lower concentration.

- (d) Which of the following statements explains why oxygen gas can be collected using the method shown in the diagram? Put a tick (✓) in the correct box.

Oxygen gas has a low solubility in water and is more dense than water. ☐

Oxygen gas has a high solubility in water and is more dense than water. ☐

Oxygen gas has a low solubility in water and is less dense than water. ☐

Oxygen gas has a high solubility in water and is less dense than water. ☐

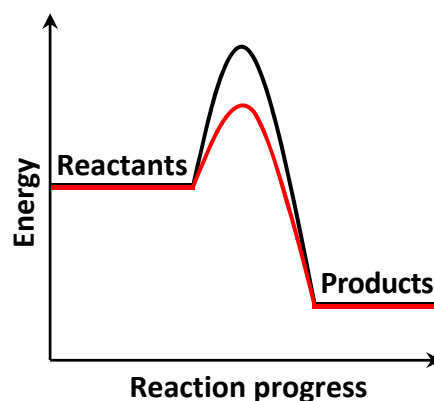
- (e) Hydrogen peroxide decomposes faster at higher temperatures.
Explain in detail why an increase in temperature increases the rate of a chemical reaction.

The decomposition of hydrogen peroxide is an exothermic reaction. The energy profile diagram for an exothermic reaction is shown below. The black line shows the progress of the reaction without using a catalyst. The red line shows the progress of the reaction when a catalyst is used.

- (f) (i) What is an exothermic reaction?

- (ii) What is the effect of using a catalyst on the activation energy for this reaction?

- (iii) On the diagram, show the overall energy change for this reaction.



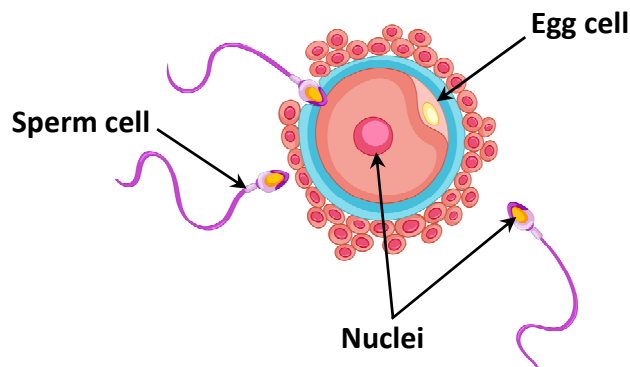
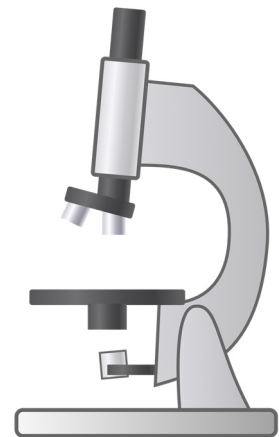
Question 12

(30 marks)

Scientists use microscopes to magnify cells (make them look bigger).
The diagram on the right shows a light microscope.

- (a) Draw a circle around a part of the microscope which magnifies cells.

The diagram below shows a human egg cell fusing with a human sperm cell (the diagram is not drawn to scale).
This event is called 'fertilisation'.



- (b) How does the structure of a sperm cell differ from the structure of an egg cell?

- (c) What important genetic structures are found in the nuclei of these cells?

The human female reproductive system is shown below.

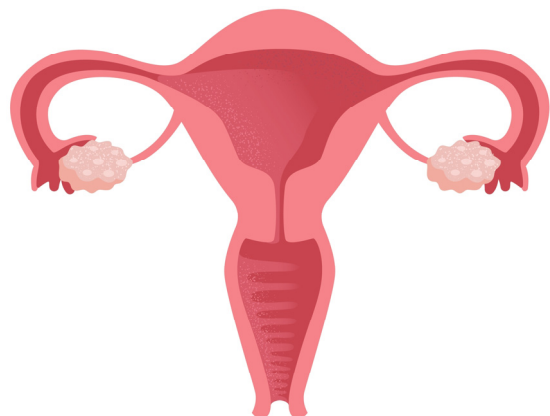
- (d) Write the letter **X** on the part of the reproductive system where fertilisation usually takes place.

The menstrual cycle is approximately 28 days long.

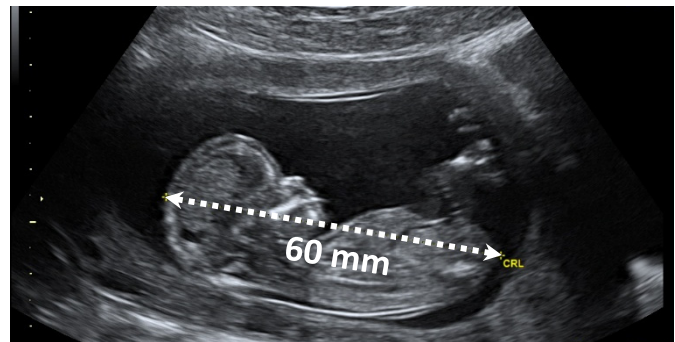
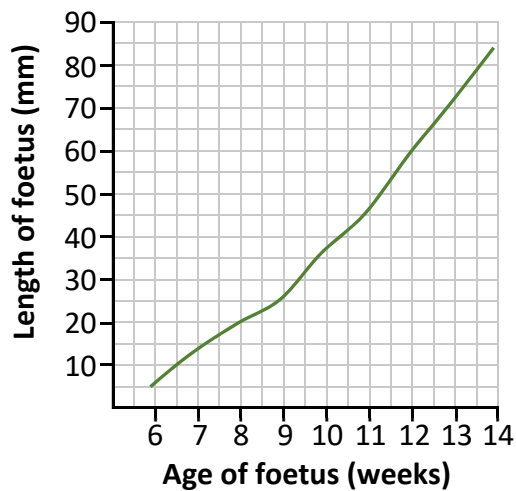
- (e) At which time in the menstrual cycle does fertilisation usually occur?

Put a tick (✓) in the correct box.

- | | |
|--------------|--------------------------|
| Days 1 — 5 | ☐ |
| Days 6 — 10 | ☐ |
| Days 11 — 17 | ☐ |
| Days 18 — 28 | ☐ |



During pregnancy, the fertilised egg develops into a foetus. The graph below shows the relationship between the length of a foetus and its age. The image below shows a human foetus during early pregnancy. The length of the foetus is 60 mm.



Adapted from commons.wikimedia.org (Dr. W. Moroder)

- (f) Use the graph to estimate the age (in weeks) of the foetus shown above.

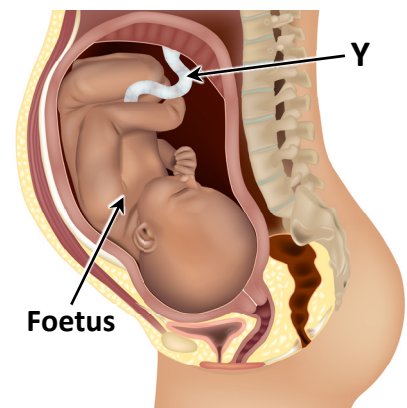
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The diagram shows a human foetus during the final weeks of pregnancy.

- (g) (i) Identify the structure labelled Y in the diagram.

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- (ii) What is the role of this structure during pregnancy?



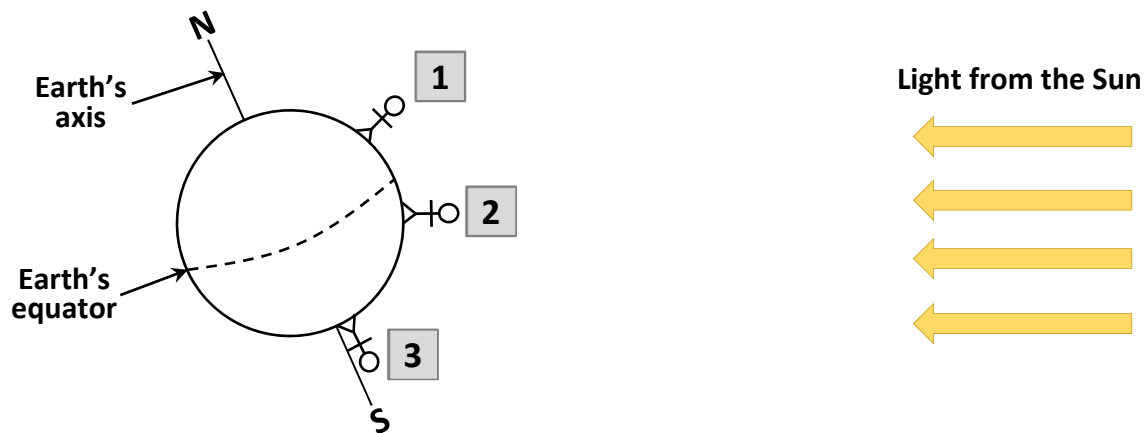
Ethical issues related to human reproduction sometimes arise.

- (h) Discuss an ethical issue associated with human reproduction.

Question 13

(30 marks)

The diagram shows the locations of three people on Earth at a particular time on a particular day of the year. Their locations are numbered **1**, **2** and **3**. The diagram is not drawn to scale.



- (a) On the diagram above, shade the part of the Earth which is in darkness at this time.
- (b) Which location, **1** or **2** or **3**, is experiencing winter? Justify your answer.

Answer questions (c) and (d) by putting a tick (✓) in the correct box.

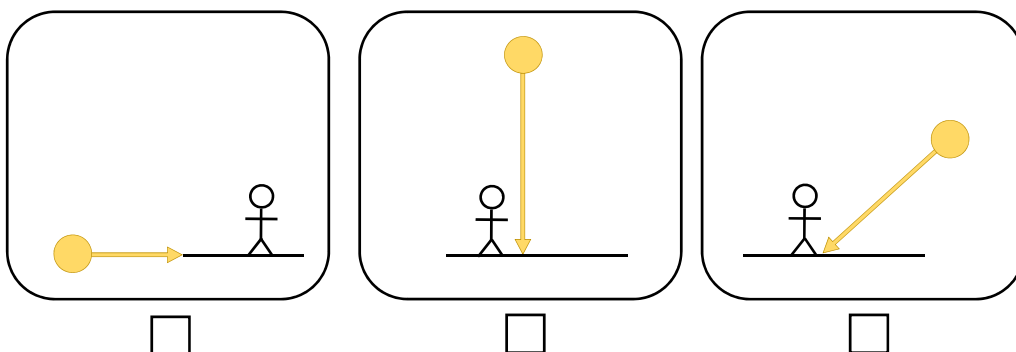
- (c) Which location, **1** or **2** or **3**, will experience the most daylight hours on this day?

Location 1 ☐

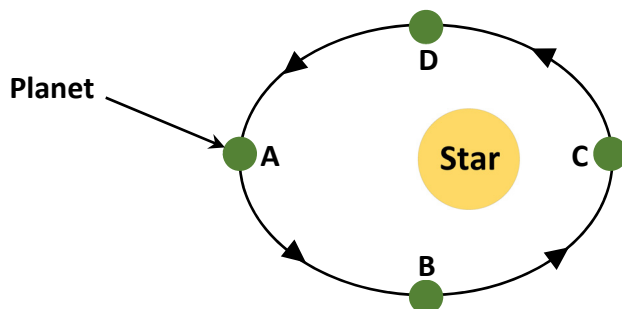
Location 2 ☐

Location 3 ☐

- (d) Which diagram below shows the angle at which sunlight hits the ground at noon at location **1**?



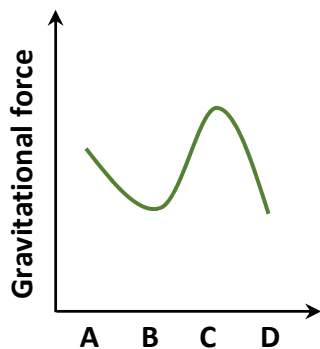
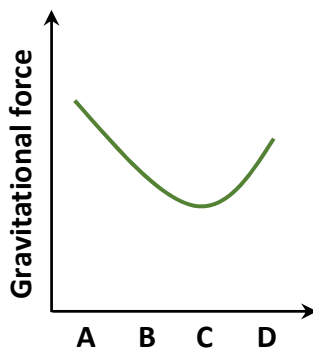
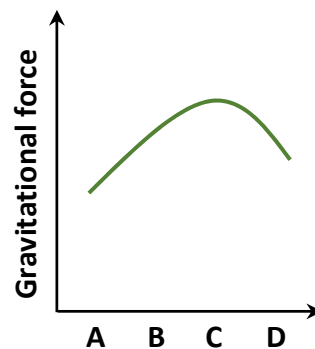
In the model below, the letters **A**, **B**, **C** and **D** represent the positions of a planet at various times as it orbits its star.



(e) State three differences between a star and its planet.

As the distance between a planet and its star decreases, the gravitational force exerted on the planet by the star increases.

(f) Which of the graphs below illustrates how the gravitational force of a star on its planet changes as it moves from position **A** to **B** to **C** to **D**?
Put a tick (✓) in the correct box.


☐

☐

☐

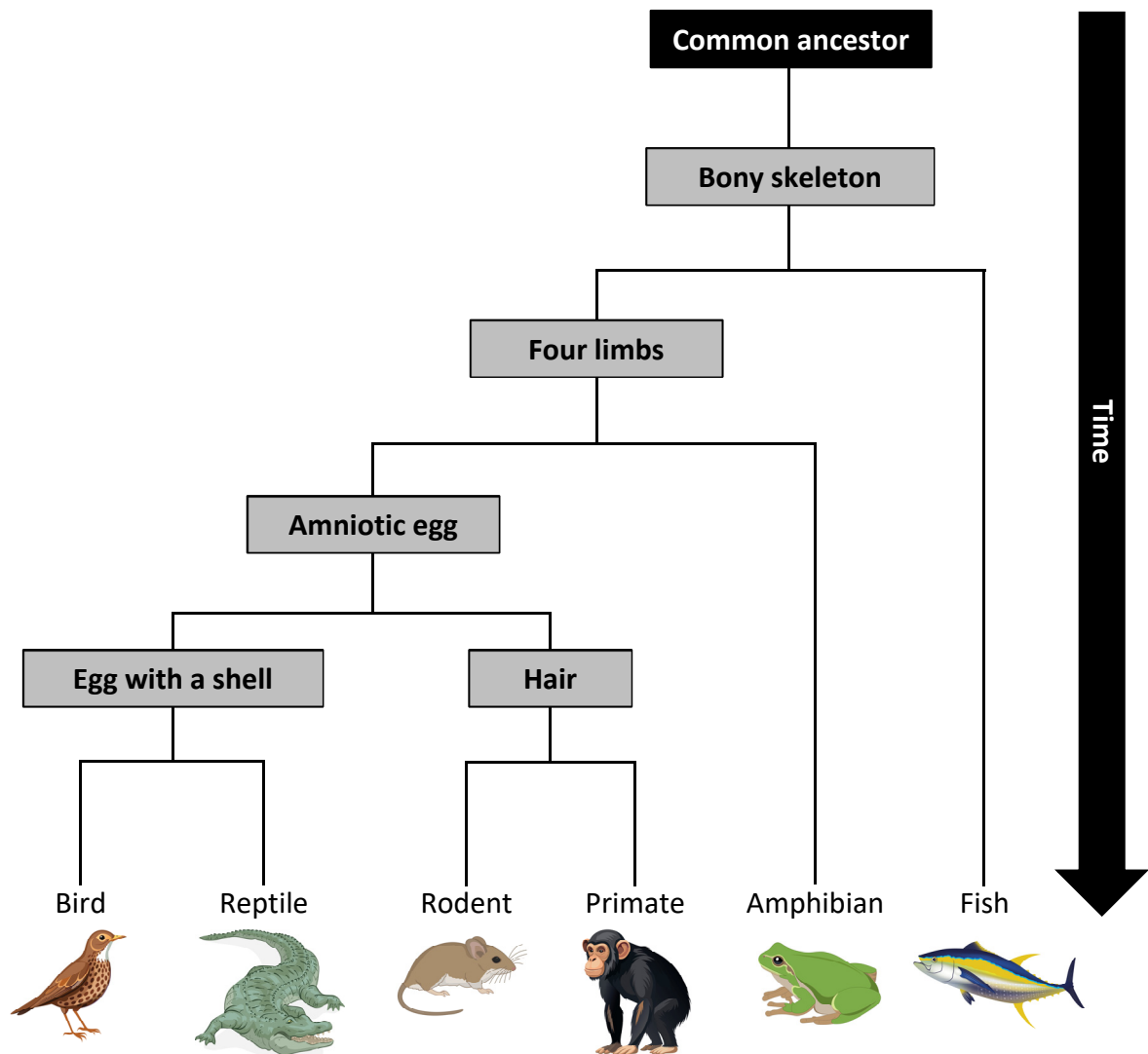
(g) If the planet in the diagram above was Earth, approximately how many months would it take to move from position **A** to position **B**?

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Question 14

(30 marks)

The diagram below describes how species are related to each other by evolution. Study the diagram and answer the questions that follow.



- (a) The table lists statements about the organisms in the diagram. Indicate if each statement is true or false by putting a tick (✓) in the correct column.

Statement	True	False
All of the organisms in the diagram have a bony skeleton.		
All of the organisms in the diagram have four limbs.		
Primates and fish both produce an amniotic egg.		
Amphibians have four limbs and produce an egg with a shell.		
Primates and rodents have four limbs and hair.		

- (b)** Select an organism from the diagram or from a habitat you have studied.
State one adaptation of this organism and describe how the adaptation helps the organism survive in its habitat.

Name of organism:	
Adaptation:	
Describe:	

- (c) (i)** Outline the theory of evolution by natural selection.

- (ii)** Outline how this theory explains the diversity of living things.

Question 15

(45 marks)

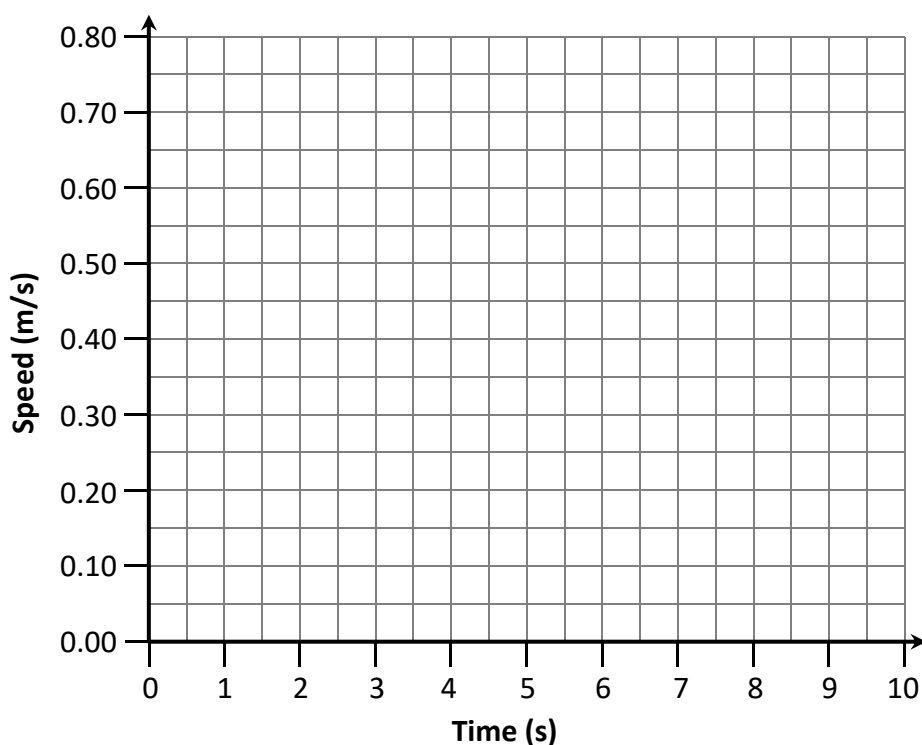
A student investigated how the speed of a toy car changed as it moved across an uneven surface. They measured the distance travelled by the car every second for 10 seconds. They then used this data to calculate the speed of the car.

Their data for speed and time are listed in the table below.

Time (s)	0	1	2	3	4	5	6	7	8	9	10
Speed (m/s)	0.00	0.10	0.20	0.30	0.40	0.40	0.40	0.40	0.40	0.55	0.70

- (a) Name an instrument the student could have used to measure time during the investigation.

- (b) Draw a line graph to illustrate the student's data in the space below.



- (c) (i) For how many seconds was the car moving at constant speed?

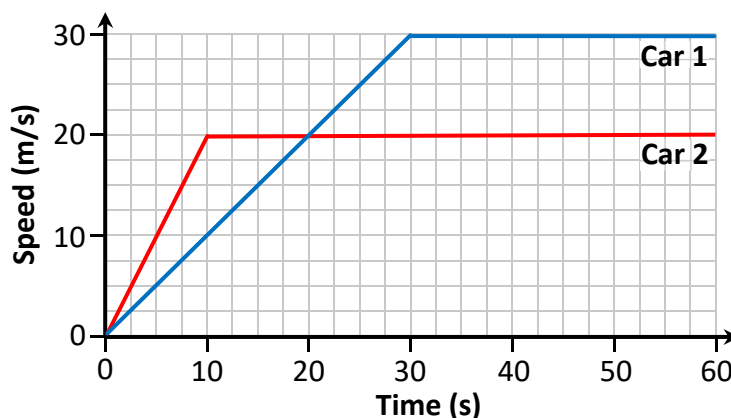
- (ii) Use your answer from (i) to calculate the distance travelled by the car during this time. Include the unit for your answer.

Calculation:

On our roads, cars move at greater speeds.

The graph on the right shows how the speed of two cars, Car 1 and Car 2, changed during the first 60 seconds of their journey.

They started at the same traffic lights. They then travelled on the same road in the same direction.



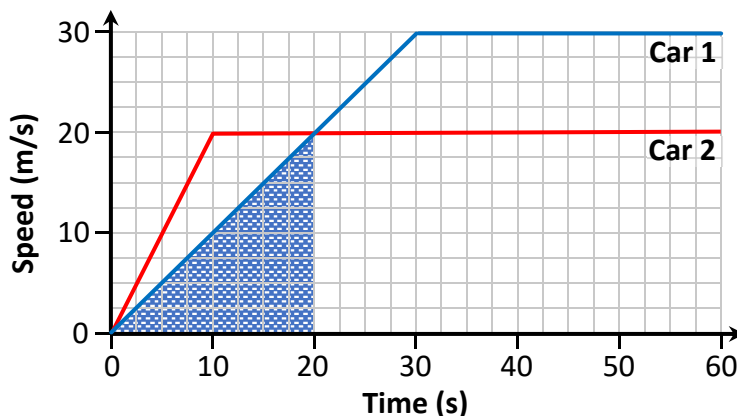
(d) The table below lists statements about the motion of the cars.

Indicate if each statement is true or false by putting a tick (✓) in the correct column.

Statement	True	False
The speed of Car 2 was constant in the first 10 seconds.	☐	☐
At 20 seconds, the cars were travelling at the same speed.	☐	☐
At 30 seconds, the speed of Car 1 was faster than the speed of Car 2.	☐	☐
Car 1 reached its maximum speed faster than Car 2.	☐	☐

Car 2 travelled a distance of 300 metres in the first 20 seconds of the journey.

The area of the shaded portion of the graph represents the distance travelled by Car 1 in the same time.



(e) Using the scales on the axes, calculate the area of the shaded portion of the graph. Hence, determine the distance between the two cars at this point of their journey.

Calculation:

Question 16

(45 marks)

Magnesium (**Mg**) is a metallic element with an atomic number of 12.



- (a) What is meant by the term 'element'?

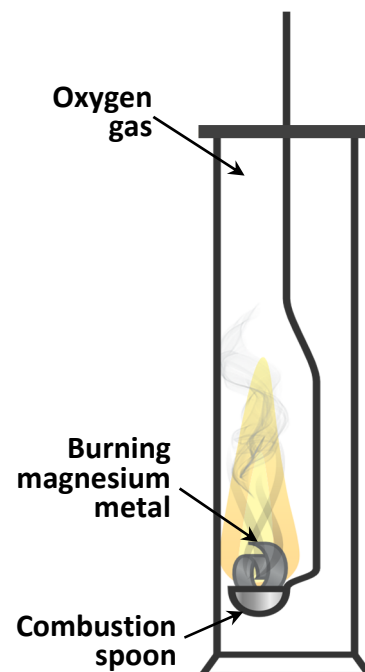
- (b) Some of the properties of metals and non-metals are listed in the table below. Decide if each property relates to a metal *or* a non-metal by putting a tick (✓) in the correct column.

Property	Metal	Non-metal
Lustrous (shiny)		
Brittle		
Normally liquid or gas at room temperature		
Good conductor of heat and electricity		

A student placed magnesium metal on a combustion spoon. They ignited the metal and inserted the spoon into a jar of oxygen gas. When the reaction was finished, they measured the mass of magnesium oxide formed.

- (c) (i) Explain why this is an example of a chemical change.

- (ii) Would you expect the mass of magnesium oxide formed to be greater than *or* equal to *or* less than the mass of magnesium used at the start? Justify your answer.



- (d) Use the Periodic Table on page 79 of the *Formulae and Tables* booklet to predict the ratio of magnesium to oxygen in magnesium oxide.
Hence write the chemical formula for magnesium oxide.

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- (e) (i) The student dissolved a small mass of magnesium oxide in water to form a base called magnesium hydroxide.
Describe how you would carry out a laboratory test to determine the pH of the solution formed.

- (ii) Magnesium hydroxide is an ingredient in some medicines used to treat acid indigestion.
Would you expect the pH of the stomach contents to increase *or* decrease after this medicine is taken? Justify your answer.



[illegible]

Acknowledgements:

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Diagrams on page 5:	chemix.org
Image on page 6:	nrp.org
Images on page 7:	Thrush, Ladybird, Frog: shutterstock.com; Greenfly, Owl, Caterpillar, Grass: istockphoto.com; Hedgehog: dreamstime.com
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Junior Cycle Final Examination – Common Level

Science

Monday 8 June

Morning 9:30 – 11:30