2026.S26

2026J057C1EL

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

Date of Birth / /

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

Centre Stamp

TEACHER-COMPLETED 2026 SCIENCE

From the SEC 2026 marking scheme.

Answers in purple.
Added teaching notes in blue.

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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.

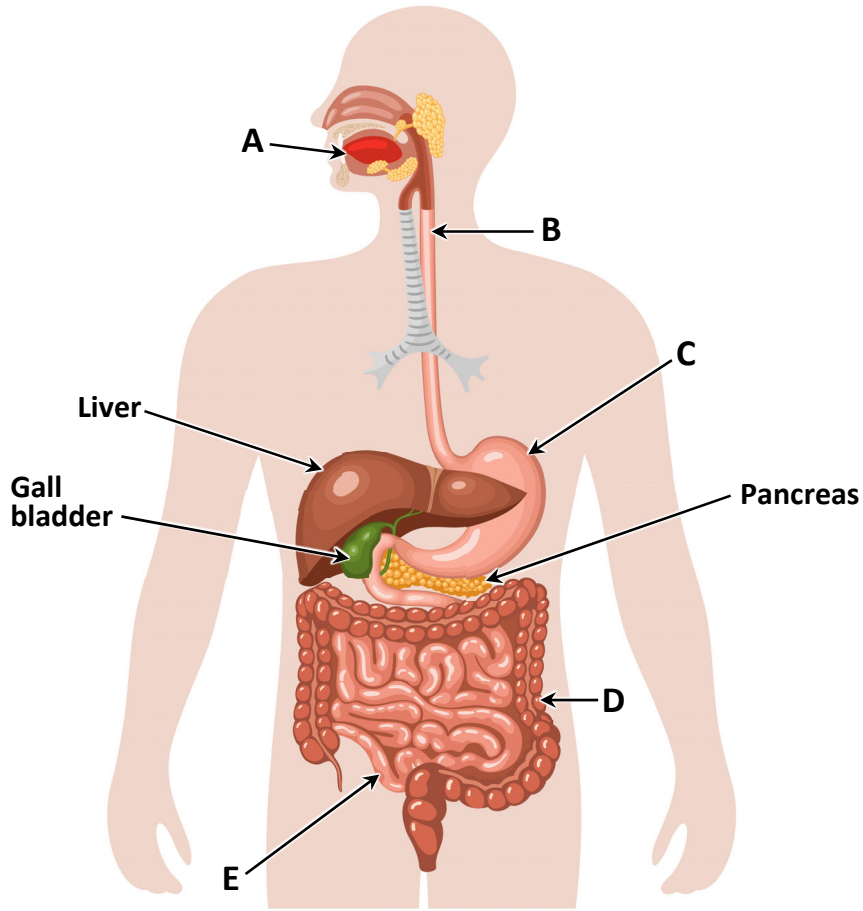
This examination booklet will be scanned and your work will be presented to an examiner on screen. Anything that you write outside of the answer areas may not be seen by the examiner.

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

Section A — 150 marks

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	E
Large intestine	D
Mouth	A
Oesophagus	B
Stomach	C

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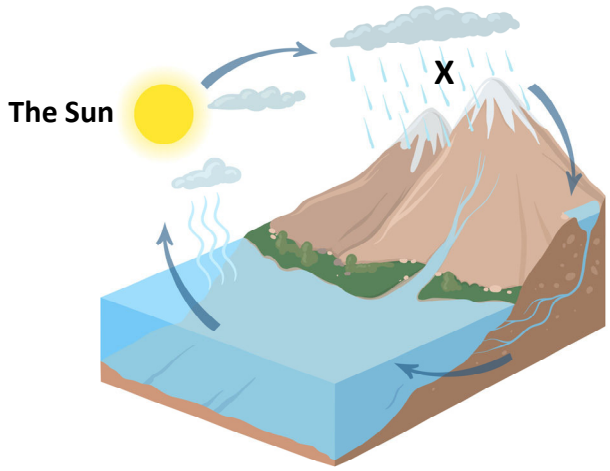
From the SEC 2026 marking scheme.

Answers in purple.
Added teaching notes in blue.

E points to the inner coils of the small intestine; D points to the outer large intestine. Follow each label line to its endpoint. The small intestine absorbs digested nutrients.

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.

The Sun supplies heat energy to evaporate water. **Water vapour cools and condenses to form clouds.** **Water returns to the surface as precipitation.**

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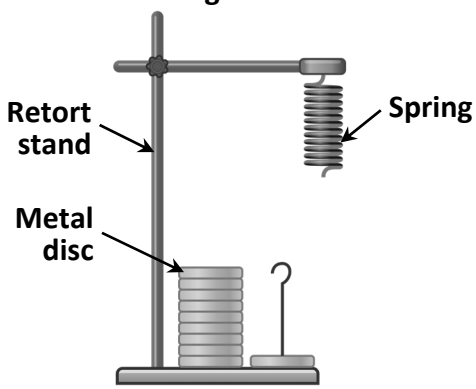
Answers in purple.
Added teaching notes in blue.

Evaporation needs energy.
Condensation releases energy as gas becomes liquid.
Transpiration is water loss from leaves.

Question 3 **(15 marks)**

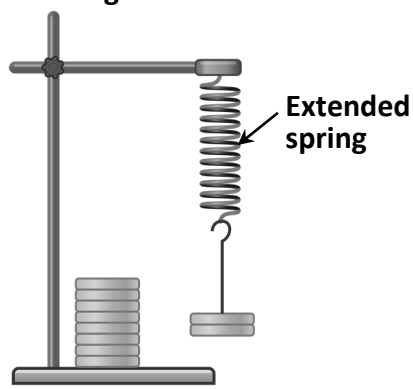
A student investigated the relationship between the extension of a spring and the force applied to it. Diagram **1** shows the arrangement of the apparatus used by the student at the start of the investigation. Diagram **2** shows the arrangement of the apparatus during the investigation.

Diagram 1



Start of the investigation

Diagram 2



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.

Balance

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

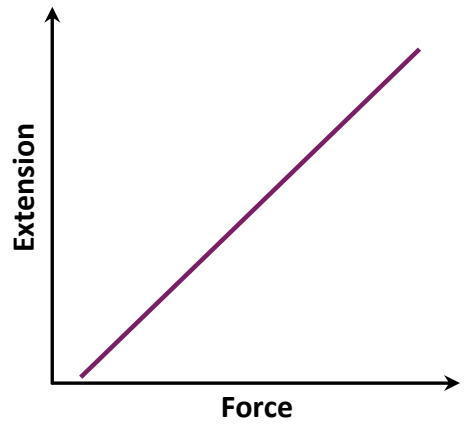
Calculation:

100 g = 0.100 kg
W = mg = 0.100 x 9.8 = 0.98 N

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.



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Convert grams to kilograms before using W = mg. Direct proportion is a straight line through the origin, within the elastic limit.

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.

Improved flexibility.
Improved communication systems.

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

Space has no breathable atmosphere. Astronauts need a supply of oxygen and a pressurised spacesuit.

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

Satellites enable global communications.
Weather satellites help forecasting and disaster warnings.

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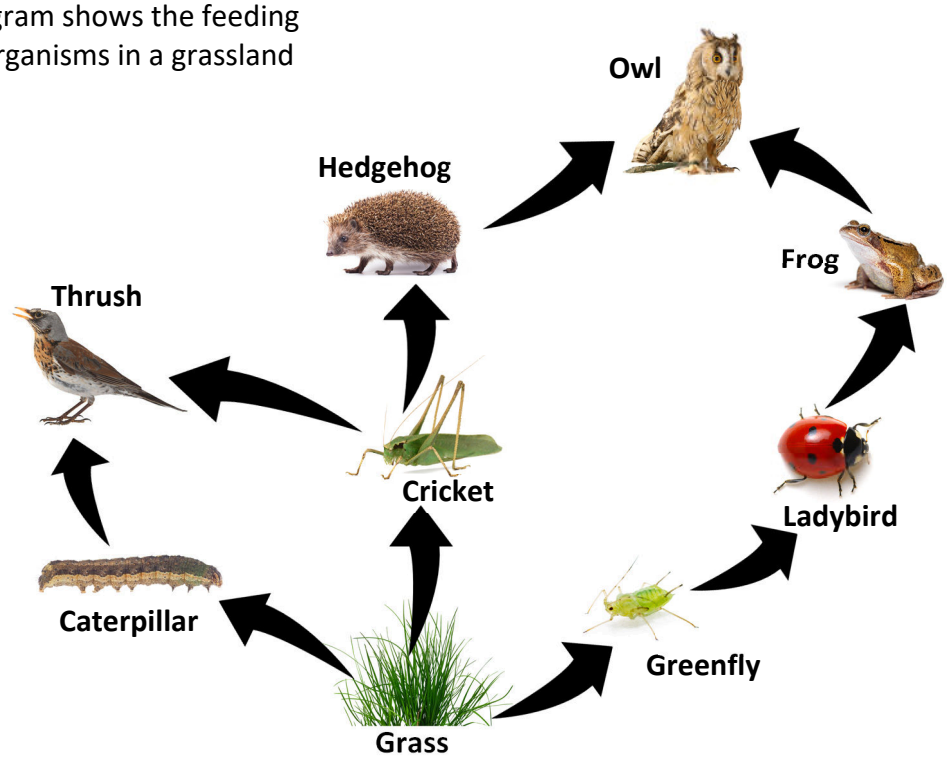
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Link a feature to the problem it solves. Space has no breathable atmosphere and extreme temperatures.

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.

Caterpillar.

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

Energy transfer from food to consumer.

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

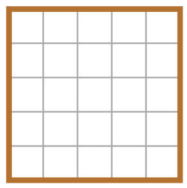
Hedgehog.

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

Grass -> cricket -> hedgehog -> owl.

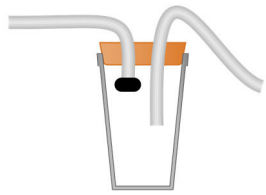
(e) Which piece of apparatus could be used to capture greenfly in a grassland habitat?
Put a tick (✓) in the correct box.

Quadrat



☐

Pooter



☑

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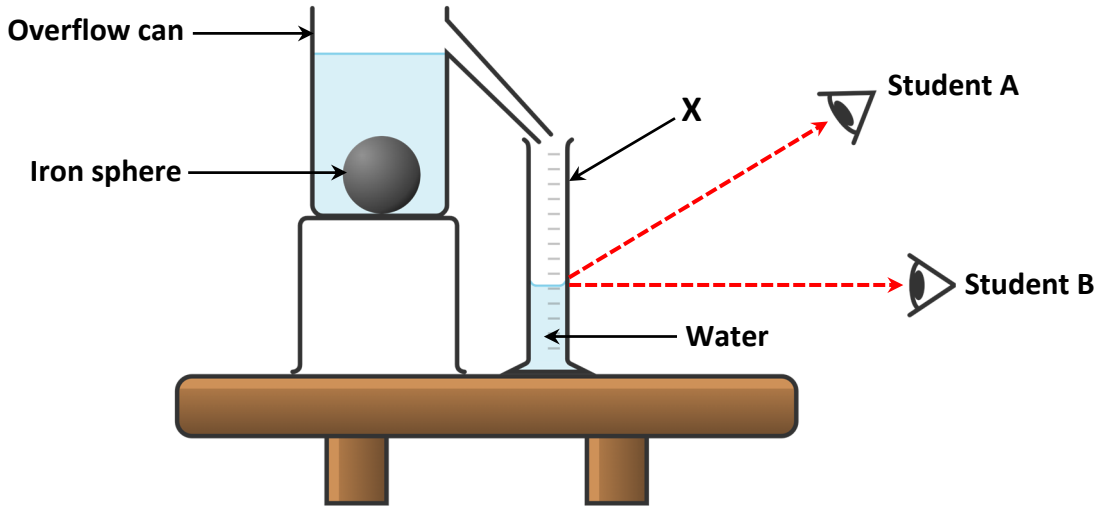
From the SEC 2026 marking scheme.

Answers in purple.
Added teaching notes in blue.

Food-web arrows show the direction of energy transfer: food to consumer.

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.

Graduated (measuring) cylinder.

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

Student B: eye level with the meniscus.

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

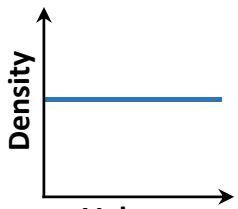
(c) Calculate the density of the sphere. Include the unit for your answer.

Calculation:

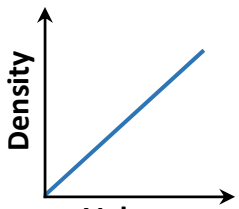
Density = mass / volume
= 395 / 50 = 7.9 g/cm3

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

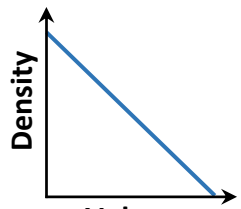
(d) Which graph shows the relationship between volume and density as the volume of a solid iron object increases? Put a tick (✓) in the correct box.



☑



☐



☐

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Answers in purple.
Added teaching notes in blue.

The displaced water volume equals the immersed solid volume. Read the meniscus at eye level. Density does not depend on sample size.

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 **galaxy**.

The Sun and all of the objects which orbit it are collectively called the **solar system**.

An example of an object which orbits a star is a **comet**.

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

The Big Bang model.

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

Distant galaxies show redshift, evidence that the universe is expanding.

Cosmic microwave background radiation is the remnant of an earlier hot, dense universe.

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Redshift supports an expanding universe. Cosmic microwave background radiation is evidence of an earlier hot, dense universe.

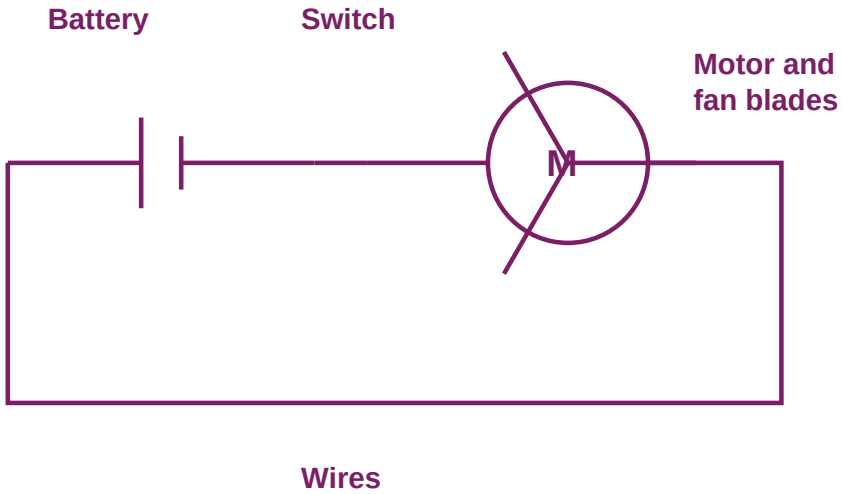
Question 8 **(15 marks)**

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:

Battery-powered fan: the blades move air.



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

Chemical -> electrical -> kinetic energy.

(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. ☑

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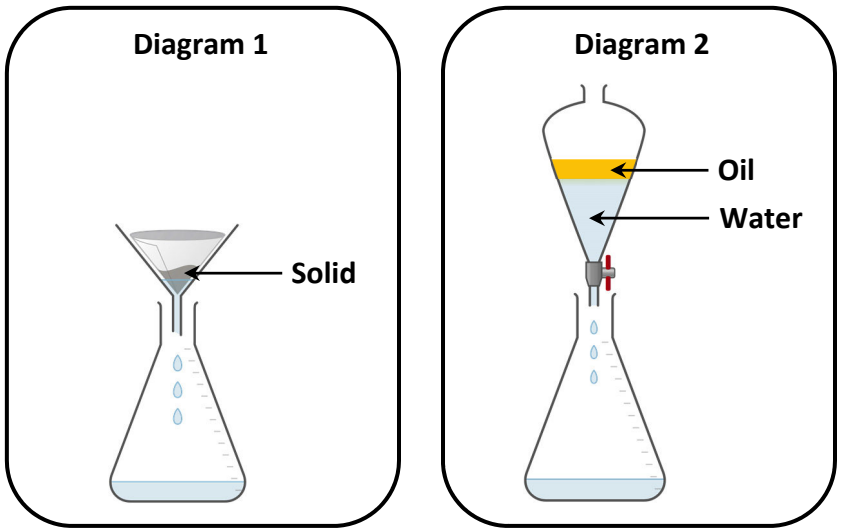
Answers in purple.
Added teaching notes in blue.

Example device only: students should describe the device they built. Efficiency compares useful output with total input, not simply speed.

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	**3**
To separate an insoluble solid from a liquid	**1**
To separate two liquids, one of which is insoluble in the other	**2**
To separate a mixture of coloured inks	**4**

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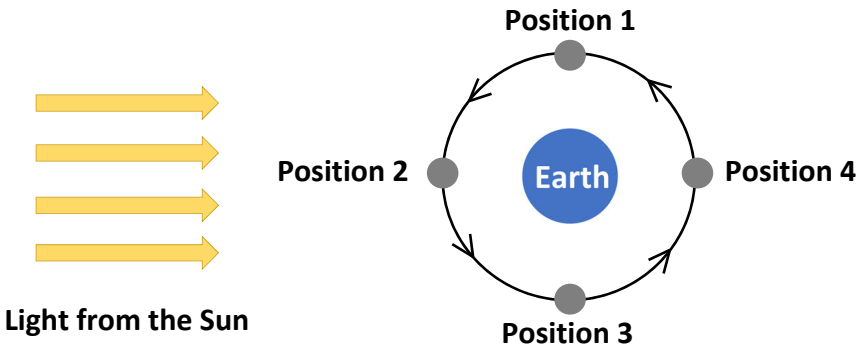
Answers in purple.
Added teaching notes in blue.

Filtration removes an insoluble solid. A separating funnel separates immiscible liquids. Chromatography separates dissolved substances.

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. ☑

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The first Moon image has its right half lit, matching the scheme. A full Moon is opposite the Sun. A solar eclipse is possible at new Moon, but does not happen every month.

Additional writing space for Section A.
Label all work clearly with the question number and part.

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Section B — 210 marks

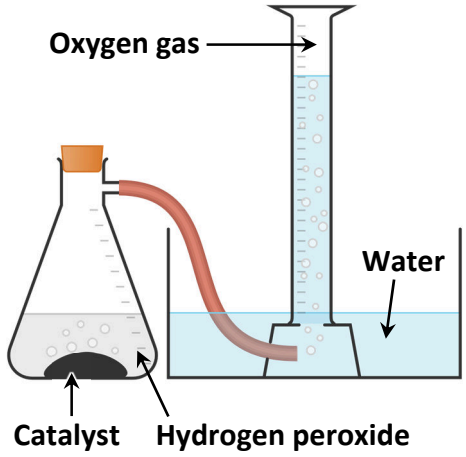
Question 11 **(30 marks)**

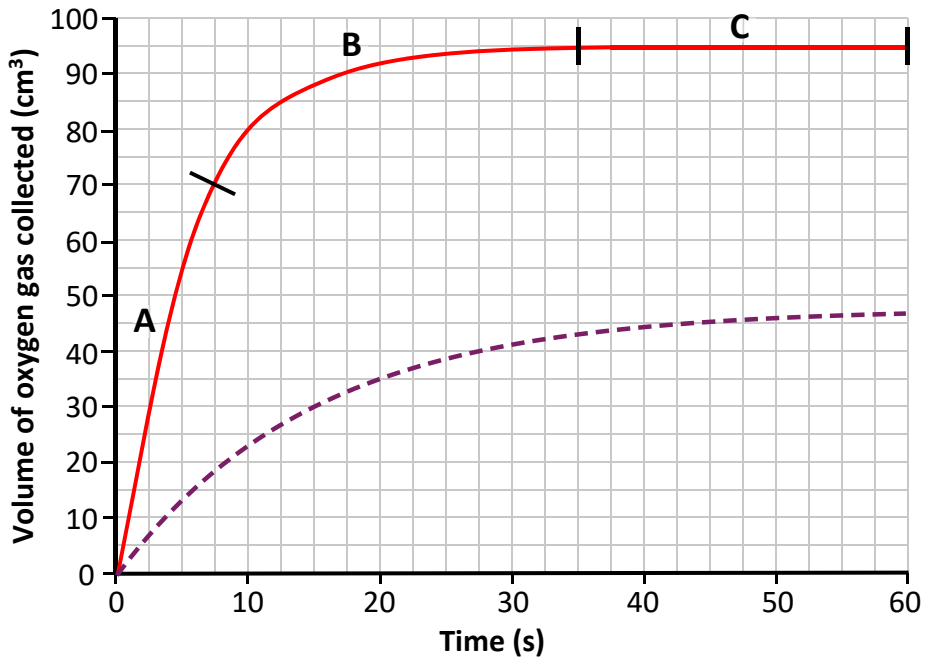
Hydrogen peroxide decomposes slowly to produce oxygen gas. The rate of decomposition of hydrogen peroxide can be increased by using a catalyst.

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

100 cm^3 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?

A

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

80 cm3.

(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.

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At 10 seconds the curve reads 80 cm3. The gradient gives reaction rate. A lower concentration at the same volume gives fewer reacting particles and less oxygen overall. Dashed line is a prediction.

(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.

Particles have more kinetic energy and move faster.
They collide more often. A greater proportion of collisions have enough energy to overcome the activation energy, so there are more successful collisions each second.

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.

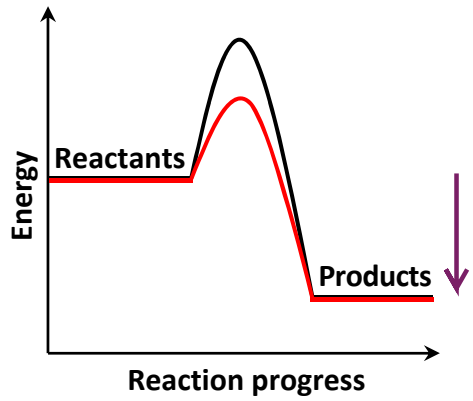
(f) **(i)** What is an exothermic reaction?

A reaction that releases energy to its surroundings.

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

It lowers the activation energy.

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



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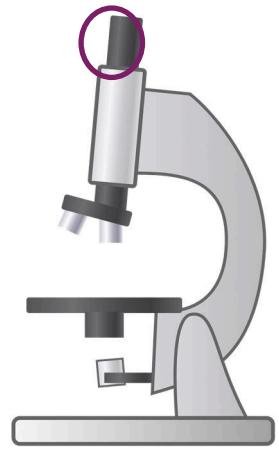
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Collection over water depends mainly on low solubility. A catalyst lowers activation energy; it does not change the overall energy released.

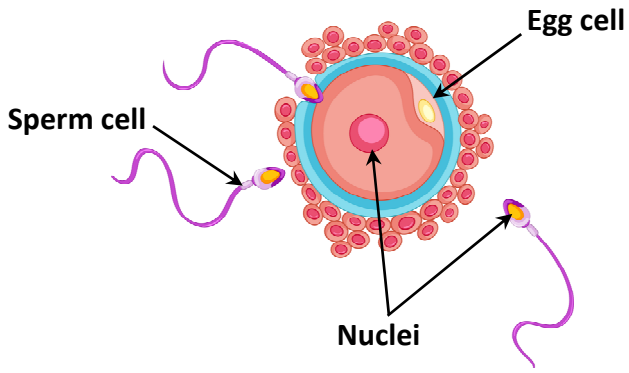
Question 12 **(30 marks)**

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?

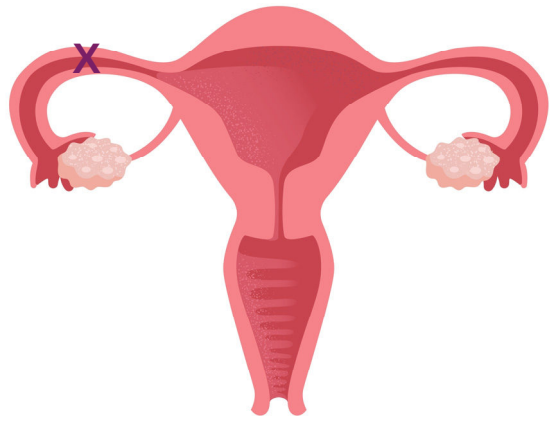
A sperm has a tail and is smaller than an egg cell.

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

Chromosomes (containing DNA).

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 ☐

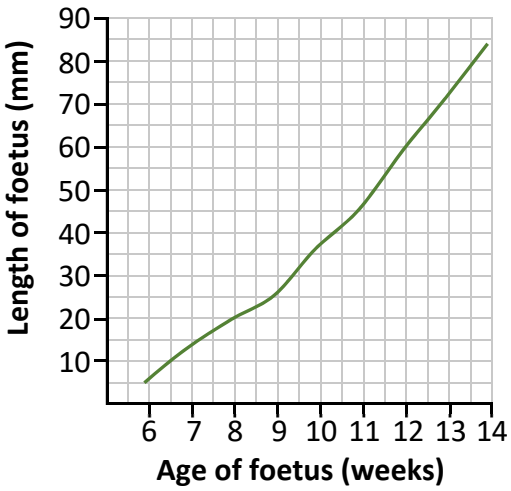
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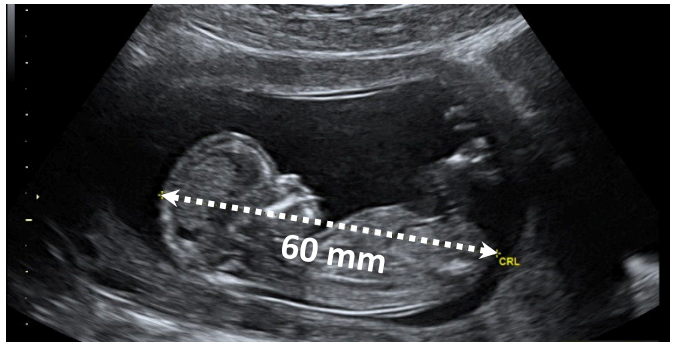
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The sperm tail helps movement. Fertilisation usually takes place in a fallopian tube. Days 11?17 refers to the simplified 28-day model; real cycles vary.

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.



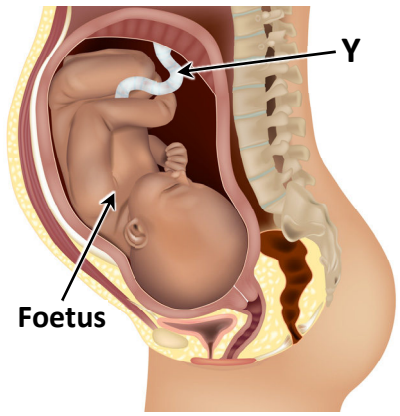


Adapted from commons.wikimedia.org (*Dr. W. Moroder*)

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

Approximately 12 weeks.

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



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

Umbilical cord.

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

Carries oxygen and nutrients from the placenta to the foetus and carries wastes back to the placenta.

Ethical issues related to human reproduction sometimes arise.

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

IVF can help people have a child. A concern is what happens to unused embryos. People differ in their views about the moral status of embryos; decisions should respect consent and the wellbeing of those involved.

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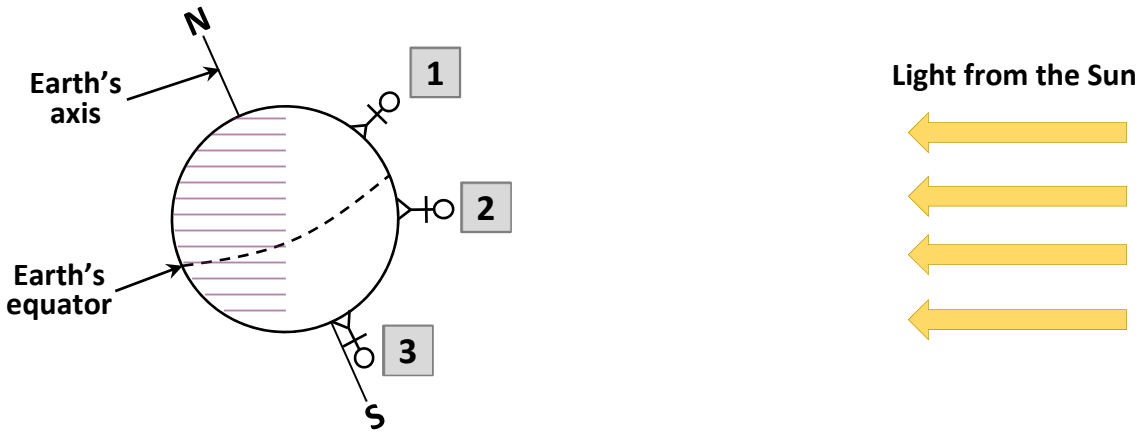
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Read across from 60 mm to the curve, then down to the age axis. Ethical discussions should explain both benefits and concerns respectfully.

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.

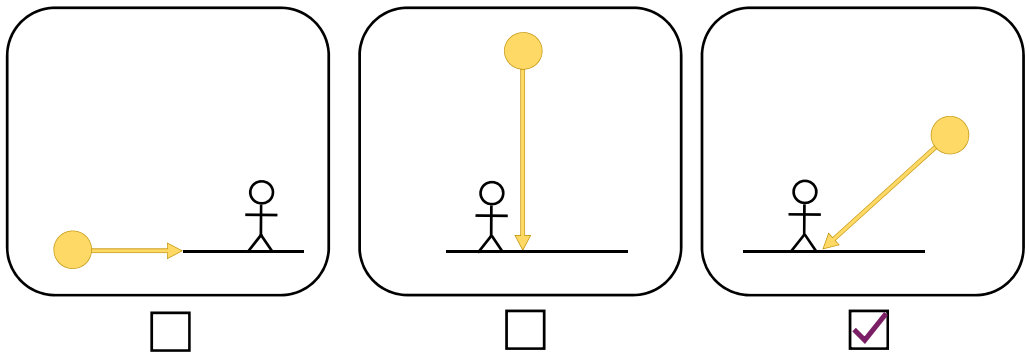
Location 1. The northern hemisphere is tilted away from the Sun, giving shorter days and less direct sunlight.

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**?



☐ ☐ ☑

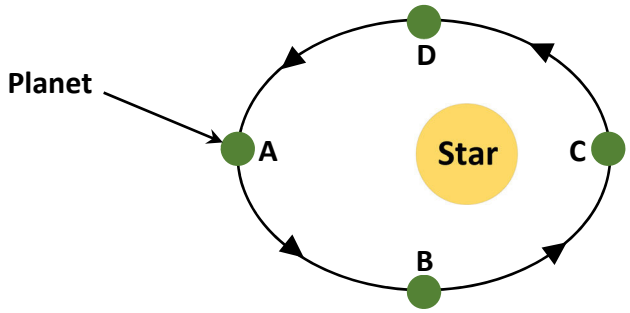
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Answers in purple.
Added teaching notes in blue.

Seasons result from axial tilt. The hemisphere tilted away gets shorter days and less direct sunlight. Shaded half faces away from the Sun.

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.

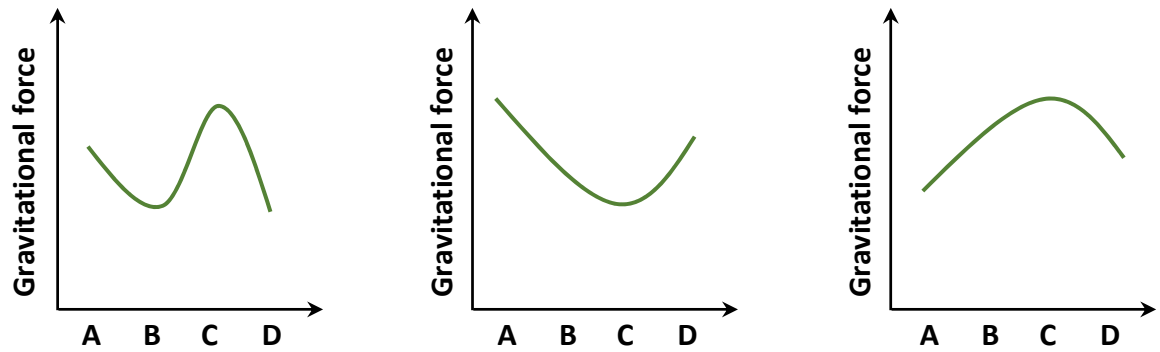


(e) State three differences between a star and its planet.

A star emits its own light; a planet reflects light.
A star is generally much more massive than its planets. **A star has a higher surface temperature than its planets.**

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**?

Approximately 3 months (simplified model).

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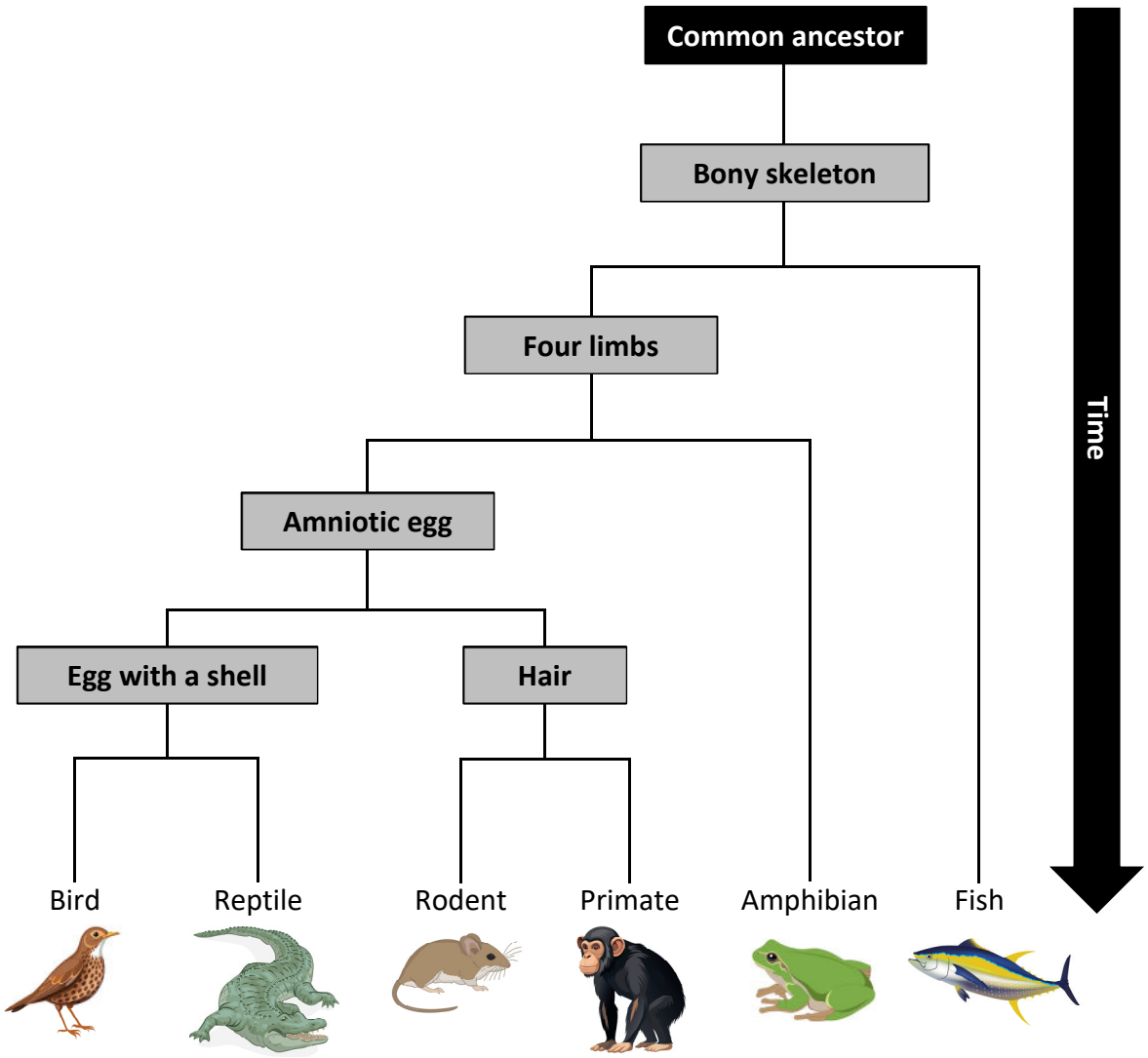
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Gravity is strongest when separation is smallest: C is closest to the star, so the third graph is correct. About three months is the simplified quarter-orbit estimate; equal arcs need not take equal time in an elliptical orbit.

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.	✓	

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Answers in purple.
Added teaching notes in blue.

Read a branching tree from the common ancestor. A trait is shared by the groups branching after that trait appears.

(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:	**Fish**
Adaptation:	**Gills.**
Describe:	
Gills absorb dissolved oxygen from water for respiration.	

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

Individuals in a population show inherited variation.
More offspring are produced than can survive. **Those with advantageous traits are more likely to survive**
and reproduce in their environment. **They pass the alleles for these traits to their offspring.**
Over generations, these traits become more common.

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

Different environments favour different inherited traits.
Separated populations can change in different ways over
many generations, eventually forming distinct species. **This helps explain the diversity of living things.**

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Added teaching notes in blue.

Natural selection acts on inherited variation. Individuals with an advantage leave more offspring, so the trait can become more common over generations.

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.

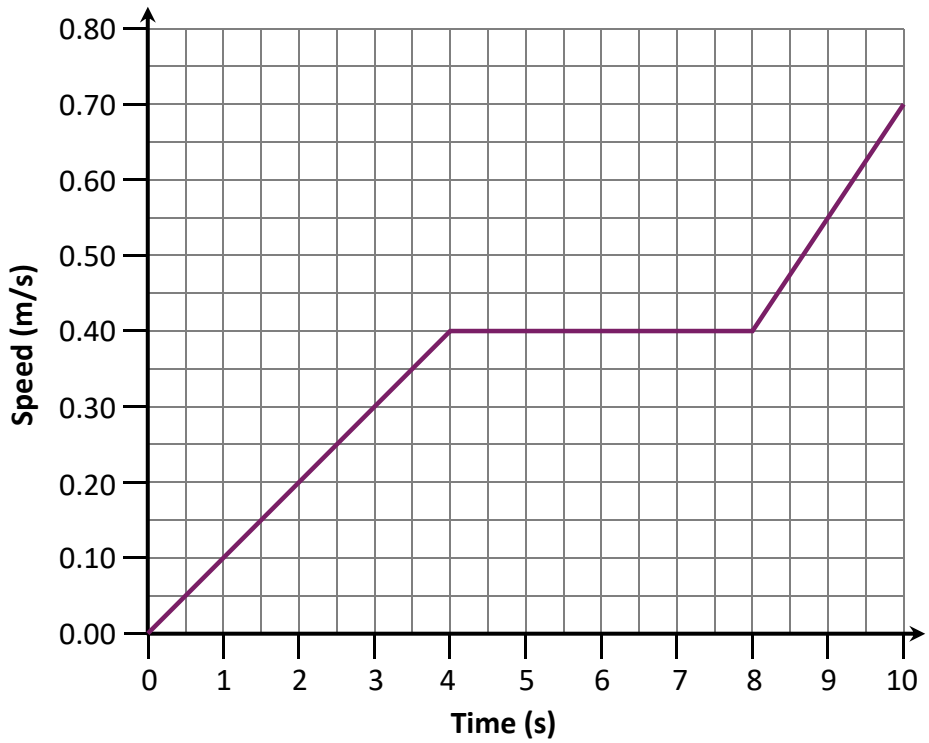
Their data for speed and time are listed in the table below.

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.

Stopwatch.

(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?

4 seconds (from 4 s to 8 s).

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

Calculation:

Distance = speed x time = 0.40 x 4 = 1.6 m

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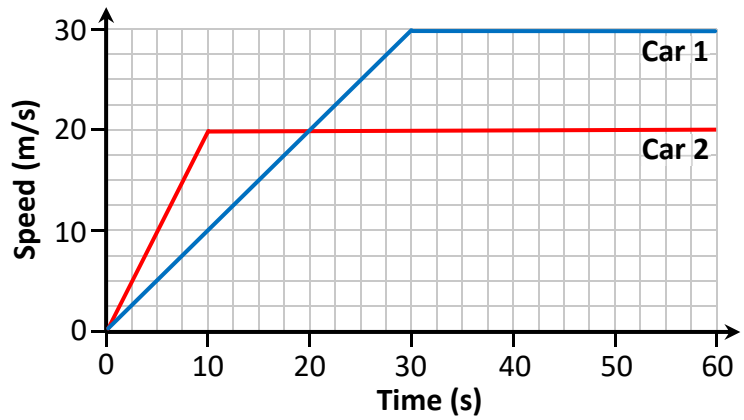
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A horizontal speed-time segment means constant speed. Count the interval: 8 - 4 = 4 seconds, not five data points.

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.

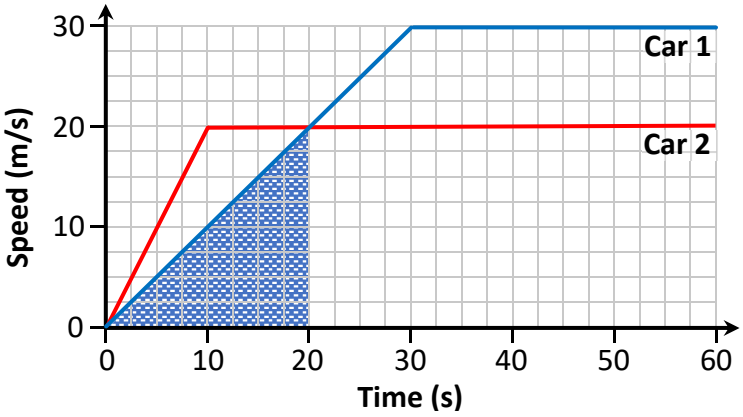


(d) The table below lists statements about the motion of the cars.
Indicate if each statement is true *or* false by putting a tick (✓) in the correct column.

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:

Car 1 distance = area of triangle
= 1/2 x 20 s x 20 m/s = 200 m
Separation = 300 - 200 = 100 m. Car 2 is ahead.

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Answers in purple.
Added teaching notes in blue.

Area under a speed-time graph is distance. Compare distances at the same time to find separation.

Question 16 **(45 marks)**

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



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

A substance made of only one type of atom.

(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	✓	

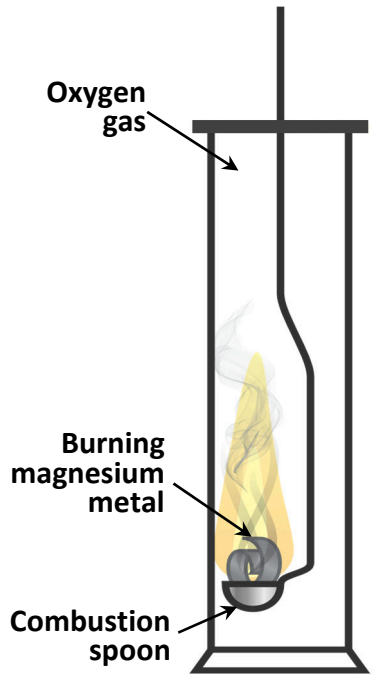
A student placed magnesium metal on a combustion spoon. They ignited the metal and inserted the spoon into a jar of oxygen gas. When the reaction was finished, they measured the mass of magnesium oxide formed.

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

A new substance, magnesium oxide,
is formed.

(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.

Greater mass. Oxygen combines with
the magnesium. The oxygen adds mass
to the solid product. Total mass is
conserved when oxygen is included.



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Scheme simplification: the table classifies liquid/gas as non-metal. This is not universal: many non-metals (e.g. carbon and sulfur) are solids. The magnesium oxide gains oxygen mass; total reactant and product mass is conserved.

(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.

Magnesium : oxygen = 1 : 1

Chemical formula: MgO

(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.

Wear safety goggles. Place a small sample of the solution in a test tube. Add a few drops of universal indicator. Compare the colour with the indicator pH colour chart and record the matching pH value.

(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.

The pH increases towards neutral. The base reacts with and neutralises stomach acid.



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Magnesium forms Mg2+ and oxygen O2-, giving a 1:1 ratio. Neutralisation of acid by a base increases pH towards neutral.

Additional writing space for Section B
Label all work clearly with the question number and part.

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Junior Cycle Final Examination – Common Level

Science

Monday 8 June

Morning 9:30 – 11:30