



Coimisiún na Scrúduithe Stáit State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2008

SCIENCE (REVISED SYLLABUS) – HIGHER LEVEL

THURSDAY, 12 JUNE – MORNING 9.30 to 11.30

INSTRUCTIONS

1. Write your **examination number** in the box provided on this page.
2. Answer **all** questions.
3. Answer the questions in the spaces provided in this booklet. If you require extra space, an extra page is provided at the back of this booklet.

Centre Number

**Examination
Number**

For examiner use only	
Section/Question	Mark
Biology	
Q.1 (52)	
Q.2 (39)	
Q.3 (39)	
Chemistry	
Q.4 (52)	
Q.5 (39)	
Q.6 (39)	
Physics	
Q.7 (52)	
Q.8 (39)	
Q.9 (39)	
Total (Paper)	
Bonus for Irish	
Grand Total Paper (390)	
Coursework	
Coursework A (60)	
Coursework B (150)	
Grand Total (600)	

Biology

Question 1

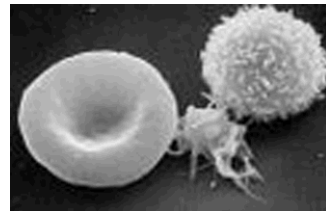
(52)

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- (a) The photograph shows *Amanita Phalloides*, a poisonous fungus, whose common name is '*Death Cap*'. Fungi are decomposers. Explain the underlined term.



- (b) The photograph shows a red blood cell and a white blood cell taken using an electron microscope. Give **one function** for each type blood cell.



Red blood cell _____

White blood cell _____

- (c) The photograph of 'spaceship earth' was taken by a member of the crew of Apollo 17. Give **two ways** in which we can care for our planet.



1 _____

2 _____

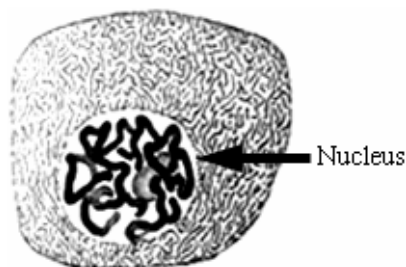
- (d) Phloem and xylem are plant transport tissues. Name a **substance**, other than water, that is transported in (i) phloem (ii) xylem.

(i) phloem _____

(ii) xylem _____

(1) (2)

- (e) At certain stages in the life of a cell **thread-like structures** that contain genes can be seen in the nucleus. What are these thread-like structures called?

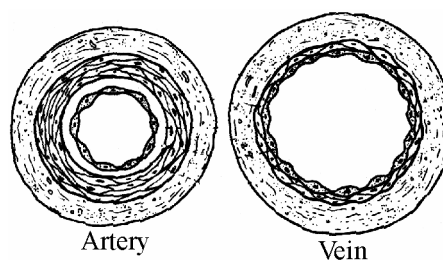


What? _____

Genes are located on these thread-like structures. Give a **role** that genes play in life processes.

Role _____

- (f) The diagram shows cross sections of an artery and of a vein. Why do **arteries have much thicker walls** than veins?



Why? _____

Give **one** other **structural difference** between arteries and veins.

Difference _____

- (g) The postage stamp shown commemorates the awarding of the Nobel Prize to Dorothy Hodgkin (1910-1994) for her work on vitamin B₁₂ in 1964. Vitamins are part of a balanced diet. Give **one function each** for (i) vitamins (ii) minerals in our bodies. (Two **different functions** are required.)



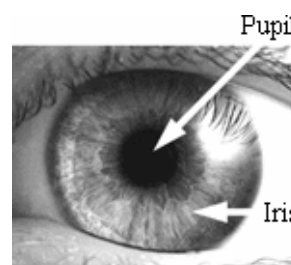
(i) _____

(ii) _____

- (h) Give the **function** of (i) the iris (ii) the pupil.

(i) _____

(ii) _____



The pupil is transparent. Why does the **pupil appear to be black** in most situations? (Note: the pupil may appear red in photographs taken in the dark using a flash).

Why...black? _____

(7 × 6 + 1 × 10)

Question 2

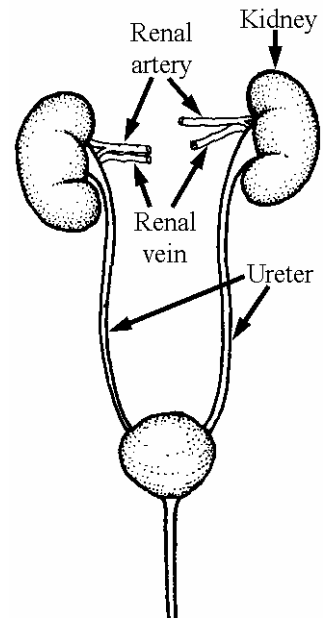
(39)

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(1) (2)

(a) The diagram shows the *human urinary system*.

(i) How does the **composition of the blood** in the **renal arteries differ** from the composition of the blood in **the renal veins**. Make reference **waste products** in your answer. (6)



(ii) Account for this **difference in the composition** of the blood entering and leaving the kidneys. (6)

(iii) What is the **function** of the ureters? (6)

(b) A pupil performed an experiment in a school laboratory to show the action of a *digestive enzyme* on a *food substance*.

(1) | (2)

(i) Name an *enzyme* suitable for such an experiment. (3)

(ii) Name a *food substance* on which the enzyme that you have named will act. (3)

(iii) Describe any *preparation* of the food required before the experiment is performed. If no preparation is required state why. (3)

(iv) Give the *temperature* at which the enzyme-food mix should be maintained for the experiment to work. (3)

(v) How much *time* is needed for digestion of the food in this experiment? (3)

(vi) Describe a *test* to confirm that digestion has occurred. (6)

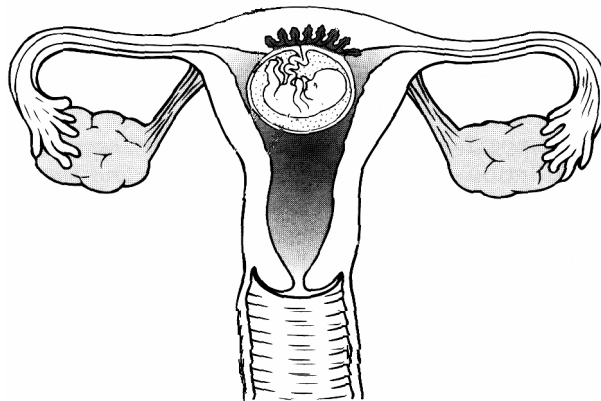
Question 3

(39)

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(1) (2)

- (a) The diagram shows a *human female's reproductive system with an eight week embryo (foetus)* which is clearly recognisable as human. The organs of the foetus are formed and will grow and mature for the next seven months.



- (i) Mark clearly on the diagram, **using an arrow and the label S**, **where the semen** (liquid containing sperm) **was released** into the female. (3)
- (ii) Mark clearly on the diagram, **using an arrow and the label F**, **where fertilization** took place. (3)
- (iii) Explain the term **fertilisation**. (6)

- (iv) State **two events** that occur **in the hours before birth** and **one event** that takes place shortly **after the baby is born**. (9)

Before

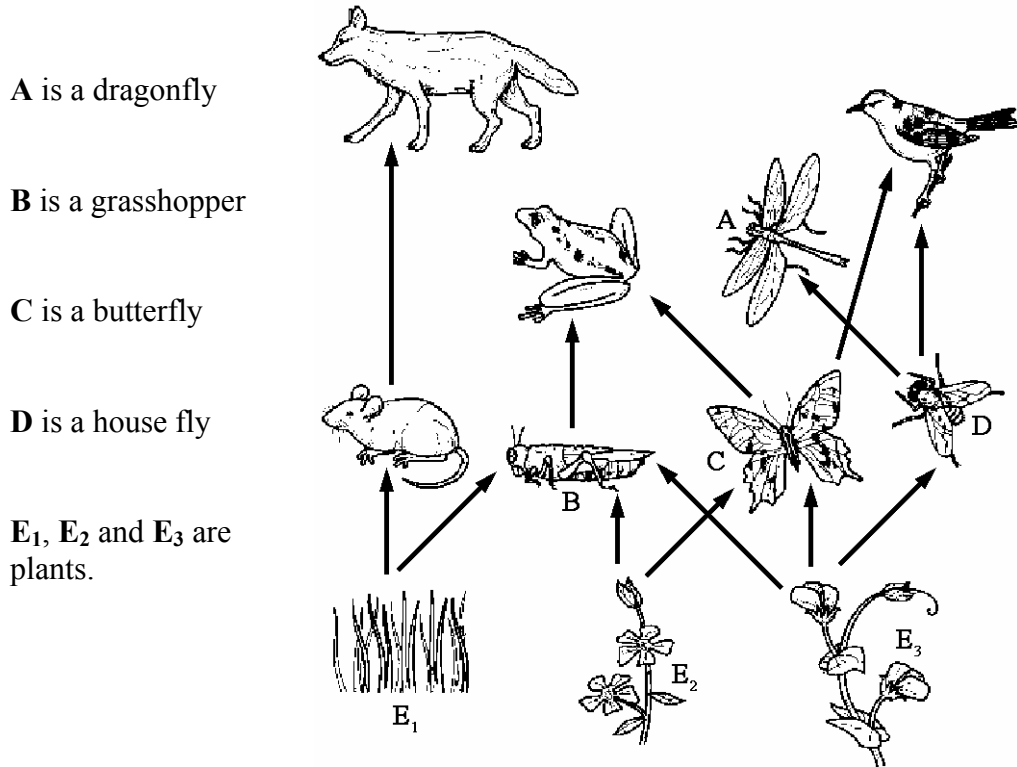
1 _____

2 _____

After

1 _____

- (b) The diagram shows part of a *food web* from a *mixed habitat* with meadows, streams and hedges.



- (i) Write down a *food chain* from the food web shown. (6)

- (ii) Select an *organism* from this habitat *or* name another organism from a habitat you have studied and state *one adaptation* that the organism has that makes it suited to its habitat. (3)

Organism _____ **Adaptation** _____

- (iii) What is meant by *competition* in a habitat? (3)

- (iv) Give an example of *interdependence* from the food web shown. (6)

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(1) (2)

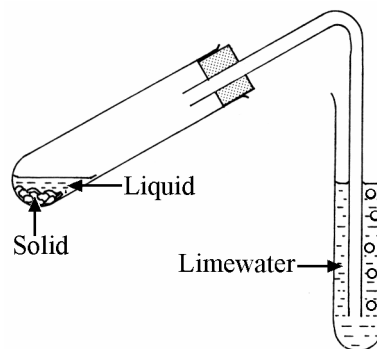
Chemistry

Question 4

(52)

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- (a) The *liquid and solid* shown in the diagram react together to produce a *gas that turns limewater milky*. Name a **liquid** and a **solid** that react together in this way. Names of **specific substances** are required.



Liquid _____

Solid _____

- (b) The following *metals* were reacted with *dilute acid*: **copper, magnesium, calcium** and **zinc**. The *reactivity* of each metal was noted. List these metals in *order of decreasing reactivity*.

List _____

- (c) Sir Joseph John Thomson (1856-1940) announced his *discovery of the electron in 1897* following extensive experimental work. He was awarded the Nobel Prize in 1906. Compare the **charge and the mass** of an **electron** with the **charge and the mass** of a **proton**.



Charge _____

Mass _____

- (d) Some atoms join together by *sharing pairs of electrons*. This is called *covalent bonding*. Draw a **diagram** in the box below showing the **covalent bonding in a molecule of water**.

(1) (2)

- (e) Give **one safety precaution** taken by the pupil, shown in the photograph, while doing an experiment in a school laboratory.



(1) (2)

Precaution _____

Describe a **precaution, not shown** in the photograph, that you would take when **heating a substance** in a test tube in a school laboratory.

Precaution _____

- (f) Name a **method** of treating iron that helps **prevent rusting**.

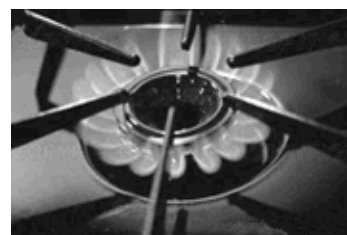
Name _____

How does the **method** that you have named **work**?

How? _____

- (g) Natural gas is a fossil fuel. What is a **fossil fuel**?

What? _____



Name the **main constituent** of natural gas.

Name _____

- (h) Magnesium was burned in oxygen as shown in the diagram.

(i) What **colour** was the flame?

(ii) Pieces of **moist blue** and **red litmus paper** were mixed with the product of the combustion. What **result** was seen?

(iii) What **conclusion** can be made from the result of the litmus test?



(7 × 6 + 1 × 10)

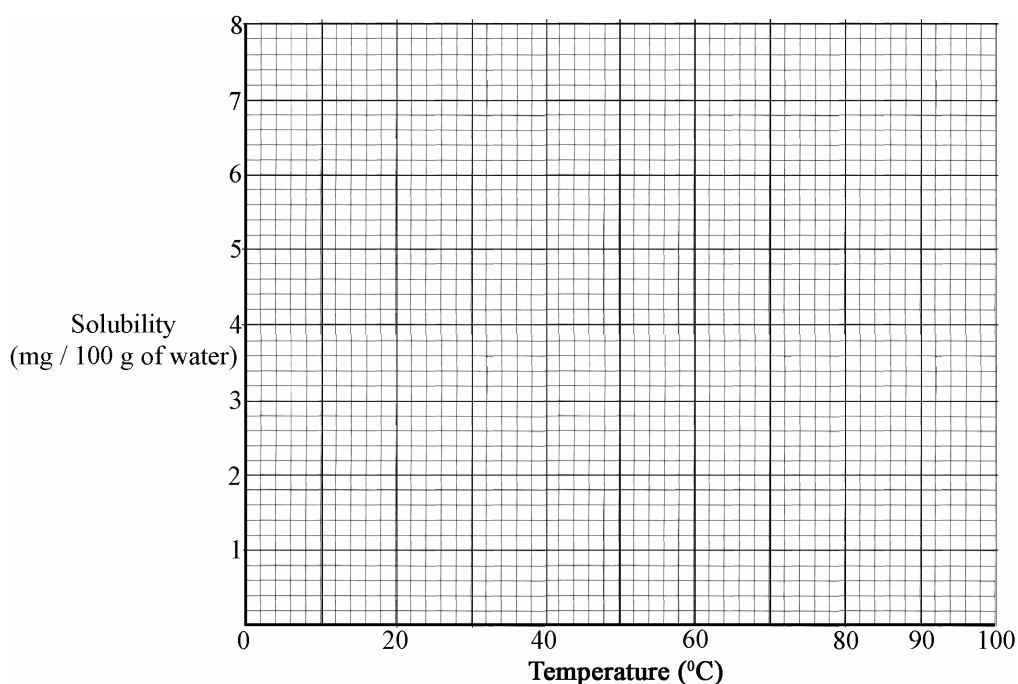
Question 5

(39)

- (a) The *limit of solubility* (maximum solubility) of oxygen gas (O₂) in water was measured, in *mg of oxygen per 100 g of water*, at a number of *different temperatures*. These measurements are given in the table.

Solubility (mg / 100 g water)	7.0	4.3	3.0	2.3	1.4	0.8	0.0
Temperature (°C)	0	20	40	60	80	90	100

- (i) Draw a **graph of solubility (y-axis) against temperature (x-axis)** in the grid provided below. (6)



- (ii) Use the graph to **estimate the solubility** of oxygen at 30 °C. (3)

- (iii) What **effect has temperature** on the **solubility** of oxygen in water? (6)

- (iv) Global warming has many implications. What **implication**, which could be inferred (concluded) from the information in the graph, might **global warming** have **for animals that live in water** e.g. fish? (6)

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(1) (2)

- (b) The diagram shows the *first twenty elements* in their positions in the *periodic table*. The number given with each element is the *atomic number* of that element.

1	2																3	4	5	6	7	8/0	
¹ H																							² He
³ Li	⁴ Be																⁵ B	⁶ C	⁷ N	⁸ O	⁹ F	¹⁰ Ne	
¹¹ Na	¹² Mg																¹³ Al	¹⁴ Si	¹⁵ P	¹⁶ S	¹⁷ Cl	¹⁸ Ar	
¹⁹ K	²⁰ Ca																						

- (i) Define *atomic number*. (3)

- (ii) Naturally occurring lithium is a mixture of two isotopes. Explain the underlined term. (6)

- (iii) By what *name* are group two metals known? (3)

- (iv) Why are the *noble gases*, group 8/0, *very chemically unreactive*? (6)

Question 6

(39)

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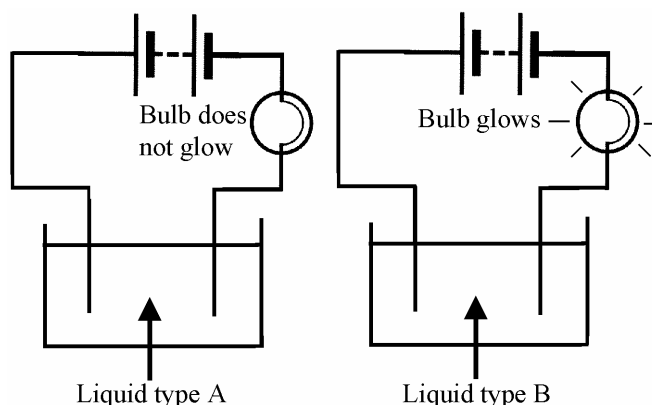
(a) Atoms of *different elements* can form *compounds* by *bonding* together.

(1) (2)

(i) What is an **ionic bond**?

(6)

A pupil investigated the *ability of covalent and ionic substances to conduct electricity*. Four substances were selected. One was a liquid. The other three substances were solids and these were dissolved in pure water before testing. The apparatus used in the investigation is drawn below. When the liquids were tested the bulb did not glow in some cases (Liquid type A) and the bulb glowed in other cases (Liquid type B).



The results of the investigation are given in the table.

Liquid	Cooking oil	Table salt	Table sugar	Copper sulphate
Liquid type	A	B	A	B

(ii) Name the **ionic substances** in the table.

Give a **reason** for your answer.

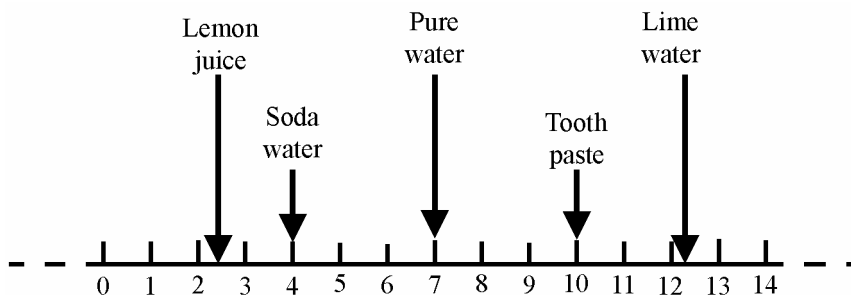
(9)

Name _____

Reason _____

(iii) **Three** of the *substances tested* are *solid at room temperature*. Why were these **substances dissolved in water** before the investigation? (3)

- (b) The diagram shows the *positions* of some common substances on the pH scale.



- (i) Classify the *substances* shown as **acidic, basic or neutral**. (9)

Acidic _____

Basic _____

Neutral _____

- (c) (i) Describe an experiment, using a labelled diagram in the box provided, to investigate the **composition of inks in markers containing water-soluble inks**, to see if they are a **single-colour ink** or a **mixture** of coloured inks. (9)

- (ii) On completion of the experiment how is it possible to distinguish between a marker containing a **pure single-colour ink** and a marker containing **mixture** of coloured inks. (3)

Physics

Question 7

(52)

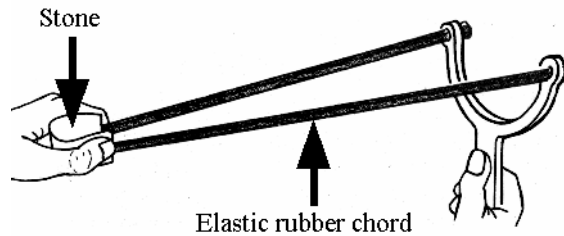
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(1) | (2)

(a) Fill in the *missing words* in both sentences.

(i) The *stretched rubber chord* has _____ energy.

(ii) If the *stone is released* it will have _____ energy.



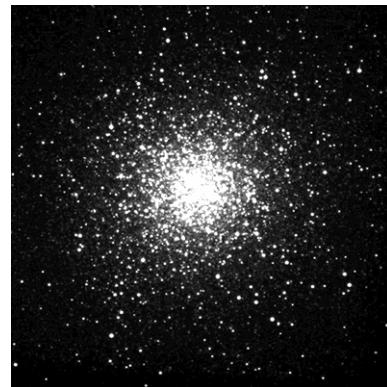
(b) State the *law of the lever*.

(c) The globular cluster shown is a group of stars (like a small galaxy). **Gravity is the force that holds the stars together** in this formation.

Give **two effects** that gravity has on your everyday life.

1 _____

2 _____

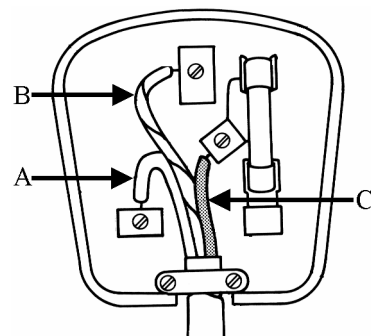


(d) Wiring a plug correctly is most important. Give the **colour/s** of **any two** of the plastic insulations on the wires labelled A, B and C.

A _____

B _____

C _____



- (e) The Pelamis, shown in the photograph, *converts the energy of waves* in seas into *electrical energy*. Give **one advantage** and **one disadvantage** of generating electrical power in this way.



Advantage _____

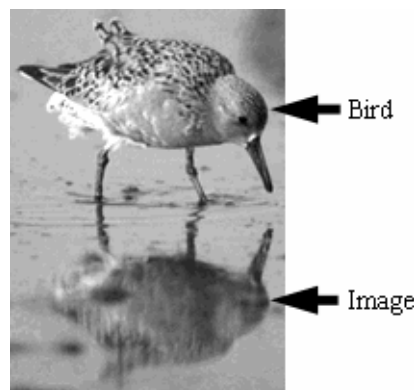
Disadvantage _____

- (f) Give **two differences** between heat and temperature.

1 _____

2 _____

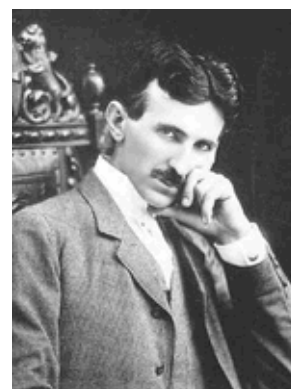
- (g) The photograph shows a wader i.e. a bird that feeds in shallow water. Is the **image** of the bird produced by **reflection** or by **refraction**? Give a **reason** for your answer.



Is? _____

Reason _____

- (h) Nikola Tesla (1856-1943) showed at the Frankfurt Fair in 1891 that *alternating current* could be *transmitted* over much *longer distances* than *direct current*. This is why the electricity supply to our homes is alternating current. Distinguish between **alternating and direct current**.



Distinction _____

What is the **average voltage** of domestic alternating current in Ireland?

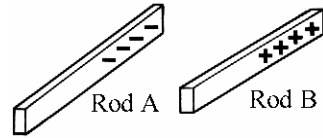
Average voltage _____

(7 × 6 + 1 × 10)

Question 8

(39)

- (a) Two rods **A** and **B**, made from *different plastics*, were given the *static electrical charges* shown in the diagram.



- (i) How could you have **charged** the rods as shown? (6)

- (ii) Describe with the help of a labelled diagram in the box provided, how the **force between the two charged rods A and B** could be **investigated**. What **result** would you expect from this investigation? (9)

Description _____

Result _____



- (iii) In dry weather you can sometimes get an electric shock from a supermarket trolley. This is caused by the build-up of static electricity on the trolley.



Explain clearly why this only happens in dry weather. (6)

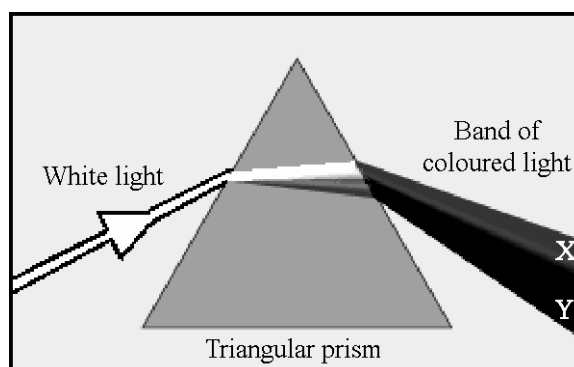
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(1) (2)

- (b) The photograph shows narrow beams of light (rays) passing through a lens-shaped piece of transparent material. *Parallel rays of light enter the material from the left and when they leave the material they converge and pass through a common point, before moving apart.*



Give a *use* for a lens having this effect on light. (3)

- (c) The diagram shows a ray of *white light entering a triangular glass prism. The light passes through the prism and emerges as a band of coloured light.*



- (i) What does this experiment *show* about the *composition of white light*? (3)

- (ii) What is this *separation* of white light into different colours called? (3)

- (iii) What *name* is given to the *band* of coloured light produced? (3)

- (iv) State the *colour of the light labelled X* and the *colour of the light labelled Y* at the extreme ends of the band of light illustrated in the diagram. (6)

X _____

Y _____

(1) (2)

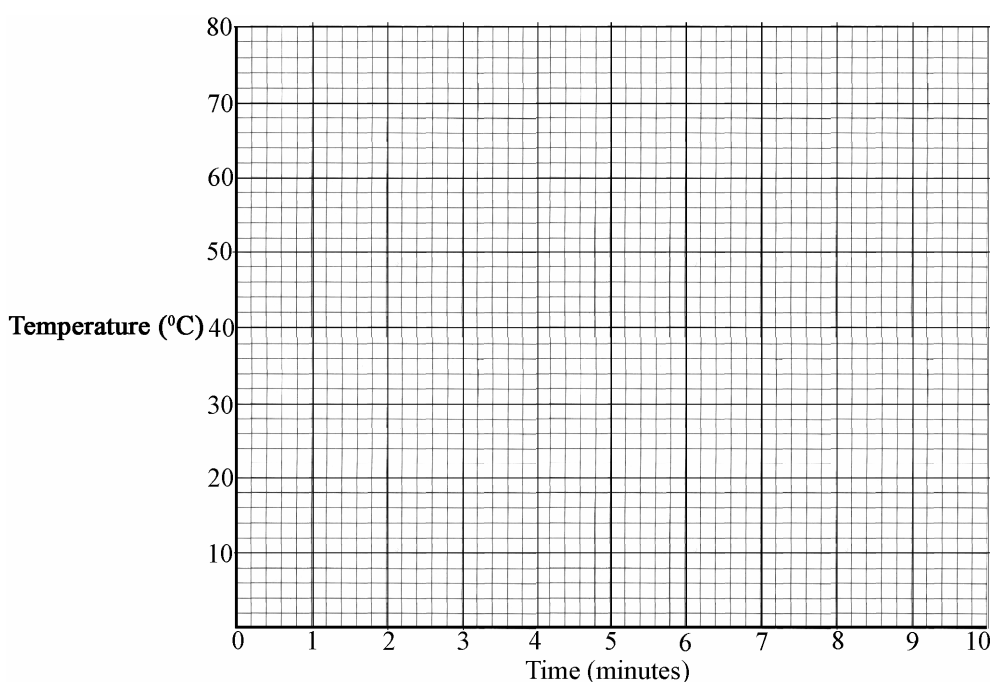
Question 9

(39)

- (a) A pupil *heated* some *lauric acid*, which is a *solid* at room temperature, until it turned into a *liquid*. The lauric acid was then allowed to *cool* at a *uniform* rate. The *temperature* of the lauric acid was taken *every minute*. The data from this experiment is given in the table.

Temperature (°C)	75	64	54	43	43	43	43	43	32	22	10
Time (minutes)	0	1	2	3	4	5	6	7	8	9	10

- (i) Draw a **graph**, using this data, of **temperature against time (x-axis)** in the grid provided below. (9)



- (ii) Explain the **shape of the graph** that you obtain. (9)

- (iii) Use the graph to estimate the **melting point** of lauric acid. (3)

(1) (2)

- (b) The top two photographs show the front (left) and the rear (right) of a sign warning motorists approaching a school to take care. The photograph underneath shows the *lights flashing* amber alternately. This happens when the *pupils are coming to school* and are *going home from school*. The *rectangular panel* above the sign is a *solar (photovoltaic) panel*. It *changes energy from the sun* into *electrical energy*.



- (i) Name the **energy from the sun** that the panel changes into electricity. (3)

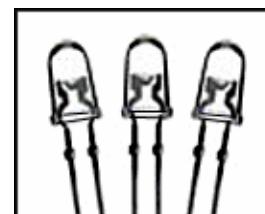
The electrical energy is then changed into a **form of energy** that can be **stored** in a **battery**.

- (ii) Name the **form of energy** that can be stored in a **battery**. (3)

In *winter* it may be *dark* when the pupils are going to or coming from school.

- (iii) Give **two energy conversions** that occur to produce the flashes of light warning motorists approaching the school on dark mornings. (6)

- _____
- _____
- (iv) Identify the **devices** shown in the diagram. (There are three in the diagram; when operating they give out light).



Devices _____ (3)

This device is often used instead of bulbs. Give a **reason** for this wide application. (3)

Reason _____

