



# Coimisiún na Scrúduithe Stáit State Examinations Commission

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**JUNIOR CERTIFICATE EXAMINATION, 2012**

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**SCIENCE – HIGHER LEVEL**

**THURSDAY, 14 JUNE – MORNING, 9.30 to 11.30**

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## 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, there is a blank page provided at the back of this booklet.
4. The use of the Formulae and Tables booklet approved for use in the State Examinations is permitted. A copy may be obtained from the examination superintendent.

**Centre Number**

**Examination  
Number**

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

# Biology

## Question 1

(52)

For  
Examiner  
use only  
(1) (2)

- (a) Eggs can form part of a balanced diet and provide a good source of some food types. Name two of these food types.

1 \_\_\_\_\_

2 \_\_\_\_\_



- (b) Why is blood considered to be a tissue?

Why? \_\_\_\_\_

Name a substance transported by blood.

Name \_\_\_\_\_

- (c) The cartoon represents global warming.  
How can human activity give rise to global warming?

How ? \_\_\_\_\_

\_\_\_\_\_

Give one effect of global warming.

Give \_\_\_\_\_



- (d) What is contraception?

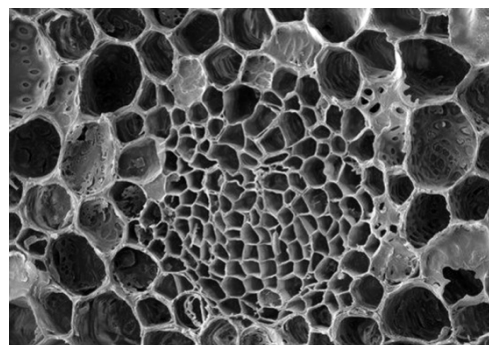
What? \_\_\_\_\_

\_\_\_\_\_

Name one form of contraception.

Name \_\_\_\_\_

- (e) The photograph, made by a scanning electron microscope, shows two types of plant vascular tissue, **xylem** and **phloem**.  
Give the function of each tissue.



Xylem \_\_\_\_\_

\_\_\_\_\_

Phloem \_\_\_\_\_

- (f) Name the two substances that chromosomes are made of.

Substance one \_\_\_\_\_

Substance two \_\_\_\_\_

- (g) Asexual and sexual reproduction occur in plants. State how a named plant can reproduce asexually.

Name \_\_\_\_\_

How? \_\_\_\_\_

- (h) Name the **type** of joint shown in the diagram.

Name \_\_\_\_\_

Describe the movements that this type of joint can make.

Describe \_\_\_\_\_

\_\_\_\_\_

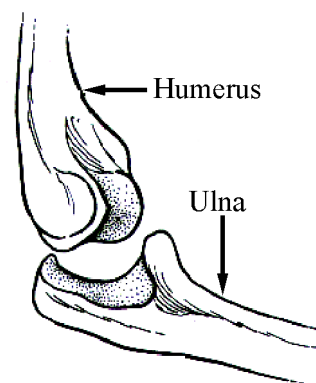
\_\_\_\_\_

Explain how muscles cause the movements of this joint.

Explain \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



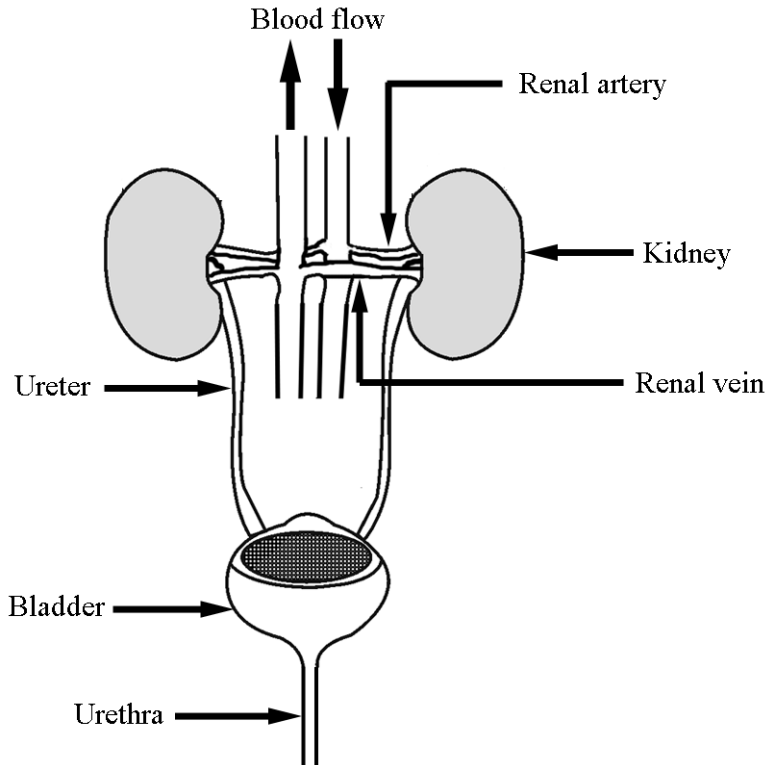
(7 × 6 + 1 × 10)

Question 2

(39)

For  
Examiner  
use only

- (a) The diagram is of the urinary system. Give the function of **five** of the six parts labelled. (15)



Renal artery \_\_\_\_\_

Kidney \_\_\_\_\_

Renal vein \_\_\_\_\_

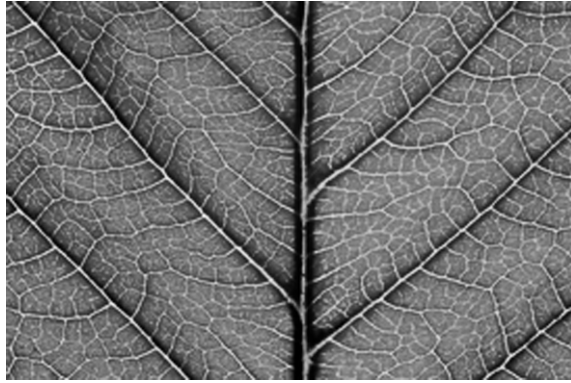
Ureter \_\_\_\_\_

Bladder \_\_\_\_\_

Urethra \_\_\_\_\_

(1) (2)

(b) The photograph shows part of a leaf of a green plant.



(i) Name a gas that moves into and a gas that moves out of a green leaf during active photosynthesis. (6)

Gas in \_\_\_\_\_

\_\_\_\_\_

Gas out \_\_\_\_\_

(ii) Outline an experiment to show that photosynthesis produces starch.  
Use the box provided for an **optional** labelled diagram. (18)

\_\_\_\_\_

\_\_\_\_\_

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**Question 3**

(39)

**For  
Examiner  
use only**

(a) An insect feeds on a flower and picks up pollen. When the insect visits another flower of the same species it leaves some of the original pollen behind.



(i) Give a second way in which transfer of pollen between plants occurs. (3)

Give \_\_\_\_\_

(ii) Draw a labelled diagram of a suitable flower showing the stigma, style, ovary, anther and filament in the box provided. (15)

(iii) Name the part of the flower that produces the male gamete. (3)

Name \_\_\_\_\_

(iv) Name the part of the flower that produces the female gamete. (3)

Name \_\_\_\_\_

(v) What follows fertilisation in flowering plants? (3)

What? \_\_\_\_\_

(1) (2)

(b) Without enzymes we would not be able to exist. Enzymes release energy from food, help build the molecules that our bodies are composed of and break down structures and wastes that we no longer need.

(i) Name an enzyme. (3)

Name \_\_\_\_\_

(ii) Name the substrate that the enzyme you have named acts on. (3)

Name \_\_\_\_\_

(iii) Name the product of the action of this enzyme. (3)

Name \_\_\_\_\_

(iv) What reagent might you use, in a laboratory, to test that the reaction has taken place? (3)

Name \_\_\_\_\_

For  
Examiner  
use only  
(1) (2)

# Chemistry

## Question 4

(52)

For  
Examiner  
use only

- (a) Alloy car wheels are made from an alloy of aluminium or magnesium. Name another alloy and give a use for it.

Alloy \_\_\_\_\_

Use \_\_\_\_\_

\_\_\_\_\_



- (b) What substance is formed when carbon is burned in oxygen?  
Give the effect of this substance on moist litmus paper.

Substance \_\_\_\_\_

Effect on litmus \_\_\_\_\_

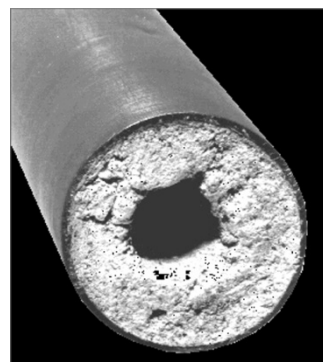
- (c) Water had been flowing through the pipe shown in the photograph for some time. The pipe originally had no internal deposit. Give a possible reason for the formation of the deposit. What do you think the deposit is?

Reason \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Deposit \_\_\_\_\_



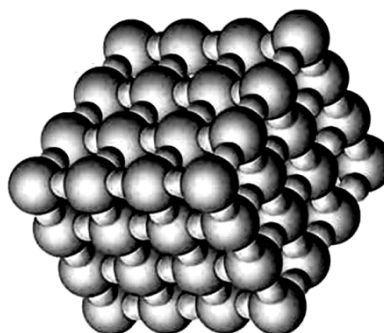
- (d) Using their atomic symbols, arrange the metals, copper, calcium, zinc and magnesium in order of decreasing reactivity with dilute hydrochloric acid.

\_\_\_\_\_

(1) | (2)



- (e) The diagram shows part of a crystal of sodium chloride. Name the type of bonding in sodium chloride. Describe this type of bonding.



Name \_\_\_\_\_

Describe \_\_\_\_\_

\_\_\_\_\_

- (f) Select a substance from the list with a pH less than 7 and one with a pH greater than 7: orange juice, rain water, toothpaste, bread soda, vinegar, sour milk, milk of magnesia, cola, washing soda.

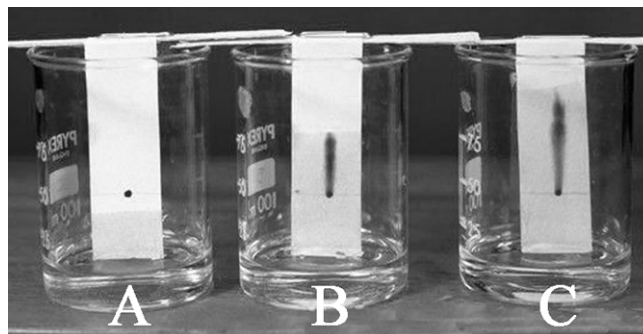
pH less than 7 \_\_\_\_\_

pH greater than 7 \_\_\_\_\_

- (g) Name two non-metallic elements.

1 \_\_\_\_\_ 2 \_\_\_\_\_

- (h) Paper chromatography was used to find the composition of brown ink in a pen. The same liquid, paper and pen were used in each of the three experiments shown. They were started at different times, **C** first then **B** and finally **A**.



- (i) Why is the ink dot above the level of the liquid in each beaker?

Why? \_\_\_\_\_

- (ii) What caused the dots of ink on the papers **B** and **C** to spread upwards?

What? \_\_\_\_\_

- (iii) Why were colours, other than brown, seen in **B** and **C** as the ink moved up the paper?

Why? \_\_\_\_\_

(7 × 6 + 1 × 10)

**Question 5**

(39)

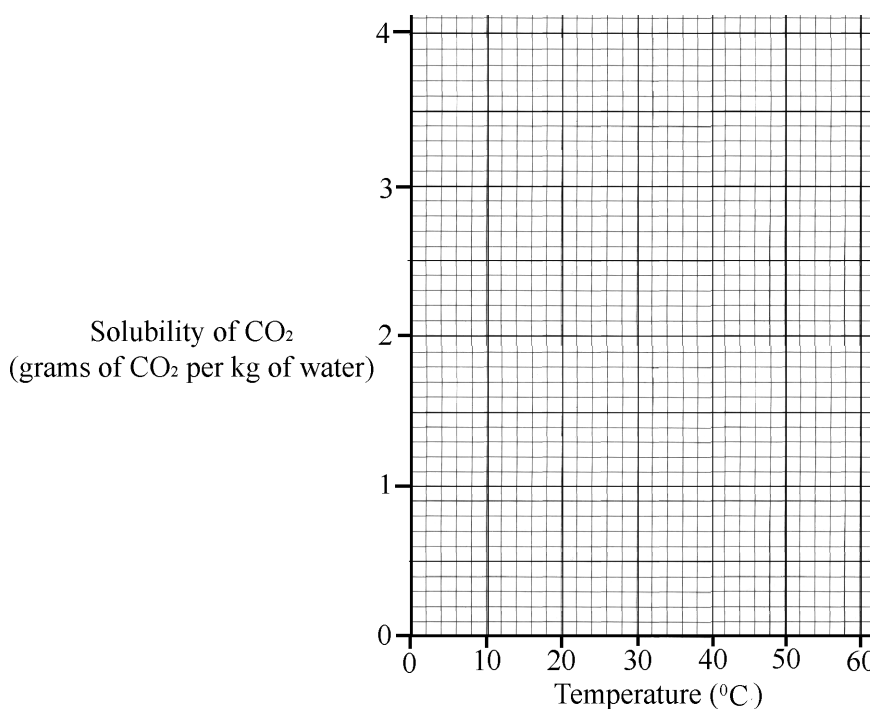
**For  
Examiner  
use only**

- (a) An experiment was performed to investigate the effect of temperature on the solubility of carbon dioxide in water. The data obtained from this experiment is given in the table below.

Solubility of CO <sub>2</sub> (grams of CO <sub>2</sub> per kg of water)	3.4	2.5	1.7	1.4	1.0	0.8	0.6
Temperature (°C)	0	10	20	30	40	50	60

(1) (2)

- (i) Draw a graph of solubility against temperature in the grid below using the data from the table. A smooth curve is required. (9)



- (ii) Usually the solubility of a solid increases with increasing temperature. The solubility of a gas decreases as the temperature increases. Suggest a reason why this decrease happens. (3)

Suggest \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

- (iii) From the graph estimate the temperature at which the solubility of CO<sub>2</sub> is 2 g per kg of water. (3)

\_\_\_\_\_

(b) The table gives the % by volume of five gases/ vapours found in our atmosphere.

Formula	% Volume
N <sub>2</sub>	78.08
O <sub>2</sub>	20.95
H <sub>2</sub> O	0 to 4
Ar	0.93
CO <sub>2</sub>	0.036

(1) (2)

(i) Which two of these gases/ vapours are produced when a fossil fuel is burned? (6)

1 \_\_\_\_\_ 2 \_\_\_\_\_

(ii) The amount of water vapour present in air is the most variable. Suggest a reason for this. (3)

Reason \_\_\_\_\_

(c) Describe an experiment, using a labelled diagram in the box provided to show the presence of carbon dioxide in air. (9)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

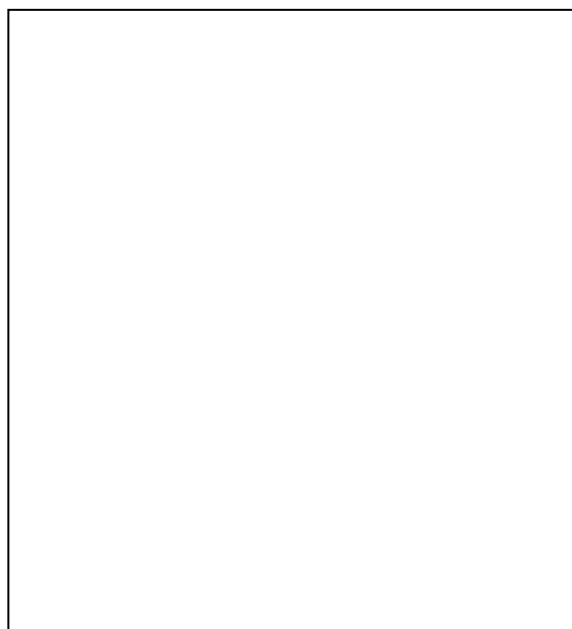
\_\_\_\_\_

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



(d) Give a test to show that the droplets formed on the outside of a glass containing a cold drink are water. (6)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**Question 6**

(39)

**For  
Examiner  
use only**

(a)



The photograph shows a water treatment plant that produces water fit for domestic consumption. Name and describe four processes used in this treatment of water. (24)

(i) Name \_\_\_\_\_

Describe \_\_\_\_\_

(ii) Name \_\_\_\_\_

Describe \_\_\_\_\_

(iii) Name \_\_\_\_\_

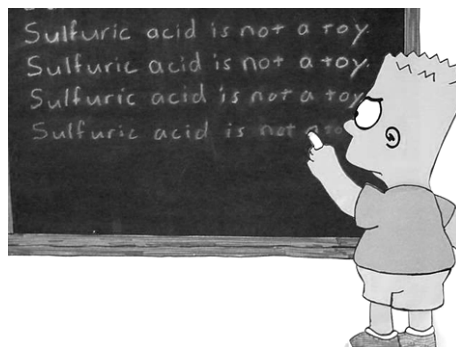
Describe \_\_\_\_\_

(iv) Name \_\_\_\_\_

Describe \_\_\_\_\_

(1) | (2)

- (b) Bart is doing lines.  
Most Junior Certificate candidates have three years experience of working in a school laboratory. Give two important safety rules, that must be followed at all times by everyone in the laboratory. (6)



Rule 1 \_\_\_\_\_

\_\_\_\_\_

Rule 2 \_\_\_\_\_

\_\_\_\_\_

- (c) Describe the reaction of a named alkali metal with water and name a product of the reaction. (9)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**For  
Examiner  
use only**

(1) | (2)

# Physics

## Question 7

(52)

For  
Examiner  
use only

(1) | (2)

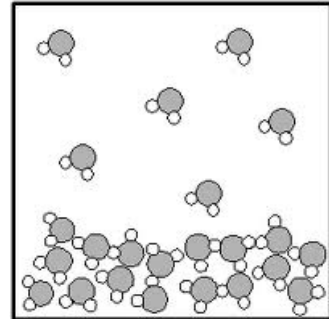
- (a) The diagram shows the evaporation of water.  
What is evaporation?

What? \_\_\_\_\_

\_\_\_\_\_

What do water molecules have to gain in order to evaporate from liquid water?

What? \_\_\_\_\_



- (b) Explain the difference between direct current (dc) and alternating current (ac).

Explain \_\_\_\_\_

\_\_\_\_\_

- (c) What causes the appearance of a 'second' drinking straw in the drink in the glass shown in the photograph?

What? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



- (d) The conversions of chemical energy to kinetic energy to potential energy occurs when you walk up a stairs. Give two more everyday examples of energy conversions and the contexts in which they occur.

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

For  
Examiner  
use only

- (e) The damage to the railway tracks shown in this image was caused by an environmental factor. Name the factor and explain how it caused the damage.

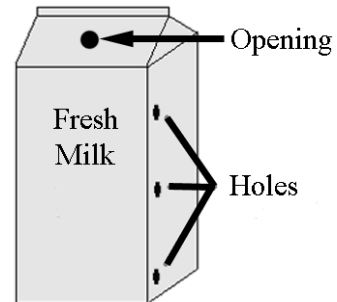


Name \_\_\_\_\_

Explain \_\_\_\_\_

\_\_\_\_\_

- (f) Three holes were made in a carton of milk at the same time. From which hole will the milk pour out at the greatest rate? Give a reason for your answer.



Which? \_\_\_\_\_

Reason \_\_\_\_\_

- (g) Fuses are used in some electrical circuits for safety. How does a fuse work for our protection?

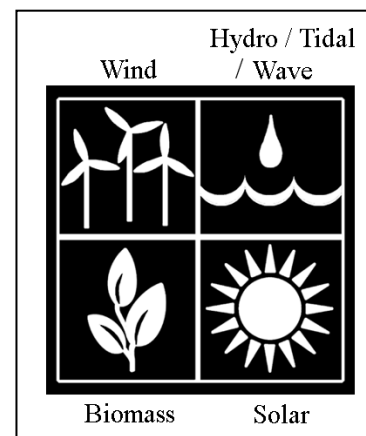
How? \_\_\_\_\_

- (h) Renewable energies are shown in the picture.

Pick any two of the energies shown in the picture and name your selection.

Energy one \_\_\_\_\_

Energy two \_\_\_\_\_



- (i) Give one advantage associated with each energy you've selected.

Two **different** reasons must be given.

Energy one \_\_\_\_\_

Energy two \_\_\_\_\_

- (ii) Give one disadvantage associated with each energy you've selected.

Two **different** reasons must be given.

Energy one \_\_\_\_\_

Energy two \_\_\_\_\_

(7 × 6 + 1 × 10)

**Question 8**

(39)

**For  
Examiner  
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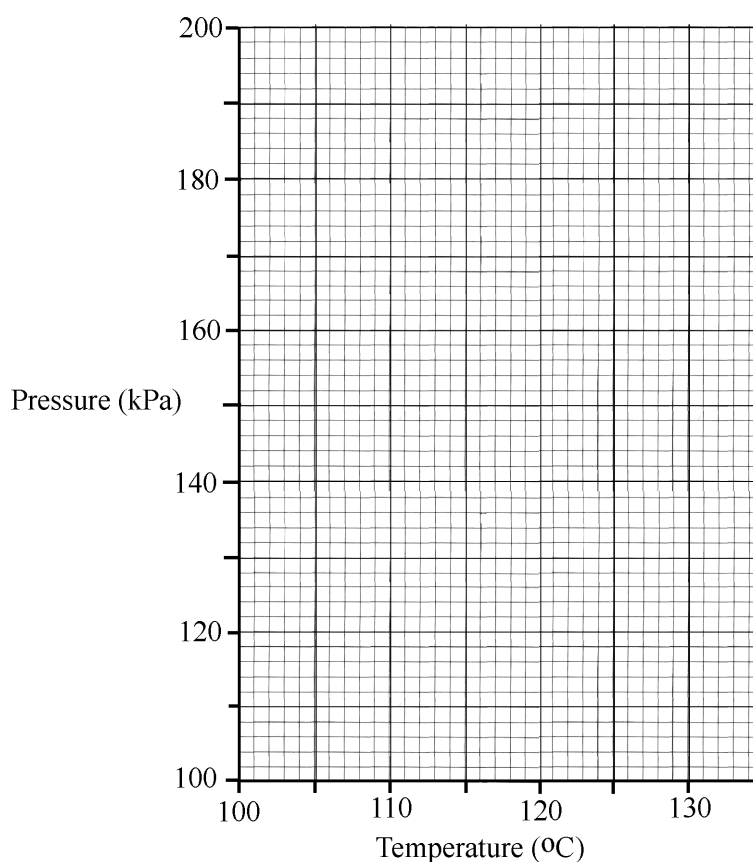
(1) (2)

(a) Define pressure. \_\_\_\_\_ (3)

An experiment was performed to investigate the effect of pressure on the boiling point of water. The data from the experiment is given in the table below.

Pressure (kPa)	100	120	140	160	180	200
Temperature (°C)	100	105	109	114	119	124

(i) Draw a graph of pressure against temperature using the grid below. (9)



(ii) What two pieces of information can be drawn from the graph about the relationship between the boiling point of water and pressure. (6)

1 \_\_\_\_\_

2 \_\_\_\_\_

(iii) What effect would reducing the pressure on water below normal atmospheric pressure, about 100 kPa, have on its boiling point? (3)

What? \_\_\_\_\_



(b)



The kilowatt-hour is the unit of electrical energy used by electricity suppliers. The photograph shows a kWh (kilowatt-hour) meter. This meter is connected into the electricity consumer's domestic circuit and it can measure energy consumption in a selected part of the circuit, the total energy used and cost it. The meter can be wall-mounted in a convenient place.

(i) Give two advantages to the consumer of having this type of meter. (6)

1 \_\_\_\_\_

2 \_\_\_\_\_

(ii) Define the Watt, the unit of power. (6)

Define \_\_\_\_\_

(iii) Give one application of the chemical effect and one application of the the magnetic effect of electric current. (6)

Chemical effect \_\_\_\_\_

\_\_\_\_\_

Magnetic effect \_\_\_\_\_

\_\_\_\_\_

**Question 9**

(39)

**For  
Examiner  
use only**

(1) (2)

(a) The circuit shown in the diagram was set-up by a pupil. Component C gave out light.

(i) Name components **B** and **C** labelled and shown in the diagram. (6)

**B** \_\_\_\_\_

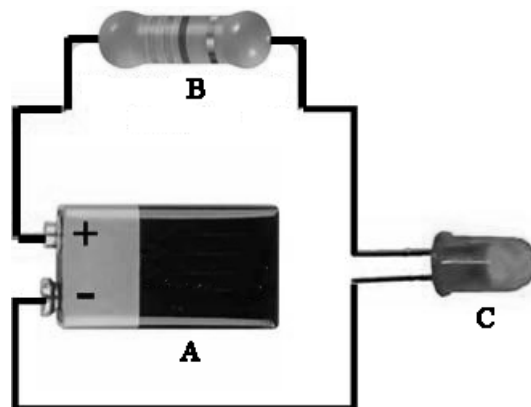
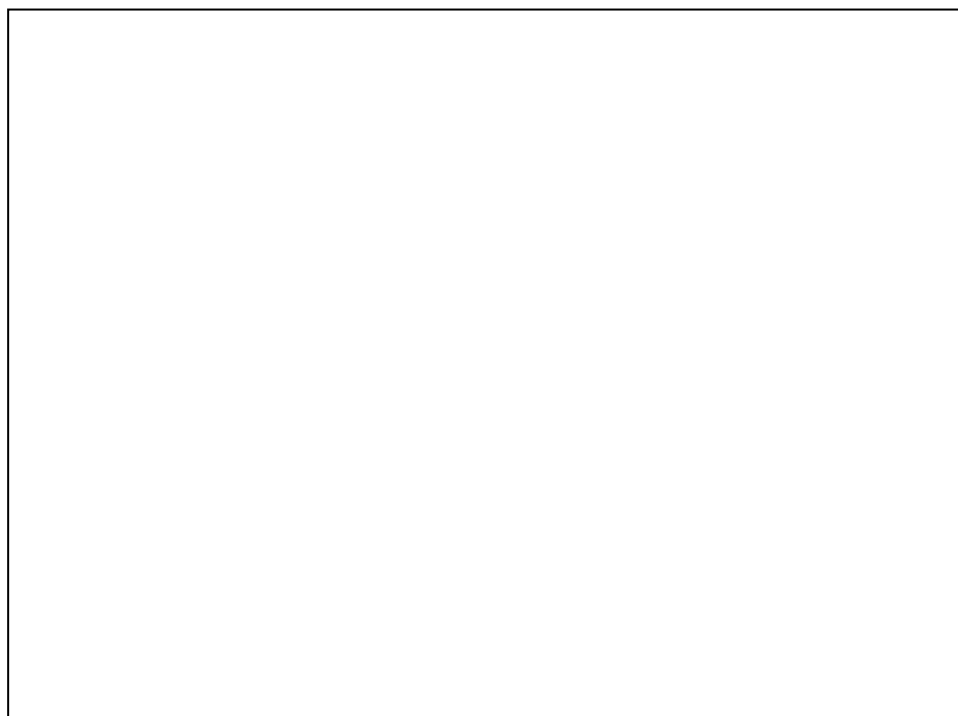
**C** \_\_\_\_\_

(ii) Give the function of component **A** and the function of component **B**. (6)

**A** \_\_\_\_\_

**B** \_\_\_\_\_

(iii) Draw a diagram of a circuit that could be used to measure the resistance of a light-dependent resistor (LDR) when exposed to light of varying brightness. (9)



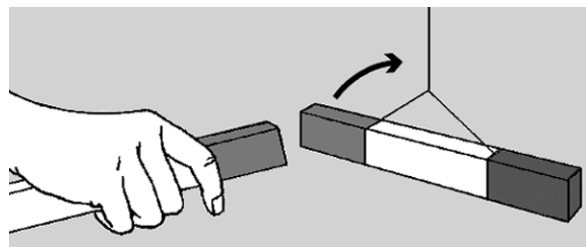
- (b) The plastic comb has been used to comb hair and it now picks up small plastic balls. Why does this happen? (6)



Why? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

- (c) The diagram shows the interaction between two magnets. Explain why this happens. (6)



Explain \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

- (d) Parts (b) and (c) of this question show examples of forces that can act without contact. Name a third different force that can act without contact. Give one important effect of the force that you have named. (6)

Name \_\_\_\_\_

Effect \_\_\_\_\_

