

WARNING
You must return this paper with your answer-book, otherwise marks will be lost.

AN ROINN OIDEACHAIS AGUS EOLAÍOCHTA
JUNIOR CERTIFICATE EXAMINATION, 2001
SCIENCE – HIGHER LEVEL
(N.B. Not for Science – Local Studies Candidates)
THURSDAY, 14 JUNE - AFTERNOON, 2.00 to 4.30

SECTION A (144 marks) TO BE ANSWERED BY ALL CANDIDATES.

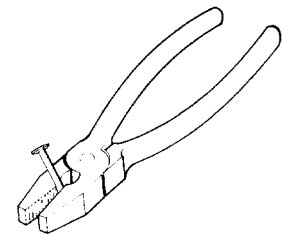
(See separate sheet for Sections B, C, D and E.)

Answer *each* of the questions 1, 2 and 3. There are **TEN** parts in each question. Answer any **EIGHT** parts. All questions carry equal marks. Answer the questions in the spaces provided. Return this Section of the examination paper. Enclose it in the answer-book you use in answering the other Sections.

1. Answer **eight** of the following, (a), (b), (c), etc.

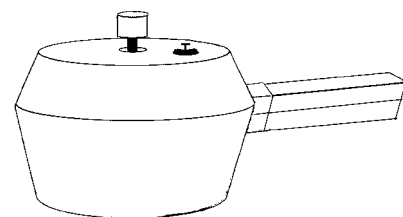
(a) The diagram shows a pliers holding a nail.

Show clearly, on the diagram, the fulcrum of the pliers.
What is the advantage of using a pliers to pull a nail?



(b) Pressure is equal to _____ divided by _____

(c) This diagram shows a pressure cooker.
The pressure in this cooker is greater than atmospheric pressure.
Why does food cook much faster in a pressure cooker?

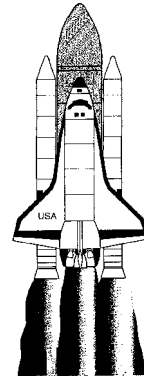


- (d) Quilt A has a tog value of 6.5 and quilt B has a tog value of 13.
What does this tell about quilt B?

- (e) Calculate the current in the filament of a 100 W light bulb when connected to a 200 V supply.

- (f) The picture shows the space shuttle taking off.

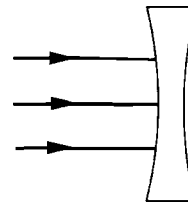
What exerts the force on the space shuttle which causes it to take off?



- (g) What is the cost of running a 2 kW electric fire for 2 hours if a unit of electricity costs 10p?

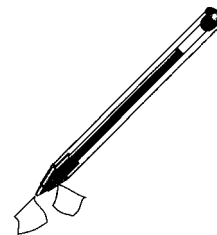
- (h) The diagram shows three rays of light entering a lens.

Draw the paths of these three rays coming out of the lens.



- (i) When a plastic pen is rubbed with a cloth it can pick up pieces of paper.

Name the force holding the paper to the pen.



- (j) Two bulbs are wired in series to a battery. One of the bulbs blows (fails).
What happens to the other bulb? Give a reason for your answer.

Bulb _____

Reason _____

(8 x 6)

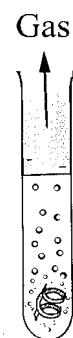
2. Answer **eight** of the following, (a), (b), (c), etc.

(a) Magnesium reacts strongly with dilute acids.

Name the gas produced by this reaction and give its chemical formula.

Name _____

Formula _____



(b) Name a solvent and a substance that would dissolve in it.

Solvent _____

Substance _____

(c) What is a molecule?

(d) Give the names of two elements present in air.

(i) _____ (ii) _____

(e) Name the method of separation shown in the diagram.

Name a mixture that could be separated in this way.

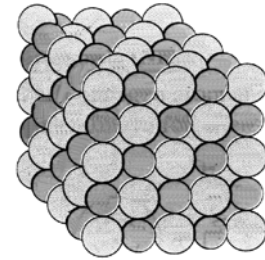
Method _____

Mixture _____



(f) Define corrosion.

(g) The diagram shows the structure of a sodium chloride crystal.



Name the type of bonding in sodium chloride.
Give one property of this type of crystal.

Name _____

Property _____

(h) Give the location in an atom of (i) neutrons, (ii) electrons.

(i) _____ (ii) _____

(i) A substance was added to water and the water got colder.

Is this reaction exothermic or endothermic?
Name a substance that would have this effect on water.

Reaction is _____

Substance _____

(j) Give two uses for carbon dioxide.

(i) _____ (ii) _____

(8 x 6)

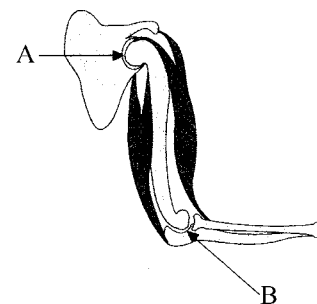
3. Answer **eight** of the following, (a), (b), (c), etc.

(a) A and B are two different types of synovial joint.

Name type A and type B.

Type A _____

Type B _____

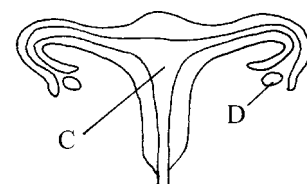


(b) Geotropism is the _____ of a plant to _____

(c) The diagram shows the female reproductive system.
Name parts C and D.

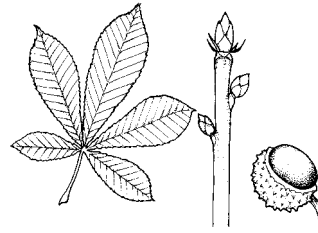
C _____

D _____



(d) Genes are located on the _____ in the _____ of plant and animal cells.

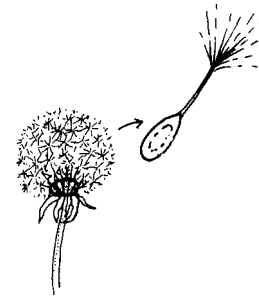
(e) The diagram shows the leaf, buds, and seed of a common tree. Name the tree.



(f) Give a food chain from a habitat you have studied.

(g) How are the seeds of the plant shown dispersed?

Name a second way in which the seeds of plants are spread.



(h) What is a pooter used for?

(i) Name the type of blood cell shown in the diagram and give the function of this type of blood cell.

Name _____

Function _____



(j) Give two examples of competition in a habitat.

(i) _____

(ii) _____

(8 x 6)

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Section A is on a separate sheet which provides spaces for your answers.
 The completed sheet should be enclosed in your answer-book.

SECTIONS B, C, D, E

These sections should be answered in your answer-book.

Answer **ONE** question from each of the Sections **B, C and D**.

All questions carry equal marks.

Answer **TWO** questions from **Section E**. All questions carry equal marks.

SECTION B - PHYSICS (48 marks)

Answer **either** question 4 **or** question 5.

4. (a) Define acceleration. (6)

A stone is dropped from the top of a cliff.

The table below gives the velocity of the stone at each second.

Time (s)	0	1	2	3	4	5
Velocity (m/s)	0	10	20	30	40	50

Draw a graph of velocity against time. Use graph paper.

Put time on the x -axis.

(12)

Use the graph to find:

- (i) the velocity of the stone at 3.5 seconds;
 (ii) the time that it takes the stone to reach a velocity of 25 m/s. (6)

- (b) State clearly what is meant by temperature.
 Give a unit used to measure temperature. (6)

List two changes that could happen to a body when it is heated. (6)

Outline an experiment to show the conduction of heat through metals. (12)

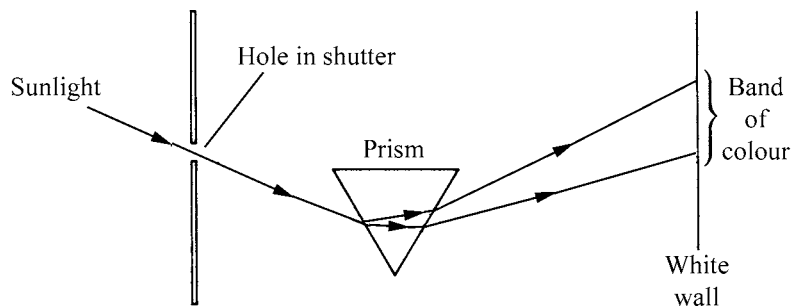
5. (a) Give two properties of a bar magnet. (6)

What is a magnetic field? (6)

Draw a diagram of the magnetic field around a bar magnet. (9)

Give one use of magnets in the home. (3)

(b)



The diagram above shows Newton's experiment with a prism.

Give the term for each of the following:

- (i) the change in direction of the light as it enters and leaves the prism;
- (ii) the spreading out of sunlight into a band of colour;
- (iii) the band of colour itself. (9)

Use a labelled diagram to show how white light can be produced by mixing coloured lights. (9)

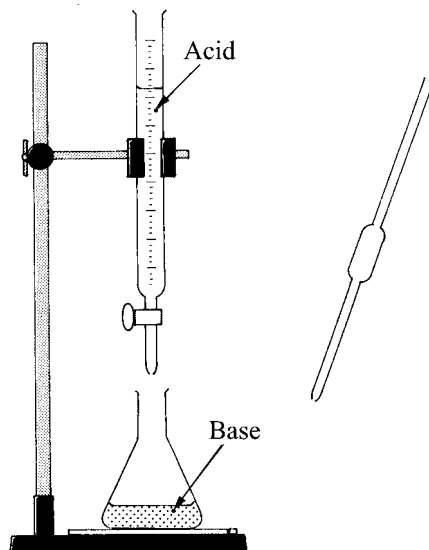
Name an electromagnetic wave whose wavelength is longer than visible light. (3)

Name an electromagnetic wave whose wavelength is shorter than visible light. (3)

SECTION C - CHEMISTRY (48 marks)

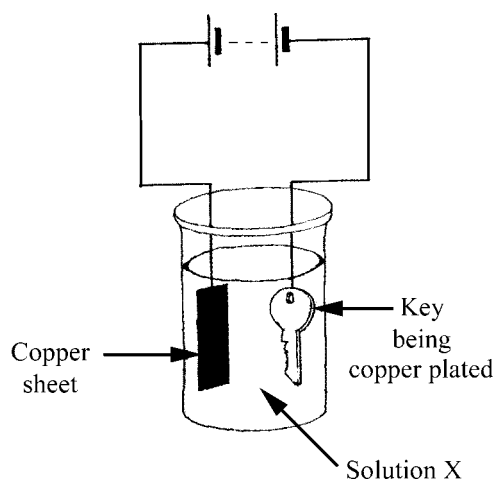
Answer either question 6 or question 7.

6. (a) A pupil prepared the salt sodium chloride using the items shown in the diagram.



- (i) Name the piece of glassware used to measure the volume of the base. (3)
- (ii) What readings must be taken to find the volume of the acid used to neutralise the base? (6)
- (iii) Why is an indicator added to the flask? (6)
- (iv) Write a chemical equation for the reaction between the acid and the base. (9)
- (b) The treatment of water, for use in our homes, includes settling, chlorination and fluoridation.
- (i) What happens to water during settling? (3)
- (ii) Why is chlorine added to the water? (6)
- (iii) Give a benefit of fluoridation. (3)
- (c) In parts of Ireland water is hard because of dissolved minerals.
- (i) Distinguish between temporary and permanent water hardness. (6)
- (ii) Name a compound that causes temporary hardness. (6)

7. (a) A pupil copper plated a key using the circuit shown in the diagram.

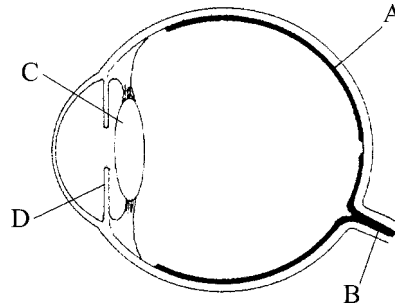


- (i) Name a copper compound that could be dissolved in water to make solution X. (6)
- (ii) Apart from the battery, where does oxidation occur in the circuit? (3)
- (iii) Explain how the copper is plated onto the key. (9)
- (iv) Name a gas produced when electricity passes through water. (3)
- (b) Natural gas is mostly methane (CH_4). When methane burns it produces carbon dioxide and water only.
- (i) Write a balanced equation for the combustion of methane. (9)
- (ii) Describe a laboratory test for carbon dioxide. (6)
- (c) Each element has a position of its own in the periodic table.
In each period of the table the elements are listed in a definite order, e.g. in the second period the order is: Li, Be, B, C, N, O, F, Ne.
- (i) What determines the order in which the elements are listed in each period of the table? (6)
- (ii) Give a reason why lithium, sodium and potassium are in the same group of the periodic table. (3)
- (iii) What is the name of the group seven elements? (3)

SECTION D - BIOLOGY (48 marks)

Answer either question 8 or question 9.

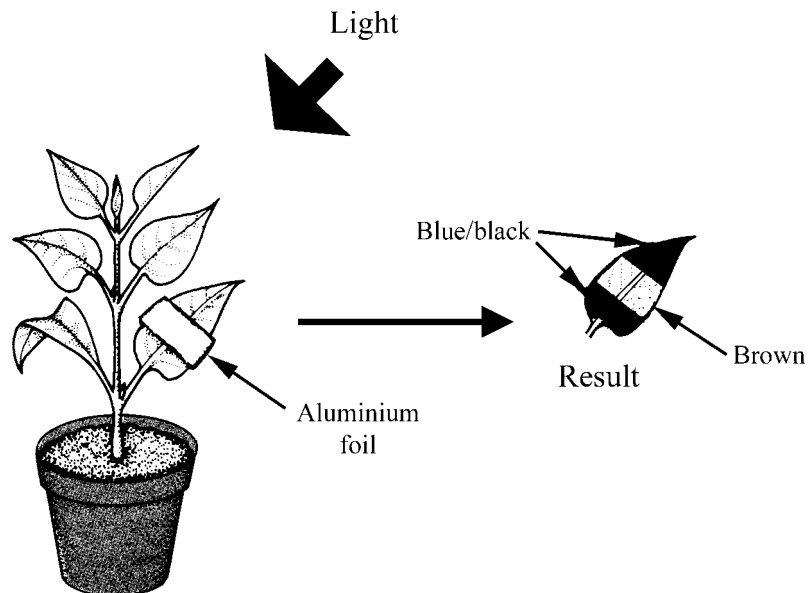
8. (a) The diagram below is a section through the human eye.
The eye receives images (pictures) from our surroundings.
Each of the parts labelled does a special job.



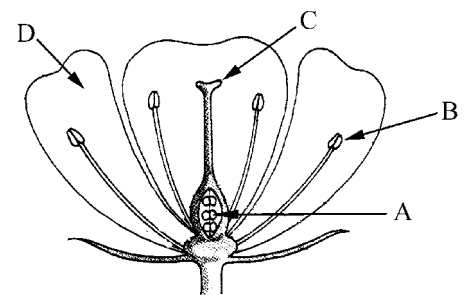
Identify the part of the eye that:

- (i) controls the brightness of the image;
 - (ii) records the image;
 - (iii) carries the image to the brain;
 - (iv) makes the image sharper. (12)
- (b) Endocrine glands release chemicals that control processes in our bodies.
- (i) What are these chemicals called? (3)
 - (ii) How do these chemicals get around the body? (3)
 - (iii) Name an endocrine gland and name one chemical that it releases. (6)
- (c) Respiration releases energy from food in the cells of living things.
- (i) Give one way in which this energy is used by our bodies. (3)
 - (ii) Name the gas required for respiration. (3)
 - (iii) Describe, with the aid of a diagram, an experiment to show that heat is produced by respiration. (12)
 - (iv) Name an animal without lungs and say how it breathes. (6)

9. (a) The diagram is of an experiment to show that light is needed for photosynthesis.



- (i) What is photosynthesis? (6)
- (ii) How was the plant prepared for this experiment? (3)
- (iii) State how the green colour was removed from the leaf. (6)
- (iv) Name the chemical added to the leaf to cause part of it to turn blue/black. (3)
- (v) Name the substance in the leaf that produced the blue/black colour with the chemical. (3)
- (vi) Give a condition, other than light, needed for photosynthesis. (3)
- (b) The diagram shows a section through the flower of a buttercup. Each of the parts labelled does a special job.
- Identify the part of the flower that:
- (i) attracts insects;
- (ii) releases pollen;
- (iii) receives pollen;
- (iv) makes female gametes. (12)
- What does pollen produce? (3)
- Define fertilisation. (9)

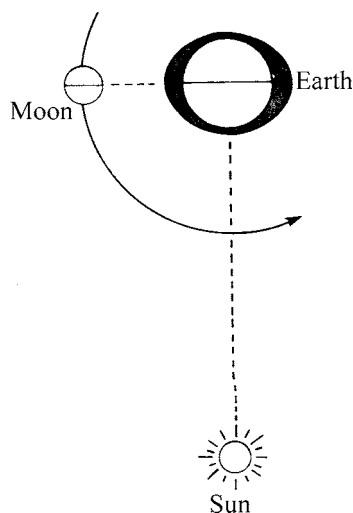


SECTION E - APPLIED SCIENCE (72 marks)

Answer TWO questions from this section.

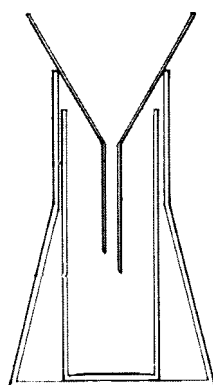
10. EARTH SCIENCE. Answer any **two** of the following, (a), (b), (c).

- (a) At certain times there are neap tides and spring tides. The moon influences tides. The diagram shows the positions of earth, sun and moon at a neap tide.



- What is a neap tide? (6)
- Draw a diagram showing the positions of earth, sun and moon at a spring tide. (6)
- Name a phase of the moon that could occur at (i) a neap tide, (ii) a spring tide. (6)

(b) The instrument shown in the diagram is used in a weather station.



- (i) Name the instrument shown and state how to use it. (9)
- (ii) What is measured with an anemometer? (6)
- (iii) Give one advantage of the aneroid barometer. (3)
- (c) The earth's atmosphere contains water vapour.
- (i) Write a brief account of a laboratory experiment to show the presence of water vapour in air. (9)
- (ii) How is fog formed? Why do cloudless skies favour fog formation? (9)

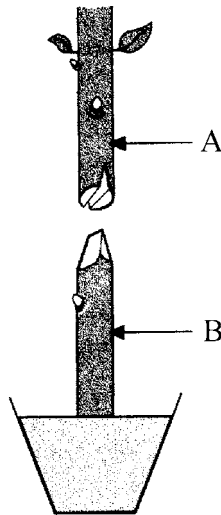
11. HORTICULTURE. Answer any **two** of the following, (a), (b), (c).

(a) Name two elements that are major plant nutrients. (6)

Outline an experiment to show the effect of the lack of essential nutrients on plant growth. (9)

What effect has the addition of lime on the pH of acid soil? (3)

(b) Parts A and B shown in the diagram were prepared for grafting. Name A and B. (6)



Name the layer of cells in A and B that must make contact for a successful graft. (3)

Give two steps that are taken in the grafting procedure after A and B are put together. (6)

State one reason why grafting is used to propagate plants. (3)

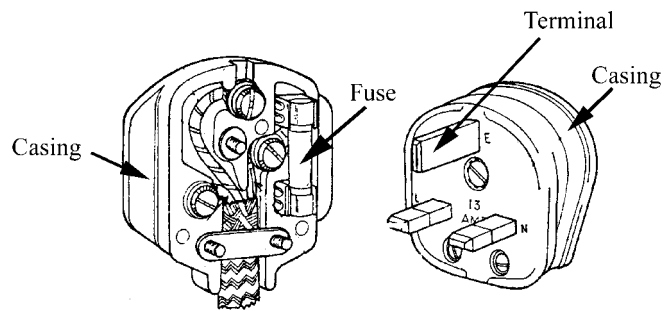
(c) Name two types of grass that are sown to grow lawns for amenity use. Give a reason why one of the grasses, that you have named, is used for this purpose. (9)

What is a mulch?

Name a common mulch and give one advantage or one disadvantage of its use. (9)

12. MATERIALS SCIENCE. Answer both parts, (a) and (b).

(a) The diagram shows a 13 A plug.



Name the material used to make (i) the plug casing, (ii) the terminals, (iii) the fuse casing. (9)

Give one other use in the home for each of the materials you have named. (9)

(b) Answer **one** of the following.

(i) PLASTICS

Many plastics are made from oil as follows:
molecules called monomers are made first;
the monomers are then reacted to form polymers.

Explain the underlined terms. (6)

Describe an experiment to investigate the flexibility of two plastics. (12)

(ii) METALS

Why are some metals found in nature in a pure state?

Name a metal that is found in nature in a pure state. (6)

Describe an experiment to extract copper metal from copper ore. (12)

(iii) TEXTILES

Textiles are made by producing yarn from fibres. The yarn is then made into cloth or fabric.

Name a fibre used to make yarn.

Give one way in which yarn can be made into a fabric. (6)

Describe an experiment to compare the absorbency of two fabrics. (12)

(iv) TIMBER

Felled trees are cut into thick planks, which are then seasoned.

Explain the underlined term.

Give one method of seasoning timber. (6)

Name a manufactured board and state how it is made. (12)

13. FOOD. Answer any **two** of the following, (a), (b), (c).

(a) Why is protein essential in our diet to maintain a healthy body? (3)

(3) Name one food that is rich in protein.

Describe a laboratory test for protein in food. (12)

(b) Why is grass converted into silage? (6)

Outline how grass could be made into silage in a laboratory. (12)

(c) What is biotechnology? Give an example of biotechnology. (9)

Antibiotics are used to treat domestic animals.

State one precaution taken so that eggs, meat, milk, etc., are free of antibiotics and so are safe for human consumption. (6)

Give one reason why food “goes off”. (3)

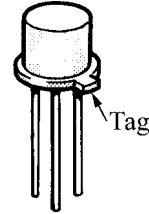
14. **ELECTRONICS.** Answer **both** parts, (a) and (b).

(a) State what is meant by a variable resistor and give its symbol. (6)

Draw a circuit diagram showing how a variable resistor can be used to vary the voltage applied to a bulb by a battery.

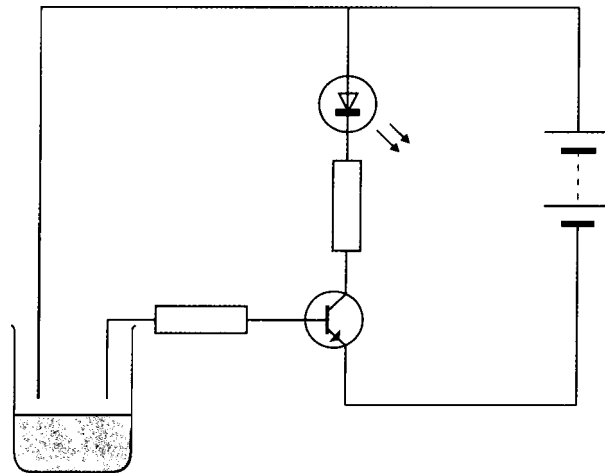
What effect will varying the voltage have on the bulb? (12)

(b) Name the component shown in the diagram. (3)



What is the terminal nearest the tag called? (3)

This component is used in the water-level detecting circuit shown below.



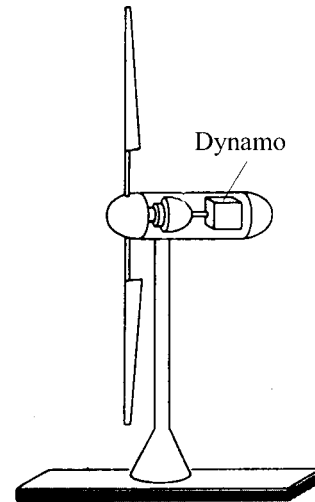
What happens to the LED when the water touches the wires in the beaker?
Give a reason for your answer. (12)

15. ENERGY CONVERSIONS. Answer **both** parts, (a) and (b).

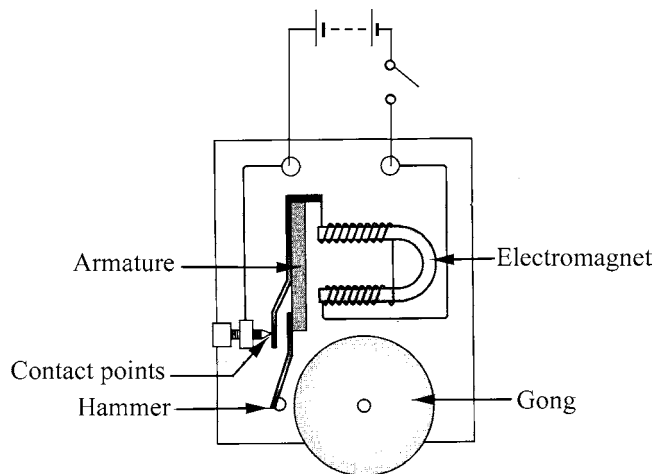
(a) There are wind farms in Ireland using wind turbines to make electricity.

The diagram shows a wind turbine.

- (i) Name the form of energy carried by wind. (6)
- (ii) What energy change happens in the dynamo? (6)
- (iii) Name two other sources of energy that can be used to make electricity. (6)



(b) The diagram shows an electric bell.



Explain how the electric bell works.

(18)