

NAME:



OUNDLÉ

School

Junior Entrance and Scholarship Examinations 2014

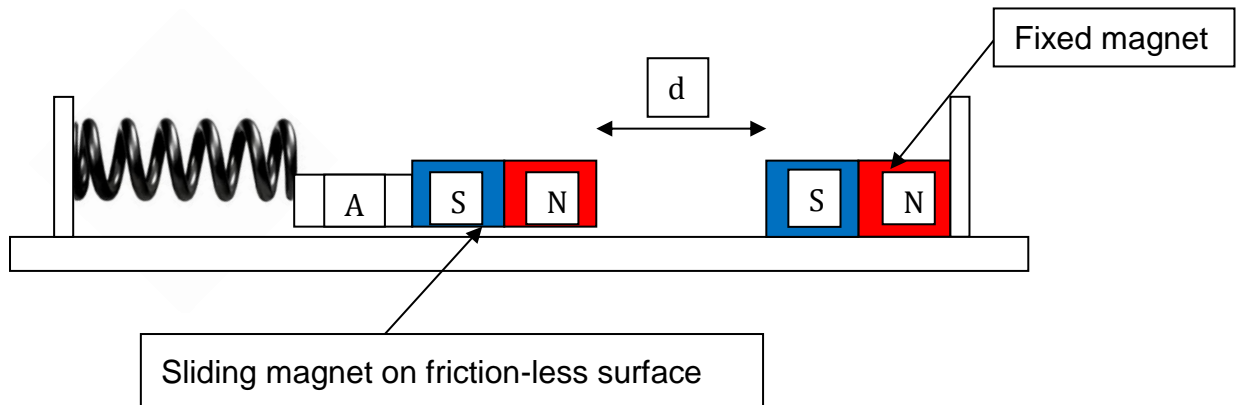
Science Theory Paper

Time allowed: 1 hour

- You have **10 minutes reading time**. In this time, you should look at the questions in the paper and choose which to do.
- **Answer only 3** of the 5 questions in the paper, the choice is totally up to you.
- You have **50 minutes to answer your 3 questions**.
- You will need a pen, pencil, ruler and calculator

This question is about springs and magnets

1. Jayne was investigating stretching springs using magnets to supply the force:



- Draw an arrow on the diagram to show the direction of the force from the spring on the block A. **Label this arrow S.** (1)
- Draw an arrow on the diagram to show the direction of the force from the magnets on the block A. **Label this arrow M.** (1)

Jayne used different springs of different stiffness (high stiffness springs are more difficult to stretch) and measured the equilibrium distance, d between the 2 magnets for each spring.

Here are her results:

Stiffness of Spring (N/m)	Equilibrium Distance, d , between the magnets (cm)
10	6
20	9
30	13
40	18
50	25
60	34

- What is the relationship between the stiffness of the spring and the equilibrium distance between the magnets?

.....

(1)

- d. The apparatus was set up with a spring of stiffness 30 N/m, and the magnets were replaced with stronger magnets. Suggest a likely distance between the magnets when equilibrium is reached.

..... (1)

- e. The right hand magnet is now turned round so that its North pole faces the North pole of the left hand magnet:



- i) What happens to the magnets now?

.....
..... (1)

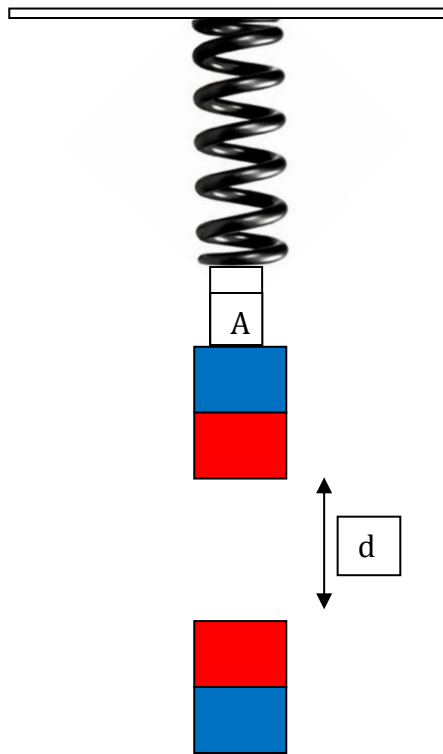
- ii) What does this do to the spring?

.....
..... (1)

- iii) What will be the relationship between the stiffness of the spring and the equilibrium distance between the magnets with the apparatus set up this way round?

.....
..... (1)

f. The apparatus is now hung from a support:



i) What additional force is now acting?

.....
.....

(1)

ii) What effect will this additional force have on the equilibrium distance?

.....
.....

(1)

iii) The top magnet is now replaced with an iron block. What will happen now?

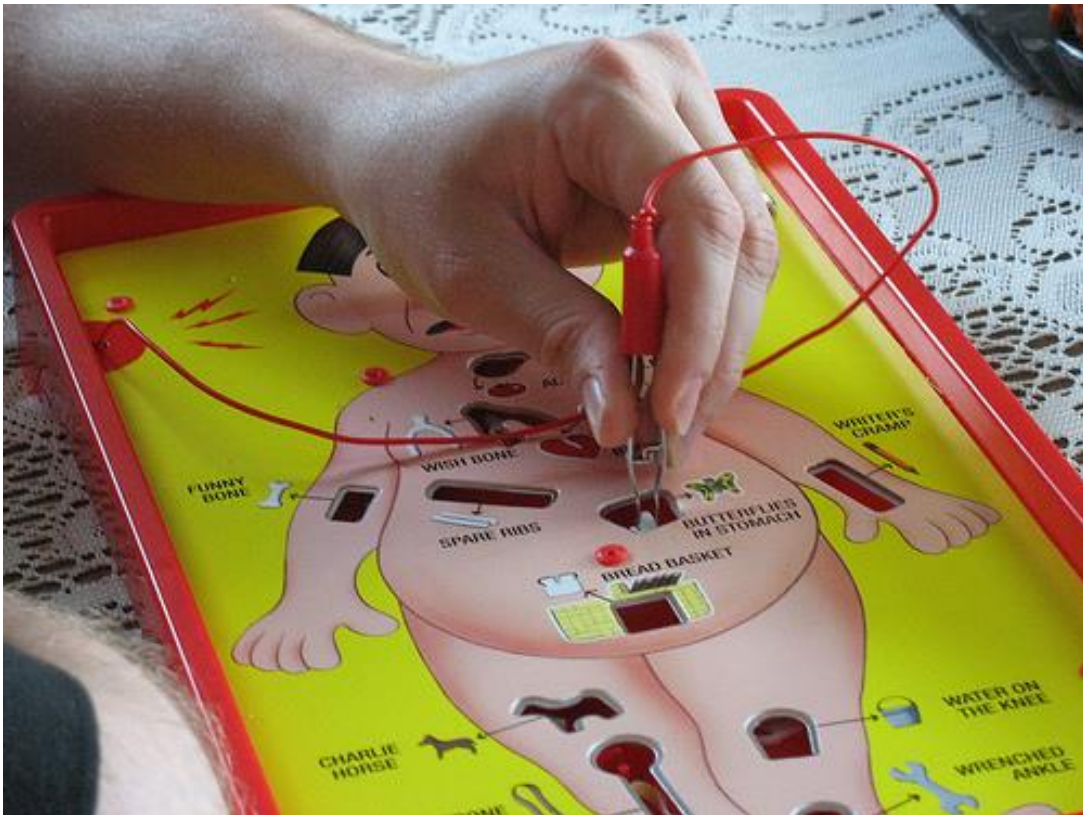
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(1)

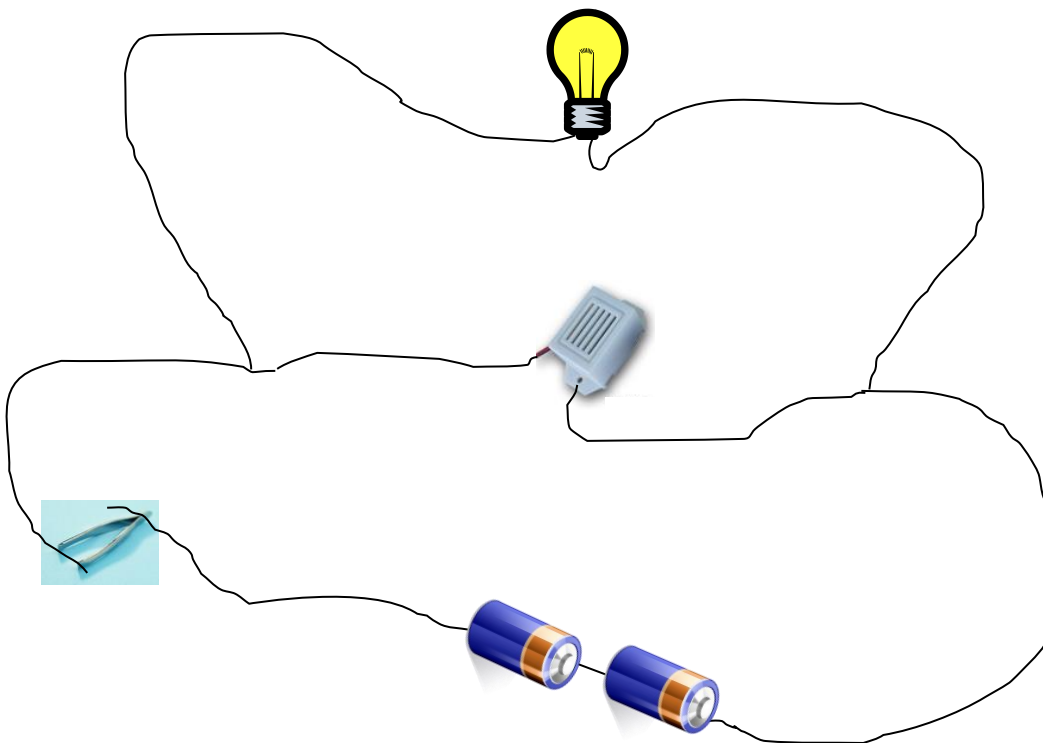
[Total: 10 marks]

This question is about electricity

- Erin builds a circuit for the game of Operation where a patient's nose will light up and a buzzer will sound if the surgeon's tweezers touch the sides of the surgical hole:



Here is the circuit he builds:



- a. Draw Erin's circuit, using conventional circuit symbols (the tweezers behave like a switch in this circuit)

(4)

- b. Suggest a suitable material for the tweezers to be made from and give a reason for your choice.

.....
.....

(2)

- c. Erin's younger brother unscrews and steals the lamp so that Erin can no longer play the game. However, Erin says that the game is still possible in this state.

State and explain why.

.....
.....
.....

(2)

- d. Erin would like to add an extra feature to his game, where a motor will switch on to make the patient frown when the surgeon's tweezers touch the side of the surgical hole.

Using the correct symbol, add a motor to your circuit diagram in a) to show where it would need to be placed in the circuit, so that it would still work, even if the lamp and the buzzer were both broken.

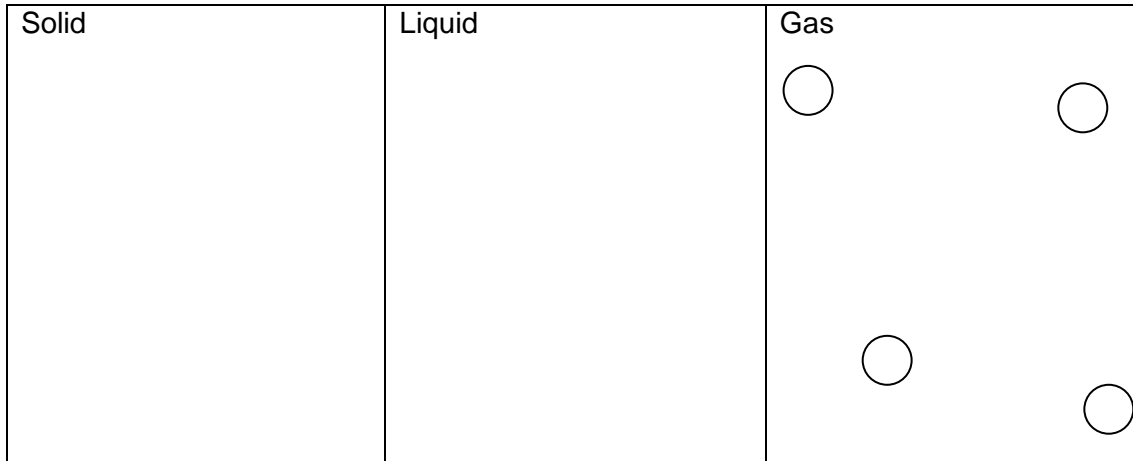
(2)

[Total: 10 marks]

This question is about solids, liquids, and gases

3. All matter exists in one of three states - solid, liquid or gas.
 a. Complete the following boxes to show how particles are arranged in each of the three states.
 One has already been done for you.

(2)



- b. Name the process that accompanies the following change of state:

- i. Solid to liquid.

.....

(1)

- ii. Liquid to gas

.....

(1)

- iii. Solid to gas

.....

(1)

c. The list below gives six substances.

- Aluminium
- Beer
- Copper
- Milk
- Pure water
- Sodium chloride

i. Put each substance in the correct column of the table.

ELEMENTS	COMPOUNDS	MIXTURES

(2)

ii. Sodium chloride (common table salt) dissolves easily in pure water to form salt water (brine).
Carefully describe how you could separate the dissolved sodium chloride from the salty solution.
A diagram can be used to aid your answer.

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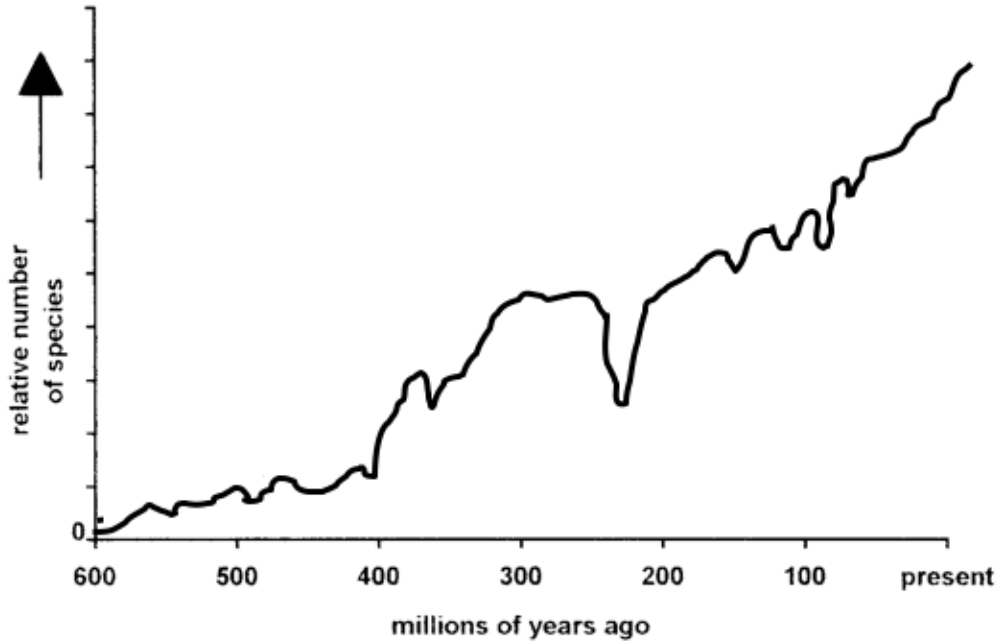
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..... (3)

[Total: 10 marks]

This question is about ecosystems and decay

4. The graph shows the relative numbers of different species of organisms present on the Earth from 600 million years ago to the present time.



- a. What is the general trend in the number of species from 600 million years ago to the present?

..... (1)

- b. Describe what happened to the number of species between 300 and 200 million years ago.

.....
.....
.....
..... (3)

c. Suggest **two** reasons why species become extinct.

1.

.....

2.

.....

(2)

d. When animals and plants die they are usually eaten or decay.
In certain circumstances organisms can be preserved as fossils because one or more of the conditions needed for decay are missing.
State **one** condition needed for decay which was missing in the following cases:

i. A baby mammoth found frozen in Siberia.

.....

(1)

ii. A mummified mammal found in a desert.

.....

(1)

iii. An insect found sealed in amber (a solidified resin from a tree).

.....

(1)

e. What term is used to describe the series of gradual changes that occur in a species over many generations?

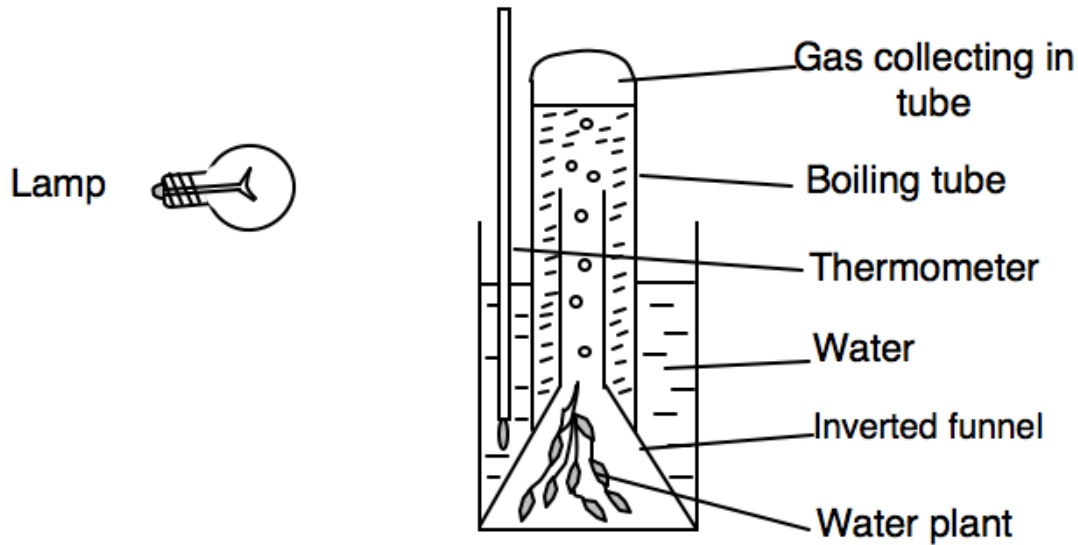
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(1)

[Total: 10 marks]

This question is about plants

An experiment was carried out to investigate the effect of light intensity on the rate of photosynthesis of a water plant. The diagram below shows the apparatus used.



- a. Suggest how you ensure that the plant had a good supply of carbon dioxide?

.....
(1)

- b. Which gas does the plant give off?

.....
(1)

- i. How could you test for this gas?

.....
(1)

- c. How could you prevent the heat from the lamp affecting the experiment? Show this on the diagram.

.....
(1)

- d. How would you use this apparatus to investigate the effect of increasing light intensity on the rate of photosynthesis?

.....
.....
.....
.....
(3)

e. The following data were collected using different coloured light filters.

Light filter	Number of bubbles in 30seconds.
White	88
Red	78
Blue	67
Green	22

i. How could this experiment be improved to make these results more reliable?

.....
(1)

ii. With reference to the table explain why photosynthesis is slowest in green light.

.....
.....
(2)

[Total: 10 marks]