

Name and School:



OUNDLE

School

2018 Academic Scholarship
Preliminary Examination

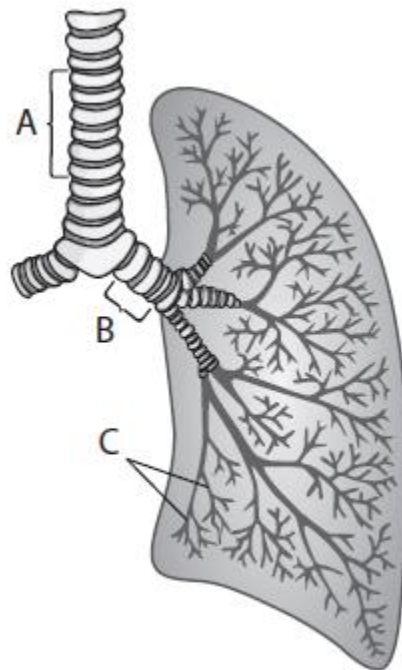
Science

Time Allowed : 60 minutes

- Write your name on the question paper
- Write all your answers on the question paper
- Calculators are allowed

Biology Section

1. The picture below is part of a system found in the human body.



a. What system is it part of?

..... [1]

b. Can you name structures A and C?

i. A: [1]

ii. C: [1]

c. Smoking can cause several diseases in the body. Can you name

i. One disease linked to smoking that affects the lungs?

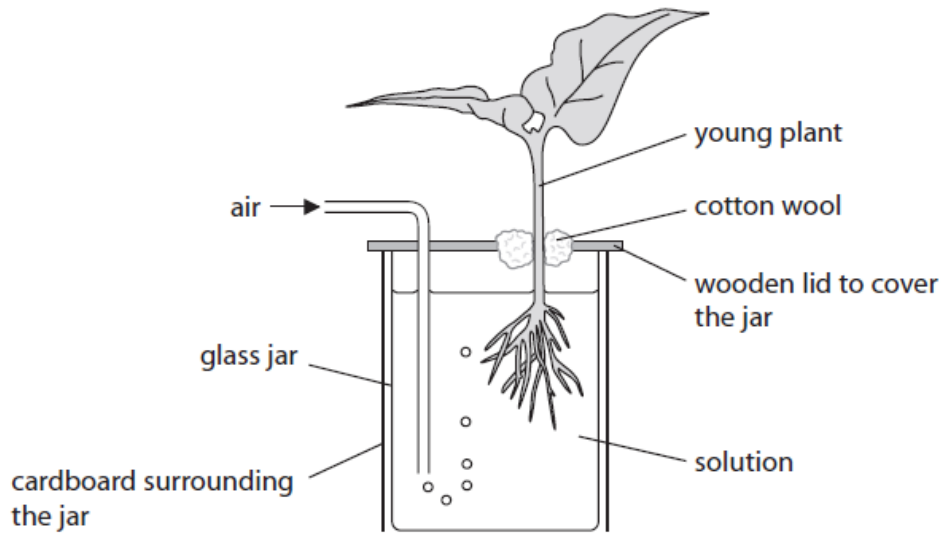
..... [1]

ii. One disease linked to smoking that affects another part of the body?

..... [1]

Total: 5 marks

2. Plants can be grown in solutions that contain everything they require (see diagram below)



a. On the diagram above, draw a line to the part of the plant that is responsible for support and anchorage. Label the line with the name of the part. [2]

b. For the plant to photosynthesise, it needs four things. Can you name any three of these?

- 1.
- 2.
- 3. [3]

c. The cardboard is put around the glass jar to stop any light reaching the water. Can you think of a reason why that is important?

-
-
-
-
- [2]

d. Give the word equation for photosynthesis in the space below

[2]

e. What do plants use magnesium for?

..... [1]

Total: 10 marks

3.

a. Can you name one important difference between an insect and an arachnid (a spider)

..... [1]

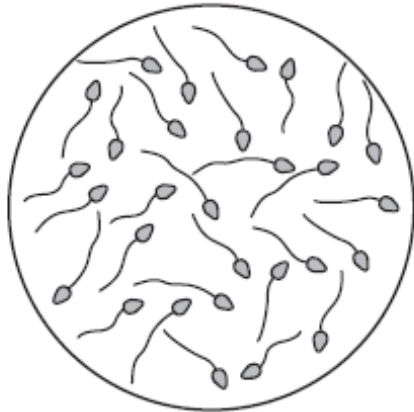
b. Can you name one important difference between a reptile and an amphibian?

..... [1]

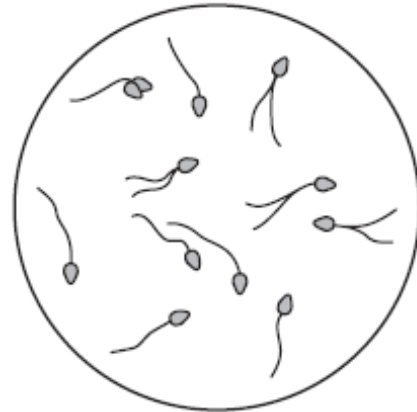
Total: 2 marks

4. The picture below shows sperm cells from two different men.

Man A



Man B



a. Man A is more fertile (it is easier for him to have babies with his partner) than Man B. Can you give two reasons why this might be?

Reason 1:

.....

.....

Reason 2:

.....

..... [2]

b. What does the nucleus of the sperm contain?
..... [2]

c. Sperm and egg cells are a special type. What are they called?
..... [1]

d. When the sperm and egg come together, their two nuclei join. What is this process called?
..... [1]

Total: 6 marks

Chemistry Section

5. This question is about solvents, solutes and solutions.

Water is a good solvent for most polar compounds, however, there are compounds which do not dissolve in water.

a. Give the name of two alternative solvents to water.

.....
..... [2]

b. Given a beaker of water and a beaker of table salt (sodium chloride), describe how you could prepare a saturated solution.

Make reference to the names of any apparatus you would use.

.....
.....
.....
.....
..... [3]

c. A saturated solution of sodium chloride is also known as brine. Give two differences between brine and seawater.

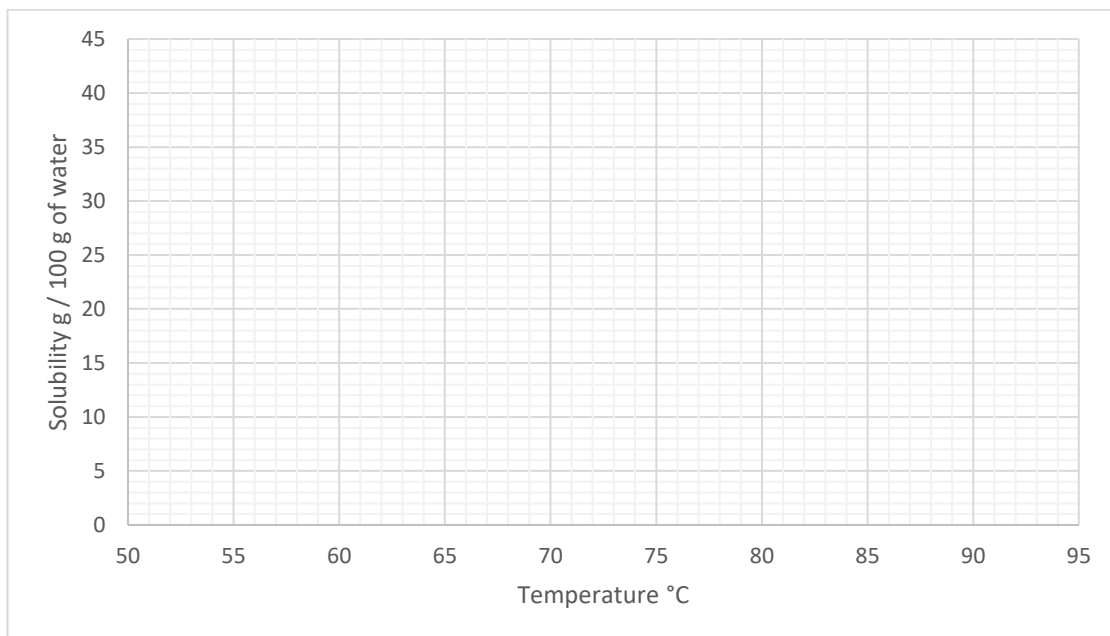
.....
..... [2]

d.

- i. The solubility of sodium chloride in water varies with the temperature of the water.

Draw a line on the graph below which illustrates the relationship between the two variables. Label the line *sodium chloride*.

[2]



- ii. Above 50°C the solubility of carbon dioxide gas in water is approximately inversely proportional to increasing temperature.

On the graph above draw a line showing this trend in solubility. Label the line *carbon dioxide*.

[2]

- e. Describe what happens to the solvent molecules when a solution is heated.

.....
.....
..... [2]

Total: 13 marks

Physics Section

1. In a race, a car travels 60 times around a 3.6 km track. This takes 2.4 hours.

What is the average speed of the car?

- A 1.5 km/h B 90 km/h C 144 km/h D 216 km/h

Answer..... [1]

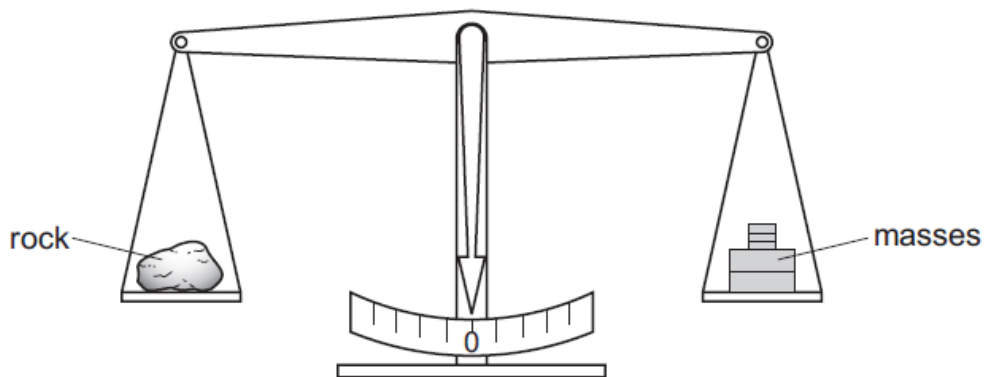
2. Which quantity is measured in joules?

- A density
- B energy
- C pressure
- D weight

Answer..... [1]

3. A geologist places a small rock on the left-hand pan of a balance. The two pans are level as shown when the masses with a total weight of 23N are placed on the right-hand pan.

Take the weight of 1.0 kg to be 10N.



What is the mass of the small rock?

- A 0.023 kg B 2.3 kg C 23 kg D 230 kg

Answer..... [1]

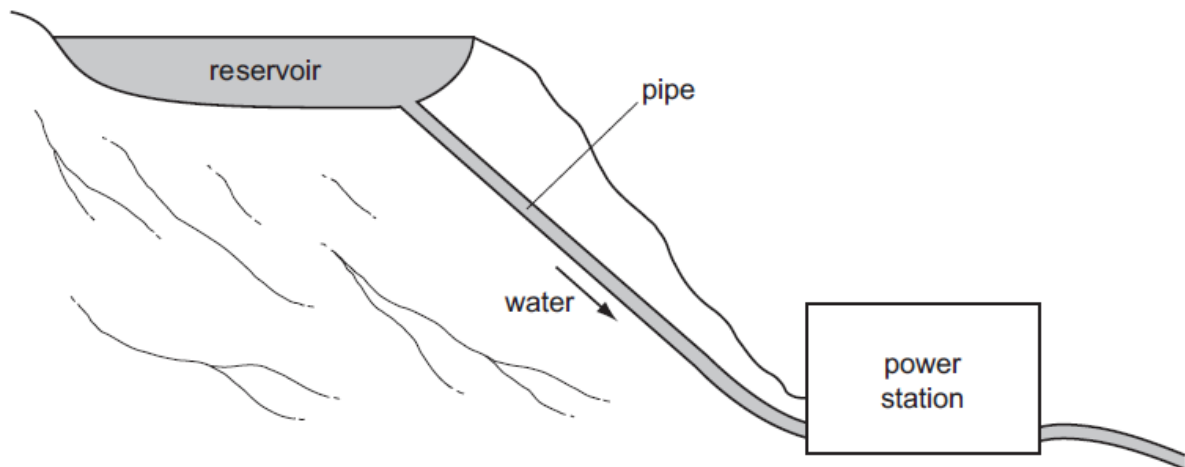
4. A stone has a volume of 0.50 cm^3 and a mass of 2.0 g .

What is the density of the stone?

- A 0.25 g/cm^3
- B 1.5 g/cm^3
- C 2.5 g/cm^3
- D 4.0 g/cm^3

Answer..... [1]

5. The diagram shows a hydroelectric system.

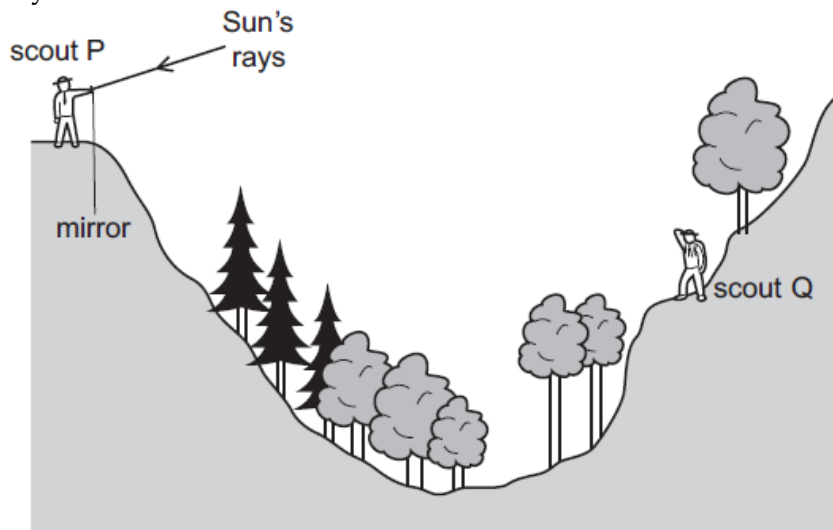


What are the main energy changes taking place?

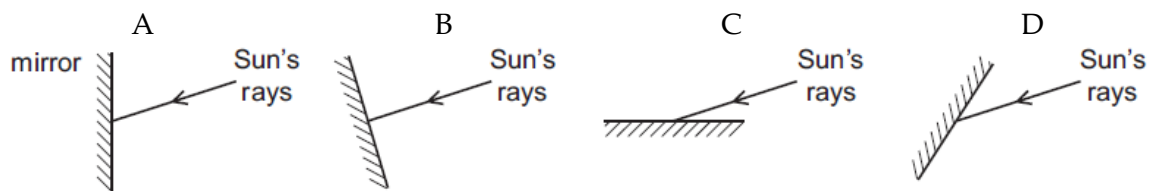
- A chemical energy \rightarrow kinetic energy \rightarrow electrical energy
- B electrical energy \rightarrow gravitational energy \rightarrow kinetic energy
- C gravitational energy \rightarrow kinetic energy \rightarrow electrical energy
- D kinetic energy \rightarrow electrical energy \rightarrow gravitational energy

Answer..... [1]

6. Scout P signals to scout Q on the other side of a valley by using a mirror to reflect the Sun's rays.



Which mirror position would allow the Sun's rays to be reflected to scout Q?



Answer..... [1]

7. A gardener studies the growth of one of his plants. At the same time each day, he measures the height h of the top of the plant from the ground, as shown in Fig. 7.

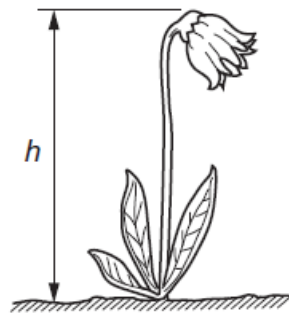


Fig. 7

The table of his results is shown below.

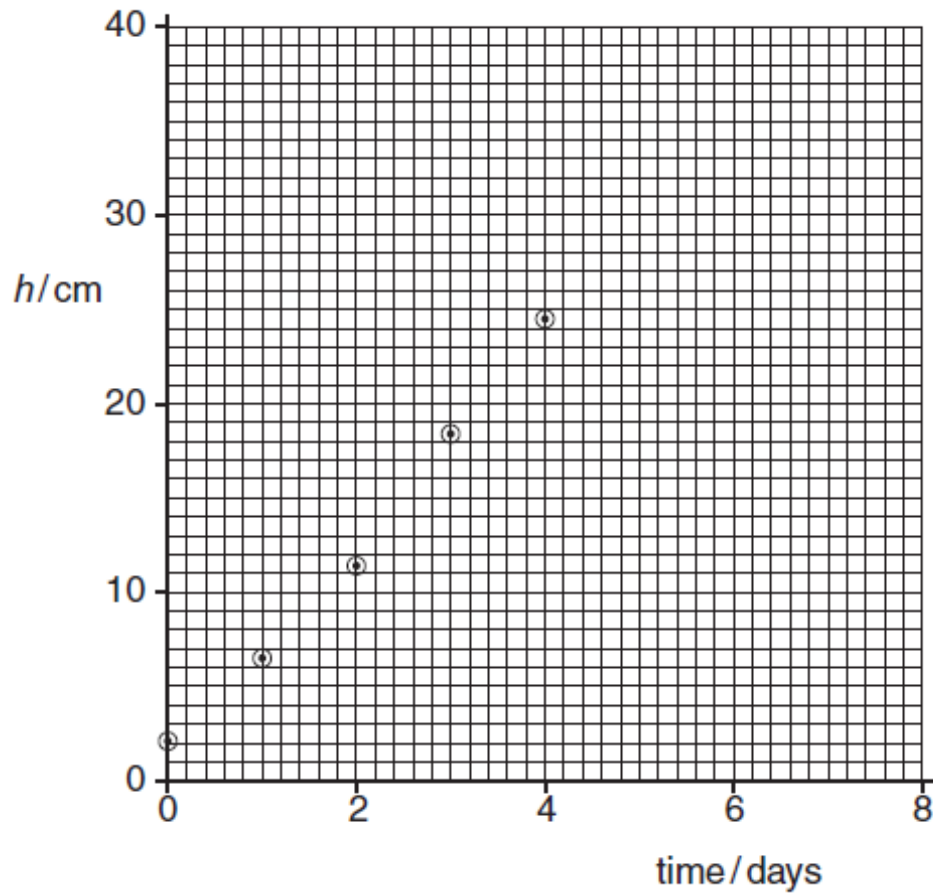
time since first measurement / days	0	1	2	3	4	5	6	7
height h / cm	2.1	6.5	11.4	18.4	24.5	26.7	30.7	37.1

- a. From the values in the table, deduce the average speed of growth of the plant during the 7 days. Work in days and cm.

average speed = cm / day **[4]**

b.

- i. Complete graph by plotting the last three values of height h against time. Do **not** draw a line through the points.



[2]

- ii. Describe how the graph shows that the speed of growth of the plant is not constant.

.....
..... [1]

Total: 7 marks

8. A student has devised the circuit in Fig. 8.1 to control the lighting of three lamps, A, B and C.

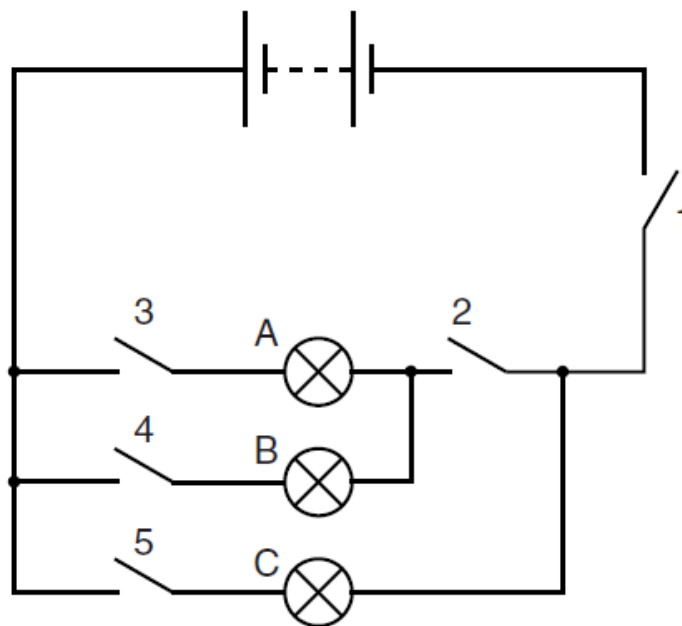


Figure 8.1

More than one switch must be closed in order to light any lamp.

- a. In the table below, put ticks to indicate which switches **must** be closed in order to light the lamps. The first row has been completed for you.

lamp that is lit	switches closed				
	1	2	3	4	5
lamp A only	✓	✓	✓		
lamp B only					
lamp C only					

[3]

- b. **All** the switches are now closed.

Which of the lamps light up? [1]

- c. Which one switch **must** be open to ensure that none of the lamps light up?

..... [1]

d. The student then builds the following circuit Fig. 8.2.

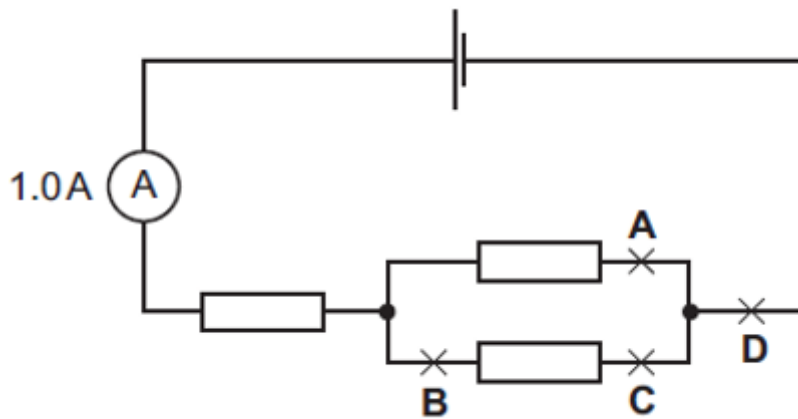


Figure 8.2

The reading on the ammeter in the circuit is 1.0A and all the resistors are identical.

i. What would be the reading on an ammeter placed at point D?

Current = A [1]

ii. What would be the reading on an ammeter placed at point C?

Current = A [1]

Total: 7 marks