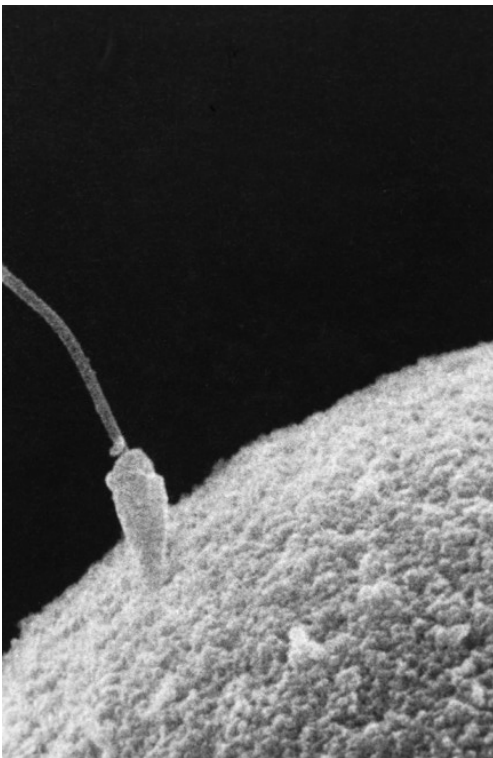


# 2<sup>nd</sup> Year Science, Summer 2022

Time allowed: 1 hour

**Mr. A. Goodison**

Student Name \_\_\_\_\_



Answer all questions in the spaces provided.

Good luck!

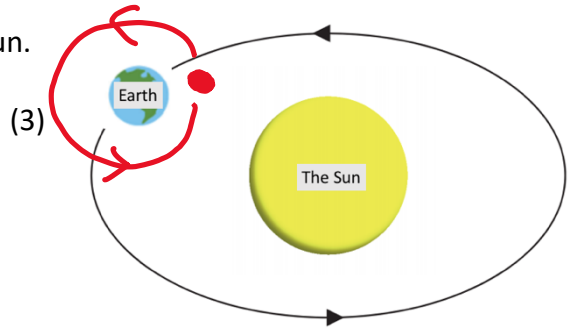
An image of a sperm fertilising an egg.

Question	Marks	Awarded
<b>Total</b>	<b>65</b>	
<b>Grade descriptor</b>		

Junior Cycle	
Percentage	Grade Descriptor
≥ 90 to 100	Distinction
≥ 75 and < 90	Higher Merit
≥ 55 and < 75	Merit
≥ 40 and < 55	Achieved
≥ 20 and < 40	Partially Achieved
≥ 0 and < 20	Not Graded (NG)

### Question 1

The diagram on the right shows the Earth orbiting the Sun. Complete the diagram to show the shape, location and motion of the Moon in the Earth-Sun-Moon system. (3)



The images below show different phases of the Moon in sequence, from left to right. Place a tick (✓) in the box beneath the image which shows the Moon in a waning gibbous phase. (1)








Shade in the image of the Moon on the left to illustrate the next phase of the Moon in the sequence above. (1)

Why Do we only see one side of the Moon, and never the far-side side? (2)

The moons orbital period is the same as its rotational period.

### Question 2 (short questions)

a) Lithium (Li) as it appears on the periodic table is on the right.

How many protons, neutrons and electrons does an atom of lithium have?

Protons: 3      Neutrons: 7-3=4      Electrons: 3      (3)

3
<b>Li</b>
6.941

b) Which subatomic particles have a negative charge? Electrons (1)

c) In a cell, what is the name of the cell structure that stores DNA? Nucleus (1)

d) In a cell, what is the location of respiration, where energy is released from food? (1)

<u>The mitochondria</u>
-------------------------

e) In the digestive system, what is the location where nutrients are absorbed into the blood? (1)

The small intestine

f) Name a pH indicator Litmus or universal indicator (1)

g) Give the colour the indicator you named above is when in an acid red (1)

(j) Describe one difference between sexual and asexual reproduction. (1)

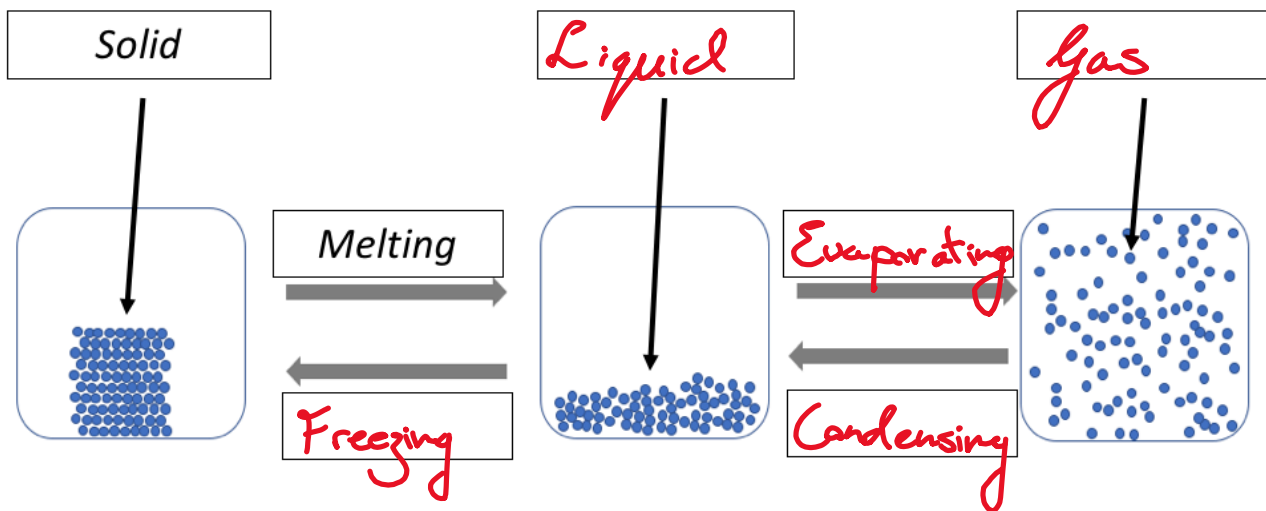
In asexual reproduction only one parent is involved, while in sexual reproduction there are two.

(k) Describe one difference between a physical and chemical change. (1)

In a physical change no new substance (type of particle) is formed, whereas in a chemical change a new substance (type of particle) is formed. Extra: in a chemical change bonds are broken and formed

### Question 3

a) The diagram below shows three states of matter and the changes of state. Fill in the blanks to complete the diagram. (5)



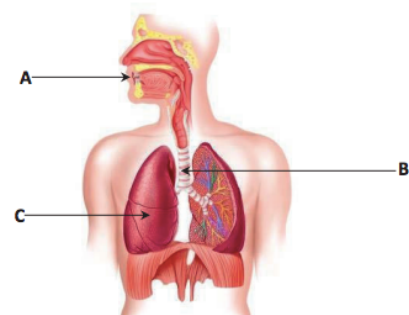
### Question 4

The diagram shows the human respiratory system.

(a) Complete the table below by matching the words to the letters in the diagram. (3)

Lung                      Trachea                      Liver  
Oesophagus                      Mouth

Letter	Part of the respiratory system
A	Mouth
B	Trachea
C	Lung



(b) Describe what happens in the respiratory system when a person breathes in. (3)

When a person inhales the diaphragm lowers. This decreases the pressure inside the lungs. The lungs expand and air is taken in. Air travels down the trachea into the lungs. Once the air has entered the lungs it goes into tiny air sacs called alveoli. This is where diffusion happens.

Oxygen leaves the lungs and enters the blood while carbon dioxide leaves the blood and enters the lungs or alveoli. (Any three of the highlighted words in context gives full marks)

## Question 5

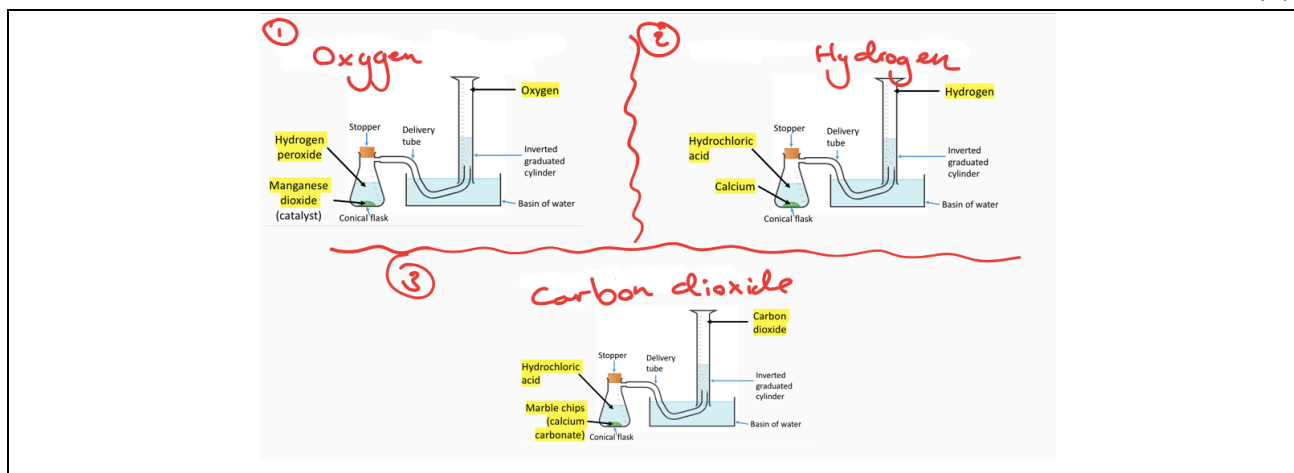
Some chemical reactions proceed quickly while some proceed at a slower rate.

During your studies, you investigated the effect of a number of variables on the rate of production of a common gas.

(a) Name a common gas that could be produced in the laboratory. (1)

Oxygen or hydrogen or carbon dioxide

(b) Draw a labelled diagram of how this gas could be produced. Include labels for any equipment and chemicals used. (5)



(c) Explain how you tested this gas to confirm its identity. Include the result of the test. (2)

Correct test for gas. Eg. Oxygen relights a glowing splint. Hydrogen ignites with a pop sound.

Carbon dioxide turns lime water milky.

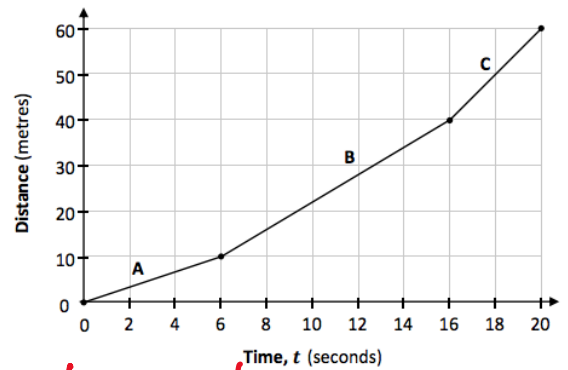
(d) Another student was asked to investigate what effect increasing temperature has on the rate of a chemical reaction. Write a suitable hypothesis for this investigation (2)

If I increase the temperature then, I think, the rate of the chemical reaction will increase

## Question 6

Martin took part in a 60 metre race.

The graph below shows his distance-time graph. The graph is in three sections, labelled A, B, and C



(a) How many seconds did it take Martin to finish the race? 20 seconds (1)

(b) What distance had Martin travelled after 16 seconds? 40 metres (1)

(c) Which was Martin's fastest section (A, B, or C) of the race? Justify your answer. (2)

C, because the slope is the most steep.

(d) Find Martin's speed during his fastest section of the race, include the units in your answer. (3)

$$\text{speed} = \frac{\text{Distance}}{\text{Time}}$$

$$= \frac{20\text{m}}{4\text{s}} = 5\text{m/s}$$

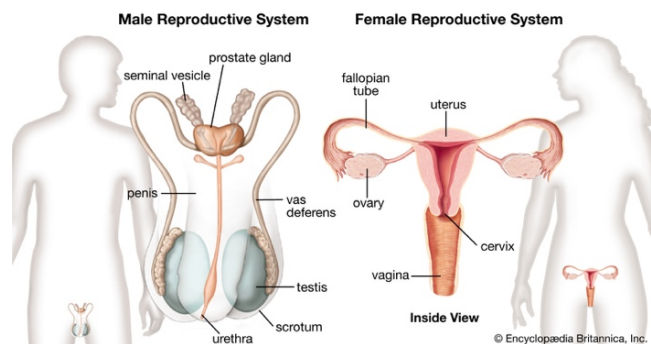
$$\text{speed} = ?$$

$$\text{Time} = 20 - 16 = 4\text{s}$$

$$\text{Dist} = 60 - 40 = 20\text{m}$$

## Question 7

The diagram below show some of the parts of the male and female reproductive system.



a) Give one function of the Ovary? (1)

It produced the female sex cell (egg) or It produced the hormone estrogen

b) Where is sperm produced? Testis (1)

c) Where does fertilisation occur? Fallopian tube (1)

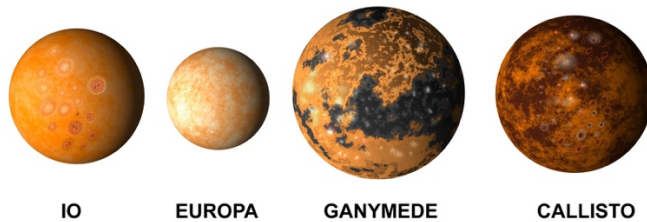
d) What is the function of the uterus (womb)? (1)

This is where the foetus (baby) develops. Or It protects the developing baby

## Question 8

The planet Jupiter is the largest planet in our solar system and is described as a “gas giant”. Jupiter has four large moons and many smaller ones. These large moons were discovered in 1610 by Italian scientist Galileo Galilei. Data about the size and density of the four large moons of Jupiter are given in the table below.

Moon of Jupiter	Diameter (km)	Density (g/cm <sup>3</sup> )
Io	3640	3.53
Europa	3120	3.01
Ganymede	5270	1.94
Callisto	4820	1.83



IO

EUROPA

GANYMEDE

CALLISTO

Data about the size and density of some other objects in our solar system are given in the table below.

Object	Diameter (km)	Density (g/cm <sup>3</sup> )
Mercury	4880	5.43
Earth	12700	5.51
Earth's Moon	3470	3.34
Mars	6780	3.93
Jupiter	140000	1.33
The Sun	139000000	1.41

a) What is the diameter of Europa? (1)

3120 Km

b) Which planet has the smallest diameter? (1)

Mercury

c) Which planet has the greatest density? (1)

Earth

d) Jack and Emma look at the data in the tables. Jack says “I think as the diameter of the increases the density increases” Emma disagrees. Does the data support Jack’s hypothesis? Explain your answer. (1)

No, the data does not support his hypothesis. From looking at the data we can see that Jupiter has the largest diameter of all the planets and moons but has the lowest density.

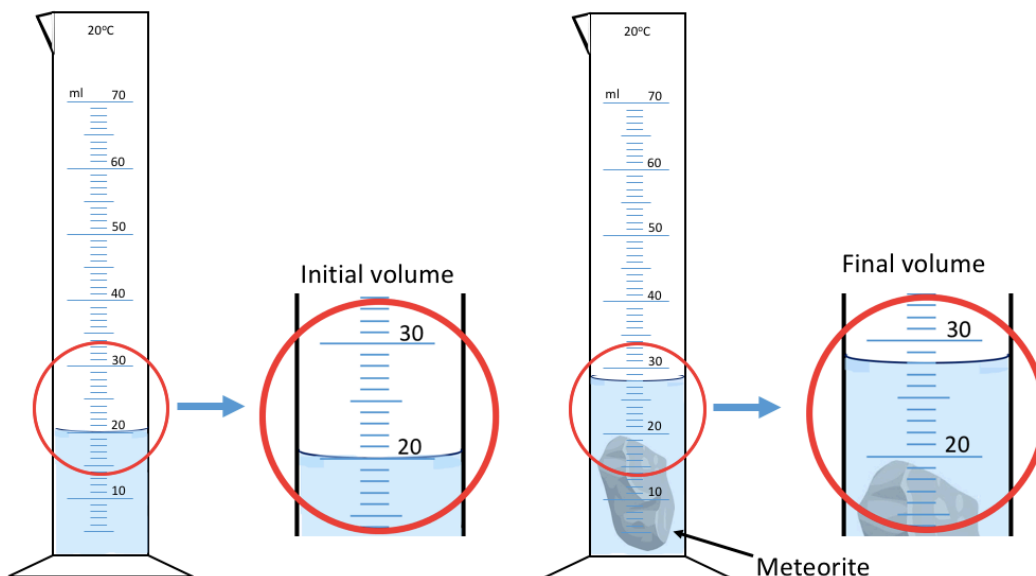
(e) Callisto is a moon and Mercury, of similar size, is a planet. What is the difference between a moon and a planet? (2)

A moon orbits a planet while a planet orbits a star.

### Question 7

A meteorite is an object that comes from outer space and lands on Earth.

Emma is working with a small meteorite which came from space and landed on Earth. She takes a piece of it and wants to measure its volume.



Study the diagram above for measuring the volume of the meteorite carefully.

a) Name the measuring instrument being used to measure the volume. (1)

Graduated cylinder

b) What was the initial volume of water? (1)

20 cm<sup>3</sup>

c) After the meteorite was added, what was the final volume? (1)

28 cm<sup>3</sup>

d) Calculate the volume of the meteorite. (1)

8 cm<sup>3</sup>

e) Afterwards, Emma then wants to measure the mass of the meteorite. What measuring instrument should she use to do this? (1)

Mass balance

The densities of four materials commonly found in space objects are given in the table on the right.

Object	Density (g/cm <sup>3</sup> )
Water	1.0
Granite	2.8
Basalt	3.0
Iron	8.0

The **mass of the meteorite was 24 g**. Using the **volume** of the meteorite which you calculated in part (d), Calculate the density of the meteorite and identify the meteorite as either, granite, basalt or iron using the table above. Include the unit with your answer. (4)

Use the correct formula from the list below to calculate the density.

Density =  $\frac{\text{mass}}{\text{Volume}}$

=  $\frac{24\text{g}}{8\text{cm}^3}$

=  $3\text{g/cm}^3$

Density (and unit) \_\_\_\_\_

Is the meteorite granite, basalt or iron? Basalt

	Forces and materials
$F = -ks$	Hooke's law
$\sigma = \frac{F}{A}$	stress
$\epsilon = \frac{\Delta l}{l}$	strain
$E = \frac{\sigma}{\epsilon}$	Young's modulus
$\rho = \frac{m}{V}$	density
$\mu = \frac{F}{R}$	coefficient of friction
$p = \frac{F}{A}$	pressure

**Finished early section**

Do you want to tell me something you learned in science this year which has not been asked in the exam? Use the space below to show off your scientific knowledge. You may get bonus points!

Show me what you learned!

+ 1 mark