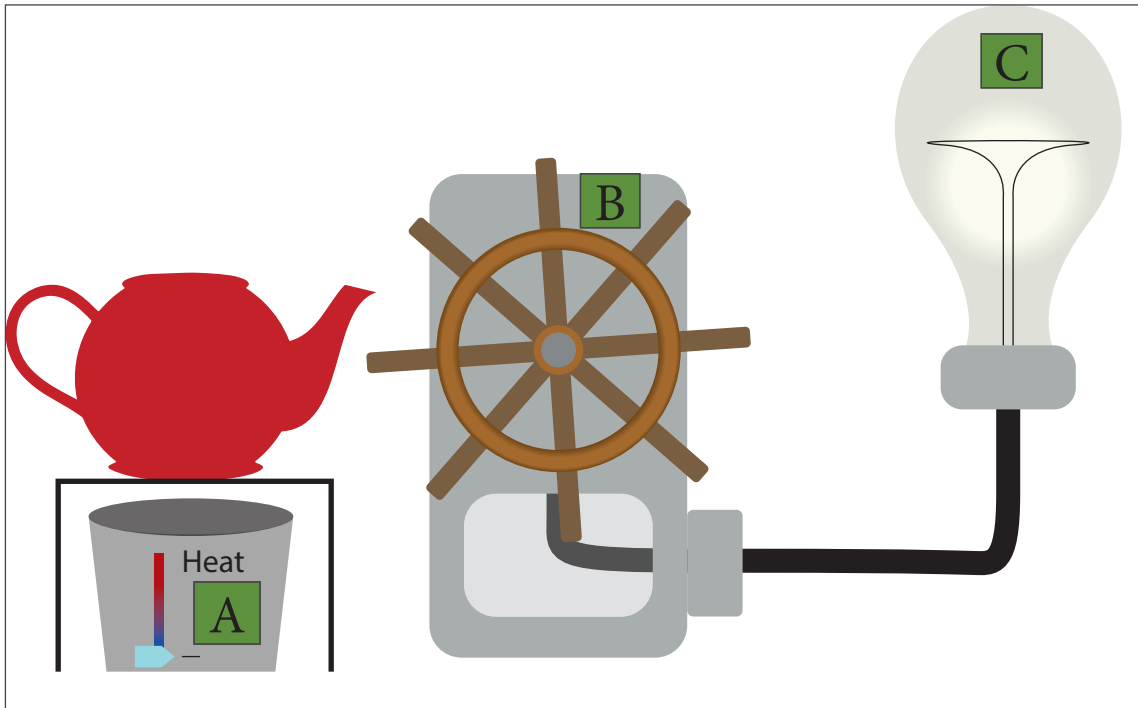


The sample material presented here has been prepared to support teacher professional development. It offers a broad indication of types and formats of assessment items that might be used to assess the learning outcomes in the Junior Cycle Science specification at a common level, but it is not a complete set of the types and formats that may be used. The items included should be read as examples of individual pieces of assessment material; they do not constitute full or partial examination papers. They are not full or partial questions from an examination paper, neither do they attempt to replicate how the examination paper might be laid out, for example, as an integrated booklet that includes the questions and the space for the student's responses.



## Question



The diagram shows a screen shot from a computer simulation. When the slider at A is moved up the heat to the kettle is increased. There is water in the kettle.

What do you think will happen to the wheel at B when the slider at A is moved up?

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Explain why you think this will happen.

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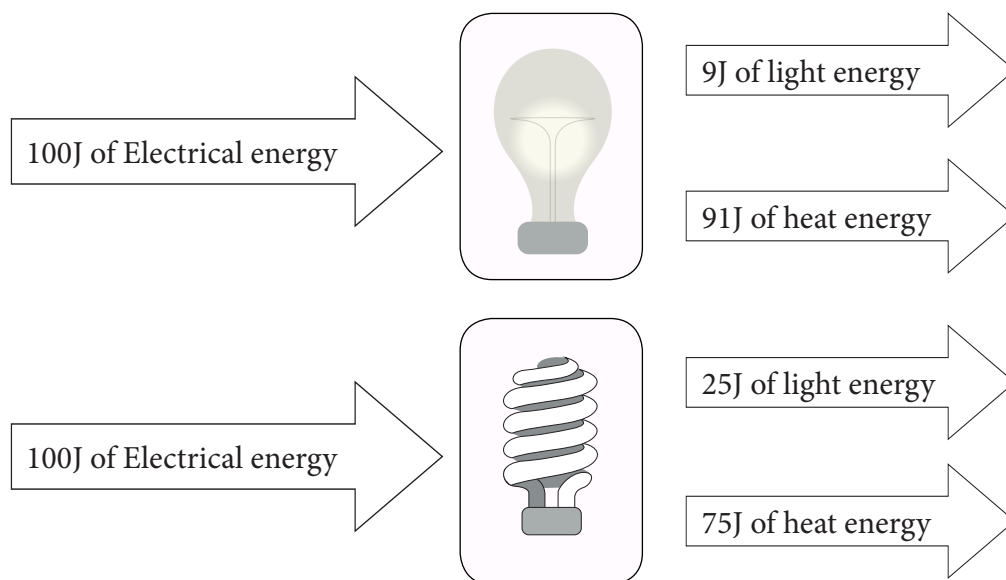
Some time after the slider was moved up the bulb C lights. List the energy changes that take place between point A and point C.

The following extract from a physics book uses the relationship between the *Useful output* and the *Input* of a device to define its efficiency

$$\text{Efficiency} = \frac{\text{Useful Output}}{\text{Input}} \times 100\%$$

You might use this relationship to help you answer part (b) below

b) Two types of light bulb are shown along with a diagram which shows the energy changes taking place in them.



Which bulb is more energy efficient?      A      B      (Circle your Answer)

Explain why you think this.

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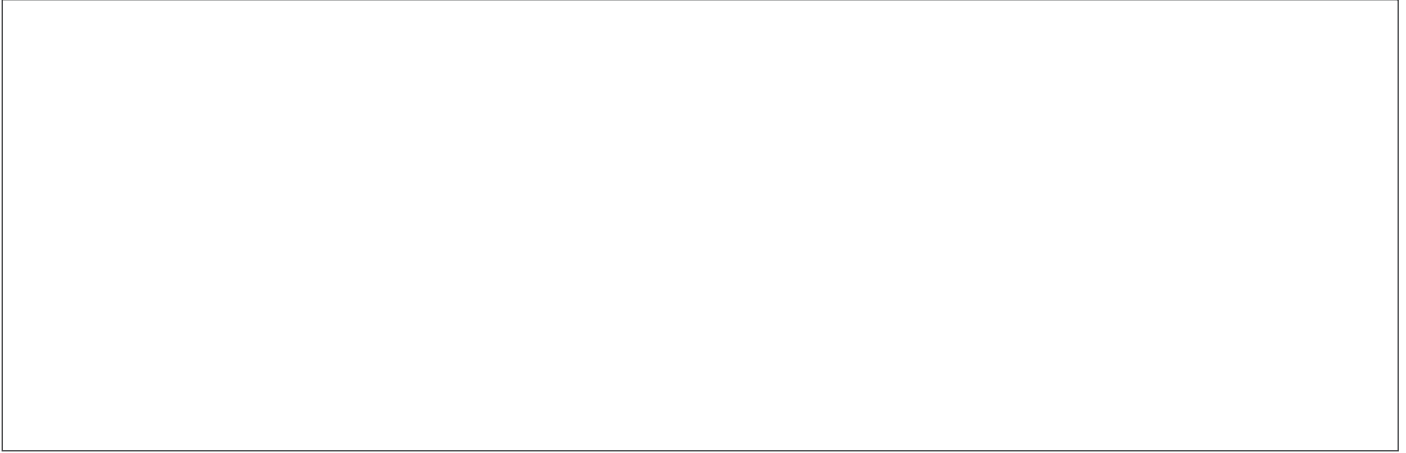
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During your study of junior cycle science you designed a device which transforms energy from one form to another.

In the space below describe the device you designed.

Draw a diagram showing the energy changes that took place in your device.



Describe how you could improve the efficiency of your device.

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## Question

The table below gives information about three fuels that can be used in cars. A tick (✓) shows a substance is produced when the fuel burns. An X shows a substance is not produced when the fuel burns.

fuel		physical state	energy released, in kJ/kg	some of the substances produced when the fuel burns		
				Water (H <sub>2</sub> O)	sulphur dioxide (SO <sub>2</sub> )	Carbon dioxide (CO <sub>2</sub> )
Petrol		liquid	48000	✓	✓	✓
ethanol (alcohol)	C <sub>2</sub> H <sub>6</sub> O	liquid	30000	✓	x	✓
hydrogen	H <sub>2</sub>	gas	121000	✓	x	x

(a) Which fuel releases the least energy per kilogram (kg)?

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(b) Some scientists say that if hydrogen is burned as a fuel there will be less pollution. From the information in the table, give one reason why there will be less pollution.

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(c) Which one of the three fuels in the table can be most easily compressed into a small container?

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(d) Which gas in the air is required for fuels to burn?

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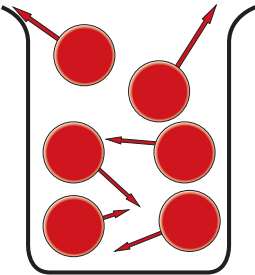
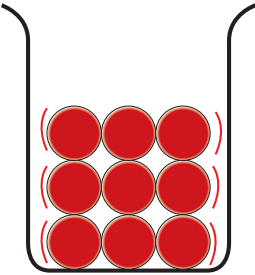
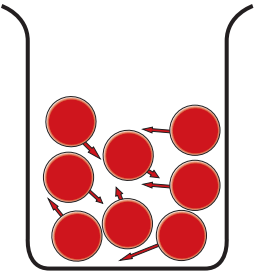


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## Question

The diagrams in the table below represent models of the different states of matter; solid, liquid and gas. Complete the table to show the state represented by each model.

Model	State of matter
	
	
	

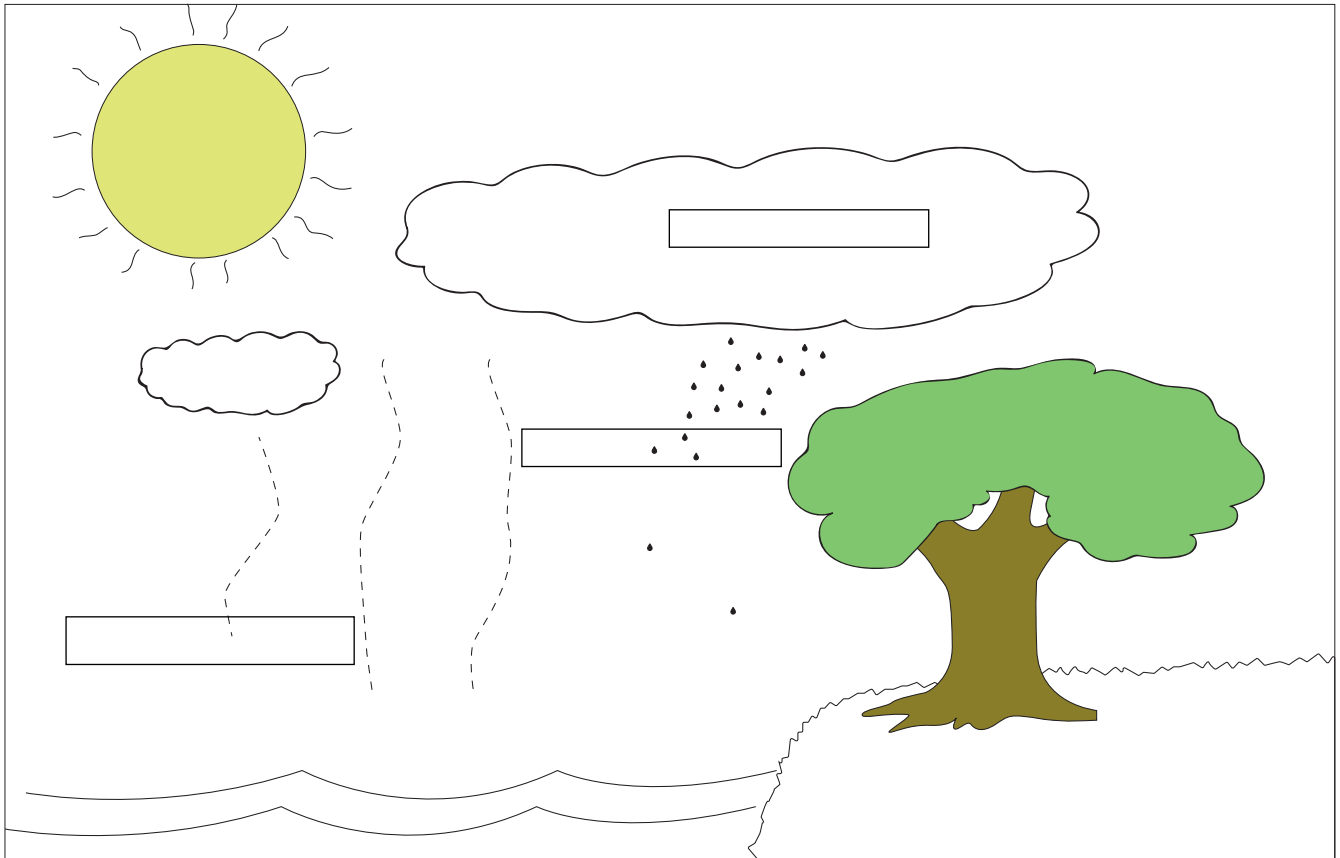
Water is a substance that can exist as a solid , liquid and a gas. Use the sentences in the boxes below to help you write a paragraph to explain what happens when ice melts.

The particles move around more  
 Heat energy is gained  
 Particles are not held together as strongly  
 The ice is heated  
 The ice is now water





(d) Water changes state during the water cycle. Use the diagram below and the words in the boxes to help you write a paragraph about how water is cycled in the water cycle.



The sun heats the water \_\_\_\_\_

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Heated

Cooled

Evaporates

Condenses

Falls



Rises





## Question

A lighting designer was investigating the type of lighting required for different areas of an Art exhibition.

Light intensity (lumens)	Power rating (watts)	
	Incandescent bulb 	Fluorescent bulb 
500	60	12
900	75	15
1200	100	20
1750	150	30
2600	200	40

(a) Draw two conclusions from her results.

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(b) Estimate the power rating of a fluorescent bulb with a light intensity of 1000 lumen \_\_\_\_\_ watts

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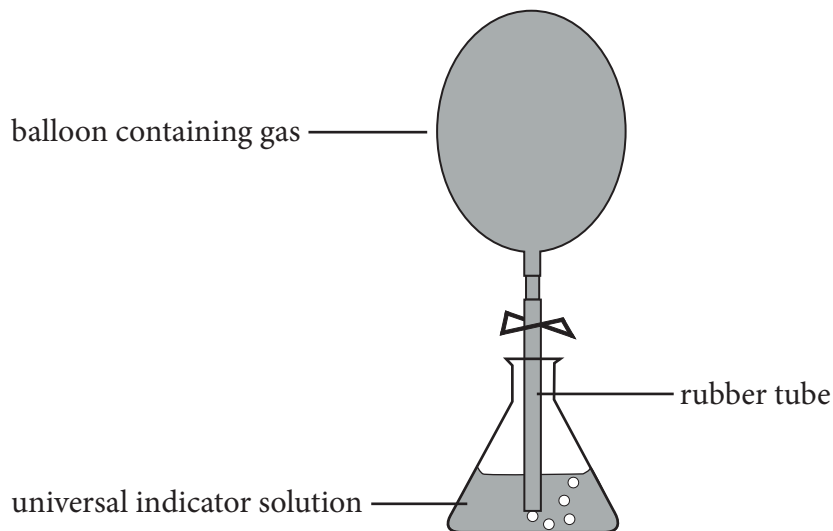


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## Question

Sophie investigated the acidity of four gases to see which gas might cause acid rain. She used balloons to collect the gases and bubbled the gases, in turn, through a fresh sample of green, neutral, universal indicator solution.



(a) Three of the gases caused the indicator to change colour.

Sophie added drops of a basic solution to the indicator until the indicator changed back to green. Her results are shown in the table below:-

Gases Collected	Change in colour of indicator	Number of drops of alkali needed to change the indicator back to green
carbon dioxide	green to red	161
Air	no change	0
human breath	green to yellow	11
exhaust gases from a car	green to red	32

Use information in the table to answer part (i) and part (ii) below.

(i) Which gas dissolved to form the most acidic solution?

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(ii) Justify your choice.

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(iii) Which gas formed a neutral solution?

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(iv) Justify your choice.

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(v) Outline a better/different way to measure the acidity of the solution.

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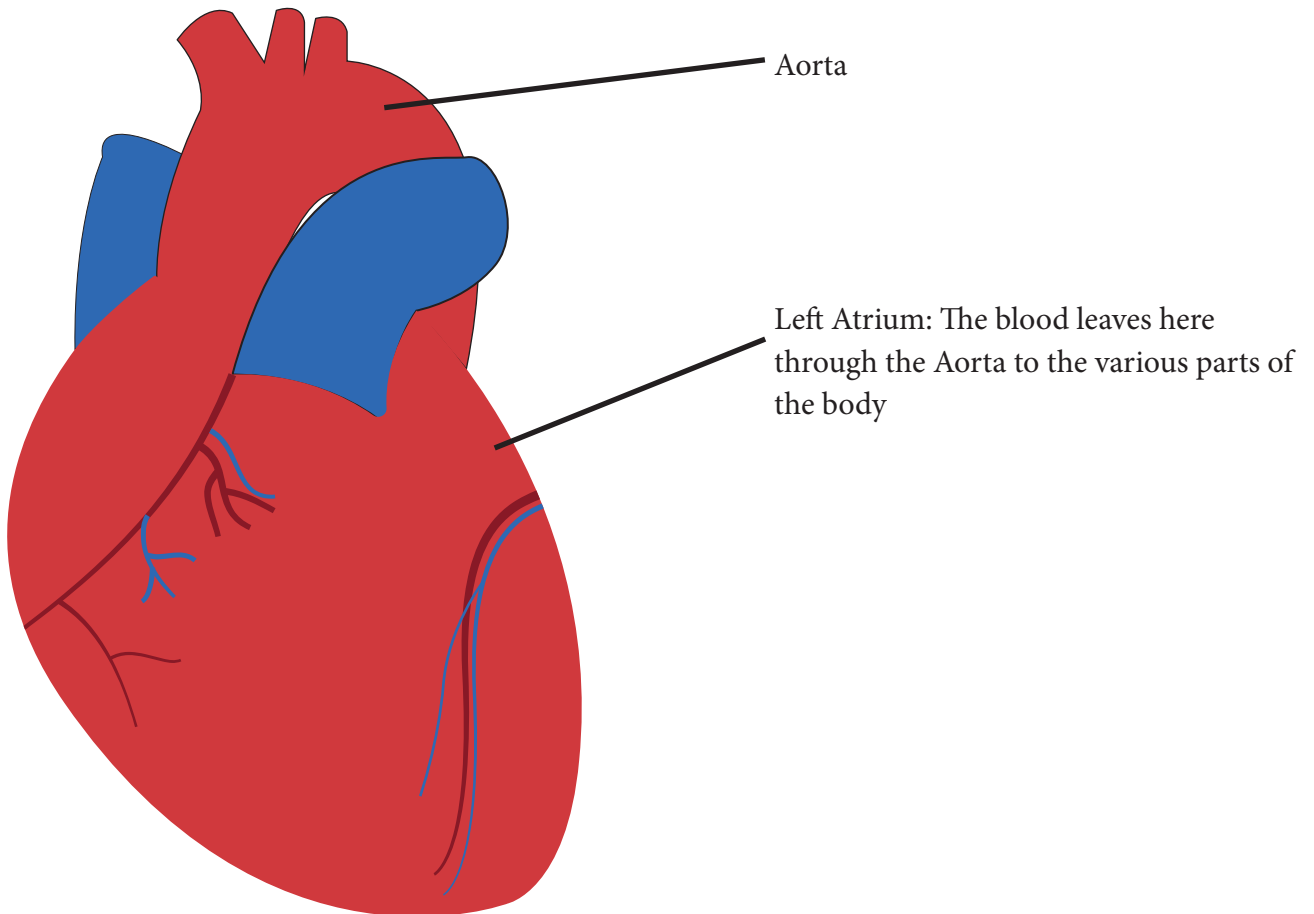




## Question

The organ that pumps the blood around the body is shown below

Name this organ \_\_\_\_\_



Construct a diagram/drawing to represent the journey taken by a litre of blood from when it leaves the **Left Atrium** until it eventually returns to the **Left Atrium** having visited the digestive and respiratory systems. Label your diagram and include in the labelling the names of the substances picked up and discharged at these locations.

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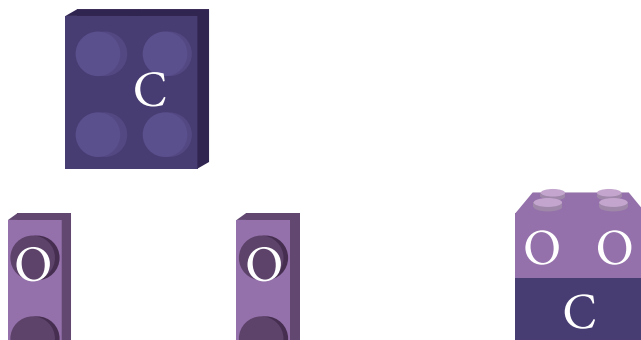


## Question

Coloured interlocking plastic bricks are one way of modelling how atoms combine to form compounds as shown in the following examples. The size of each piece represents the number of valence electrons in each atom.



Formula = NaCl  
Name = sodium chloride



Formula = CO<sub>2</sub>  
Name = carbon dioxide

hydrogen 1 <b>H</b> 1.0079																			helium 2 <b>He</b> 4.0026
lithium 3 <b>Li</b> 6.941	beryllium 4 <b>Be</b> 9.0122												boron 5 <b>B</b> 10.811	carbon 6 <b>C</b> 12.011	nitrogen 7 <b>N</b> 14.007	oxygen 8 <b>O</b> 15.999	fluorine 9 <b>F</b> 18.998	neon 10 <b>Ne</b> 20.180	
sodium 11 <b>Na</b> 22.990	magnesium 12 <b>Mg</b> 24.305												aluminium 13 <b>Al</b> 26.982	silicon 14 <b>Si</b> 28.086	phosphorus 15 <b>P</b> 30.974	sulfur 16 <b>S</b> 32.065	chlorine 17 <b>Cl</b> 35.453	argon 18 <b>Ar</b> 39.948	
potassium 19 <b>K</b> 39.098	calcium 20 <b>Ca</b> 40.078		scandium 21 <b>Sc</b> 44.956	titanium 22 <b>Ti</b> 47.867	vanadium 23 <b>V</b> 50.942	chromium 24 <b>Cr</b> 51.996	manganese 25 <b>Mn</b> 54.938	iron 26 <b>Fe</b> 55.845	cobalt 27 <b>Co</b> 58.933	nickel 28 <b>Ni</b> 58.693	copper 29 <b>Cu</b> 63.546	zinc 30 <b>Zn</b> 65.39	gallium 31 <b>Ga</b> 69.723	germanium 32 <b>Ge</b> 72.61	arsenic 33 <b>As</b> 74.922	selenium 34 <b>Se</b> 78.96	bromine 35 <b>Br</b> 79.904	krypton 36 <b>Kr</b> 83.80	
rubidium 37 <b>Rb</b> 85.468	strontium 38 <b>Sr</b> 87.62		yttrium 39 <b>Y</b> 88.906	zirconium 40 <b>Zr</b> 91.224	niobium 41 <b>Nb</b> 92.906	molybdenum 42 <b>Mo</b> 95.94	technetium 43 <b>Tc</b> [98]	ruthenium 44 <b>Ru</b> 101.07	rhodium 45 <b>Rh</b> 102.91	palladium 46 <b>Pd</b> 106.42	silver 47 <b>Ag</b> 107.87	cadmium 48 <b>Cd</b> 112.41	indium 49 <b>In</b> 114.82	tin 50 <b>Sn</b> 118.71	antimony 51 <b>Sb</b> 121.76	tellurium 52 <b>Te</b> 127.60	iodine 53 <b>I</b> 126.90	xenon 54 <b>Xe</b> 131.29	
caesium 55 <b>Cs</b> 132.91	barium 56 <b>Ba</b> 137.33	57-70 *	lutetium 71 <b>Lu</b> 174.97	hafnium 72 <b>Hf</b> 178.49	tantalum 73 <b>Ta</b> 180.95	tungsten 74 <b>W</b> 183.84	rhenium 75 <b>Re</b> 186.21	osmium 76 <b>Os</b> 190.23	iridium 77 <b>Ir</b> 192.22	platinum 78 <b>Pt</b> 195.08	gold 79 <b>Au</b> 196.97	mercury 80 <b>Hg</b> 200.59	thallium 81 <b>Tl</b> 204.38	lead 82 <b>Pb</b> 207.2	bismuth 83 <b>Bi</b> 208.98	polonium 84 <b>Po</b> [209]	astatine 85 <b>At</b> [210]	radon 86 <b>Rn</b> [222]	
francium 87 <b>Fr</b> [223]	radium 88 <b>Ra</b> [226]	89-102 * * *	lawrencium 103 <b>Lr</b> [262]	rutherfordium 104 <b>Rf</b> [261]	dubnium 105 <b>Db</b> [262]	seaborgium 106 <b>Sg</b> [266]	bohrium 107 <b>Bh</b> [264]	hassium 108 <b>Hs</b> [269]	meitnerium 109 <b>Mt</b> [268]	ununnium 110 <b>Uun</b> [271]	ununium 111 <b>Uuu</b> [272]	unubium 112 <b>Uub</b> [277]		ununquadium 114 <b>Uuq</b> [289]					

Draw diagrams, similar to above of the interlocking plastic bricks, to model 2 compounds of your choosing. Include the name and the formula for each compound.

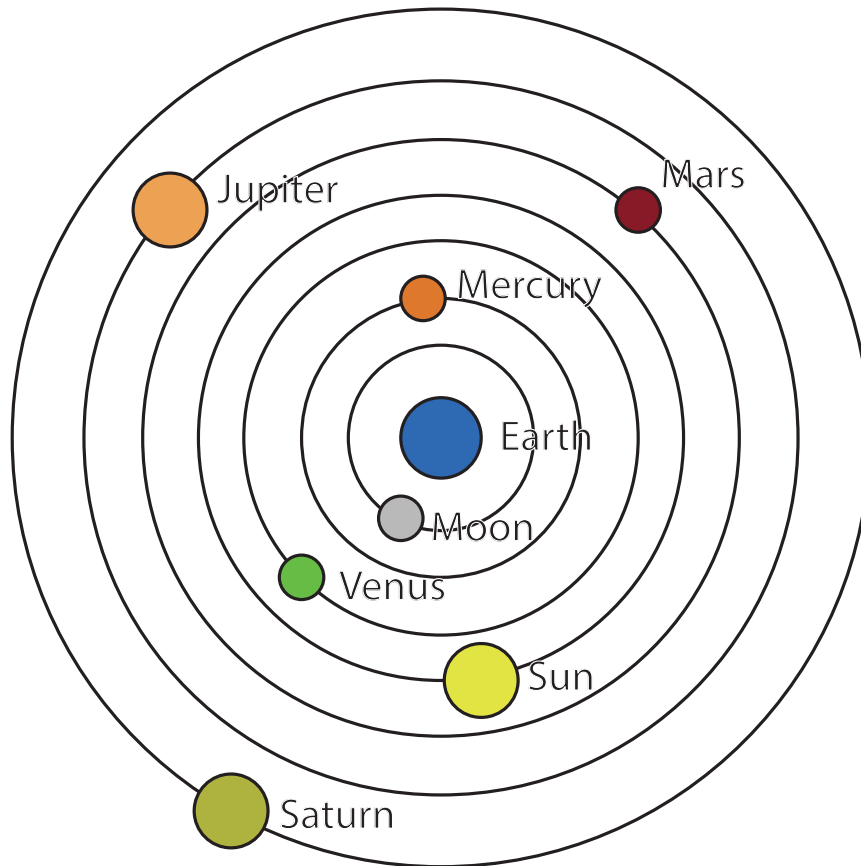
Formula =  
Name =

Formula =  
Name =

## Question

20

The diagram below shows how the astronomer Ptolemy drew the solar system over 2000 years ago.



not to scale

Today we know the correct arrangement of the planets and the sun in our solar system.

a) State two ways how the model above is incorrect.

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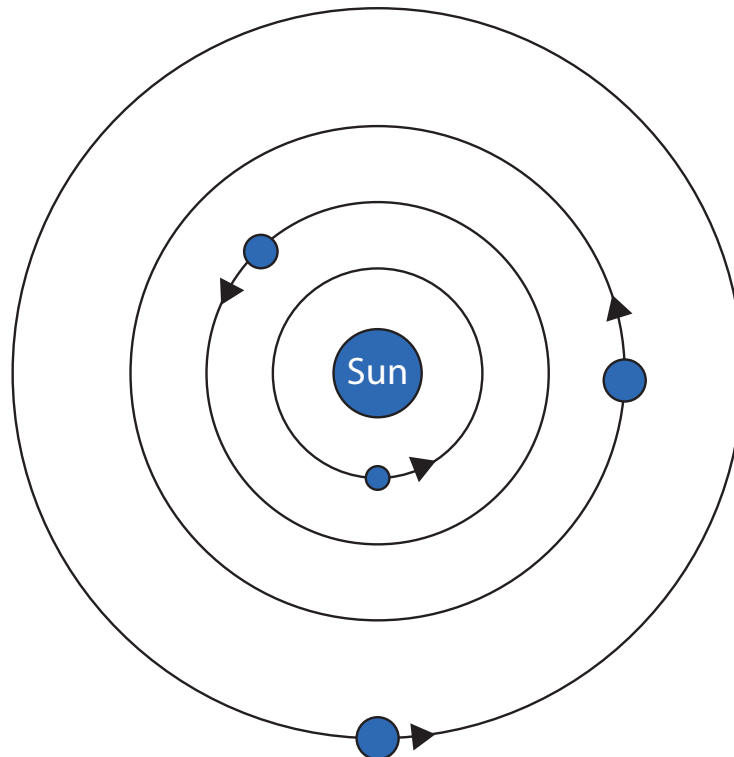
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## Question

The table below shows information about four planets

Planet	Approximate time taken to orbit the Sun (Earth Years)	Distance from the centre of the Sun (million km)
Mercury	0.25	60
Venus	0.5	108
Earth	1.0	150
Mars	2.0	228

a) Below is a model representing the information in the table. Label the diagram to show the position of the planets.

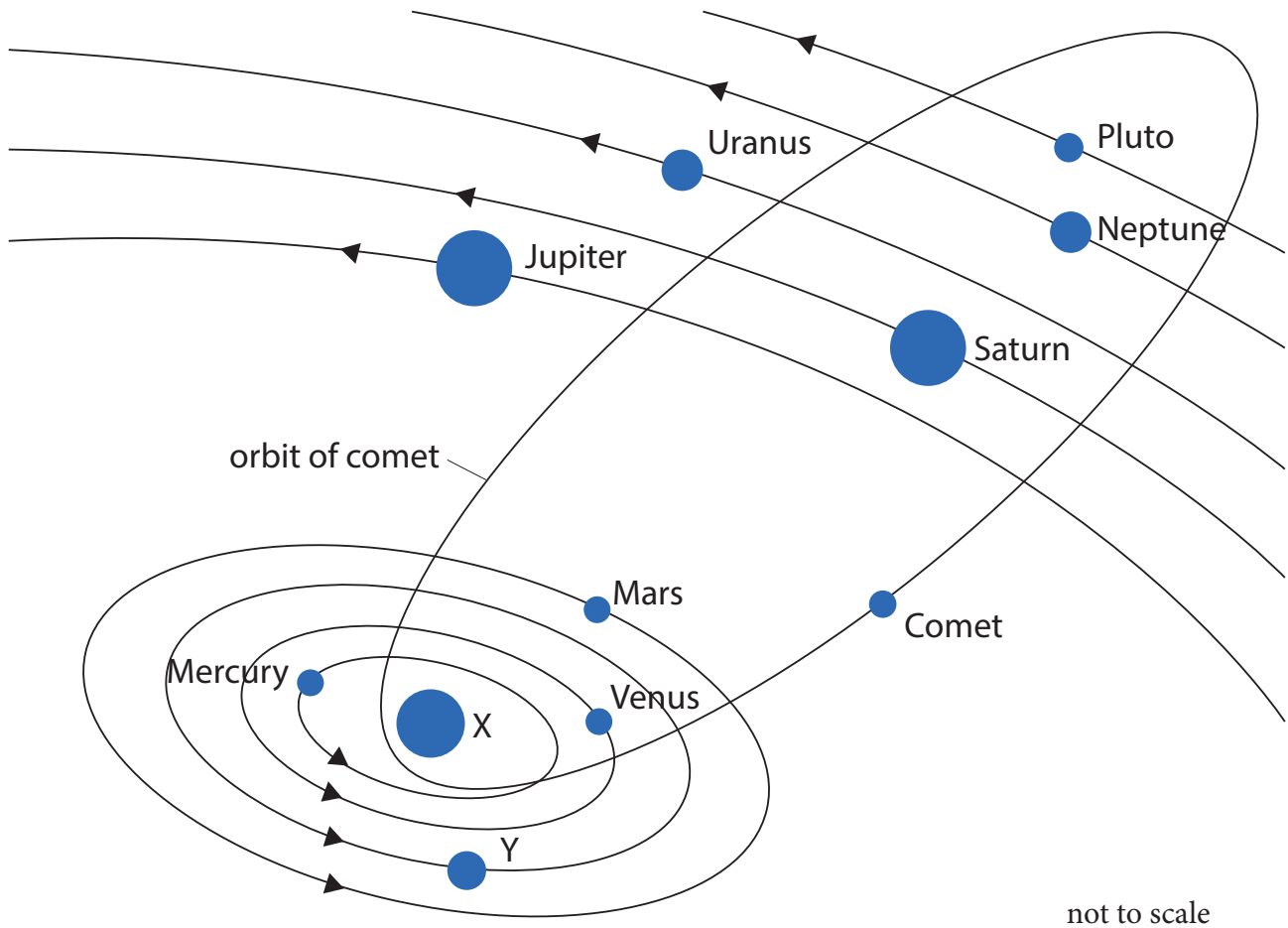


not to scale



## Question

The diagram below shows a model of the solar system



Name the objects marked X and Y in the model

X  
\_\_\_\_\_

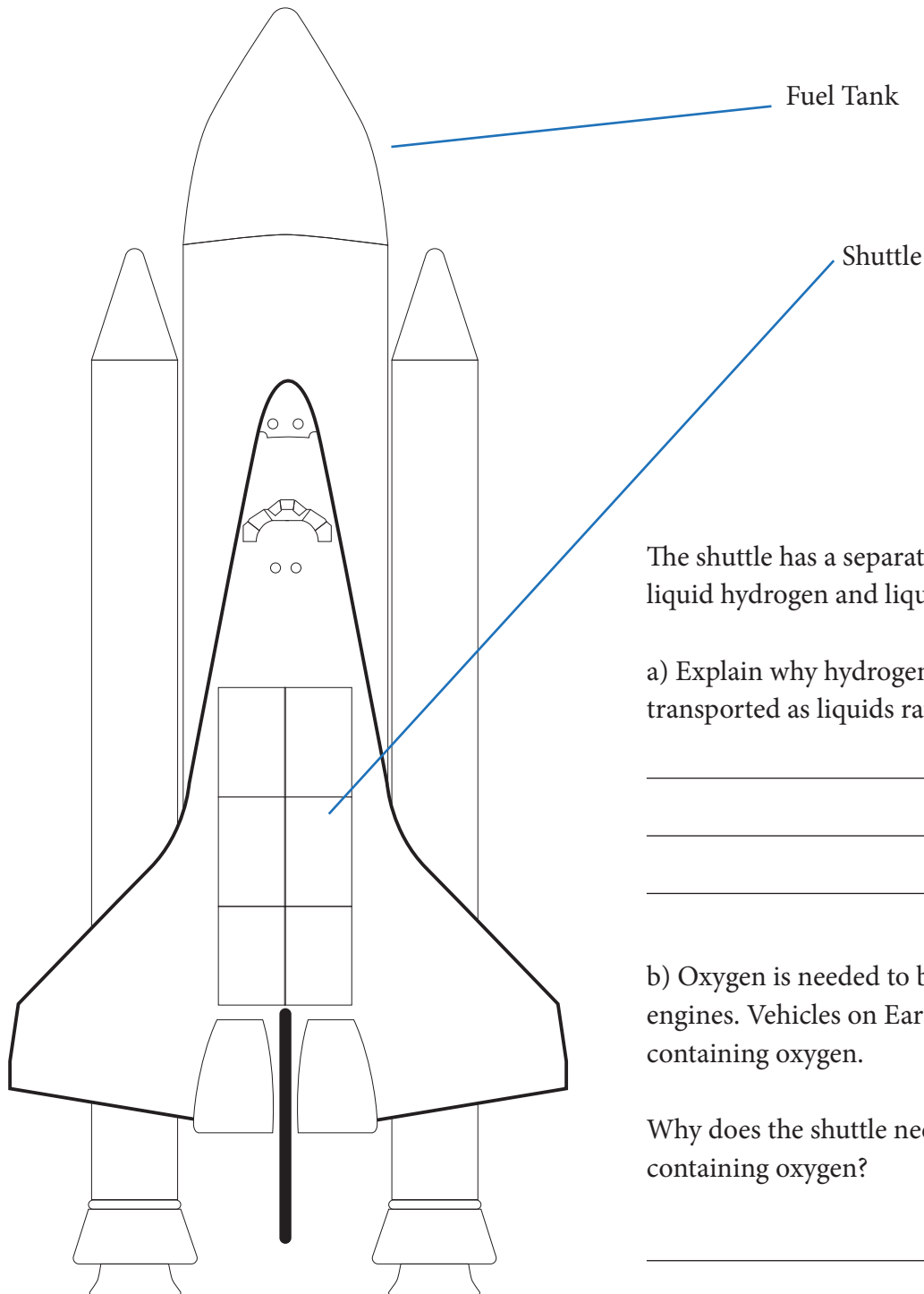
Y  
\_\_\_\_\_





## Question

This is a diagram of a space shuttle



The shuttle has a separate fuel tank containing liquid hydrogen and liquid oxygen.

a) Explain why hydrogen and oxygen are transported as liquids rather than as gases.

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b) Oxygen is needed to burn the fuel in the shuttle's engines. Vehicles on Earth do not need a tank containing oxygen.

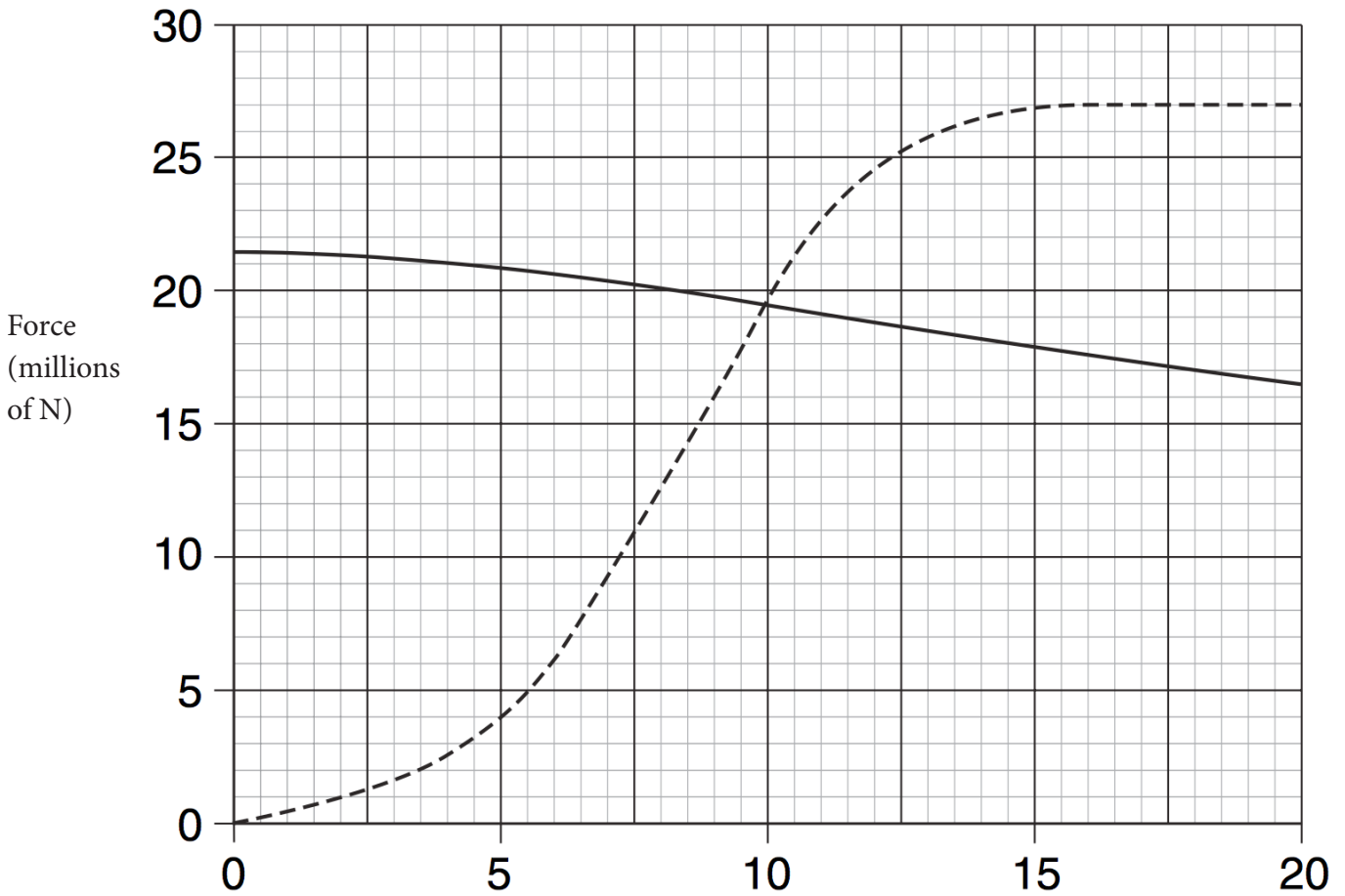
Why does the shuttle need to have a tank containing oxygen?

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The graph below shows how the upward force and the weight of the shuttle, including fuel, change during the first 20 seconds, after the fuel is ignited.



Key:

- Thrust, upward force on the shuttle
- Total weight of the shuttle and fuel

Describe what happens to the total weight of the shuttle during the first 20 seconds.

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Explain why you think this happens

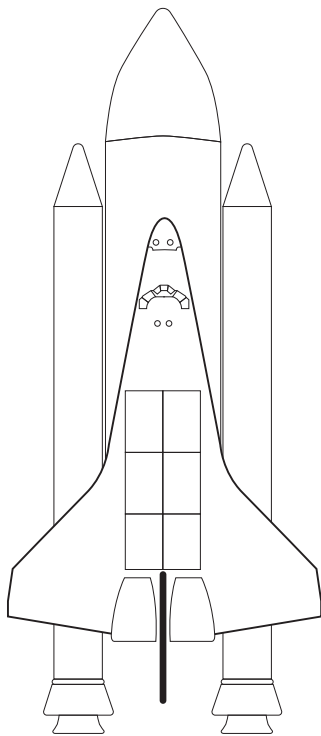
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Use the graph to help you label the diagram showing the name, size and direction of the forces acting on the shuttle 5 secs after take-off.



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Use the graph to explain how the shuttle cannot take-off before 10 seconds.

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## Question

The diagram below shows an organism called Euglena. It is made of only one cell. It lives in ponds and streams.

Conor and Caoimhe were using a microscope to examine a specimen of Euglena.

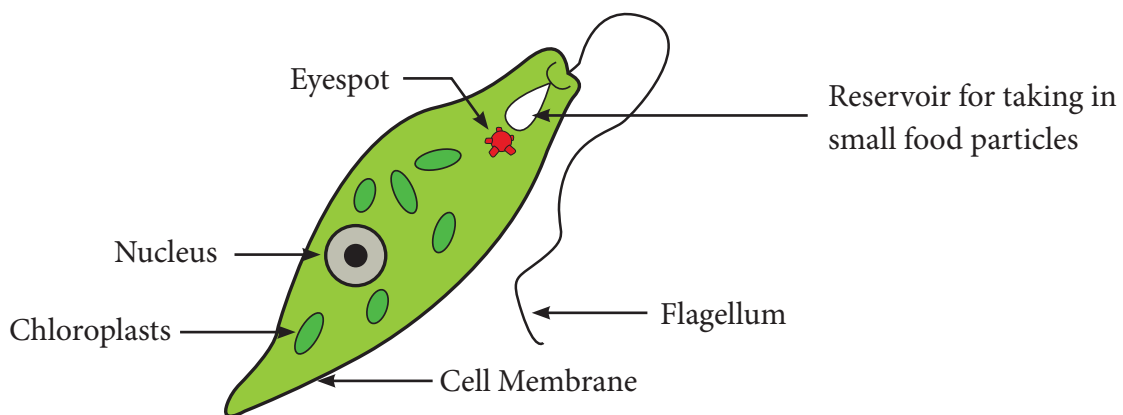
Why did Conor and Caoimhe use a microscope?

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This is a diagram of Euglena



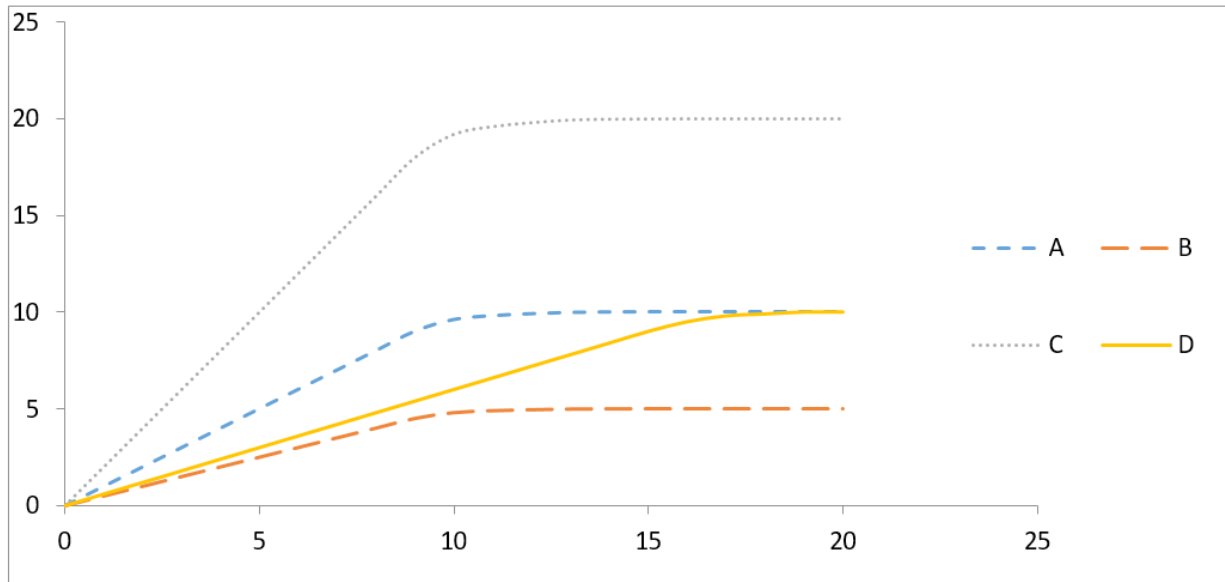
I think this organism is a plant.

No look it is an animal



## Question

When hydrochloric acid (solution) reacts with calcium carbonate (solid), carbon dioxide (gas) is released. The graph below shows the volume of carbon dioxide released (Y-axis) against time (X-axis). In each of the cases labelled A, B, C and D the following variables were kept constant: temperature, pressure, volume of hydrochloric acid used, concentration of hydrochloric acid used.



a) What is meant by the term variable in an experiment? \_\_\_\_\_

\_\_\_\_\_

b) Why is it important to keep some of the variables constant during an experiment?

\_\_\_\_\_

\_\_\_\_\_

c) In which case, A, B, C or D, was the least mass of calcium carbonate used? Explain your answer.

\_\_\_\_\_

\_\_\_\_\_

d) Explain any one difference between the conditions used during case A and the conditions used during case D.

\_\_\_\_\_

\_\_\_\_\_



e) At the start of the reactions, which case, A, B, C or D, showed the greatest rate of reaction?

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## Question

Select one media-based argument concerning Science or Technology that you evaluated as part of your study of Science.

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a) Describe the information/data you collected and examined to make judgements about the media-based argument.

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b) What judgement did you make about the media-based argument?

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Media-based arguments can sometimes be backed by limited amount of evidence or data

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c) How did you identify those limitations in your evaluation of the argument? Use the argument to support your answer.

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## Question

Siobhan bought a potted plant. She kept it well watered but some of the leaves turned yellow.



Siobhan thought that the plant did **not** have enough light for photosynthesis. She moved the plant closer to the window but more leaves turned yellow.

She then thought that the plant did **not** have enough minerals. The table below gives information about minerals.

mineral	why the mineral is needed
magnesium	to make chlorophyll
nitrogen	to make protein
phosphorus	to grow and transfer energy
potassium	to make fruit

a) Siobhan's plant did **not** have enough of one of the minerals in the table. Use the information in the table to suggest which mineral this was.

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b) A plant growing in a pot is more likely to be affected by a shortage of minerals than a plant growing in a garden.

Give the reason for this.

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c) Siobhan bought some fertiliser for her plant.

The names and formulae of four different fertilisers are shown below.

<b>A</b>	Grow Well $\text{NH}_4\text{NO}_3$	<b>B</b>	Easy Grow $\text{MgSO}_4$
<b>C</b>	Miracle Grow $\text{KNO}_3$	<b>D</b>	Superphosphate $\text{Ca}(\text{H}_2\text{PO}_4)$

Give the letter of **one** box of fertiliser, A, B, C or D, that would provide each of the minerals in the table below.

Write the letters in the table.

mineral	Letter of fertiliser
magnesium	
nitrogen	
phosphorus	
potassium	

(ii) Grow Well  $\text{NH}_4\text{NO}_3$  is ammonium nitrate. How many elements are present in ammonium nitrate?

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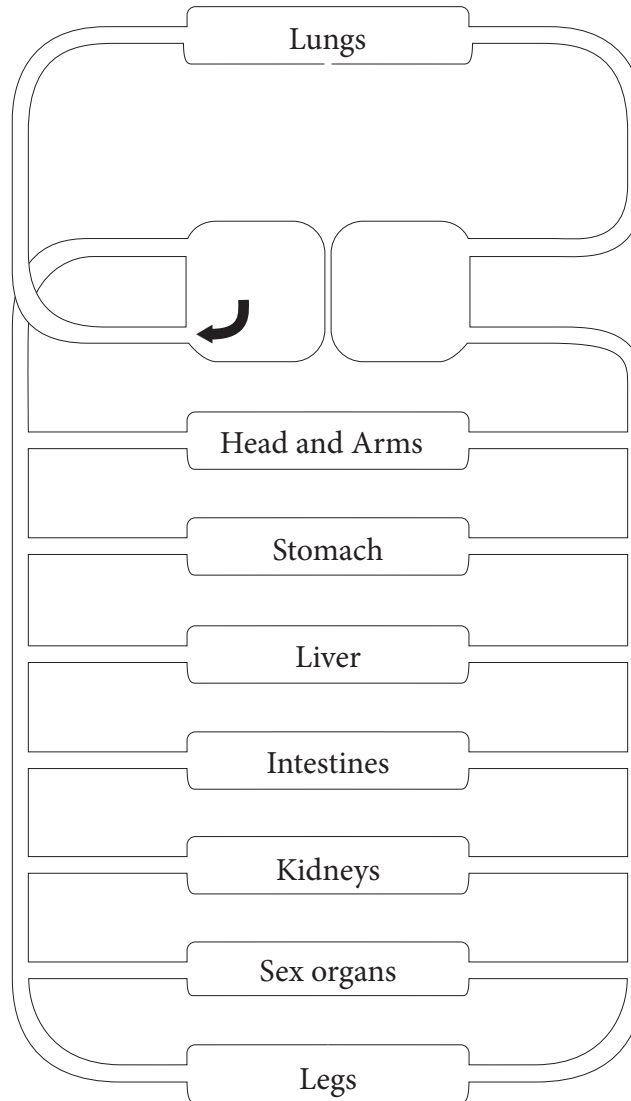


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## Question

37

The diagram below shows a model of the system which is used to circulate blood around the body.



a) Name the organ which is responsible for pumping blood around the body.

b) An arrow is drawn in the diagram to indicate the direction in which blood flows in that part of the system. Draw arrows in other parts of the diagram to indicate the direction in which blood flows in other parts of the system.

c) Mark with the letter G a place in the system where the blood gains oxygen.

d) Mark with the letter L a place in the system where the blood loses oxygen.

e) Mark with the letter W a place in the system where waste is removed from the blood.

f) Mark with the letter N a place in the system where the blood absorbs nutrients.

g) Describe one function of the circulatory system which does not involve the transport of substances around the body.

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h) The body needs both nutrients and oxygen for a process called respiration. Describe what happens during respiration and why this process is important for living things.

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i) Mark with the letter P a place in the system where a person's pulse could be measured.

j) Explain why a person's pulse might increase while they are exercising.

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k) Name one lifestyle choice that could cause a person's resting pulse to increase over time.

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