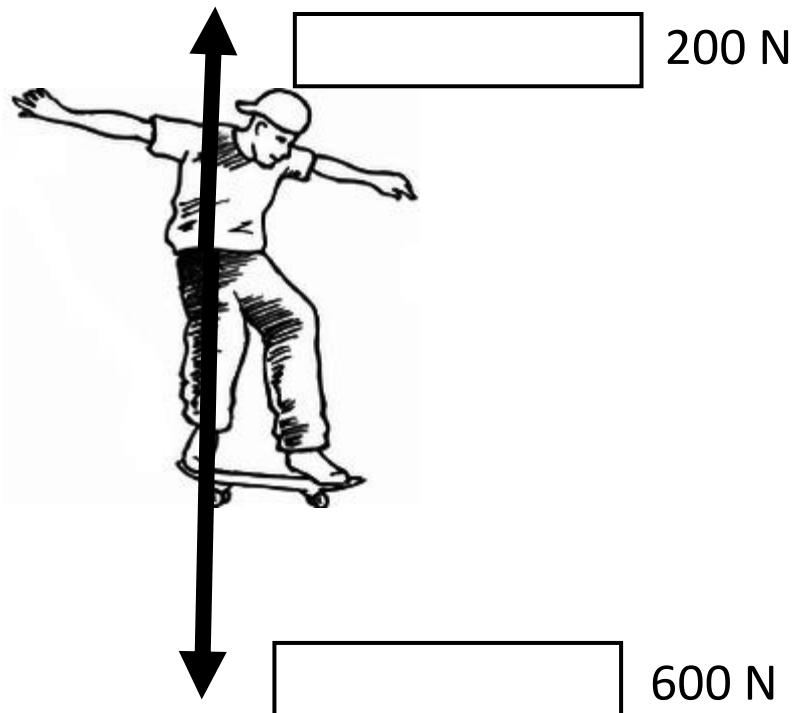


PRACTICE Science Equivalency Test

Name:

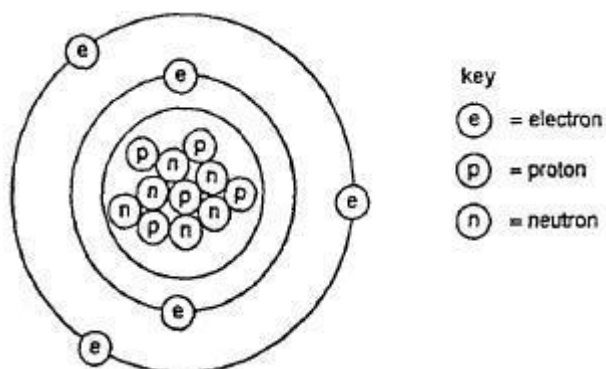
1. This diagram shows a skater at some point during an 'ollie' – jumping in the air.



- a) What is the name of the force acting downwards? **Add this to the diagram.** (1 mark)
- b) What is the name of the force acting upwards? **Add this to the diagram.** (1 mark)
- c) Calculate the resultant force and state its direction. (2 marks)

_____ N Direction _____

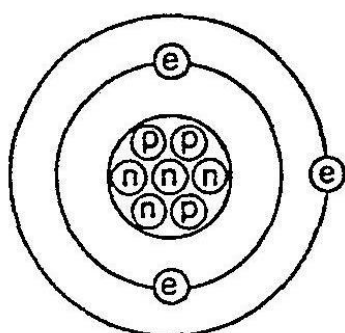
2. This diagram represents a Boron atom.



a) What is the mass number of Boron? (1 mark)

b) What is the atomic number of Boron? (1 mark)

c) This diagram shows a 'mystery' atom and a section of the periodic table.



key

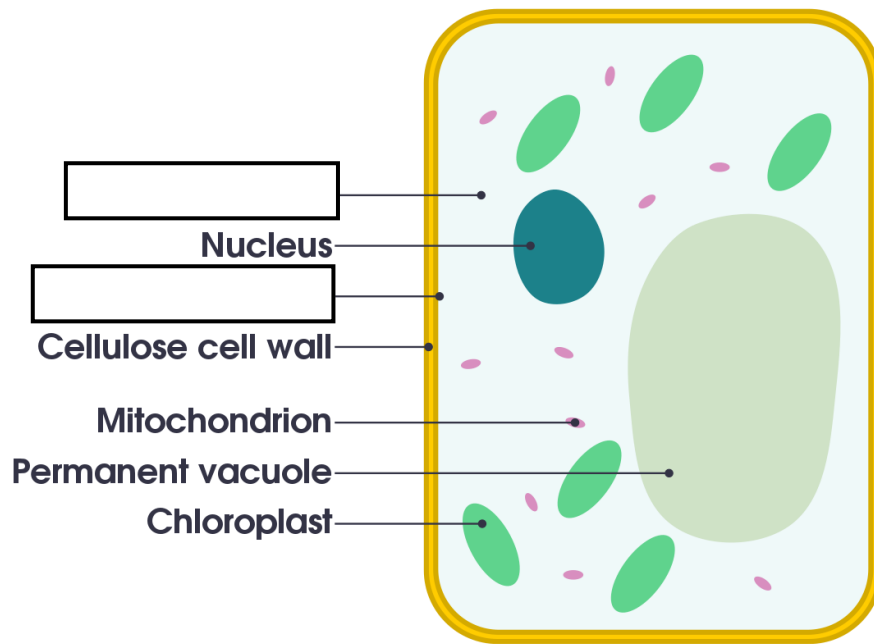
- p proton
- n neutron
- e electron

7 Li lithium 3	9 Be beryllium 4
23 Na sodium 11	24 Mg magnesium 12

i) Circle the 'mystery' atom on the periodic table excerpt. (1 mark)

ii) Using the excerpt of the periodic table above, calculate how many neutrons are in a Beryllium atom (2 marks)

3. This diagram shows a plant cell.



a) Fill in the two missing labels with the correct organelles. (2 marks)

b) Complete the table below with the correct name or function. (3 marks)

Organelle Name	Function
	Photosynthesis
Cellulose cell wall	
Nucleus	

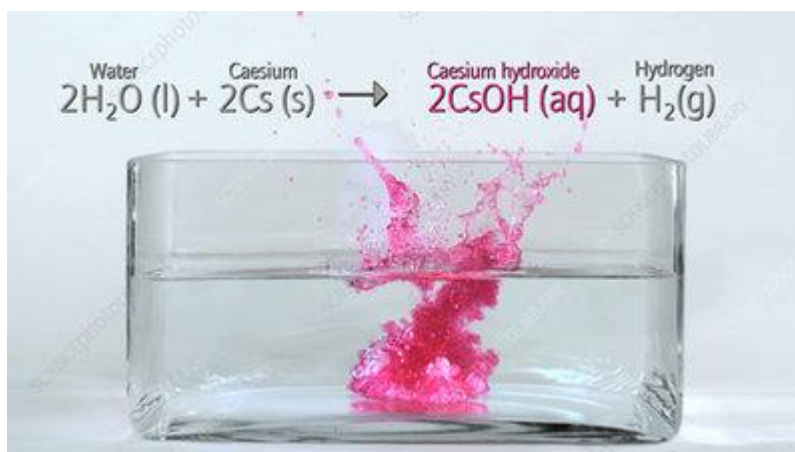
c) Name **three** parts of the plant cell that are not present in animal cells. (3 marks)

d) Complete the equation for photosynthesis (2 marks)

_____ + water → _____ + oxygen

e) What green **substance** is in the organelle that controls plant photosynthesis? (1 mark)

4. Caesium reacts vigorously with water to produce Caesium hydroxide and Hydrogen.
An image of the reaction and the chemical equation are below.



- a) Circle the correct response in the box to complete the following sentence: (1 mark)

The large number '2's to the left of each substance in the chemical equation are to ensure it is...

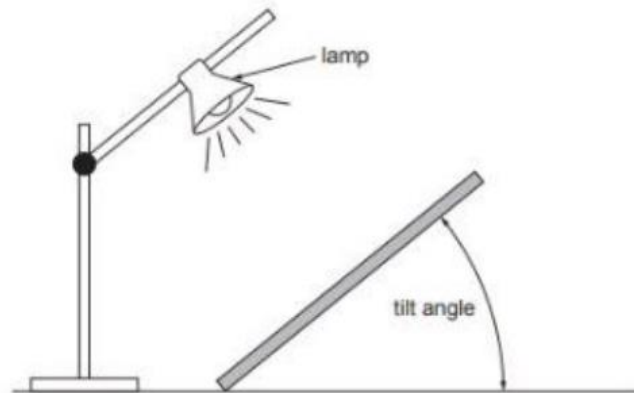
Equal Balanced Reactive Equivalent

- b) Complete the table below to identify whether each substance is an **element** or a **compound**.
The first one has been done for you. (3 marks)

Name of Substance	Element or Compound?
Water	Compound
Caesium	
Hydrogen	
Caesium hydroxide	

- c) Caesium is in Group 1 of the periodic table. How many electrons does it have in its outer shell? (1 mark)

5. Some students are investigating what happens to the output voltage and current of a solar cell when they change its tilt angle. A diagram of the setup and their results are shown below.



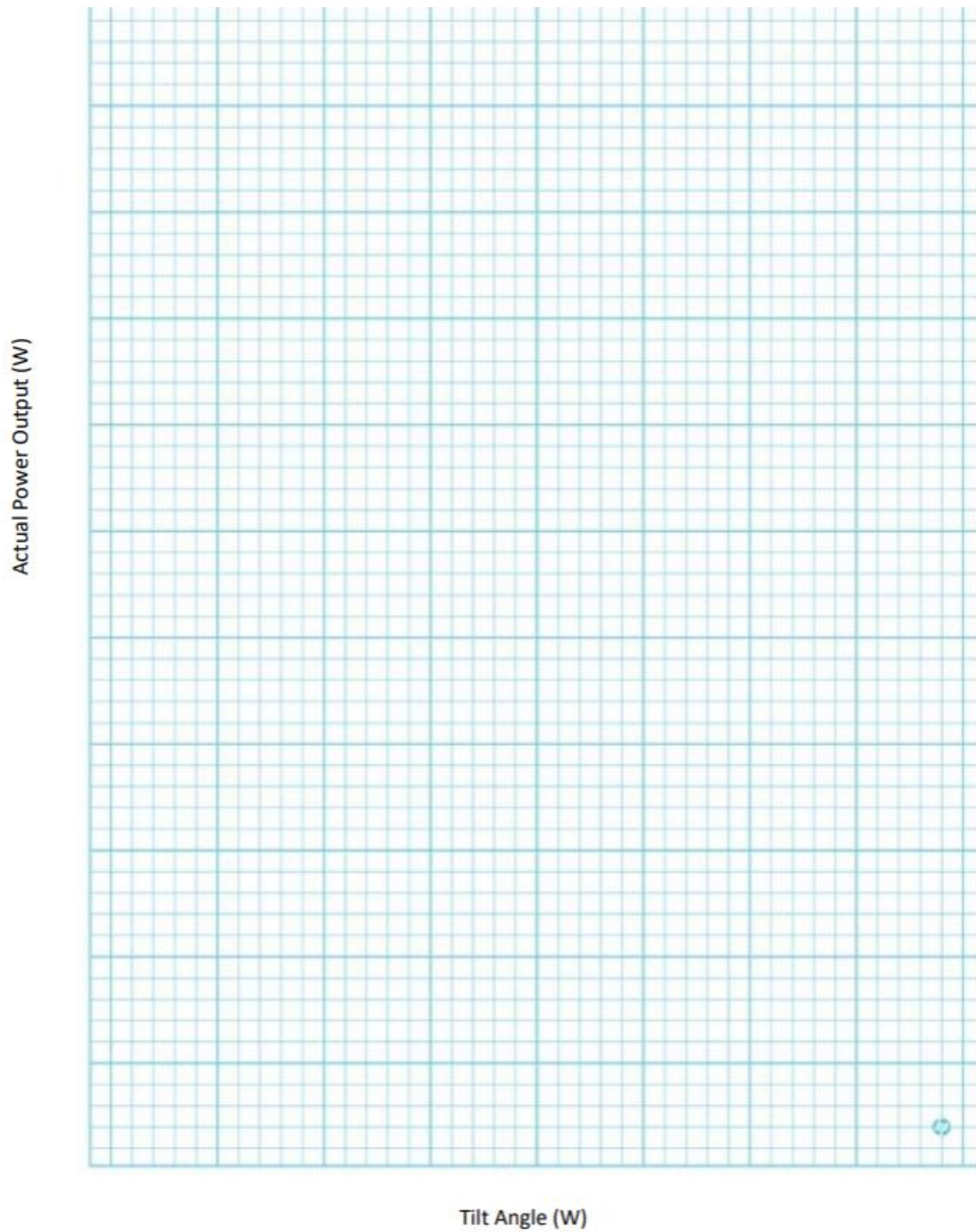
The results of their investigation are shown below.

Solar cell tilt angle (degrees)	Output voltage (V)	Output current (A)	Actual power output (W)
90	0.66	1.30	0.86
75	0.80	1.60	1.28
60	0.84	1.70	1.43
45	0.90	1.80	1.62
30	0.88	1.75	
15	0.72	1.45	1.04
0	0.58	1.15	0.67

- a) Use the equation below to **complete the missing value in the table**. There is some space for you to perform your calculation if you need to. (2 marks)

$$\text{power} = \text{voltage} \times \text{current}$$

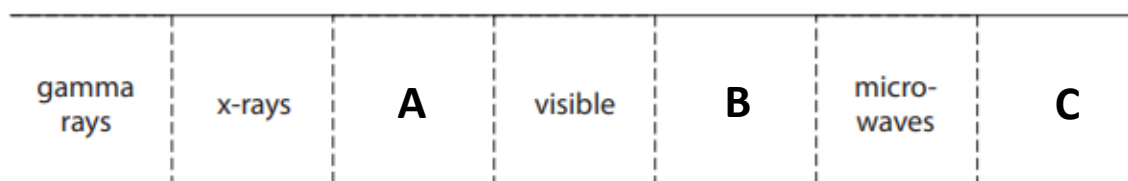
- b) Use the graph paper to plot a graph of **tilt angle** against **actual power output**. Add a best-fit line. (4 marks)



- c) Use your graph to estimate the power output at an angle of 65 degrees. Answer _____W
(1 mark)

- d) Describe the relationship between the tilt angle and the power output. (2 marks)

6. The diagram below shows the EM (electromagnetic) spectrum in order of decreasing energy.



- a) Which row of the table correctly represents A, B and C? Tick the correct one. (1 mark)

	A	B	C
☐	Ultraviolet	Radio	Infrared
☐	Infrared	Ultraviolet	Radio
☐	Radio	Ultraviolet	Infrared
☐	Ultraviolet	Infrared	Radio

- b) Complete the following sentences using words from the box. You don't have to use all the words but you can use them more than once. (4 marks)

All electromagnetic waves travel at the same _____ in a vacuum. This is called the _____ of _____. Electromagnetic waves each have a different _____ and _____. As the _____ gets longer, the _____ gets lower.

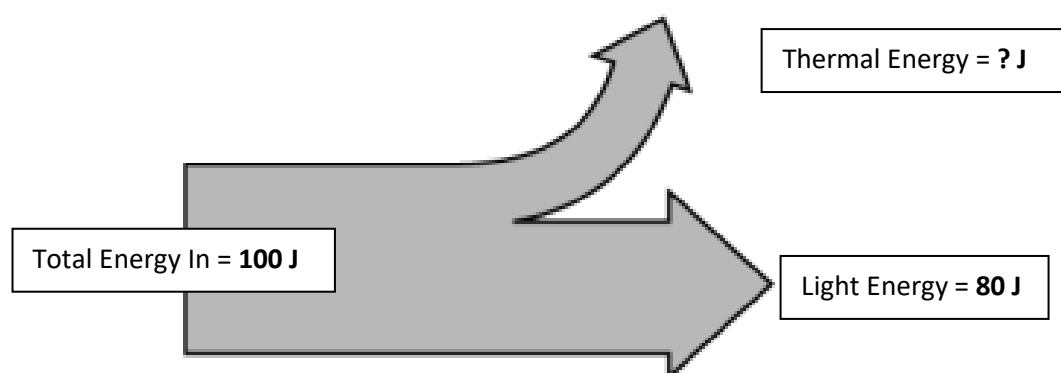
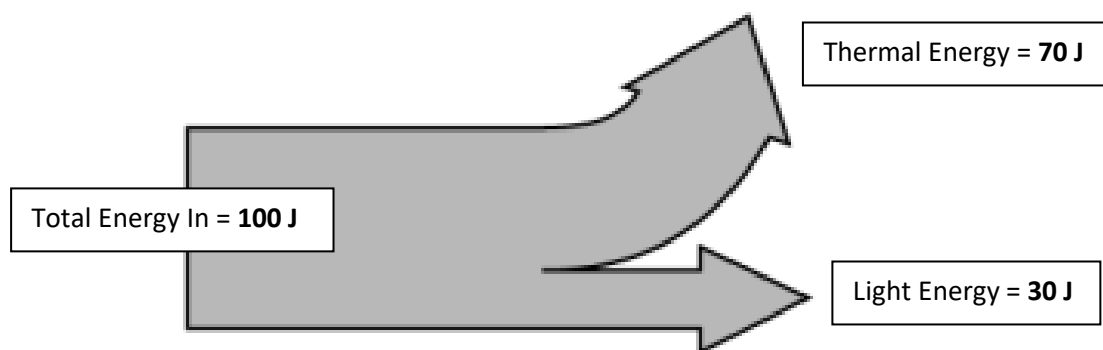
Speed	Frequency	Period	Amplitude	Light
	Wavelength	Sound		

- c) A microwave has a wavelength of **0.12m** and a frequency of **2,500,000,000 Hz**. Use the formula below to calculate its speed. (2 marks)

$$\text{speed} = \text{frequency} \times \text{wavelength}$$

_____m/s

7. The Sankey diagrams below show the energy transfers in a **filament bulb (top)** and a more modern **LED bulb (bottom)**.



- a) Which is the most efficient bulb? (1 mark)

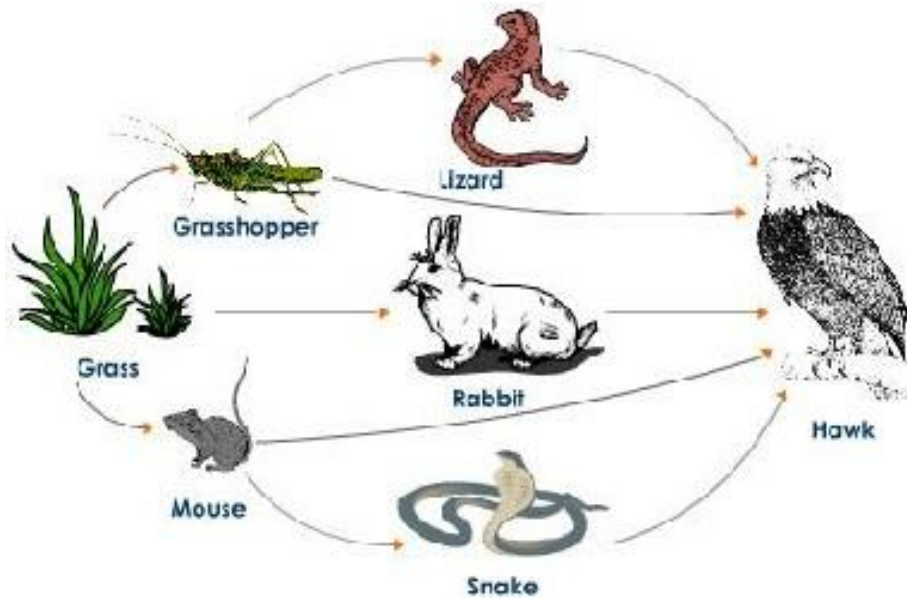
- b) What is the amount of thermal energy transferred by the LED bulb? (1 mark)

- c) The following equation can be used to calculate an appliance's efficiency. Calculate the filament bulb's efficiency as a **percentage**. (4 marks)

$$\text{Efficiency} = \frac{\text{Useful Energy}}{\text{Total Energy In}}$$

_____ %

8. This diagram shows an example food web.



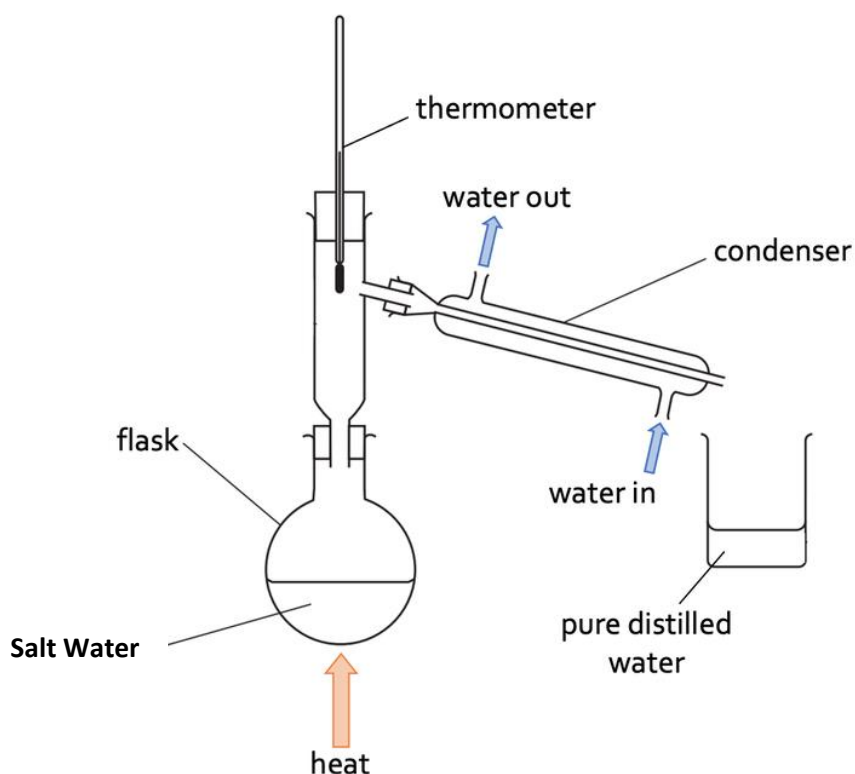
a) Name a **carnivore** in the food web? (1 mark)

b) Name **two herbivores** in the food web? (2 marks)

c) Which animal is the **apex predator** in the food web? (1 mark)

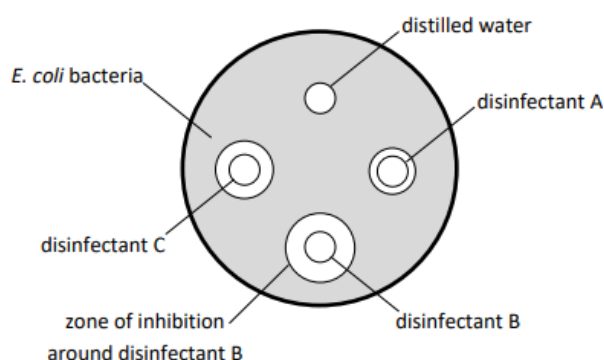
d) What is the source of energy in this ecosystem? It is not pictured in the diagram. (1 mark)

9. Dave uses the process of distillation to separate a solution of salt and water that his friend Liz made. The diagram is shown below.



- a) Name one piece of laboratory equipment that could be used as a source of heat in this process (1 mark)
-
- b) What temperature would need to be shown on the thermometer for this process to work? Include units. (2 mark)
-
- c) Liz made the salt water solution by adding **20g of salt** to **80g of water**. Circle the correct answer for the fully-prepared solution's mass. (1 mark)
- More than 100g
 - Less than 100g
 - Between 80g and 100g
 - Exactly 100g
- d) Dave now makes Liz a mixture of sand and water. Name a process that could be used to separate these two substances. (1 mark)

10. Some students put some different household substances on small circles of paper to find out what the best disinfectant was. These were then placed on an Agar plate with E-coli bacteria on it. The image below shows what happened after 24h.



- a) What is the independent variable in this investigation?
(1 mark)

- b) What is the dependent variable in this investigation?
(1 mark)

- c) The experiment was repeated by three other students. This table shows their results:

	Liz	George	Victoria	
Disinfectant	Zone of inhibition (cm ²)	Zone of inhibition (cm ²)	Zone of inhibition (cm ²)	Mean
Distilled Water	0.0	0.0	0.0	0.0
Mouthwash	2.5	2.4	2.8	2.6
Garlic	4.2	3.6	3.9	3.9
Kitchen spray	6.2	5.8	6.8	

- i) Calculate the missing mean for Kitchen Spray and add it to the table. (1 mark)
- ii) Use the results table and picture to give the real name of each disinfectant used (3 marks)

Disinfectant	Real name of disinfectant
A	
B	
C	

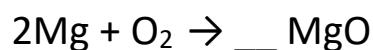
- iii) Dave did the same experiment but found that the zones of inhibition surrounding his disinfectants were very unclear. Explain how this might have happened and suggest a precaution he could have taken to avoid it. (2 marks)

11. The picture below shows magnesium burning in air.



a) How can you tell that a chemical reaction is taking place? (1 mark)

b) The reaction is represented by the chemical equation below. Add a number in the space to make the equation balanced. (1 mark)



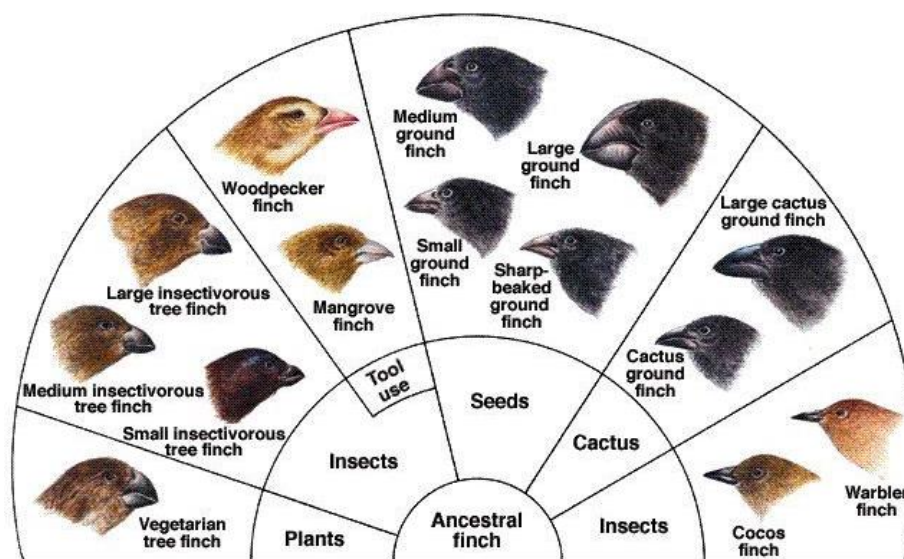
c) Write **product** or **reactant** in the right-hand side of the table about the reaction below. (3 marks)

Magnesium	
Magnesium oxide	
Oxygen	

d) The magnesium needs to be heated before it reacts with the air. Tick the correct statement to explain why this is. (1 mark)

- a. It is an endothermic reaction
- b. It is an exothermic reaction
- c. The reaction has a high activation energy
- d. The reaction is reversible

12. This diagram shows some information about different species of finch.



a) Use 3 correct words from the box to fill in the blanks of the sentences below. (3 marks)

The existence of different varieties of finch in a certain population is referred to as _____.

The slow change of beak shape from the ancestral finch over millions of years, is called _____.

The competition and survival of particular species of finch is described as _____.

Adaptation	Natural Selection	Variation	Evolution
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b) Name one feature of the Warbler Finch that makes it suited to eating insects from holes in trees. (1 mark)

END OF PAPER

