Homework	Due Date	Award
1		
2		
3		
4		
5		

Stonelaw High School

Science Faculty

BGE Science

Home is Where the Science Begins

Homework Booklet

Name: _____

Class: _____

Success Criteria

✓	**I am confident that I understand this and can apply this to problems**
?	**I have some understanding, but I need to revise this some more**
✖	**I do not understand this, and I need help with it**

I will be successful if I can…		**How well can you do this?**
2nd	Identify the circuit symbols for a bulb, switch, motor, bell, buzzer, wires, cell and battery	✓ ? x
2nd	Describe the transfer of energy in each electrical component	✓ ? x
2nd	Draw a diagram of a circuit	✓ ? x
2nd	Design and build an electrical circuit	✓ ? x
3rd	Explain what is meant by the current in an electrical circuit	✓ ? x
3rd	State the unit of electrical current and describe how to measure the current in a circuit	✓ ? x
3rd	Describe the flow of electrical current in a series circuit	✓ ? x
3rd	Explain why bulbs connected in series can have the same brightness	✓ ? x
3rd	Describe the flow of electrical current in a parallel circuit	✓ ? x
3rd	Explain why bulbs connected in parallel may not have the same brightness	✓ ? x
3rd	Explain what is meant by the voltage of an electrical circuit	✓ ? x
3rd	State the unit of voltage and describe how to measure the voltage across a component	✓ ? x
3rd	Explain why voltage is different across each component in a series circuit	✓ ? x
3rd	Explain why voltage is the same across each component in a parallel circuit	✓ ? x
3rd	Explain the advantages of a parallel circuit compared to a series circuit	✓ ? x
4th	Describe the relationship between current, voltage and resistance	✓ ? x
4th	Explain what is meant by electrical resistance in a circuit	✓ ? x
4th	Describe how different electronic input devices such as variable resistors, light dependent resistors and thermistors can be used	✓ ? x
4th	Describe how different electronic output devices such as bulbs, LEDs, motors and relays can be used	✓ ? x
4th	Design and construct an electronic circuit to solve a problem	✓ ? x
3rd	Describe the EM spectrum	✓ ? x
4th	List the common and individual properties of the parts of the EM spectrum	✓ ? x
3rd	Describe a use of radio waves, TV waves, infrared or microwaves	✓ ? x

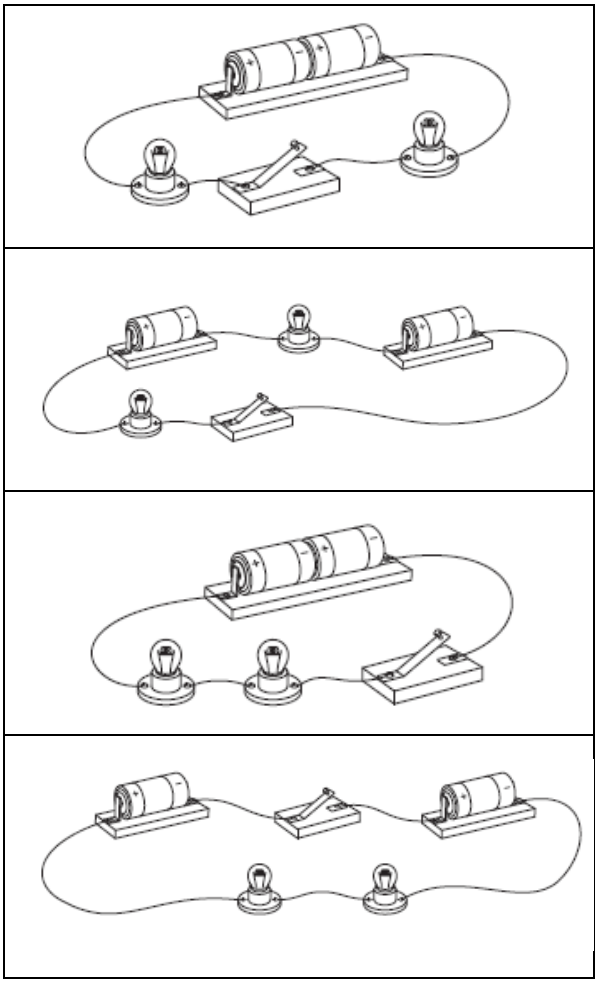
3rd	Give an advantage and a limitation when using radio waves, TV waves, infrared or microwaves	✓ ? x
2nd	Describe the characteristics of solids, liquids and gases	✓ ? x
2nd	Explain how the properties of a material changes during a physical change	✓ ? x
2nd	Describe changes of state using the terms freezing, evaporating and condensing	✓ ? x
3rd	Describe how heat is transferred between hot and cold objects	✓ ? x
3rd	Explain how heat is transferred by conduction, convection and radiation	✓ ? x
3rd	Give examples of thermal conductors and insulators	✓ ? x
3rd	Describe the relationship between heat loss in a building and the temperature difference inside and outside of the building	✓ ? x
3rd	Give examples of different ways heat can be lost from a home	✓ ? x
3rd	Explain how materials can be used to reduce heat loss in a building	✓ ? x
2nd	Identify the signs of a chemical reaction	✓ ? x
3rd	Describe the indicators of a chemical reaction	✓ ? x
2nd	Explain why a chemical reaction is not easily reversed	✓ ? x
3rd	Give examples of everyday chemical reactions and name the new substances which are produced	✓ ? x
3rd	Describe the relationship between particle size, temperature, and concentration on the rate of a chemical reaction	✓ ? x
3rd	Give examples of how the rate of everyday chemical reactions can be controlled	✓ ? x
3rd	Describe the role of a catalyst in a chemical reaction	✓ ? x
3rd	Explain how catalysts can be used to speed up chemical reactions	✓ ? x
3rd	Give two examples of everyday uses of catalysts	✓ ? x
3rd	Describe the colour changes of indicators when added to acids, alkalis, or neutral substances	✓ ? x
3rd	Identify a substance as acidic, alkaline or neutral based on its pH value	✓ ? x
3rd	Give examples of every day and laboratory acids and alkalis	✓ ? x
3rd	Describe what happens to the pH of an acid when it is added to an alkali	✓ ? x
2nd	Describe how to separate mixtures of solids of different sizes or properties	✓ ? x
3rd	Describe what is meant by solubility	✓ ? x
2nd	Explain what is meant by a soluble or an insoluble substances	✓ ? x
2nd	Identify the solute, solvent and solution when a substances is dissolved in a liquid	✓ ? x
2nd	Explain why a dissolved solid cannot be separated from the solvent by filtering but can be separated by evaporation	✓ ? x

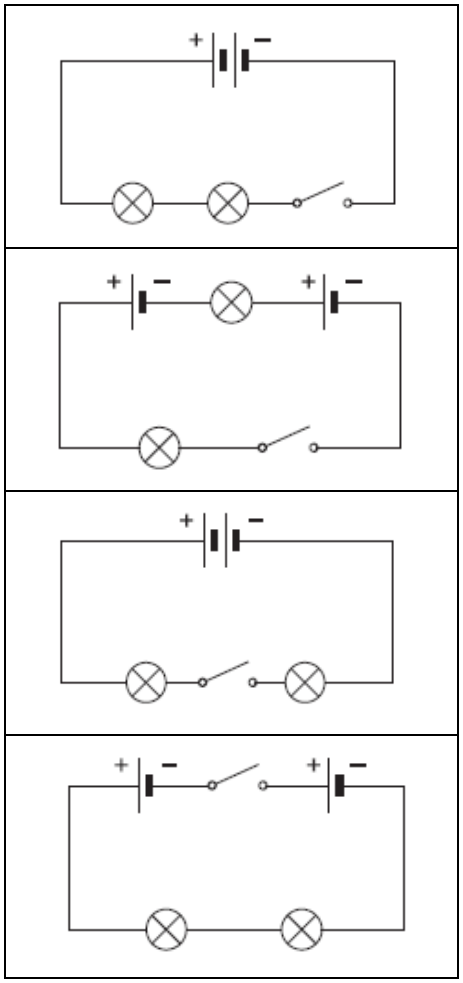
2nd	Describe the relationship between temperature, time, particle size, stirring and the quantity of a solvent and how much of a solute can dissolve	✓ ? x
3rd	Give examples of different solvents which can be used to dissolve substances	✓ ? x
3rd	Describe the relationship between the quantity of the solute or solvent and the concentration of the solution	✓ ? x
2nd	Identify different types of microorganism and give an example of each type	✓ ? x
2nd	Give everyday examples of where microorganisms can be found	✓ ? x
2nd	Describe the role of microorganisms in digestion and decay	✓ ? x
2nd	Calculate the number of microorganisms that would be present after a period of time	✓ ? x
3rd	Describe conditions that microorganisms need to grow and reproduce	✓ ? x
3rd	Describe the effect of temperature on the growth of microorganisms	✓ ? x
3rd	Give everyday examples of chemicals which can prevent the growth of microorganisms	✓ ? x

Homework 1 **GOLD SILVER BRONZE**

1. Symbols are used to represent electrical circuits as diagrams.

   Match the drawing of each circuit to its correct diagram.



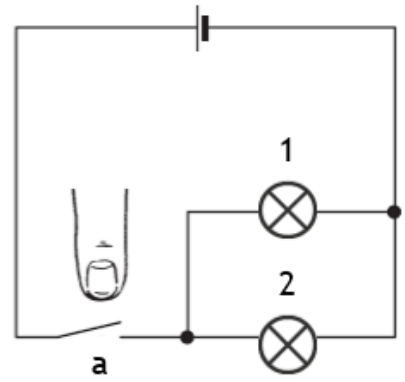


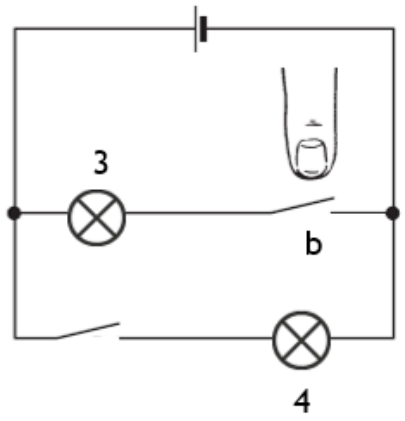
2. Draw a circuit diagram to show:

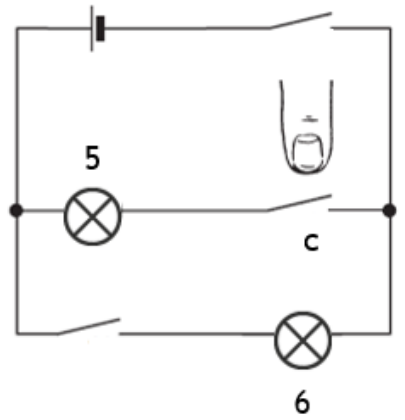
   (a) A battery connected to two bulbs. Each bulb can be switched on individually.

   (b) A single cell connected to a motor and a separate branch with a switch and a buzzer.

3. For each circuit diagram, identify the bulb or bulbs which will light up when the switches are closed by the **fingers** shown.

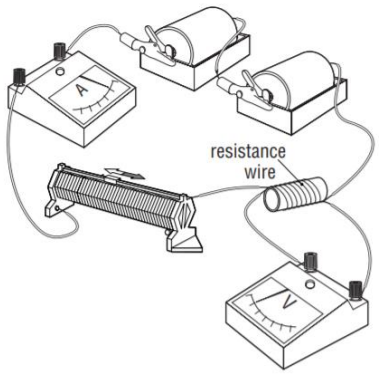






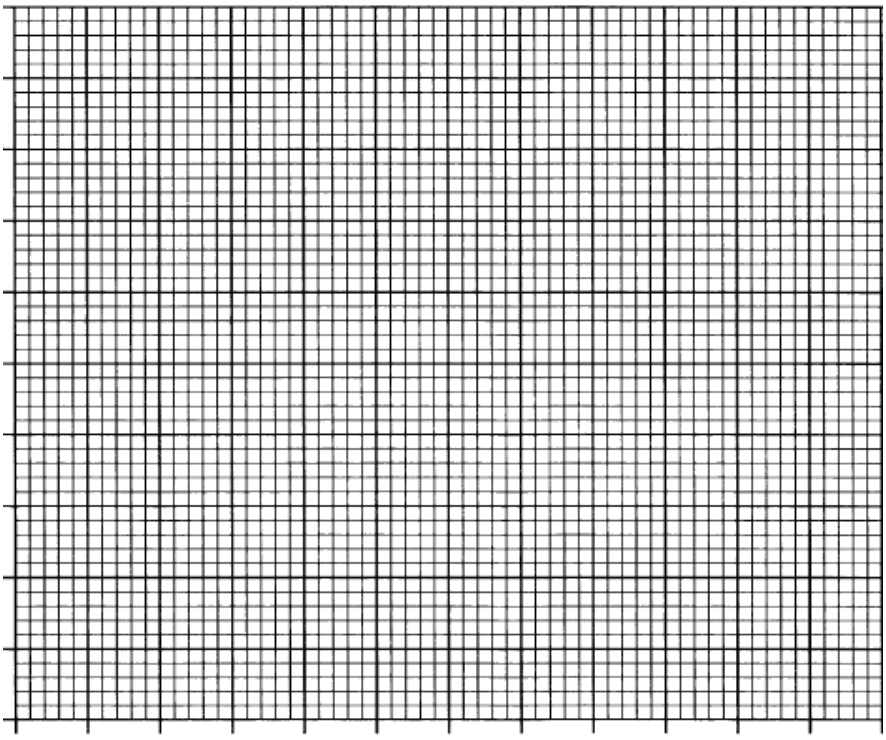
Switch closed	*Bulbs which light*
a	
b	
c	

4. A group of students built the circuit shown below. They used the variable resistor to alter the voltage across the resistance wire, so the current flowing through it varied.
Their results are given in the table.



Voltage across wire (V)	*Current through wire* (A)
0.25	0.05
0.50	0.10
1.00	0.20
1.25	0.25
1.50	0.30
2.00	0.40
2.50	0.50

(a) Use the results in the table to construct a line graph.



(b) Describe the relationship between the voltage across the wire and the current through the wire.

As the voltage across the wire { increases / decreases } the current through the wire { increases / decreases }.

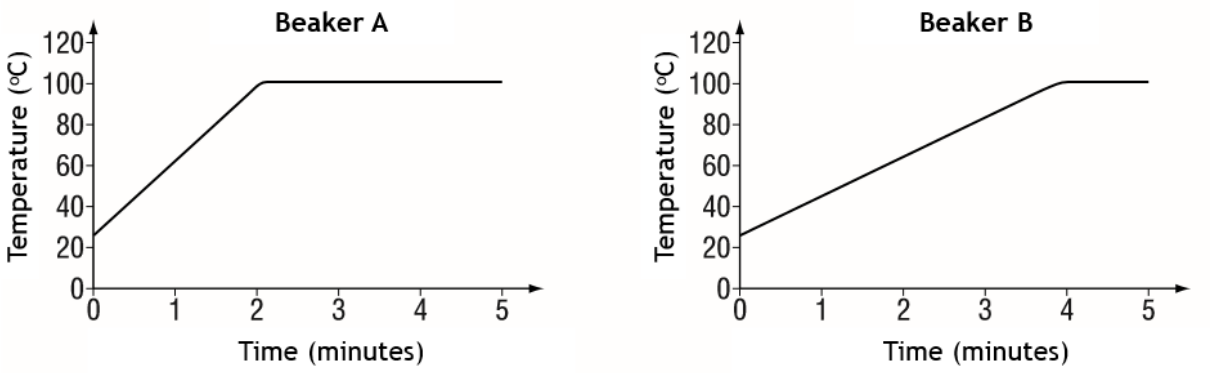
(c) Predict the current through the bulb if the voltage was 3V.

_____ A

[END OF HOMEWORK 1]

Homework 2 **GOLD SILVER BRONZE**

1. Students heated two beakers of water. One contained 200 cm^3 of water and the other 100 cm^3 of water. They used the same Bunsen flame each time. The graphs show how the temperature in each beaker changed with time.



(a) State the maximum temperature reached by the water.

_____ °C

(b) Calculate how much longer it took the water in Beaker B took to reach the maximum temperature compared to the water in Beaker A.
Space for calculation

_____ minutes

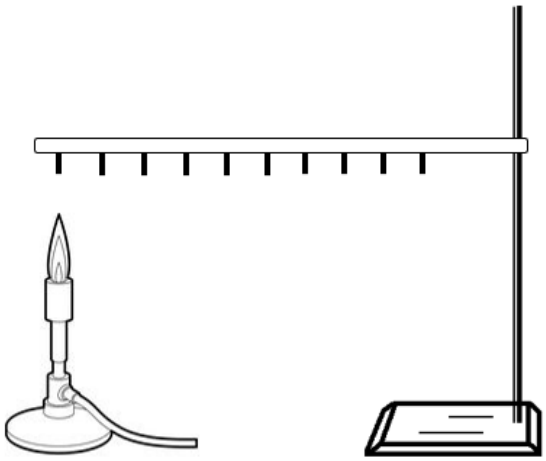
(c) State which beaker contained 100 cm^3. Explain your answer.

Beaker _____

Explanation _____

_____

2. A group of students set up an investigation to find out which metal is the best conductor of heat energy.
They attached drawing pins using wax to a strip of metal and then heated the metal using a Bunsen burner. As the wax melts, the drawing pins fall off.
They then repeated their investigation using different metal strips.



The time taken the 10 pins to fall off each metal strip was recorded.
Their results are shown in the table.

Type of Metal	*Time taken for pins to fall off* (seconds)									
	1	2	3	4	5	6	7	8	9	10
Copper	33	42	50	58	70	79	88	96	105	115
Steel	57	74	93	106	122	140	155	171	185	200
Aluminium	43	54	65	75	87	99	110	120	132	145

(a) Identify the independent variable (variable that was changed) in this experiment.

_____

(b) State a conclusion that can be drawn from the results.

_____

_____

(c) Nickel is another metal that is good at conducting heat. It is a better conductor than aluminium but not as good as copper.
Predict the time it would take for all 10 pins to drop off a nickel rod.

_____ seconds

(d) Suggest how the students could have made their results more reliable.

_____

3. Read the passage below then answer the questions.

Heat can be transferred from one place to another by convection in liquids and gases. Unlike the particles in a solid, particles in liquids and gases can move from place to place. Convection occurs when particles with a lot of heat energy in a liquid or gas move and take the place of particles with less heat energy.

Liquids and gases expand when they are heated because the particles in liquids and gases move faster when they are heated than they do when they are cold. As a result, the particles take up more volume because the particles move further apart from each other. The liquid or gas in hot areas is less dense (lighter) than the liquid or gas in cold areas, so it rises into the cold areas. The denser cold liquid or gas falls into the warm areas. This forms convection currents.

Convection currents can be seen in lava lamps. The wax inside the lamp warms up, becomes less dense than the liquid and so rises. When it rises, it cools and becomes denser again, so it sinks. This same effect can be seen by putting a crystal of potassium permanganate in a beaker of water and gently heating it. Convection explains why hot air balloons rise, and also why it is often hotter in the lofts of houses than downstairs.

As well as these examples, convection is seen on a much bigger scale in our weather and ocean currents.

(a) Describe the difference between particles in a solid compared to a liquid or gas.

_____

_____

(b) Explain why gases expand when they are heated.

_____

(c) Use the information in the passage and the word bank below to label the diagram.

Particles _____ _____.

This means particles are _____

dense so they _____ .

Particles _____ _____.

This means particles are _____

dense so they _____ .

heat up	*cool down*	*sink*	*rise*	*less*	*more*

(d) Explain why the loft of a house is warmer than downstairs.

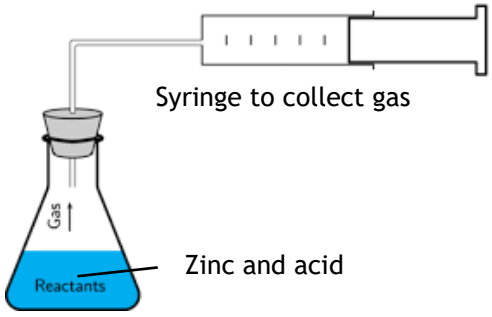
_____

_____

[END OF HOMEWORK 2]

Homework 3 **GOLD SILVER BRONZE**

1. A student investigated the effect of increasing the concentration on the rate of a chemical reaction. They added different concentrations of acid to zinc and timed how long it took to collect 100 cm^3 of gas. Their set up is shown below.



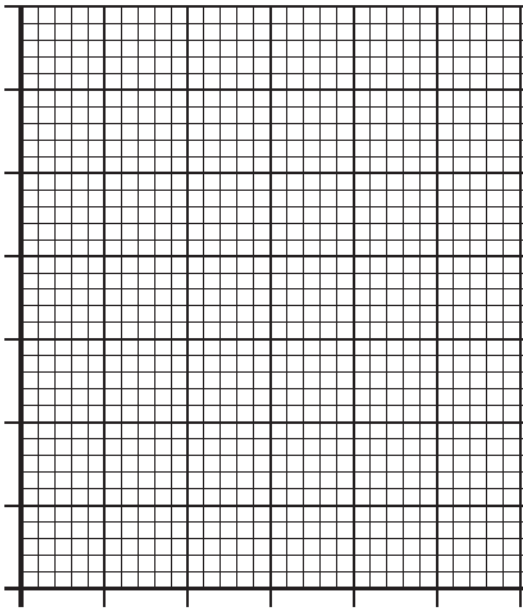
(a) State one variable which would have to be kept constant for a fair test.

_____

(b) Their results are shown in the table below.

Concentration (M)	*Time taken to collect 100 cm^3 of gas* (s)
1	26
2	17
3	11
4	9
5	7

On the grid below, draw a line graph of the student's results.



(c) Complete the sentence below by selecting the correct word in the brackets.

As the concentration increases, the rate of reaction { increases / stays the same / decreases } .

2. The rate of a reaction can be calculated using the formula below.

$$\text{rate of reaction} = \frac{\text{mass of product formed}}{\text{time}}$$

Use the formula to calculate the rate for the following reactions.

(a) 24 cm^3 of gas produced in 2 minutes.
Space for calculation

_____ cm^3 / minute

(b) 5g of a solid produced in 100 minutes.
Space for calculation

_____ g / minute

4. A group of students wanted to find which plants make the best indicator to test pH. They ground up different fruits and flowers and tested the juices in acidic, neutral and alkaline solutions.

Flower/Fruit	*Colour in acidic solution*	*Colour in neutral solution*	*Colour in alkaline*
A	Red	Red	Yellow
B	Green	Red	Blue
C	Light green	Dark green	Turquoise
D	Red	Orange	Yellow

(a) (i) State which flower would make the best indicator.

_____

(ii) Explain your choice.

_____

_____

[END OF HOMEWORK 3]

Homework 4 **GOLD SILVER BRONZE**

1. A student carried out an investigation into the effect of increasing the temperature on how much copper sulfate could dissole in 100g of water.

   Their results are shown below.

Temperature (^0C)	*Mass of copper sulfate dissolved (g)*
0	14
10	17
20	20
30	25
40	29
50	34
60	40
70	46

(a) Identify the solute and solvent in the experiment.

Solute _____

Solvent _____

(b) Calculate the increase in mass of copper sulfate dissolved as the temperature increased from 0^0C to 70^0C.
Space for calculation

_____g

(c) State a suitable conclusion for the results shown.

_____

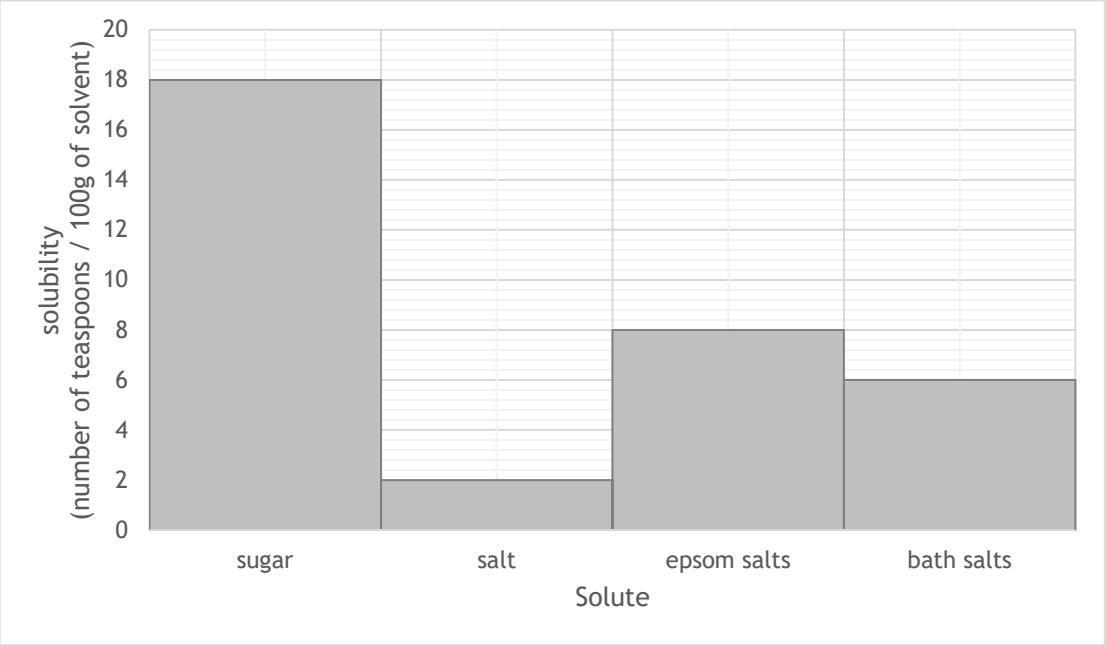
_____

(d) Describe one other way to increase how much copper sulfate could dissolve.

_____

_____

2. All soluble substances do not dissolve equally well. Sugar dissolves very easily, while other substances, such as salt, dissolve less easily. The mass of solute that will dissolve in a solvent is a measure of its *solubility*.
Pupils carried out an investigation to measure the solubility of different solutes.
Below is a graph showing their results.



(a) (i) State the number of teaspoons of salt which will dissolve in 100g of water.

_____

(ii) State the number of teaspoons of bath salts which will dissolve in 100g of water.

_____

(b) Another substance is more soluble than Epsom salts but less soluble than sugar.
Predict the range of teaspoons you would expect to dissolve

_____ to _____

(c) List the solutes in the bar graph in order of their solubility. Write the name of the most soluble substance first.

_____ _____ _____ _____

(d) State one variable which should be kept constant when carrying out this experiment to measure the solubility of different substances.

_____

[END OF HOMEWORK 4]

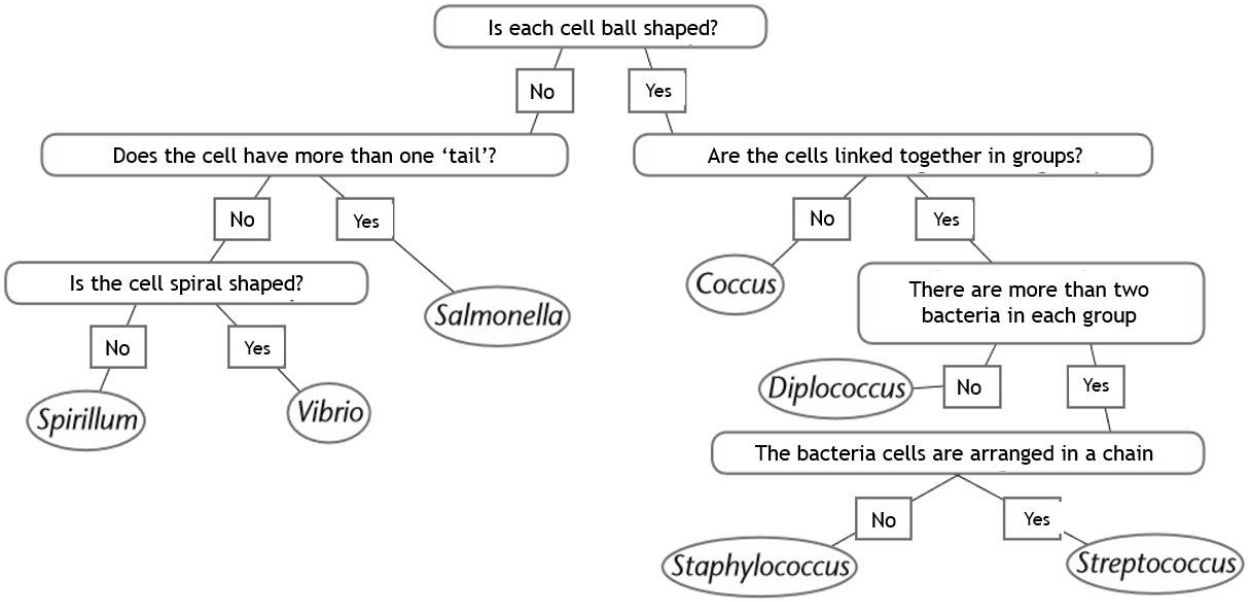
Homework 5 **GOLD SILVER BRONZE**

1. The table below contains statements about microorganisms.

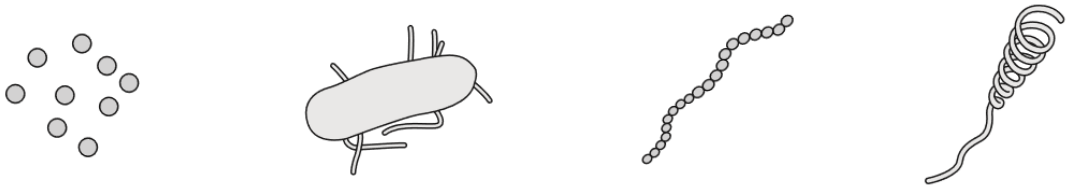
   Decide if each of the following statements about microorganisms are **True** or **False** and tick (✓) the appropriate box.
   If the statement is **False**, write the correct word in the **Correction** box to replace the word underlined in the statement. The first one has been done for you.

Statement	*True*	*False*	*Correction*
There are <u>two</u> types of microorgansims.		✓	*Three*
Microorganisms are <u>large</u> living organisms.			
<u>Fungi</u> can be unicellular or multicellular.			
<u>Bacteria</u> are the smallest type of microorganism.			
Bacteria do not contain a <u>cell wall</u>.			

2. The key below can be used to identify different types of bacteria.



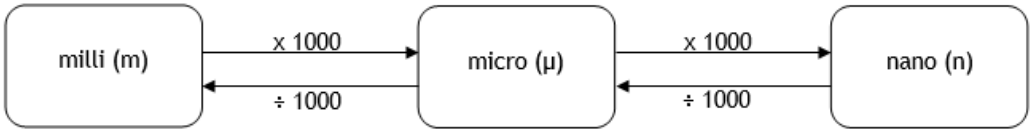
Using the key above, identify each of the following bacterial cells.



1. _____ 2. _____ 3. _____ 4. _____

3. Microorganisms are so small, scientists use micrometres or nanometres to measure them.

The chart below shows how scientists can convert between different units of length.



For example, something which is 500 nm would be 0.5 μm or 0.0005 mm.

Convert each length below into nanometres.

(i) 5 μm
Space for calculation

_____ nm

(ii) 0.002 mm
Space for calculation

_____ nm

[END OF HOMEWORK 5]