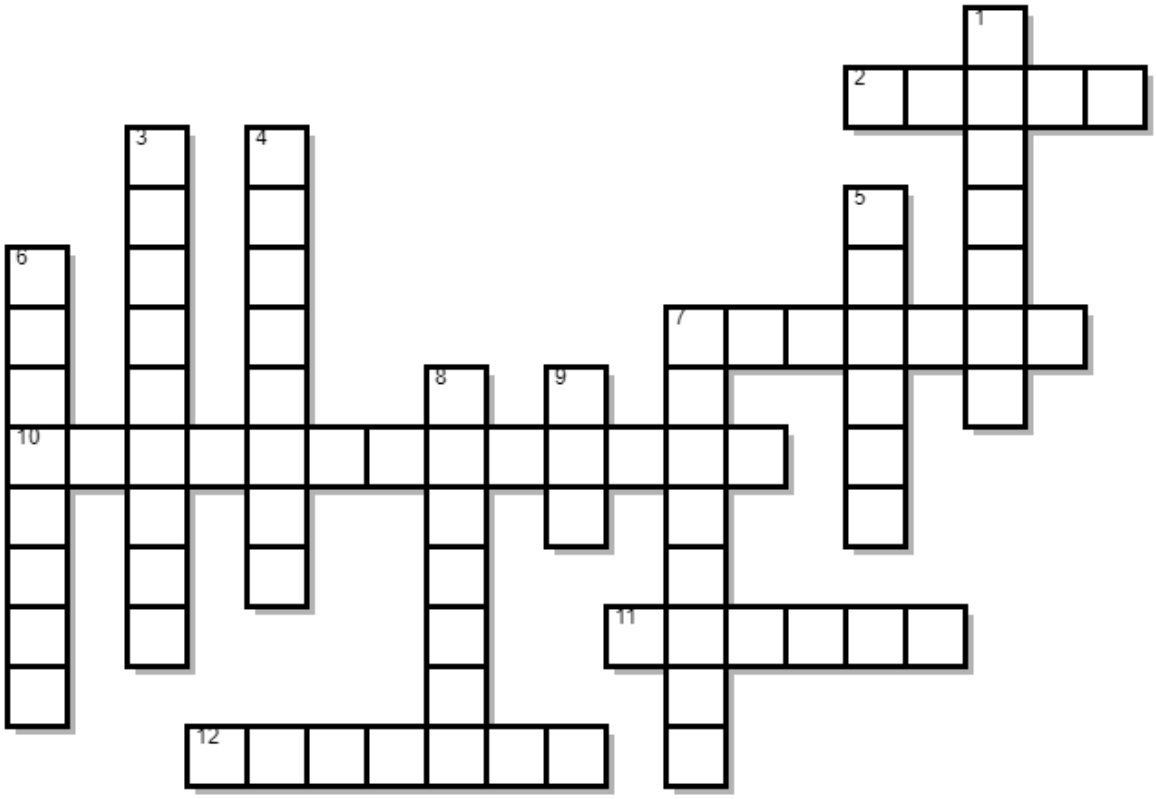
1) Introduction to Chemistry and Periodic Table



ACROSS

2 _____ is the state of matter that holds shape and has a fixed volume.

7 _____ (p^+) are one of the three main parts of the atom.

10 All the elements that we know of are found on the _____.

11 _____ is the state of matter that takes the shape of the container but keeps a fixed volume.

12 _____ started in Ancient Greece and China as a mixture of chemical knowledge, magic and philosophy about how materials are formed.

DOWN

1 Each different type of atom is called an _____.

3 _____ (e^-) are one of the three main parts of the atom.

4 _____ (n^0) are one of the three main parts of the atom.

5 Chemistry is the study of _____.

6 Atoms of different elements join together to form a _____.

7 Marie Sklodowska-Curie won the Nobel Prize for Chemistry in 1911 because of her discovery of the radioactive elements radium and _____.

8 _____ is the study of the world around us.

9 _____ is the state of matter that takes the shape and the volume of the container.

2) Chemical Reactions, Chemical Equations and Chemical Bonding

hydrogen	proteins	**covalent bond**	**one**
colour change	three	gas bubbles	*carbon*
nucleic acids	***product***	*nitrogen*	***carbohydrates***
catalyst	*ionic bond*	**four**	**reactant**
two	oxygen	temperature change	
formation of a precipitate		Organic chemistry	reaction rate

1. A chemical reaction may have occurred if this evidence is observed: _____, _____, _____ or _____.

2. The _____ can be changed by adding energy such a heat or light.

3. _____ can help speed up or slow down a reaction.

4. _____ is any substance that is consumed or used up during the reaction.

5. The substance that is produced by a chemical reaction is called the _____.

6. _____ is the chemical bond that involves stealing electrons.

7. _____ is the chemical bond that involves sharing electrons.

8. _____ is the central element to all living organisms.

9. _____ is the study of compounds that contain the element carbon.

10. Most organic molecules are made up of long rings or chains of carbon atoms (C) with atoms of other elements attached, such as _____ (H), _____ (O) or _____ (N).

11. Examples of organic molecules are _____, _____ and _____.

12. Carbon naturally forms _____ bonds. A hydrogen atom can form _____ chemical bond. Oxygen naturally forms _____ bonds. Nitrogen forms _____ bonds.

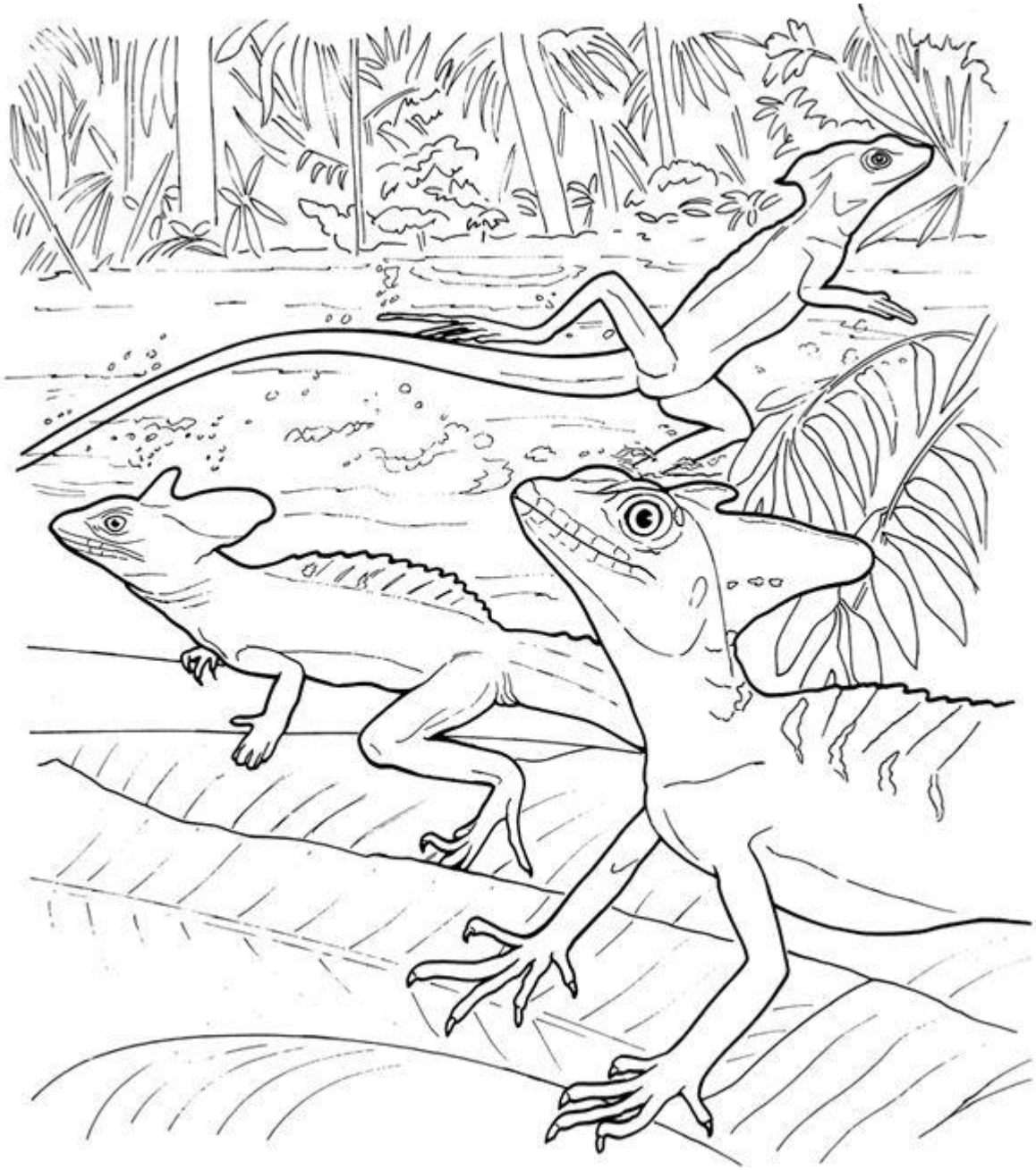
Ethanol (C_2H_6O) is the alcohol found in beer, wine and spirits, but it also has medical applications as an antiseptic and disinfectant. Draw the structure of ethanol showing all atoms and bonds. *(Hint: Remember how you build it with Play-Doh and toothpicks during class 😊!)*	

3) Surface Tension

1. _____ is a property of the surface of a liquid that allows it to resist an external force.
2. A _____ is the electromagnetic attraction between polar molecules in which hydrogen is bound to a larger atom, such as oxygen or nitrogen. This is not a sharing of electrons, as in a covalent bond. Instead, this is an attraction between the positive and negative poles of charged atoms.
3. Water molecules form hydrogen bonds with each other creating _____.
4. Water molecules form hydrogen bonds with other polar molecules creating _____.
5. Soap has a _____ head and a _____ tail.

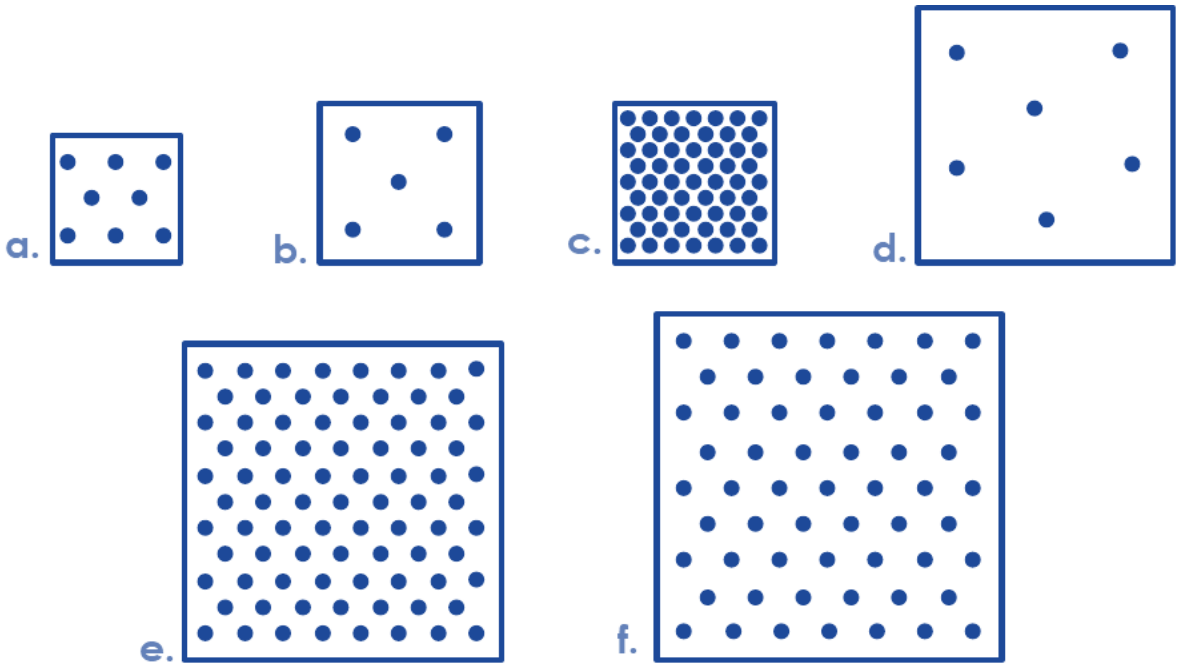
Colouring page ☺

The **Green Crested Basilisk Lizard** (*Basiliscus plumifrons*) is one of four species, including *Basiliscus basiliscus* and the Striped Basilisk Lizard, *Basiliscus vittatus*, that live in trees in tropical America. Males may be 2½ feet long and are not lightweights, but these lizards astonishingly can run across rivers and ponds on their long hind legs, without sinking. The big hind feet have flaps of skin on each toe. The lizard runs so quickly that it covers a substantial distance before its feet break the **surface tension** of the water. These lizards are excellent swimmers and can stay submerged for long periods to flee from danger or to hide. Males have high, narrow crest along their upper body.



4) Density

We have recently talked about the relationship between mass, volume and density. In this worksheet we will continue to explore this relationship. Below are several squares of various sizes which represent their volume. The number of dots inside the squares represents the mass of the object. Answer the questions about the squares that follow.



1. Which object has the greatest mass? Explain. _____
_____
_____

2. Which object has the smallest mass? Explain. _____
_____
_____

3. Which object has the largest volume? Explain. _____
_____
_____

4. Which object has the smallest volume? Explain. _____
_____
_____

5. Which two objects have the same volume? Explain. _____
_____
_____

6. Which two objects have the same mass? Explain. _____
_____
_____

7. If two objects have the same volume, do they have to have the same mass? Explain. _____
_____
_____

8. Which object has the greatest density? Explain. _____
_____
_____

9. Which object has the smallest density? Explain. _____
_____
_____

10. Which two objects have the same density? Explain. _____
_____
_____

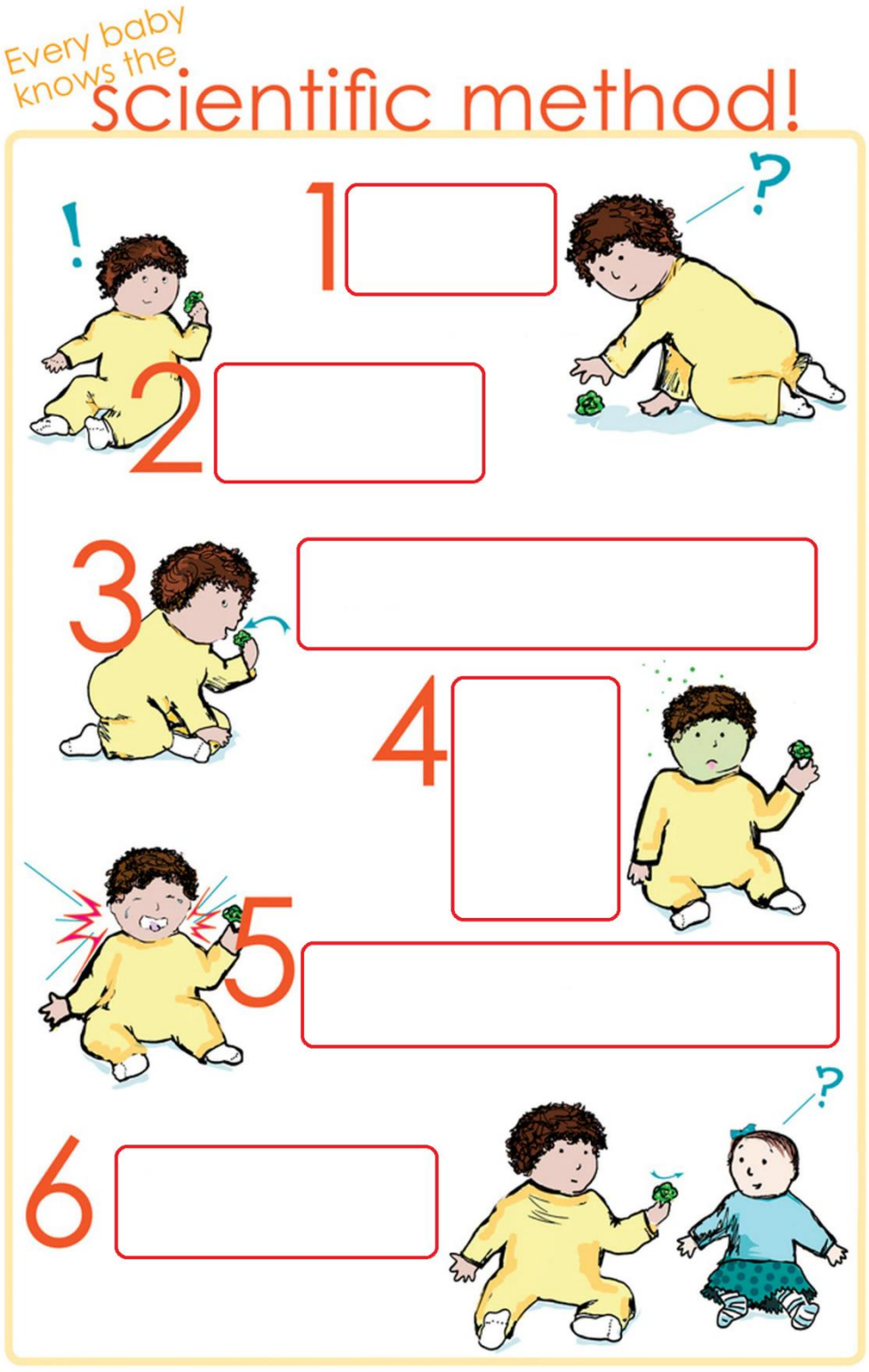
11. Which two objects would you expect to be made of the same material? Explain. _____
_____
_____

12. Why does the object with the largest volume not have the largest mass also? _____
_____
_____

13. Using squares and dots, draw two pictures of objects with different volumes and densities in the space below. The object with smaller volume must have a smaller mass but greater density than the object with greater volume.

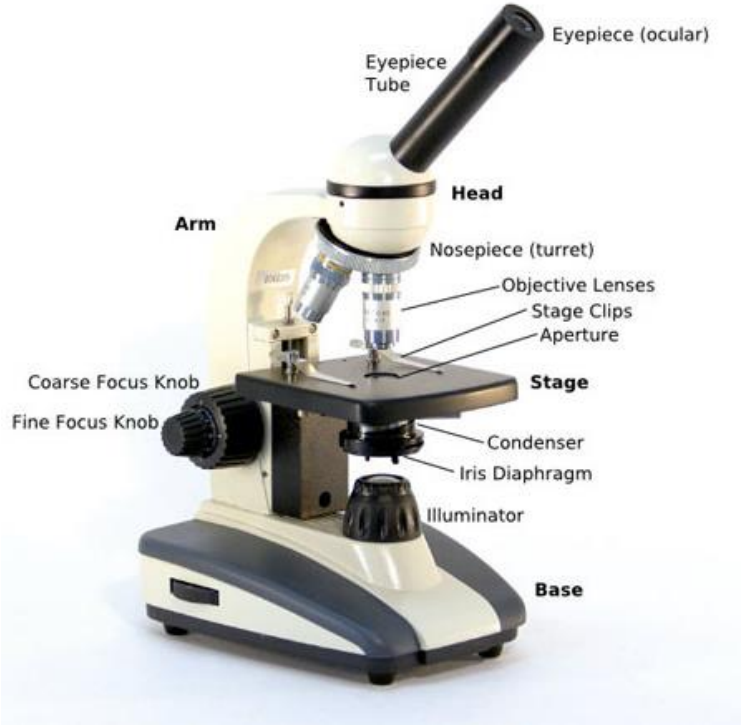
5) Scientific Method

Experiment and test your hypothesis.
Share your findings.
Observe, record and analyse your results.
Ask a question.
Draw your conclusions.
Form a hypothesis.



Parts of the microscope

W B M D W O D P N O F T O U E	EYEPIECE
K C P A N B C N V P T U A B H	TUBE
L T V W Q V H B B V A T A I O	ARM
Q W E E E S N V J A P S Q E V	BASE
Y E E R D M Z K V O E I V C A	ILLUMINATOR
M G S E R O B J E C T I V E S	STAGE
V A Y K E U H F B R H S B I V	TURRET
D T X Q S G T P V O V U E P N	OBJECTIVES
X S I N Q L X M H J T U O E J	COARSE FOCUS
C R O T A N I M U L L I F Y O	FINE FOCUS
H I B I G K V U K L Q A V E M	
S U C O F E S R A O C A Q E M	
Q P A A X D X R B B G R T W E	
F Z W W L X I F D N S M A P I	
Q F I N E F O C U S U M V J Y	



6) Biochemistry

eukaryotic	***antiseptics***	**virus**
fungi	Penicillium	*Staphylococci*
disinfectants	***antibiotic era***	*protozoa*
penicillin	bacteria	**prokaryotic**
algae	antibiotics	inhibited
Florey, Chain and colleagues		Alexander Fleming

1. _____, _____, _____, _____ and _____ are families of microorganisms.

2. Bacteria cells are _____ because they have ribosomes but no other organelles. In contrast, _____ cells contain membrane-bound organelles, such as nucleus, mitochondria, cell wall, chromosomal DNA, etc.

3. _____ are used to safely destroy bacteria within the body.

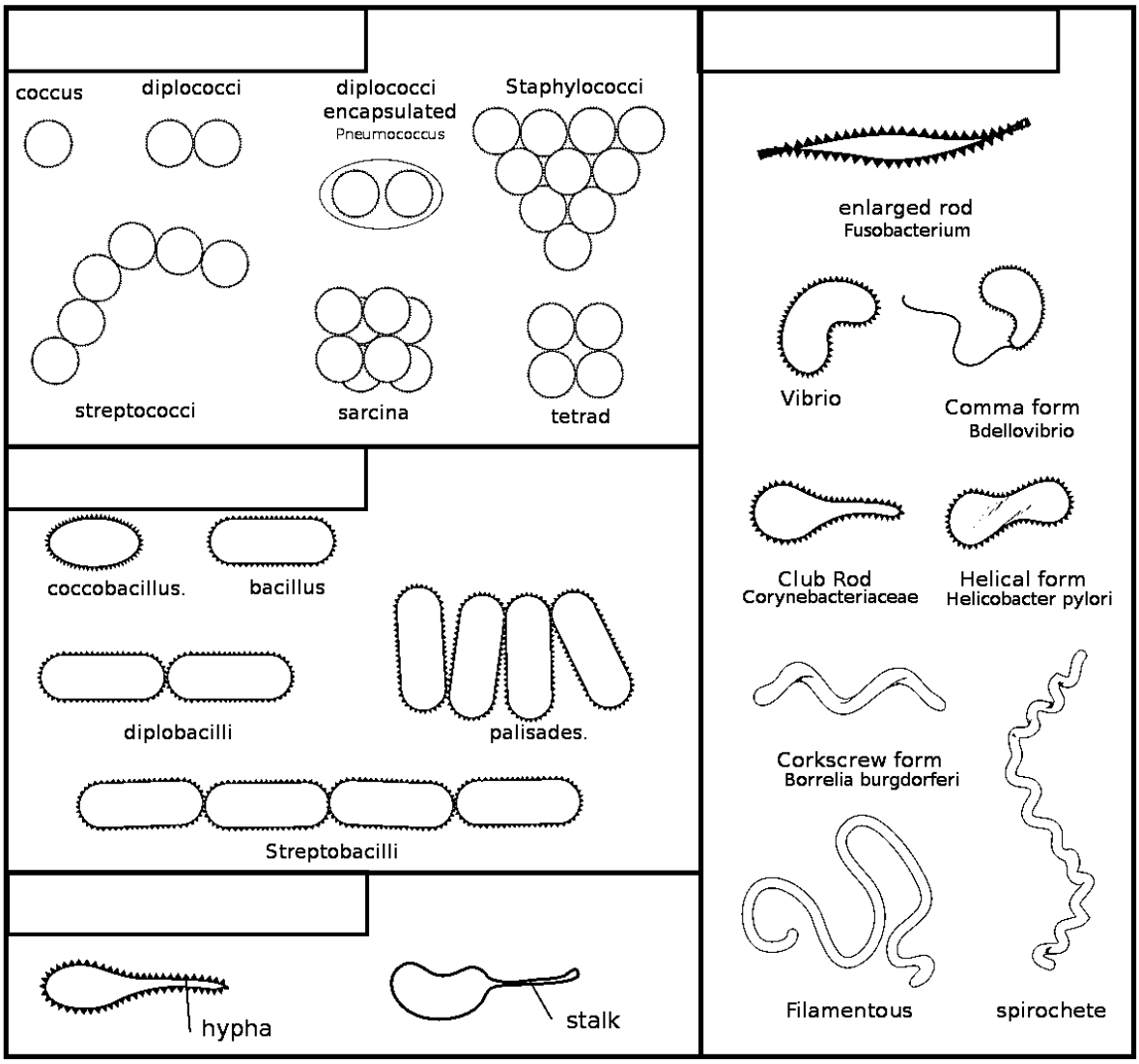
4. _____ are applied to living tissue/skin to reduce the possibility of infection or putrefaction.

5. _____ are used to destroy microorganisms found on non-living objects.

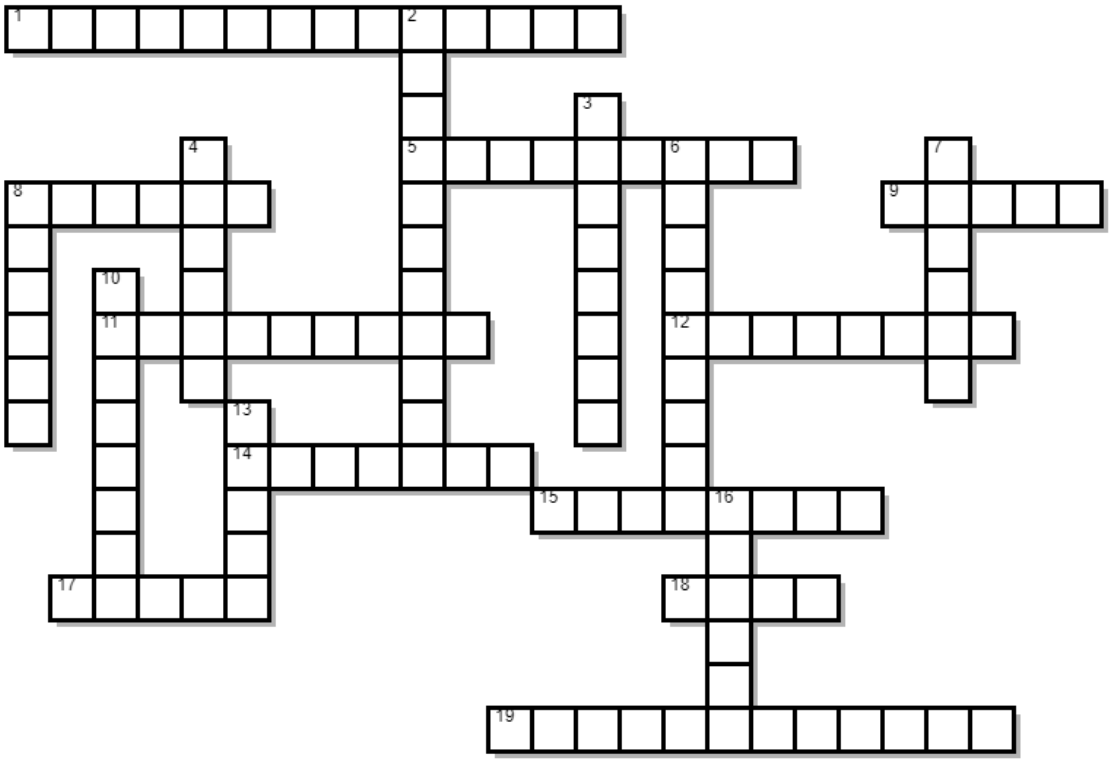
6. In 1928, _____, working at St Mary's Hospital in London, observed that a culture plate on which _____ were being grown had become contaminated with a mould of the genus _____, and that bacterial growth in the vicinity of the mould had been _____. He isolated the mould in pure culture and demonstrated that it produced an antibacterial substance, which he called _____. This substance was then prepared in bulk, extracted and its antibacterial effects analysed by _____ at Oxford in 1940. They showed that it had powerful therapeutic properties in infected mice, and that it was non-toxic, thus ushering in the '_____'.

Classification of bacteria according to shape. Write the name of each family of bacteria in the blank boxes, then colour the bacteria 😊.

Bacilli Budding and appendaged Others Cocci



7) Acids, Bases and pH



ACROSS

1 _____ is the reaction between acids and alkalis.

5 When a _____ ion (OH^-) is released, the solution becomes basic (also known as alkaline).

8 _____ acid is released in muscles during exercise.

9 The pH _____ is used to measure how acidic or basic a liquid is, and it is a number from 0 to 14.

11 _____ indicator gives you an approximate pH based on the different colours of the strip.

12 _____ acid is found in fizzy drinks.

14 _____ and sodium hydroxide are bases commonly found in kitchen cleaners.

15 When a _____ ion (H^+) is released, the solution becomes acidic.

17 _____ have a sour taste.

18 The two products of neutralisation reactions are always a _____ and water.

19 _____ acid is found in our stomach.

DOWN

2 Some food, such as red cabbage or blueberries, contain a chemical called _____ that changes colour depending on the acidity of its environment, hence it can be used as a natural indicator.

3 When a substance dissolves in water, it makes a _____.

4 _____ acid is found in lemons, limes and oranges.

6 A pH _____ changes colour when it is dipped into a solution containing an acidic or basic substance.

7 _____ acid is found in vinegar.

8 _____ paper is a type of pH indicator which is good for quickly telling you whether a solution is an acid or base, but doesn't tell you the exact pH.

10 _____ acid is found in car batteries.

13 _____ feel soapy.

16 _____ acid is found in broccoli and Brussel sprouts.

Neutralisation reactions. Complete the neutralisation reactions by writing the missing names of the reactants or products. **Note:** The balanced chemical equations are given for you to familiarise with chemical formulae! 😊

Ex	1 HCl Hydrochloric acid	+	1 NaOH Sodium hydroxide	→	1 NaCl Sodium chloride	+	1 H_2O Water
1	2 HCl Hydrochloric acid	+	1 $Ca(OH)_2$ Calcium hydroxide	→	1 $CaCl_2$	+	2 H_2O
2	2 HCN Hydrocyanic acid	+	1 $Ba(OH)_2$ Barium hydroxide	→	1 $Ba(CN)_2$	+	2 H_2O
3	2 CH_3COOH	+	1 $Zn(OH)_2$ Zinc hydroxide	→	1 $Zn(CH_3COO)_2$ Zinc acetate	+	2 H_2O
4	1 HI Hydroiodic acid	+	1 LiOH	→	1 LiI Lithium iodide	+	1 H_2O
5	2 HF Hydrofluoric acid	+	1 $Sr(OH)_2$ Strontium hydroxide	→	1 SrF_2	+	2 H_2O
6	1 H_2S Hydrosulphuric acid	+	2 CsOH Caesium hydroxide	→	1 Cs_2S	+	2 H_2O
7	2 H_3PO_4 Phosphoric acid	+	3 $Be(OH)_2$ Beryllium hydroxide	→	1 $Be_3(PO_4)_2$	+	6 H_2O
8	2 HNO_3 Nitric acid	+	1 $Hg(OH)_2$ Mercury(II) hydroxide	→	1 $Hg(NO_3)_2$	+	2 H_2O
9	4 HCl	+	1 $Pb(OH)_4$ Lead(IV) hydroxide	→	1 $PbCl_4$	+	4 H_2O

10	1 H_2CO_3 Carbonic acid	+	2 NH_4OH Ammonium hydroxide	→	1 $(NH_4)_2CO_3$	+	2 H_2O
11	3 HCl	+	1 $Al(OH)_3$ Aluminium hydroxide	→	1 $AlCl_3$	+	3 H_2O
12	2 HBr Hydrobromic acid	+	1 $Mg(OH)_2$ Magnesium hydroxide	→	1 $MgBr_2$	+	2 H_2O
13	1 HI	+	1 AgOH Silver hydroxide	→	1 AgI	+	1 H_2O
14	1 H_2SO_4 Sulfuric acid	+	1 $Pb(OH)_2$ Lead(II) hydroxide	→	1 $PbSO_4$	+	2 H_2O
15	1 H_3PO_4 Phosphoric acid	+	1 NaOH	→	1 Na_3PO_4	+	3 H_2O
16	1 H_3PO_4	+	3 KOH Potassium hydroxide	→	1 K_3PO_4	+	3 H_2O
17	2 HBr	+	1 $Ca(OH)_2$ Calcium hydroxide	→	1 $CaBr_2$	+	2 H_2O
18	1 $HClO_4$ Perchloric acid	+	1 RbOH	→	1 $RbClO_4$ Rubidium perchlorate	+	1 H_2O Water
19	1 HF Hydrofluoric acid	+	1 NH_4OH Ammonium hydroxide	→	1 NH_4F	+	1 H_2O
20	1 H_2S Hydrosulphuric acid	+	1 $Cu(OH)_2$ Copper(II) hydroxide	→	1 CuS	+	2 H_2O