

# Applied Science

To prepare effectively for Applied Science it is suggested you work through the below tasks and bring these with you for your first day at Bilton sixth form.

**Please note you will be expected to submit your mini-assignment from Task 4 and will also sit a baseline assessment related to the material in Tasks 1-3 when you commence 6th form.**

## Task 1— Cells

- A) Draw and label a animal cell (including plasma membrane, cytoplasm, rough endoplasmic reticulum, smooth endoplasmic reticulum, mitochondrion, nucleolus, nucleus, lysosome, golgi apparatus and 80S ribosome) and a plant cell (including tonoplast membrane, amyloplasts, middle lamella, chloroplasts, vacuole, cell wall plasmodesmata and pits). Draw and label a prokaryotic cell (including plasmids, capsule, ribosome, nucleoid, cell wall and flagella). List the differences between eukaryotic and prokaryotic cells.
- B) Research the following specialised cells (palisade and root hair cells in a plant, sperm cells, egg cells, white blood cells and red blood cells).

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## Task 2 — Formulae and bonding

- A) Research and learn the chemical formulae for nitrate, carbonate, sulfate, hydroxide, ammonium, zinc and silver. Explain how to write a balanced equation. Write a balanced equation for oxygen and hydrogen forming water, and carbon and hydrogen forming methane.
- B) Explain the electronic structure of an atom (its electron arrangement) including how many electrons are found in shells 1 to 4. Explain how you can work out how many electrons an atom has using only the periodic table.
- C) Explain what happens during ionic bonding and the properties of an ionic compound. Give an example of an ionically bonded compound which forms a giant lattice.
- D) Explain what takes place during covalent bonding and which elements will covalently bond with each other. Draw the dot and cross diagram showing carbon dioxide and methane.
- E) Explain how metallic bonding works (including a diagram), then give four key properties of metals.
- F) Is diamond ionic, covalent or metallically bonded? Explain why diamond is so strong.

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## Task 3 — Waves

- A) What do waves transfer, energy or matter? Draw and label a longitudinal wave and a transverse wave, explaining how they oscillate and giving examples of each.
- B) Explain how to calculate wave speed and describe an experiment in which you can measure waves in water and on a string.
- C) Explain what the electromagnetic spectrum is. Draw and label the electromagnetic spectrum including the wavelength and frequency of electromagnetic waves and the uses of each.
- D) List the dangers of any of the electromagnetic waves, explaining why they are dangerous
- E) Explain how different electromagnetic waves are used in communication and what properties they have which make them suited to this method of communication
- F) Research and write comprehensive notes about what a critical angle is and draw a diagram to show this. Draw and label a diagram of how light travels down an optic fibre and explain how it works. List the uses of fibre optic wires.

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## Task 4—Cells mini assignment

Please read the assignment brief and produce your mini assignment, which will be submitted in your first lesson. Please note below the command words used and their meanings.

### **Pass command words**

**Describe** Give a clear description that includes all the relevant features - think of it as 'painting a picture with words'

**Illustrate** Include examples or a diagram to show what you mean

### **Merit command words**

**Compare/Contrast** Identify the main factors that apply in two or more situations and explain the similarities and differences or advantages and disadvantages

**Explain in detail** Provide details and give reasons and/or evidence to clearly support the argument you are making

### **Distinction command words**

**Evaluate** Review the information then bring it together to form a conclusion. Give evidence for each of your views or statements