



South Craven School

SUPPORTED BY SOUTH CRAVEN ACADEMY TRUST

BTEC Level 3 Applied Science Y12 Summer Preparation Work

EXPLORE.

EXPERIMENT.

EXPLAIN.

Please hand in to your Applied Science teacher in your **first lesson** after the summer break.

Name (print clearly):

Previous School:

Exam board for GCSE Science: **OCR / AQA / Edexcel / other** (circle one)

At GCSE did you take **Triple** or **Combined** Science (circle one)

Science grades achieved at GCSE / /

Maths grades achieved at GCSE /

English grades achieved at GCSE /



Dear student,

We are looking forward to welcoming you to South Craven School's sixth form in September.

We are very pleased that you have chosen to study Applied Science with us. You will be part of a large cohort of students that have also opted to study science at BTEC and A-Level.

You will not be surprised to find out that Applied Science is one of the most challenging post-16 subjects. However, most students find that the experience of studying the subject is highly rewarding and satisfies much of the curiosity developed in GCSE science.

There are several **skills** that you will need to develop in order to be successful in Applied Science. These include:

- **ability to communicate effectively in writing**
- **good levels of basic numeracy**
- **following instructions carefully in practical work (written and verbal)**
- **ability to find out information and work independently**
- **recognising when you are struggling and then doing something about it**
- **confidence in seeking help from your teachers**
- **completing work set by your teachers.**

There is a strong correlation between the amount of work completed by students and the grades achieved by them.

We also expect students to contribute in lessons by asking and answering questions. This will be one of the criteria by which you will be judged during regular reviews of your performance.

Lessons need to be considered as a two-way process!

When you start the course, you will need to obtain a textbook. We strongly recommend one written specifically for the course (Pearson Level 3 BTEC in Applied Science).

Now answer the following questions. Read them carefully. Some of them are multiple choice so simply circle the letter of the correct response



Math skills

Decimals and Standard Form

1. Convert the following numbers to standard form:

- a) 100 _____
- b) 1000 _____
- c) 10 000 _____
- d) 0.1 _____
- e) 0.01 _____
- f) 0.001 _____
- g) 21 000 000 _____
- h) 435 000 000 000 000 _____
- i) 0.000 000 003 9 _____

2. Convert the following units to metres and write them in standard form:

- a) 1 mm _____
- b) 1 nm _____
- c) 1 μm _____
- d) 1 cm _____
- e) 27 mm _____
- f) 5647 mm _____
- g) 399 cm _____
- h) 29 000 000 μm _____

_____/17

3. Round the following numbers:

- a) 98.4478 to three significant figures _____
- b) 1 298.444 444 4 to four significant figures _____
- c) 5.555 55 to four significant figures _____
- d) 0.358 to one significant figure _____
- e) 0.000 464 8 to two significant figures _____

_____/5



Science Investigations

Define all the following terms that are to do with conducting an investigation:

a) Independent variable

b) Dependant variable

c) Control variables

d) Anomaly

e) Accuracy

f) Precision

g) Reliability

h) Reproducibility

i) Bias



Science Questions

Q1. Plants absorb light to photosynthesise.

(a) What is the correct word equation for photosynthesis? Tick **one** box.

carbon dioxide + glucose \rightarrow oxygen + water

glucose + oxygen \rightarrow carbon dioxide + water

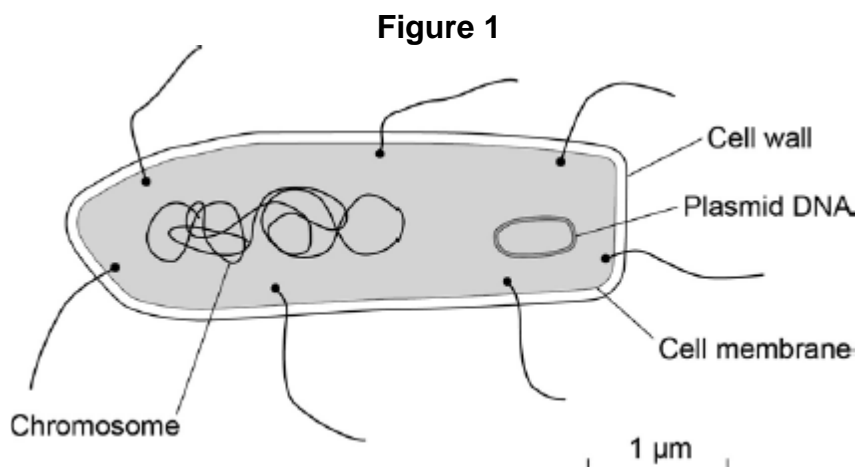
oxygen + water \rightarrow carbon dioxide + glucose

water + carbon dioxide \rightarrow oxygen + glucose

(1)

Q2. Bacteria can cause disease.

Figure 1 shows some features of a *Salmonella* bacterium.



(a) Draw **one** line from each feature of the *Salmonella* bacterium to the function.

| Feature | Function |
|--|---|
| <input type="text" value="Cell membrane"/> | <input type="text" value="Controls the movement of substances into and out of the cell"/> |
| <input type="text" value="Plasmid DNA"/> | <input type="text" value="Carries genetic information"/> |
| <input type="text" value="Chromosome"/> | <input type="text" value="Provides support and protection"/> |
| <input type="text" value="Cell wall"/> | <input type="text" value="The site of protein synthesis"/> |

(2)



(b) How is *Salmonella* spread between people? Tick **one** box.

Animal bites

Contaminated food

Sneezing

Sexual contact

(1)

(c) Give **two** ways you could stop *Salmonella* from spreading.

1. _____

2. _____

(2)

(d) Harmful bacteria can also be useful.

Scientists are doing research to find out if *Salmonella* can be used in a vaccine to treat cancer.

The *Salmonella* vaccine can be injected into the blood or swallowed in a tablet. One benefit of injecting the vaccine is that it gets to the cancer quickly in the blood.

What is another benefit? Tick **one** box

All cancers can be treated by the injection

It will not cause sickness and diarrhoea side effects

The injection is not painful to the patient

The injection introduces cancer cells into the body

(1)



Q3. This question is about calcium.

(a) What type of compound is calcium oxide? Tick **one** box

An acid

A base

A carbonate

A salt

(1)

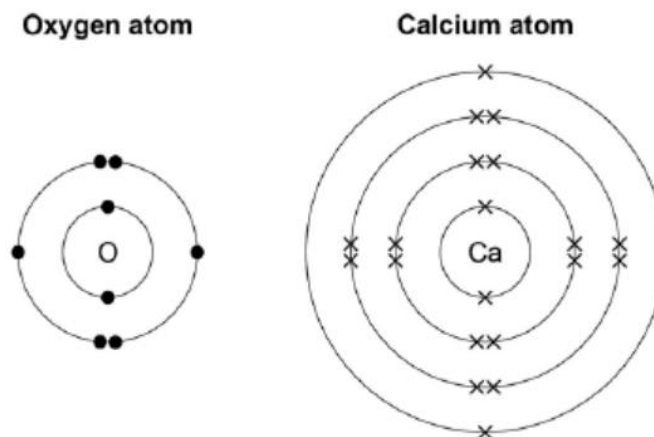
(b) Ionic compounds, such as calcium oxide, have high melting points. Complete the sentence. Use a word from the box.

bonds forces ions layers

Calcium oxide has a giant ionic lattice in which there are strong electrostatic _____ of attraction in all directions.

(1)

(c) The figure below shows the electronic structure of an oxygen atom and a calcium atom.



Describe how the calcium atom and the oxygen atom forms calcium oxide. You should give the charge on each ion formed.

(4)



Q4. This question is about hydrocarbons.

(a) The hydrocarbon $C_{16}H_{34}$ can be cracked. Balance the equation for cracking of $C_{16}H_{34}$.



(b) Describe the difference between cracking and distillation.

(2)

(c) What type of reaction is cracking? Tick **one** box.

Combustion

Decomposition

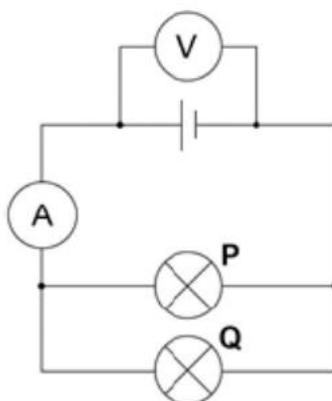
Neutralisation

Precipitation

(1)

Q5. Figure 1 shows a circuit diagram containing two identical lamps arranged in parallel. The reading on the ammeter is 186 mA.

Figure 1



(a) Which statement about the current through the lamp is true? Tick **one** box.

The current through both lamp **P** and lamp **Q** is **0.093 A**



The current through both lamp **P** and lamp **Q** is **0.186 A**

The current through both lamp **P** and lamp **Q** is **0.93 A**

The current through both lamp **P** and lamp **Q** is **1.86 A** (1)

(b) One of the lamps breaks and is not replaced. Which statement about the current in the other lamp is true? Tick **one** box.

The current through the lamp is **0.093 A**

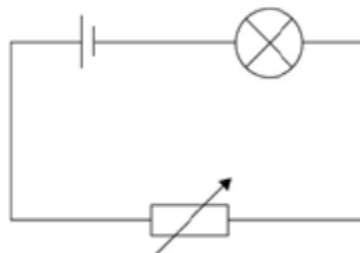
The current through the lamp is **0.186 A**

The current through the lamp is **0.93 A**

The current through the lamp is **1.86 A** (1)

(c) **Figure 2** shows a circuit that can be used to alter the brightness of a lamp.

Figure 2



The resistance of the variable resistor is increased. What effect will this have on the brightness of the lamp?

Explain your answer.

(2)



(d) When the potential difference across the lamp is 3.3 V, the current is 0.15 A.

Write down the equation that links current, potential difference and resistance.

Equation:

_____ (1)

(e) Calculate the resistance of the lamp.

Resistance = _____ Ω (3)