

# BTEC Applied Science

BTEC Level 3 National  
Certificate in  
Applied Science



## Summer tasks

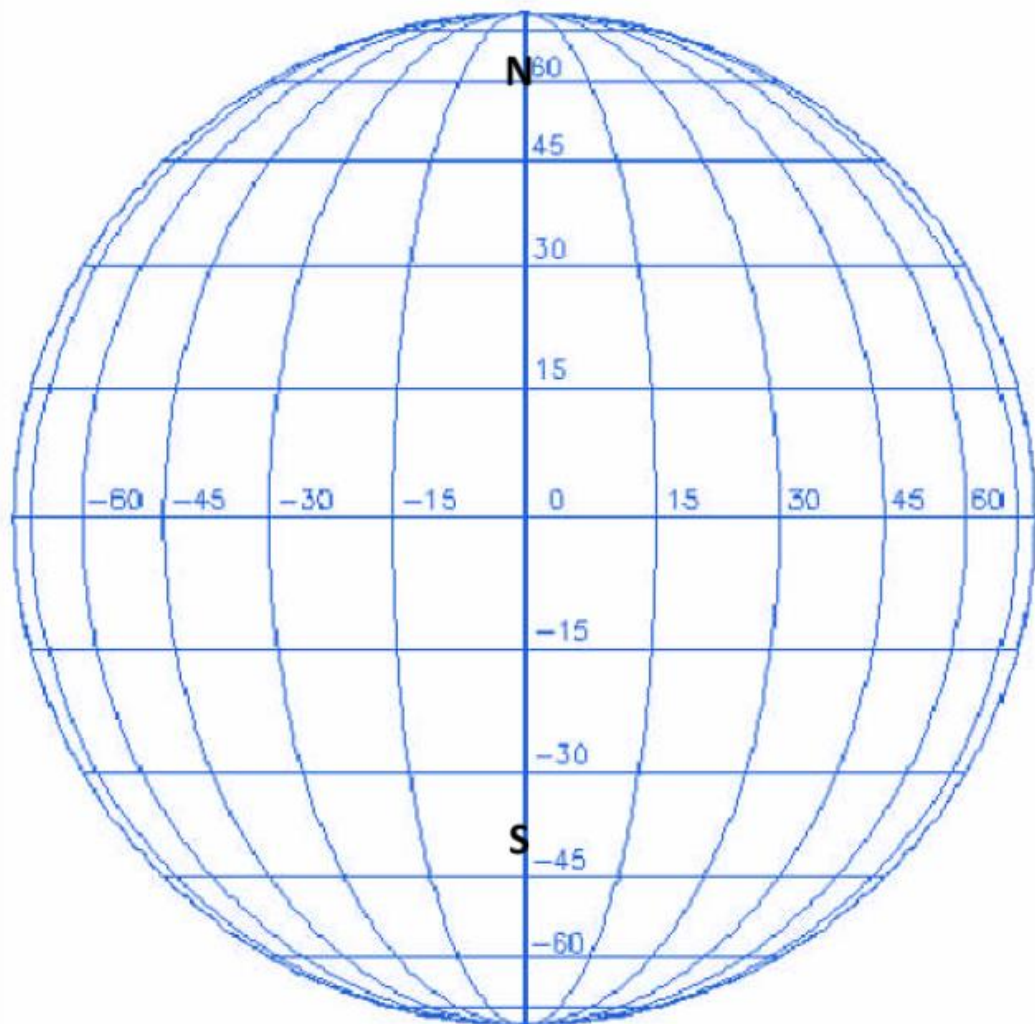
## Task 1

### Tracking an Active Sunspot Region

Sunspots are regions on the sun's surface that are cooler than their surroundings. Their number and movement allow scientists to take measurements and make predictions about the sun's activity.

Use the table below to plot the location of the active region of the sunspot group AR7220 on a solar graph as it moves across the face of the Sun. Ensure you place the date next to each plot.

Date	Location
7/5/92	S11E73
7/6/92	S12E63
7/7/92	S11E50
7/8/92	S12E38
7/9/92	S11E25
7/10/92	S12E11
7/11/92	S12W01
7/12/92	S12W14
7/13/92	S11W28
7/14/92	S12W41
7/15/92	S13W55
7/16/92	S12W69



1. What pattern do you notice in the movement of AR7220?

2. The first day that AR7216 was seen, its location was N13E75. After 12 days where would you expect AR7216 to be?

**E**

**W**

## Task 2

### Ionic and covalent bonding

After completing this worksheet you should be able to:

- describe the bonding in ionic and covalent compounds and the properties resulting from these
- compare the bonding in ionic compounds and simple molecular substances.

### Questions

1. Ionic bonding involves the transfer of electrons. The electrons are transferred from metal atoms to non-metal atoms. The metal atoms become positively charged ions and the non-metal atoms become negatively charged ions. Upon transfer, both sets of ions have a full outer shell of electrons. Ionic bonding is therefore the electrostatic attraction between the oppositely charged ions.

- a Sodium reacts with chlorine to form the ionic compound sodium chloride. Construct a balanced symbol equation for this reaction. (1 mark)
- b Copy and complete the dot-and-cross diagram in Figure 1 to show the sodium ions and chloride ions in this compound. (4 marks)

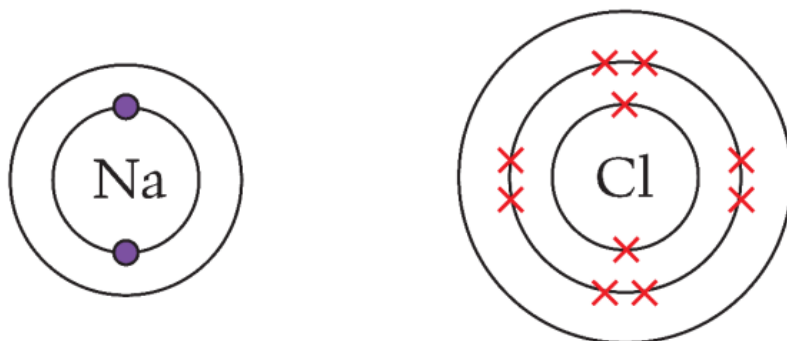


Figure 1 Incomplete dot-and-cross diagram for sodium chloride

- c Explain why sodium chloride has a high melting point. (3 marks)
- d Explain why solid sodium chloride **does not conduct** electricity. (1 mark)
- e Explain why molten sodium chloride **does conduct** electricity. (1 mark)
- 1 **Covalent bonding** occurs between non-metal atoms. The atoms share pairs of electrons so that all the atoms have a full outer shell of electrons. Carbon, for example, reacts with hydrogen to form methane, CH<sub>4</sub>. Methane is a simple molecule formed when a small number of non-metal atoms are joined together by covalent bonds.
- a Construct a balanced symbol equation for the formation of methane from carbon and hydrogen. (1 mark)
- b Copy and complete the dot-and-cross diagram in Figure 2 to show the bonding in a molecule of methane, CH<sub>4</sub>. (2 marks)

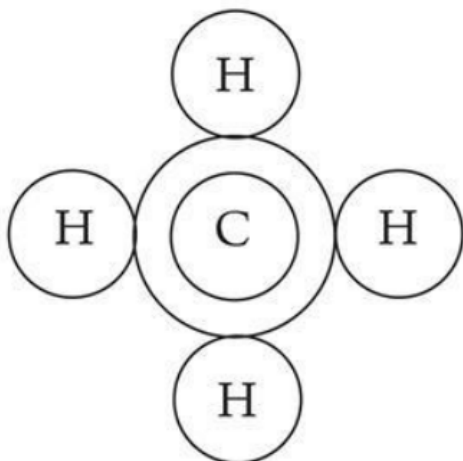
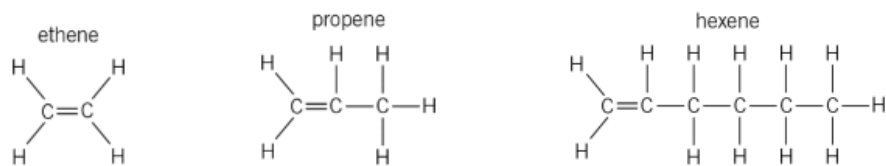


Figure 2 Incomplete dot-and-cross diagram for methane

### Task 3

Answer the questions below.



**Figure 1**

- 1 Alkanes are hydrocarbons. Are alkenes hydrocarbons as well? Justify your answer.

.....  
.....

(2 marks)

- 2 Write down the formula of hexene.

.....

(1 mark)

- 3 Look at the displayed formula of hexene in Figure 1.

Explain why the second carbon atom only has one hydrogen atom attached.

.....  
.....

(2 marks)

#### Task 4

Complete the following table in relation to alkenes

Number of carbon atoms	Name of alkene	Displayed formula	Molecular formula
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			



### **Task 8**

Download a copy of the Pearson BTEC Level 3 National Extended Diploma in Applied Science Specification. You can access this from the website link below;

<https://qualifications.pearson.com/en/qualifications/btec-nationals/applied-science-2016.html>

You can also do a quick google search

### **Task 9**

Once you have the specification, go to page 5 of specification and print page 5-6. This is a summary of the units you will complete and information regarding the points needed to achieve each level of the qualification. Read through this information to familiarise yourself with the course and its content.

### **Task 10**

You will complete a variety of core units throughout the course. These are compulsory units and some are externally assessed. It is important you are aware of the content covered. Read the information regarding the following units;

- A) Unit 1 (**assessed externally**)
- B) Unit 2
- C) Unit 3 (**assessed externally**)
- D) Unit 4
- E) Unit 5 (**assessed externally**)
- F) Unit 6
- G) Unit 7 (**assessed externally**)