

YEAR: 11 SUBJECT: Applied Science (Double Award)

Knowledge Focus: 3.1 Materials for purpose



Skills, knowledge and understanding to be developed in this Learning Plan:

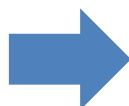
- Identify materials based on a variety of chemical and physical properties.
- Describe and explain different types of bonding within compounds.
- Label the structure of a leaf.
- Debate the arguments associated with intensive farming and selective breeding of plants.

Key terms to be learned in this

- LP:**
- Ions
 - Alloy
 - Composite
 - Photosynthesis

Week 1 - Learning Objectives: 3.1 Materials for purpose

- Properties of metals and non-metals.
- Bonding found within metals.
- *Investigate the thermal conductivity of metals***
- Use electron structure to form covalent bonds using shared pairs of electrons.
- Properties and uses of carbon allotropes such as graphite, graphene and fullerenes.



Objective assessments:

- Be able to:
- Describe the properties of metals and non-metals.
- Explain how the properties of metals make them appropriate for certain jobs.
- Link the properties of metals to their structure.

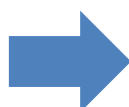
Homework/Gwaith cartref:
Exam questions drawing covalent bond diagrams.

Set:
Due:

Specified practical

Week 2 - Learning Objectives: 3.1 Materials for purpose

- Draw diagrams to show the movement of electrons to form ions.
- How do ions attract one another in ionic bonding.
- Properties of ionic compounds.
- Properties of giant and simple ionic structures and how these relate to their uses.
- Main classes of materials (metals, alloys, polymers, ceramics and composites) with examples of each.



Objective assessments:

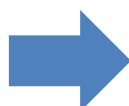
- Be able to:
- Draw accurate diagrams to show the formation of ions.
- Draw dot and cross diagrams to demonstrate the movement of electrons in ionic bonding.
- Describe the different classes of materials and identify materials based on their physical and chemical properties.

Homework/Gwaith cartref:
Draw accurate ionic diagrams.

Set:
Due:

Week 3 - Learning Objectives: 3.1 Materials for purpose

- Definition of an alloy and differences in malleability, hardness and strength of different alloys.
- How properties of polymers are related to bonding and structure including reference to cross-linking between chains.
- Strength of bonding between polymer chains.
- Awareness of important exceptions to polymer characteristics (e.g., Kelvar is relatively hard and strong).
- How carbon fibre can be mixed with polymers to form a composite material.



Objective assessments:

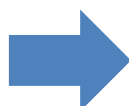
- Be able to:
- Describe the difference between alloys and metals including alloys with differing amounts of metals.
- Describe and explain the properties of polymers made from different types of monomers.
- Describe the strength of bonding between polymer chains.

Homework/Gwaith cartref:
6-mark QER on the properties and uses of metals.

Set:
Due:

Week 4 - Learning Objectives: 3.1 - Materials for purpose

- Practical ways to assess the properties of materials include flexibility, brittleness, tensile strength, hardness, density, etc.
- Use mathematical equations to find out the properties of materials, i.e., density and stress.

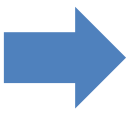
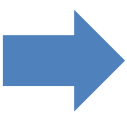


Objective assessments:

- Be able to:
- Calculate density of materials using mass and volume.
- Calculate stress using force and cross-sectional area.

Homework/Gwaith cartref:
Revision for EoT assessment.

Set:
Due:

<p>Investigate Hooke's law of extension. How to assess the suitability of material for a purpose i.e. const, environmental impact and sustainability. Specific uses of a combination of materials such as sports equipment, clothing and surgical equipment.</p>	<p>Assessment: 3.1 End of Topic Assessment</p>	<p>Calculate Hooke's law using force and extension as found during the practical investigation. Describe and explain how materials are made and the impact they have on the environment.</p>	
<p>Week 5 - Learning Objectives: 3.2 – Food for the Future Materials required by a plant to support life. The general structure of a leaf. Photosynthesis as a way plants produce food. Factors that affect the rate of photosynthesis. *Investigating the factors that affect the rate of photosynthesis* How plants use glucose produced during photosynthesis.</p> <p style="text-align: center;">*Specified practical*</p>		<p>Objective assessments: Be able to: Label the structure of leaf and explain what each components' purpose is. Describe and explain the factors that affect the rate of photosynthesis. Identify the reactants and products of photosynthesis. Form a balanced symbol equation for the photosynthesis reaction.</p>	<p>Homework/Gwaith cartref: Exam question applying photosynthesis knowledge.</p> <p>Set: Due:</p>
<p>Weeks 6-7 - Learning Objectives: 3.2 – Food for the future Plant nutrient requirements (nitrates and potassium) and the effects that these have on growth. The impact of the use of nitrogen fertilisers. The differences in intensive and organic farming (yield, cost of production). The impact of pesticides and fertilisers on the environment. Opinions associated with intensive farming and the use of pesticides in food production. Artificial transfer of genes to improve crop yield; potential disadvantages and issues. Selective breeding of plants includes disadvantages such as reduction in variation and increased susceptibility to disease.</p>		<p>Objective assessments: Be able to: Identify the nutrients required for plant growth. The impact of fertilisers on nutrient availability for plants. The differences in organic and intensive farming and how these can impact cost and yield. Discuss the advantages and disadvantages of selective breeding in plants for desirable characteristics.</p>	<p>Homework/Gwaith cartref:</p> <p>Set: Due:</p>