

PRIMARY STEM PROJECT

UNIT 3



RESEARCH

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TEACHERS' NOTES

UNIT 3:

RESEARCH

In this unit pupils will assemble a racing car chassis, by carefully following instructions, and will then explore aerodynamics in order to design a bodyshell which will streamline the shape of the car.

LEARNING OUTCOMES

Pupils will aim to

- Become familiar with aspects of good design
- Have an understanding of aerodynamics
- Work constructively as a team and allocate jobs appropriately
- Have a broad view of car types

Most students will be able to

- Recognise the use of aerodynamics in a real-world setting
- Be able to label parts of a car
- Recognise that different cars are used for different purposes

Some students will be able to

- Use knowledge of aerodynamics to inform design the process
- Know the parts of a car and their function
- Be able to differentiate cars by style and function

Pupil differentiation

Extension work can be used to stretch top end pupils.
All worksheets are accessible to all students.

LESSON 1

LOGOS & UNIFORMS

<p>LEARNING OBJECTIVES</p> <p>Pupils will</p> <ul style="list-style-type: none"> • Recognise logos in everyday life and understand their value as a marketing tool. • Investigate uniforms and their various uses 	<p>INDIVIDUALS GROUP</p>
<p>RESOURCES</p> <p>WORKSHEETS</p> <p>DESIGN A TEAM LOGO UNIFORMS TEAM UNIFORMS T-SHIRT DESIGN TEAM T-SHIRT (FRONT & BACK)</p> <p>POWERPOINTS</p> <p>LOGOS UNIFORMS TEAM COLOURS</p>	<p>EQUIPMENT</p> <p>*Writing Equipment *Coloured Pencils</p>
<p>RELATED WORKSHEETS</p> <p>DESIGN A KEYRING WHY DO WE WEAR UNIFORMS? (Teacher notes)</p>	<p>DESIGN A KEYRING</p> <p>*Tracing paper *Craft foam *Glue *Ball Chain & Connectors or *String</p>
<p>IN PREPARATION</p> <p>This lesson could be preceded by a lesson to design a keyring based on letters, using the worksheet DESIGN A KEYRING</p>	
<p>STEPS</p> <ul style="list-style-type: none"> • Introduce the lesson using PowerPoint LOGOS. • Hand out DESIGN A TEAM LOGO worksheet. • Pupils Individually design a team logo. Pupils should be encouraged to use all the information that they have learned to influence their designs. • The team then come together to positively discuss all the designs and decide upon a final team logo. • Use PowerPoint UNIFORMS as an introduction to this part of the lesson. • Class discussion on Uniforms • Working as a team complete UNIFORMS worksheet. • Hand out TEAM UNIFORM worksheet. • Pupils individually design a team t-shirt, using the T-SHIRT DESIGN worksheet. • These can then be reviewed by the whole team • Graphic designer to draw out final T-shirt design, using TEAM T-SHIRT (FRONT& BACK) worksheets. 	
<p>PLENARY</p> <p>Review UNIFORMS worksheet with the class as a whole, with each team offering their suggestions for answers.</p> <p>Teams could prepare a table-top display to showcase their designs to the rest of the class.</p>	

LESSON 2

FORCES

<p>LEARNING OBJECTIVES</p> <p>Pupils will:</p> <ul style="list-style-type: none"> Learn about air resistance, gravity and how these forces act upon objects 	<p>INDIVIDUALS PAIRS GROUP</p>
<p>RESOURCES</p> <p>WORKSHEETS</p> <p>FORCES WHAT IS STREAMLINED?</p> <p>VIDEO LINKS</p> <p>Sir Isaac Newton & Gravity https://www.bbc.com/teach/class-clips-video/discovering-the-work-of-sir-isaac-newton/zr4mf4j https://www.youtube.com/watch?v=2ydh7AShMzM https://www.youtube.com/watch?v=xmJoPCZj1_Q</p> <p>Experiment to demonstrate Air/water resistance https://www.bbc.com/teach/class-clips-video/investigating-air-and-water-resistance/z4m6nrd</p> <p>Demonstrate air resistance by making a parachute. https://www.bbc.com/teach/class-clips-video/investigating-what-makes-a-good-parachute/zjps382</p>	<p>EQUIPMENT</p> <p>*Writing Equipment</p> <p>MAKE A PARACHUTE</p> <p>*Eggs *Tissue Paper *Plastic Bags *String *Sticky Tape</p>
<p>RELATED WORKSHEETS</p> <p>DEMONSTRATING AIR RESISTANCE WRITING UP EXPERIMENTS EXPERIMENT TO....</p>	<p>AIR RESISTANCE DEMO</p> <p>*Wallpaper Paste *Large Glass Measuring *Cylinder or *Empty 2L Drinks Bottle (label removed)</p>
<p>IN PREPARATION</p> <p>You may wish to review the suggested video clips for suitability and information.</p>	
<p>STEPS</p> <ul style="list-style-type: none"> You may wish to precede this lesson by looking at Sir Isaac Newton and Gravity. The suggested links could act as an introduction. Additional links show investigations into air resistance and streamlining. The short videos could be useful to explain these theories. Water resistance can be used to demonstrate air resistance. As it acts in a similar way. This could be demonstrated in the class room using DEMONSTRATING AIR RESISTANCE experiment or by using the suggested video clip. Read through FORCES worksheet and work through the classroom activity with the exception of Step 3, which can be addressed later on in the project. Complete worksheet WHAT IS STREAMLINED? either individually or in teams. 	
<p>PLENARY</p> <p>Summarise learning by recapping key points.</p>	

LESSON 3 CAR DESIGN

<p>LEARNING OBJECTIVES</p> <p>Pupils will:</p> <ul style="list-style-type: none"> Learn about the importance of technical drawings and how they are used to convey accurate measurements Expand specialist vocabulary 	<p>INDIVIDUALS PAIRS GROUP</p>
<p>RESOURCES</p> <p>WORKSHEETS LABEL THE CAR PARTS TYPES OF CAR (1 & 2) CAR DESIGN</p> <p>POWERPOINT TECHNICAL DRAWING</p> <p>ON-LINE RESOURCES</p> <p>Blog looking at how streamlining in cars developed. https://www.youtube.com/watch?time_continue=38&v=1QiS97_qYU4</p> <p>More advanced information Wind tunnel testing- Sauber F1 Wind Tunnel watch</p> <p>IsoSketch 3D Dice Tutorial</p>	<p>EQUIPMENT</p> <p>*Writing Equipment *Scissors *IsoSketch Drawing Tools Available via the F1 in Schools Primary STEM website</p>
<p>RELATED WORKSHEETS</p> <p>LABEL A FI CAR</p>	
<p>IN PREPARATION</p> <p>View online videos to become familiar with content.</p>	
<p>STEPS</p> <ul style="list-style-type: none"> The lesson could be introduced using TECHNICAL DRAWING PowerPoint Look at LABEL THE CAR PARTS worksheet Discuss the purpose of each of the features and why they are necessary. Look at the view point of the drawings. Explain Isometric projection in relation to elevation drawings or plans. This can be demonstrated using worksheets LABEL THE CAR PARTS & TYPES OF CAR. 	
<p>PLENARY</p> <p>Recap on car parts and vocabulary used. Check on the progress of the glossary and ensure that it is being used to keep track new of words.</p>	
<p>ENRICHMENT</p> <p>Extension work on LABEL THE CAR PARTS worksheet and additional worksheet LABEL AN F1 CAR.</p>	

LESSON 4 EVALUATION

<p>LEARNING OBJECTIVES</p> <p>Pupils will:</p> <ul style="list-style-type: none"> Learn how to sensitively extract information using carefully worded questions to evaluating their peer. These could be written in advance 	<p>INDIVIDUALS PAIRS GROUP</p>
<p>RESOURCES</p> <p>WORKSHEETS</p> <p>SUMMARY & EVALUATION DESIGN TASK CAP TEMPLATE SPIRAL HAT TEMPLATE</p>	<p>EQUIPMENT</p> <p>*Writing Tools *Drawing equipment *Coloured Pencils *Scissors *Thin card</p>
<p>RELATED WORKSHEETS</p> <p>FEED BACK BURGER</p>	
<p>IN PREPARATION</p>	
<p>STEPS</p> <ul style="list-style-type: none"> During this round of evaluation, it is suggested that pupils could be paired with a pupil from a different team. Pupil should look through the work produced and fill in the SUMART & EVALUATION worksheet. This could be done interview style with each pupil asking questions to the other. If this project is to culminate in a race day event, pupils could design a team hat. These could be printed and given to team supports or sold as an enterprise project to raise funds. 	
<p>PLENARY</p> <p>Look at the car chassis. Discuss modifications and how these might help the car go faster. Recap on learning about aerodynamics and streamlining. Encourage the use of newly-acquired vocabulary.</p>	
<p>ENRICHMENT</p> <p>The spiral hat template will test the accuracy of fine motor skills.</p>	