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| **Keep the Path Clear** | | |
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| Looking at ways to keep birds away from airport runways | | |
| **Subject(s):** Design and Technology  **Approx time:** 50-80 minutes |  | **Key words / Topics:**   * airplane * bird strike * design ideas * engine * future of flight * runway * spider charts/mind maps |
| **Stay safe**  Whether you are a scientist researching a new medicine or an engineer solving climate change, safety always comes first. An adult must always be around and supervising when doing this activity. You are responsible for:  • ensuring that any equipment used for this activity is in good working condition  • behaving sensibly and following any safety instructions so as not to hurt or injure yourself or others  Please note that in the absence of any negligence or other breach of duty by us, this activity is carried out at your own risk. It is important to take extra care at the stages marked with this symbol: ⚠ | | |
| **Suggested Learning Outcomes** |  |  |
| * To understand the dangers of bird strikes * To be able to design a system and layout to mitigate the risk of bird strikes occurring | | |
| **Introduction** |  |  |
| This is one of a series of resources designed to allow learners to use the theme of the future of flight to develop their knowledge and skills in Design & Technology. This resource focusses on the issue caused by birds in the vicinity of the airport/airplanes.  Bird strikes can be extremely dangerous and cause a lot of damage to aircraft. Your challenge is to think of creative ways in which this can be prevented! | | |
| **Purpose of this activity**  In this activity learners will come up with ideas to precent bird strikes. In this activity learners will develop their analytical and researching skills, and then be able to apply these to the given design situation.  This activity could be used as a main lesson activity to teach about research and analysis skills within design, through the use of an aviation theme. It could also be used as part of a wider scheme of learning to teach about the use of the research and design process within Design and Technology and Engineering. | | |
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| **Activity** |  | **Teacher notes** |
| **Introduction (10-20 minutes)**  Teacher to introduce the activity and the dangers caused by bird strikes to aircraft. Show the video on slide 4 of the presentation about what can happen when a bird hits an aircraft. Learners to take notes. The video can be paused at strategic points to enable learners to add details to their activity sheets.  **Mind mapping (10-15 mins)**  Learners to work in pairs to analyse the situation and produce a mind map/spider chart of ways in which bird strikes can be prevented from happening, or their likelihood reduced.  **Good v bad points (10-15 minutes)**  Teacher to demonstrate how to evaluate the good points and bad points of each given solution. Learners then add their own for each possible solution on the activity sheet.  **Design (10-20 minutes)**  Learners to use the map on the activity sheet to draw their proposed solutions, thinking about both the methods themselves and the potential layout of them on on the map.  **Plenary (10 minutes)**  Learners to share their solutions with their peers – what are the good features? What could be improved? |  | **Bird strike discussion**  The dangers of bird strikes to aircraft include engine damage/failure, damage to fuselage, wings etc.  **Bird strike video**  Check suitability of the video clip inserted depending on the maturity of the group and its individual learners.  Show the video to learners and pause at appropriate points for them to take notes and discuss what they have seen. This video is available on YouTube - <https://www.youtube.com/watch?v=tkMJRVuOQXM>  **Mind mapping and good v bad points**  Opportunity to extend learners – can they think of more novel ways of achieving the desired outcome?  **Design application**  Learners should add their ideas to prevent bird strikes to the map shown on their activity sheet handout. They could use a range of different methods.  Learners could also consider the effect on the environment. E.g. if trees and other bird habitats are removed could they be placed somewhere else where there is not a danger to aircraft? |
| **Differentiation** |  |  |
| **Basic** |  | **Extension** |
| * Provide learners with a partially completed mind map. * Allow learners to add predetermined ideas onto the drawing sheets. * Designing the layout could be altered to give premade symbols that the learners could physically move around a map. |  | * Think of ways to safely relocate wildlife, rather than simply removing it, to avoid disruption to the environment. * Explain how all the different methods used are related and how they would work together to achieve the desired outcome. * Create a model of the airport with indications of the systems being used. |

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| **Resources** |  | | **Required files** icon-docicon-pdficon-ppt |
| * Pens * Pencils * Rulers * Projector/interactive whiteboard or computers for watching the video |  | | icon-ppt Presentation - Keep the path clear  icon-doc Keep the path clear activity sheet |
| **Additional websites** | | | |
| * **YouTube - What happens when a bird strikes an aircraft:** Video explaining the Hudson River incident in 2009, where a bird strike resulted in an aircraft losing both its engines. <https://www.youtube.com/watch?v=tkMJRVuOQXM> * **YouTube - Bird strike jet engine test:** Video showing the results of a bird strike test on an aircraft jet engine. <https://www.youtube.com/watch?v=lgspIiTFWIk> * **YouTube - Why planes don’t have mesh or grills to stop birds:** Video explaining how this could have unforeseen effects, such as preventing the engine form working correctly. <https://www.youtube.com/watch?v=CCGN9i3RGOY> | | | |
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| **Related activities (to build a full lesson)** |  | |  |
| **Starters** (Options)   * Discuss what could endanger an aircraft during take-off and landing. Show a picture of aircraft taking off/landing during discussion. * Discuss the damage that bird trikes can cause to aircraft and why it is important that this is avoided as much as possible. | | **Plenary**   * Learners to share their findings on which systems they have chosen – can they justify why they have decided to place them where they are? * Learners to share their solutions with their peers – what are the good features? What could be improved? | |
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| **The Engineering Context** film |
| * The future of flight is a great context to explore the opportunities that working in the aeronautical engineering and travel industry presents! For example, designing, making and maintaining aircraft and systems that make travellers’ journey’s safer, easier and more relaxing. * It is vital for engineers to understand the importance of safety in the aviation industry. Since the early days of aviation, collisions of aircraft and birds have taken place, sometimes with fatal consequences. Development of larger, faster and quieter aircraft, jet engines and intensification of air traffic caused an increase in the number of incidents. |

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| **Curriculum links** | |
| **England: National Curriculum**  Design and technology   * KS2 use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups. | **Northern Ireland Curriculum**  Art and Design   * KS2 Respond to the world around them * Develop and use their imagination. |
| **Scotland: Curriculum for Excellence**  Technologies   * I can extend and enhance my design skills to solve problems and can construct models. * TCH 2-09a | **Wales: National Curriculum**  Design and technology   * KS2 Pupils should be given opportunities to use a range of information sources to generate ideas for products |
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| **Assessment opportunities** | | |
| * Formative and/or formal assessment of the responses on the finished worksheet. * Formal teacher assessment of ideas produced. | | |
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