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| **Air traffic control communication** | | |
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| Learning about the importance of clear communication for  air traffic controllers | | |
| **Subject(s):** Engineering, Mathematics  **Approx time:** 40-60 minutes |  | **Key words / Topics:**   * Air traffic control * Flight safety * Future flight * Instructions * Shapes * Verbal communication |
| **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 role of an air traffic controller. * To understand the importance of clear communication in the aviation industry. * To be able to give clear verbal instructions for others to be able to produce different shapes. | | |
| **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 Engineering and Mathematics. This resource focusses on developing the communication skills needed to perform the role of an air traffic controller.  Clear communication is vital to the role of an air traffic controller, so they can ensure safety for aircraft in the skies. Can you provide clear and concise instructions so that your team can produce a range of different shapes? | | |
| **Purpose of this activity**  In this activity learners will make use of the theme of the future of flight to learn about the importance of clear communication for air traffic controllers. They will work together in groups to follow instructions to make a range of shapes using different cards.  This activity could be used as a main lesson activity to teach about communication skills within aeronautical engineering. It could also be used as part of a wider scheme of learning focussing on jobs and careers within the aviation sector. | | |
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| **Activity** |  | **Teacher notes** |
| **Introduction (10-20 minutes)**  Teacher to discuss the role of an air traffic controller and the importance of clear communication between the air traffic controller and pilots.  **Preparation**  Learners to get into groups and decide who will be the air traffic controller and who will make the shapes from the instructions given by them.  Teacher to then hand out the shape cards – one set for each group.  **Giving/following instructions to make the shapes (30-40 minutes)**  The air traffic controllers should be shown the shape – this should not be shown to the other team members.  Groups to work together, following the instructions from the designated air traffic controller to make each shape shown on the teacher presentation (slides 6-8).   * Shape 1 - House * Shape 2 - Arrow spinner * Shape 3 - Spacecraft   Discuss the results of the activity with learners. How successful were the air traffic controllers in giving clear instructions? |  | This activity should be carried out in small groups – three or four learners is an ideal size.  **Introduction**  A possible example of what can happen if communication between controllers and aircraft is not clearly understood is the Tenerife air disaster, although discretion should be used if using this example with learners due to the large loss of life involved. This resulted in changes to how information is given that would prevent such an accident happening again.  **Preparation**  Print the shape cards handout and give one set to each group. Learners can either cut the cards out themselves using scissors ⚠ or these could be pre-cut by the teacher.  The card handout can be upscaled to A3 paper if the teacher wishes to increase the size of the cards.  **Task**  Each shape to be produced increases in order of difficulty and the number of shape cards required:   * Shape 1 is simple two card shape. * Shape 2 is a more complex three card shape. * Shape 3 is the most complex, requiring the use of four different card shapes.   The shape should be kept at a location where the designated air traffic controllers could come and look at it if they need a reminder.  Learners following the instructions must only use those given by the air traffic controller but can discuss these with each other.  The teacher presentation (slides 6-8) can be shown when learners have completed each shape to demonstrate what they should have created.  The group could switch roles after each shape if desired. |
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| **Differentiation** |  |  |
| **Basic** |  | **Extension** |
| * Pre-cut shape cards for weaker learners. * Slides 6-8 of the teacher presentation can be used as a visual prompt for weaker learners when, or after, completing the activity. |  | * Create additional shape cards for learners to produce more complex shapes – e.g. different types of aircraft, plants/trees or different types of animals. * Ask learners to navigate their teams through a maze, or to follow a track on the floor, to further develop their communication skills. |

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| **Resources** |  | | **Required files** icon-docicon-pdficon-ppt |
| * Scissors (to cut out shape cards). * Shape cards. |  | | Presentation – Air traffic control  icon-pdf Shape card handout |
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| **Additional websites**   * **National careers service – Air traffic controller**: Information about career options and the role of an air traffic controller: <https://nationalcareers.service.gov.uk/job-profiles/air-traffic-controller> * **Historynet – Tenerife air disaster**: Analysis of the worst air disaster in history, widely attributed to unclear communication between the control tower and the two aircraft involved: <https://www.historynet.com/disaster-on-tenerife-historys-worst-airline-accident/> | | | |
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| **Related activities (to build a full lesson)** |  | |  |
| **Starters** (Options)   * Discuss the role of an air traffic controller and why clear communication is important. | | **Extension** (Options)   * Create additional shape cards for learners to produce more complex shapes – e.g. different types of aircraft, plants/trees or different types of animals. * Ask learners to navigate their teams through a maze, or to follow a track on the floor.   **Plenary**   * Discuss the success of the activity – did groups manage to complete each shape from the instructions given? If not then why not? What went well/even better if? * Make a list of improvements that could be made to the instructions received for the next class/group. | |
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| **The Engineering Context** film |
| * Clear communication is vital to ensuring success in all engineering sectors, especially within the aviation industry. Giving wrong or unclear information can lead to safety issues and even loss of life, so it is vital that instructions are given clearly and accurately. * The future of flight is a great context to explore the opportunities that working in the aeronautical engineering industry presents! For example, designing, making and maintaining aircraft and all their different parts. |

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| **Curriculum links** | |
| **England: National Curriculum**  Design & Technology   * KS2 1b   Mathematics   * KS1 Geometry - recognise and name common 2-D and 3-D shapes. * KS2 Geometry - draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them | **Northern Ireland: Curriculum**  Mathematics and numeracy – Shape and space   * KS1 - Sort 2-D and 3-D shapes in different ways * KS1 - Make constructions, pictures and patterns using 2-D shapes * KS2 - Construct a range of regular and irregular 2-D shapes. |
| **Scotland: Curriculum for Excellence**  Technologies   * TCH 1-12a   Numeracy and mathematics   * MTH 1-16a * MTH 1-16b * MTH 2-16c | **Wales: National Curriculum**  Design and Technology   * KS2 Skills: Designing 5   Mathematics   * KS2 Shape: Recognise and classify triangles, squares, rectangles, pentagons and hexagons, including irregular cases. |
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| **Assessment opportunities** | | |
| * Formal teacher assessment of finished shapes and instructions given. * Peer and/or self-assessment of finished shapes and instructions given. | | |
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