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| **Luggage of the Future** |
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| Designing a new way of carrying things |
| **Subject(s):** Design and Technology, Mathematics**Approx time:** 60-75 minutes  |  | **Key words / Topics:** * design criteria
* design ideas
* future of flight
* luggage
* security
* sketching
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| **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 create a set of design criteria for the contents of a new item of luggage
* To be able measure the required contents for a new item of luggage
* To be able to produce creative design ideas for a new item of luggage
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| **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 and Mathematics. This resource focusses on designing a new item of luggage that travellers can use to store and carry their belongings.People need to able to carry their luggage when travelling, such as when going abroad on holiday. Can you design the luggage of the future? |
| **Purpose of this activity**In this activity learners will design a new form of luggage. They will create a list of design criteria for the luggage, apply mathematical knowledge in measuring the objects that need to be carried, then design the luggage itself.This activity could be used as a main lesson activity to teach about designing skills and the application of mathematics within them, through an aviation theme. It could also be used as part of a wider scheme of learning to teach about the use of the design process within Design and Technology and Engineering. |
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| **Activity** |  | **Teacher notes** |
| **Introduction (10-15 minutes)**Teacher to introduce the activity. Teacher to lead a class discussion on what we use luggage for and use the presentation to exemplify what could go into it for a certain scenario, for example when going on holiday.**Design criteria (5 minutes)**Teacher to discuss the purpose and importance of design criteria. What is a set of design criteria? What is it used for? Why is it important?**Generating the design criteria (10-15 minutes)**Learners to decide upon a destination for the task and generate statements for the criteria. **Learners identify what objects go into their luggage and take measurements (10 minutes)**Learners to measure the dimensions of the objects to go into their luggage and record these on the activity sheet to aid with their designing.**Producing the luggage design (20 minutes)**Learners to produce their design idea, using notes and sketches to show how it will meet the needs of the design criteria. |  | **Design criteria**Examples of exiting design criteria could be showed for other commonly used existing products. For example, a mobile phone or a classroom chair.Learners could be given pre-determined scenarios to consider with prompts for the criteria – these could be done via a handout or class discussion.When producing their own design criteria, learners should think about who it is for, where it will need to go and what will need to be included within it. They should also consider how it will be moved. Learners could also share selected criteria points with the class to inspire peer responses.**Measuring the objects to go in the luggage**A tape measure or ruler could be used to take measurements of dimensions. Responses should be listed on the activity sheet.Exemplar measurements could be given to students to choose from to ease the process.**Producing designs**Designs could be produced on the activity sheet, or on A3/A4 paper if required. These should take the form of labelled sketches. |
| **Differentiation** |  |  |
| **Basic** |  | **Extension** |
| * Provide learners with a pre-written list of design requirements.
* Exemplar measurements could be given to students to choose from to assist with designing.
* Give templates for learners to use to create different shapes of luggage.
 |  | * Produce a card model of the luggage design.
* Discuss and write down ways to get the luggage to follow the user remotely.
* Learners could look at ways of securing their luggage against theft e.g. using alarms, sensors, lights or sirens.
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| **Resources** |  | **Required files** icon-docicon-pdficon-ppt |
| * Pencils
* Rulers
* Tape measures (if available)
* A3 and A4 paper as required
 |  | icon-ppt Presentation - Luggage of the futureicon-doc Luggage activity sheet |
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| **Additional websites** |
| * **YouTube - The Bluetooth bag:** Video showing a bag that moves itself automatically using Bluetooth. <https://www.youtube.com/watch?v=ts2rmMwBUaI>
* **YouTube - Top 10 coolest Futuristic Smart Suitcases:** <https://www.youtube.com/watch?v=Yn_VxmzD7tg>
* **YouTube - Design a custom suitcase:** <https://www.youtube.com/watch?v=NKhyXGMmvR0>
* **YouTube - Anti-theft:** A video showing the use of anti-theft zippers on luggage. <https://www.youtube.com/watch?v=vm3-VzzlfKQ>
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| **Related activities (to build a full lesson)** |  |  |
| **Starters** (Options) * Discuss the purpose and importance of design criteria.
* Show a product (e.g. a car, mobile phone or chair) and discuss what the design criteria for it would be.
 | **Plenary*** Learners to share their sketches and create a Dragons Den style pitch of their ideas to their teacher.
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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 products that make travellers’ journey’s safer, easier and more relaxing.
* Designers and engineers must be able to produce and interpret design criteria for different products that they are designing. This helps to ensure that the designs are fit for purpose and meet the needs of the user.
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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

Mathematics* KS2 convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre).
 | **Northern Ireland Curriculum**Art and Design* KS2 Respond to the world around them
* KS2 Develop and use their imagination.
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| **Scotland: Curriculum for Excellence**Mathematics* I can solve practical problems by applying my knowledge of measure, choosing the appropriate units and degree of accuracy for the task and using a formula to calculate area or volume when required.
* MNU 3-11a
 | **Wales: National Curriculum** Design and technology* KS2 develop a simple specification/recipe for their products indicating their intentions and approach.
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| **Assessment opportunities** |
| * Formative and/or formal assessment of the responses on the finished worksheet.
* Formal teacher assessment of designs produced.
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