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| **Santa’s suit replacement** | | | |
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| Designing a high-tech replacement for Santa’s suit  **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: ⚠ | | | |
| **Subject(s):** Design & Technology  **Approx. time:** 50 - 60 minutes |  | | **Key words / Topics:**   * Christmas * context * design criteria * textiles * sketching * smart materials |
| **Suggested Learning Outcomes** |  | |  |
| * To be able to design a high-tech alternative to Santa’s traditional red suit. * To be able to communicate design ideas using sketches, notes and annotations. | | | |
| **Introduction** |  | |  |
| This is one of a series of resources designed to allow learners to use Christmas themes to develop their knowledge and skills in Design & Technology and Engineering. This resource focusses on designing a high-tech replacement for Santa’s suit.  Santa’s traditional red and white outfit first appeared in the 1870’s in drawings by the American cartoonist Thomas Nast. Since then there have been many developments in technology. Wouldn’t benefiting from some of these developments make Santa’s job on Christmas eve easier? | | | |
| **Purpose of this activity**  In this activity, learners will design a replacement for Santa’s suit that meets a series of design criteria and incorporates at least one technology to make Santa’s work easier. For example, this could be a smart material, boots that fly like a hoverboard, wearable electronics, or augmented reality headsets that summarise the nice or naughty status of people they look at – there are a vast amount of options, impeded only by the bounds of creativity.  This could be used as a fun one-off main lesson activity to develop creativity and graphics skills in design & technology, as well as increasing understanding of how developments in technology affect our lives. | | | |
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| **Activity** |  | | **Teacher notes** |
| **1. Introduction and Background (10 mins)**  Teacher to introduce the objective of the activity (designing a new suit for Santa) and outline some of the developments in technology that could be considered when designing the new outfit.  **2. Introduce the context and design criteria (5-10 mins)**  Introduce and discuss the following design brief and criteria with the class.  **Context**  Santa’s clothes have a challenging life:   * they have to resist wear and tear from sliding down chimneys * they must resist soot marks and stains spilled drinks left for him by grateful children * they have to keep him warm in freezing temperatures * they must protect him when he falls off roofs * they have to give him camouflage when naughty children try to stay awake to see him!   **Criteria:**  The new clothes must:   * protect Santa from knocks and falls. * give some form of camouflage. * keep Santa warm. * be fashionable and aesthetically appealing – Santa needs to be stylish! * include some new technologies to make his job easier. |  | | **Links with ‘The Moving World’**  This activity also provides opportunities to link with a range of IET secondary activities, including the ‘Wearable Technology’ and ‘Wearable Antennas’ suites of activities, and Designing a Hoverboard’, all of which focus on developments in technology which could contribute to the design.  The handout includes a body shape to assist in drawing; if learners prefer they could draw on the reverse or blank paper instead.  **Notes and annotations**  Learners should use notes and detailed annotations to explain and describe how their design meets the needs of the design criteria. They should especially focus on how the use of one or more technologies would make Santa’s job easier. |
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| **3. Designing the outfit (30 mins)**  Learners sketch their idea for an outfit that meets the needs of the design criteria given. They should fully annotate their ideas to explain the main features and how they meet specific criteria. Ideas should be rendered appropriately so they are suitable to be presented to their peers.  Designs can be produced on the handout provided or on blank A4/A3 paper.  **4. Peer review (5-10 mins)**  Learners to ask three people to suggest one improvement each to their design.  They should then select one of these suggested improvements and use it to update the design.  **Differentiation** |  | |  |
| **Basic** |  | | **Extension** |
| Identify a specific technology that learners should incorporate into their design, explaining its benefits. |  | | Design uniforms that could be worn by Santa’s reindeer  Consider other potential uses of the technologies you have used in Santa’s new clothes.  Render the design ideas to an exceptional standard |
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| **Resources** |  | | **Required files** icon-docicon-pdficon-ppt |
| * Projector/whiteboard * Sketching equipment |  | | icon-ppt Santa’s suit replacement presentation  icon-pdf Santa’s suit replacement handout |
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| **Additional websites** |  | |  |
| The following websites can be used for additional background information or to aid with the activity:   * **Bitesize – textile-based materials:** videos outlining the design considerations for textiles <https://www.bbc.co.uk/bitesize/guides/zjc3rwx/revision/1> and developments in new materials <https://www.bbc.co.uk/bitesize/guides/znd48mn/revision/4>. * **Bitesize – Developments in new materials:** videos explaining a range of smart, modern and composite materials <https://www.bbc.co.uk/bitesize/guides/znd48mn/revision/1> and, focussing on smart materials, <https://www.bbc.co.uk/bitesize/guides/zfq8jty/revision/2>. * Development of D30 – video: <https://www.stem.org.uk/elibrary/resource/33314>. * **Hoverboards –** the story behind the design of hoverboards:<https://www.youtube.com/watch?v=q_BYvUlDviM> and the science behind their design: <https://www.youtube.com/watch?v=IM0sRctOxQc> * **IET Faraday Resources – Wearable technology and wearable antennas:** free resources that can be used to build learner knowledge and understanding. <https://education.theiet.org/secondary/teaching-resources/wearable-technology/> and <https://education.theiet.org/secondary/teaching-resources/wearable-antennas/> | | | |
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| **Related activities (to build a full lesson)** |  | |  |
| **Starters**   * Videos: Any of the seven videos listed in the additional websites above * Show the learners some examples of smart materials and ask them to explain their benefits and suggest what they could be used for   **Main**   * ACTIVITY: Super Sleigh (design a new sleigh for Santa) * ACTIVITY: Wearable technology * ACTIVITY: Wearable antennas * ACTIVITY: Designing a Hoverboard | | **Plenary**   * Peer review, giving feedback on designs | |
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| **The Engineering Context** film |
| A major aim of technology is to improve quality of life. One way that it achieves this is to make it easier for us to carry out tasks – this has been a common theme from the first use of rocks as a tool to hit things to the use of complex robotic systems to manufacture products. |

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| **Curriculum links** | |
| **England: National Curriculum**  Design & Technology   * KS3 1a, 1b, 1d, 1e, 3b, 3d | **Northern Ireland: Curriculum**  Technology & Design   * KS3 Knowledge, understanding and skills: Design – identifying problems; investigating, generating, developing, modelling and evaluating design proposals; giving consideration to form, function and safety. * Communication – use of free-hand sketching and formal drawing techniques and ICT tools (including 3D modelling).   Learning Outcomes:   * Demonstrate creativity and initiative when developing ideas and following them through. |
| **Scotland: Curriculum for Excellence**  Technologies   * TCH 3-05a, TCH3-06a, 3-09a, 3-11a, 4-09a] | **Wales: National Curriculum**  Design and Technology   * KS3 Skills: Designing 2, 3, 6, 8, 9 |
| **GCSE D&T**  AQA D&T   * 3.1.1, 3.1.3, 3.1.6.1, 3.1.6.2, 3.2.1, 3.3.4, 3.3.5, 3.3.6   Edexcel D&T   * 1.2.1, 1.2.2, 1.4.1, 1.4.3, 1.13.1, 1.15.1, 1.17, 6.3, 6.4.1, 6.4.2   Eduqas D&T   * 2.1 Core: 1, 2, 4, 12   OCR D&T  1.1a, 1.2a, 2.1a, 2.2a, 3.1a, 4.1a, 5.1e, 5.2a-c | **GCSE Engineering**  AQA Engineering  3.1.1, 3.1.3, 3.5, 3.6 |
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| **Assessment opportunities** | | |
| Regular questioning throughout the activity, formal teacher assessment of completed work, peer review of designs produced. | | |
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| **Personal, learning & thinking skills (PLTS)** | | |
| * Self-manager * Reflective learner * Creative thinker | | |
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