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| **Engineering a stadium** | | |
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| Designing the sports stadium of the future | | |
| **Subject(s):** Design and Technology, Engineering  **Approx time:** 50 - 80 minutes |  | **Key words / topics:**   * Design considerations * Football * Modelling * Sketches * Sports * Stadium * World Cup |
| **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 main considerations when designing sports stadiam. * To be able to design a sports stadium of the future. * To be able to present design ideas as annotated sketches. | | |
| **Introduction** |  |  |
| This is one of a series of resources designed to allow learners to use the theme of the men’s football World Cup to develop their knowledge and skills in Design and Technology and Engineering. This resource focusses on designing a sports stadium that can be used for both the competition itself and subsequently.  Millions of people from all over the world will attend the men’s football World Cup in Qatar in 2022. Can you design a stadium that will not only meet their needs, but also leaves a future legacy from the competition? | | |
| **Purpose of this activity**  In this activity, learners will use the theme of the World Cup to design a future football stadium. They will think about the main design considerations and requirements for the stadium. They will then produce annotated sketches of their idea and think about how it could be used after the event has taken place.  This could be used as a one-off main lesson activity to develop designing and sketching skills. Alternatively, it could be used as a part of a wider scheme of work to develop designing and modelling skills in Design and Technology and Engineering. | | |
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| **Activity** |  | | **Teacher notes** |
| **Introduction and design brief (5-10 minutes)**  Teacher to introduce the activity and the theme of the 2022 men’s World Cup. Teacher to use the presentation to introduce and discuss the design brief with learners.  **Design considerations (15-25 minutes)**  Class to list and discuss different considerations that learners should think about when producing their response to the brief. For example, how the stadium will look, how the supporters will be kept dry and comfortable etc. Teacher to use the presentation to review and add additional considerations, if required.  **Existing stadiums (5-15 minutes)**  Teacher to use the presentation to show examples of existing stadiums. Class to discuss what is good about them and what could be improved.  **Producing the designs (25-30 minutes)**  Learners to produce sketches of their designs using the pitch handout template. They should annotate their ideas to show the main features and how it meets the needs of the brief.  A class display could be created showing all the different designs produced. |  | | **Introduction and design brief**  Explain how legacy is very important for a World Cup – i.e. what the stadia will be used for afterwards.  **Design considerations and existing stadia**  Learners could make a mind map or fishbone diagram of their thoughts. Can they think of any more design considerations? E.g. Qatar will be extremely hot, even in Winter, so is air conditioning needed?  **Existing stadiums**  Slide 8 of the presentation gives examples of existing stadia for learners to look at, from L-R – Wembley Stadium (London, England), Nou Camp (Barcelona, Spain), Olympic Stadium (Munich, Germany). Discuss the main defining features of each and where they could be modernised or improved. E.g. for Nou Camp – holds a lot of people but no cover from the weather.  **Extension activities**  When designing a stadium for a different sport, learners should think about what would be needed that is different for this sport to football. E.g. a cricket ground should have a pavilion for the players to change and watch from. |
| **Differentiation** |  | |  |
| **Basic** |  | | **Extension** |
| * Provide partially completed stadium designs for weaker learners to add to and improve. * Provide card or paper cut outs of different stadium elements that they could assemble to produce a finished design. |  | | * Design a method of holding up the roof structure of the stadium. * Design a new stadium for another sport. |
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| **Resources** |  | | **Required files** icon-docicon-pdficon-ppt |
| * Paper. * Pens, pencils and coloured pencils. |  | | icon-ppt Engineering a stadium presentation  icon-pdf Engineering a stadium handout |
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| **Additional websites** | | | |
| * **FIFA – World cup 2022:** Official website for the FIFA men’s world cup 2022 in Qatar. <https://www.fifa.com/tournaments/mens/worldcup/qatar2022> * **Wikipedia –** **Qatar:** Information about the host country for the world cup. <https://en.wikipedia.org/wiki/Qatar> * **The Stadium Guide - World Cup 2022:** Information about the stadiums to be used in the 2022 world cup. <https://www.stadiumguide.com/tournaments/fifa-world-cup-2022-stadiums-qatar/> * **Dezeen – Stadiums:** <https://www.dezeen.com/tag/stadiums/> * **Design Build Network – Wembley Stadium:** <https://www.designbuild-network.com/projects/wembley/> * **Wikipedia – Munich Olympic Stadium:** <https://en.wikipedia.org/wiki/Olympiastadion_(Munich)> * **World cup soundtrack**: <https://www.youtube.com/watch?v=vyDjFVZgJoo> | | | |
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| **Related activities (to build a full lesson)** |  | |  |
| **Starters** (options)   * Analyse and evaluate examples of existing stadium designs. * Discuss the requirements for a future football stadium. | | **Plenary**   * Share their ideas to peers and produce a class display. * Compare their designs to stadiums already produced for the World Cup. | |

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| **The Engineering Context** |
| * The football World Cup will require engineers of a wide range of disciplines to make sure that it runs smoothly and effectively. From structural engineers in charge of stadium design to textile engineers producing the players’ kits, the importance of engineers is huge. |

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| **Curriculum links** | |
| **England: National Curriculum**  Design and technology   * KS2 1a, 1b. * KS2 4a. | **Northern Ireland Curriculum**  Personal development and mutual understanding   * Mutual Understanding in the Local and Wider Community: being aware of their own cultural heritage, its traditions and celebrations; recognising and valuing the culture and traditions of one other group who shares their community. |
| **Scotland: Curriculum for Excellence**  Craft, design, engineering and graphics   * TCH 2-09a. * TCH 2-11a. | **Wales: National Curriculum**  D&T   * KS2 Skills: Designing 1, 2, 5, 6. |
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| **Assessment opportunities** |
| * Formal summative assessment of completed designs by the teacher. * Peer assessment and feedback on designs produce. |