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| **Designing the Trainers of the Future** |
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| Designing footwear for sports use |
| **Subject(s):** Design and Technology, Science**Approx time:** 70-100 minutes  |  | **Key words / Topics:** * Cushioning
* Flexibility
* Footwear
* Friction
* Support
* Traction
* Trainers
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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 analyse the function and components of a product
* To be able to communicate a design through drawing using information gained through research
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| **Introduction** |  |  |
| This is one of a series of resources designed to allow learners to use the theme of the London Marathon to develop their knowledge and skills in Design & Technology. Trainers are one of the most commonly worn shoes in our culture. They provide comfortable support for our feet as we go about our active lives as students, athletes, educators and engineers. The design of trainers (and all athletic shoes) is based on how they will be used and is an example of bioengineering.This activity introduces the concept of research through product analysis to support the design process. The main activity involves designing a trainer.  |
| **Purpose of this activity**In this activity, learners will use the theme of the London Marathon to respond to a design context, investigate existing products for inspiration and design a trainer.This activity could be used as a main lesson activity to develop skills in designing. It could also be used to introduce the review of existing products to inspire design solutions. |
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| **Activity** |  | **Teacher notes** |
| **Introduction (10-15 minutes)**Teacher to introduce the activity, designing the trainer of the future. Class to discuss the use of trainers – what are they for? Why do we need different ones?**The Task (10-15 minutes)**Teacher to present the setting the scene context on slide 5. Learners to explore the context individually by answering the questions posed. Learners are to think about what movement is being undertaken and what is needed to make that comfortable for the user.**Compare (10-15 minutes)**Learners to compare two different types of trainers/footwear, looking at key features and key words – cushioning, traction etc.**Research (20-30 minutes)**Learners to research into 5 identified new technologies used in footwear design, recording information on the activity sheet along with supporting images or sketches.**Design your Trainer (20-30 minutes)**Learners to create designs for their trainer – to incorporate at least 1 technological advancement they have found or are already aware of. The designs should draw inspiration from the three tasks above and take account of cushioning, flexibility, support, traction and modern technology. Annotation is needed to show detail and their thinking. |  | This activity could be carried out as individuals.Print the activity sheet and distribute to the learners.**The Task**If additional time and appropriate resources are available, learners could use the internet to research the requirements for different sports or even observe live sports. **Compare** Suggested sentence starters could be used for the to assist the comparisons.**Design your trainer**Depending upon the time available, learners could produce two (or more) initial design ideas and use these as inspiration for their final design. |
| **Differentiation** |  |  |
| **Basic** |  | **Extension** |
| * Provide a scaffolded research sheet with sentence starters and questions to answer.
* Allow learners to adapt a partial design solution.
 |  | * Make a list of sports that have similar types of foot motions. Do these sports need the same kind of shoes or different ones? Why?
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| **Resources** |  | **Required files** icon-docicon-pdficon-ppt |
| * Pens, pencils and drawing instruments
* Variety of trainers/shoes for comparison
 |  | icon-ppt Presentation Trainers of the Futureicon-doc Activity Sheet Trainers of the Future |
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| **Additional websites** |  |  |
| * **How a sport shoe is made :** <https://www.youtube.com/watch?v=EDfavRMI2T8>
* **Men’s sports shoe TV ad** : <https://www.youtube.com/watch?v=Xg--lBFNOqM>
* **Reebok’s 3D printing technology :** <https://www.youtube.com/watch?v=2_Mz8saTcRI>
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| **Related activities (to build a full lesson)** |  |  |
| **Starters** (Options) * Watch the video <https://www.youtube.com/watch?v=Xg--lBFNOqM>.
* Ask learners to describe what they like about trainers and how many pairs they have.
 | **Plenary*** Self/peer assess the design ideas produced.
* Learners to share their thoughts on what the future of footwear is – where will technology take us next?
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| **The Engineering Context**  |
| Bioengineers are involved in the design of trainers. They combine their knowledge of the human body with mechanical engineering and materials science to design footwear that aid athletic performance. The shoes must provide the right type of support and traction needed for the intended sport while also taking into consideration their appearance. |
| **Curriculum links**  |
| **England: National Curriculum**D&T KS3* develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations
* understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists
 | **Northern Ireland Curriculum**KS3 Technology and Design* identifying problems; investigating, generating, developing, modelling and evaluating design proposals; giving consideration to form, function and safety
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| **Scotland: Curriculum for Excellence**Technologies* I can apply my knowledge and understanding of engineering disciplines and can develop/build solutions to given tasks.
* TCH 3-12a
 | **Wales: National Curriculum** D&T KS3* identify and use appropriate sources of information to help generate and develop their ideas for products
* be creative and innovative in their thinking when generating ideas for their products
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| **Assessment opportunities** |
| Informal formative assessment of the finished worksheet, possible extension of writing recommendation for future developments and verbal presentations of ideas. |