Gladiators Inventor Workshop #2
Researching and Designing Gadgets

Estimated duration: 50mins

Lesson Overview

In this lesson, pupils will explore the challenges Gladiators face in their competitions, such as improving speed, balance, stamina, and strength. The class will use their knowledge of existing sports technology to design an innovative fitness gadget to help a Gladiator overcome a specific challenge.

The pupils will learn about different types of design diagrams, including annotated sketches, cross-sectional and exploded diagrams, and choose the most appropriate method to represent their invention. By the end of the lesson, pupils will have created and presented their own designs.

Learning Objectives:

- Understand the challenges that Gladiators face in their performances and think critically about solutions.
- Learn about annotated sketches, cross-sectional and exploded diagrams and how to use them in design.
- Research existing gadgets and sports technology to inform their designs.
- Draw and label their own gadget inventions, choosing an appropriate diagram method to depict their creation.

Curriculum Links:

England: Design and Technology (KS2)

Pupils should be taught to:
- Use research and develop design criteria to inform the design of innovative, functional, and appealing products that are fit for purpose.
- Generate, develop, model, and communicate ideas through discussion, annotated sketches, cross-sectional and exploded diagrams.

Scotland: Technologies (Second Level)

- TCH 2-05a: Investigate how product design has been influenced by changing lifestyles.
- TCH 2-11a: Use graphic techniques, manually and digitally, to communicate ideas, experimenting with shape, colour, and texture.
- TCH 2-12a: Extend knowledge of engineering to create solutions.

Wales: Science and Technology (Progression Step 3)

- I can creatively respond to the needs of the user based on the information collected.
- I can identify and consider factors when developing design proposals.
- I can use design communication methods to present ideas and respond to feedback.

Northern Ireland: The World Around Us (KS2)

- Understand how science supports technological inventions.
- Design and make models using labelled diagrams.

Materials Needed

- Paper, pencils, erasers, rulers
- Coloured pencils or markers
- Digital devices for research (if available)
- Example images of labelled, cross-sectional, and exploded diagrams (included at end of lesson plan)

What fitness skills does your class think they excel at?

Lesson Outline

Introduction (5 mins)

Begin the lesson watching a clip of the Gladiators in action from the programme's clips page:
https://www.bbc.co.uk/programmes/m001vfg8/clips

Recap the various challenges that Gladiators face in their competitions (like strength, balance, speed, and reaction time). Use examples, such as:

- **Speed:** The Gladiators need to maintain their speed over long distances and avoid obstacles.
- **Strength:** The Gladiators need to have strength for lifting or pulling heavy objects.
- **Balance:** The Gladiators must demonstrate good balance on wobbly platforms.
- **Reaction Time:** The Gladiators must be able to react quickly to unexpected obstacles.

Ask the pupils to think about which area they'd like to improve if they were a Gladiator.
Write their ideas on the board.

Main activity:

Part 1: Researching Existing Technology (10 mins)

N.B: If your class delved into market research in the previous lesson, you can skip this part and move straight to part two.

Pupils assemble into teams of 3-4. Ask them to discuss existing technology they know that's used by people for fitness, exercise and wellbeing. Optionally you can provide your own examples to discuss (Our first Gladiators Inventor Workshop lesson plan has example pictures included).

Ask the pupils to consider how each of the examples work and how they may relate to features found on the micro:bit, e.g. LED display, sensors and data collection, etc.

Part 2: Understanding Design Diagrams (10 mins)

N.B. Examples of the diagrams discussed in this section are at the end of this document. We encourage you to also have a go at drawing your own diagrams for additional examples of what they could look like. Don't worry if you're not an artist, it's about explaining things clearly!

Show the class different examples of design diagrams.

Annotated Sketches:

The simplest type of technical drawing, show the sample (or your own) examples to discuss with the children. Explain that an annotated sketch shows an invention or object with parts clearly named and explained. The labels should be neat, with lines connecting to the part of the drawing. Each label should include a short description of what the part does.

Cross-Sectional Diagrams:

Explain that a cross-sectional diagram shows a "slice" of an object, so you can see inside it. They are typically used when you need to show the internal parts of your invention, such as a micro:bit inside a gadget. This allows you to show the different 'hidden' components in greater detail.

Exploded Diagrams:

Explain that an exploded diagram shows how the parts of an object fit together, but spread out, so each piece is visible. Exploded diagrams are useful for showing how different components of a gadget, like buttons, sensors, and screens, connect or assemble.

Part 3: Design Your Own Gladiator Gadget (25 mins)
Now, pupils will design their own invention to help a Gladiator overcome a specific challenge (e.g., balance improvement, strength training). They can design a gadget for a specific Gladiator's needs or for the all the Gladiators to use. The BBC Gladiators programme page has profiles for the cast:
https://www.bbc.co.uk/programmes/profiles/3ySWC0B0nqPjqvQgggCGffn/gladiators-ready

Each child in the group will independently sketch out their ideas. To start simply, they can focus on producing an annotated sketch each by the end of the session. They will use pencils and paper and (optional) colouring pencils to create their first ideas.

N.B. More confident children can attempt other diagram styles.

The Gladiators micro:bit challenge page has printable worksheets alongside these lesson plans for students to draw their diagrams, if blank paper feels too directionless.
Set goals for the children to include in their sketches:

Success criteria for sketches:

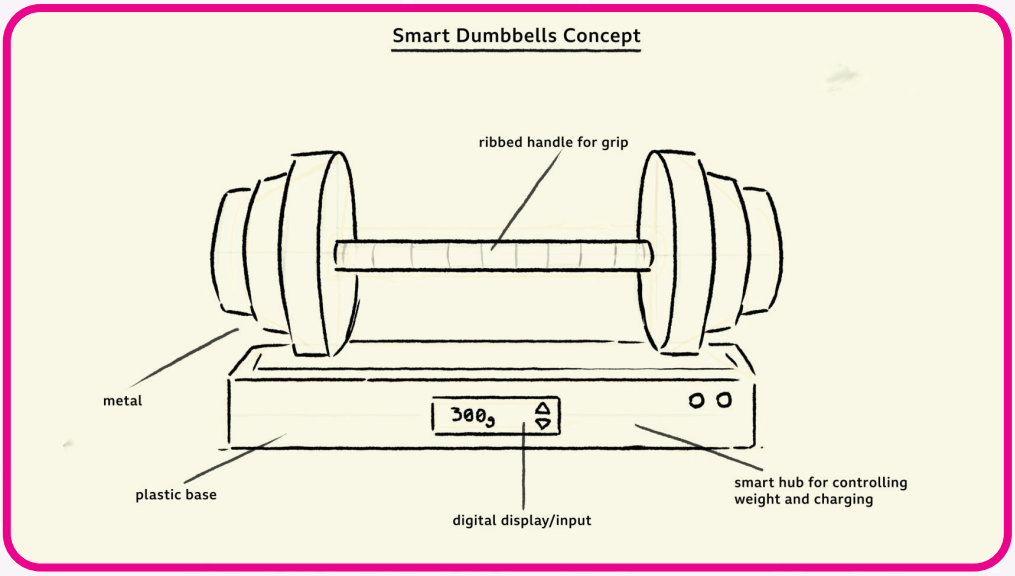
- Labelled sketches of their first design ideas, explaining what the gadget does.
- micro:bit integration: Show how the micro:bit would be used in the gadget, e.g., using its accelerometer for balance detection or its LED display to show feedback.
- Additional features: How the gadget might give real-time feedback, track data, or improve performance.

Teacher to visit each group to advise pupils with diagram clarity, labelling, and device function explanations.

Plenary (5 mins)

Allow volunteers to give some quick feedback on some of their design ideas. You can do this as a whole class or as a pair share. For the latter, you could ask pupils to comment on what they liked about their partner's designs after a quick discussion with them.

To finish, encourage the pupils to continue thinking about how their designs could be further developed with the micro:bit, explaining that in the next lesson, they will refine their ideas after discussions within their groups.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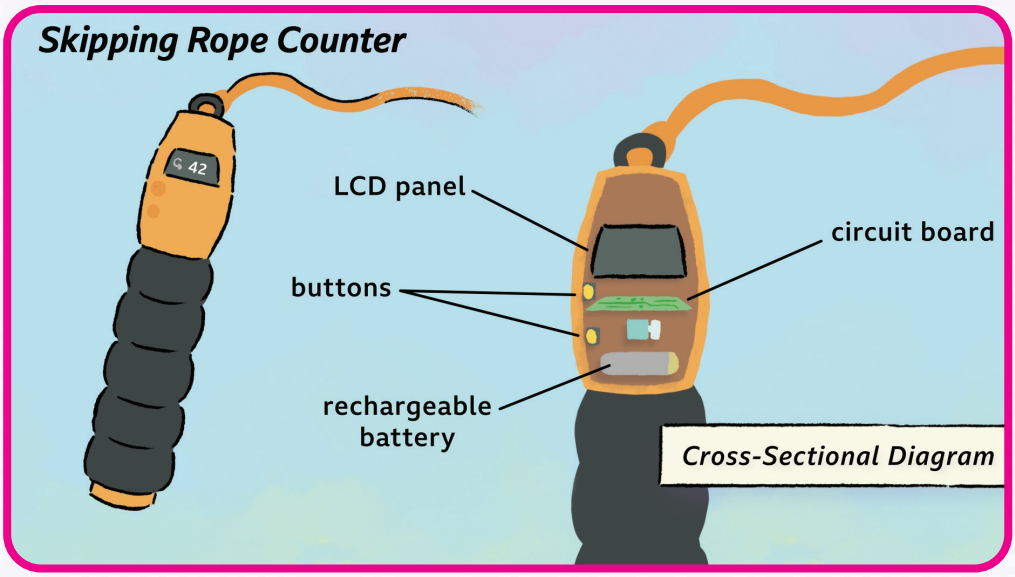
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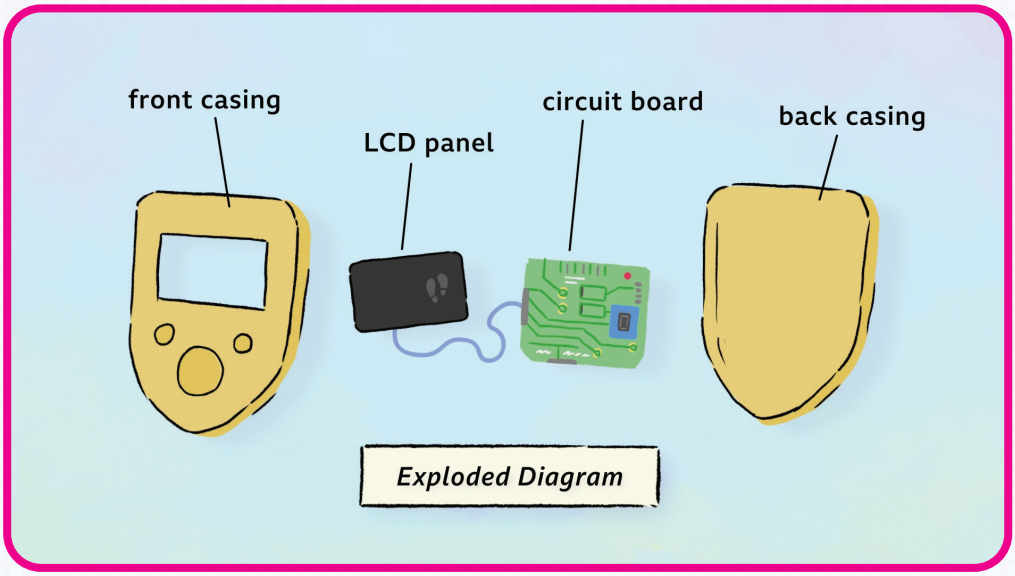
circuit board
buttons
rechargeable battery
Cross-Sectional Diagram


front casing
LCD panel
circuit board
back casing
Exploded Diagram