THE STRIVING

MUSLIM ACADEMY

Islamic and Academic Education

STAGE 3 · DESIGN AND TECHNOLOGY · DESIGN AND MAKE

Design and make

Decisions to learn, things to make, and the questions to ask of the thing afterwards.

WHAT IS INSIDE

- Research, then write a specification
- Drawings that carry information
- Choosing a material on purpose
- Making a structure stiffer
- The three systems, and what each is for
- Working accurately
- Mechanical systems: changing a movement
- The first iron bridge
- Task 1: Specification
- Task 2: Annotated sketch and exploded diagram
- Task 3: Prototype, then test against the specification
- Analyse a product that somebody designed well
- Look at what you made

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No answers at the back. The work is the answer.

Written for a parent teaching at home. No training assumed, and nothing else to buy.

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The three systems, and what each is for

Read this, then use it on the task pages.



THE THREE SYSTEMS, AND WHAT EACH IS FOR

At this stage a product is allowed to do something, which means it contains a system. There are three kinds and most products use more than one.

Mechanical systems change a movement. Levers and linkages change its direction and size, cams turn a round movement into an up and down one, and gears and pulleys trade speed for turning force.

Electrical systems move energy round a loop. A series circuit is one loop with everything in it, a switch is a gap you can close on purpose, and bulbs, buzzers and motors are the outputs that turn the electricity into light, sound or movement.

Computing lets the product decide. Apply what you know about programming to monitor an input and control an output: the product measures something, a program decides what counts, and an output acts. Choose the system by what the product has to do, not by which one you enjoyed last time.

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Mechanical systems: changing a movement

Read this, then use it on the task pages.



MECHANICAL SYSTEMS: CHANGING A MOVEMENT

A mechanical system takes a movement you can make and turns it into a different movement that you need.

A lever changes the size and direction of a movement, and where you put the pivot decides which. A linkage is two or more levers joined, so a push at one end becomes a movement somewhere else entirely, in a direction you choose.

A cam turns a round movement into an up and down one. Turn a shaft with an egg shaped cam on it, rest a rod on the cam, and the rod rises and falls once per turn. Change the shape of the cam and you change how it rises: a gentle curve lifts slowly, a step drops the rod suddenly.

Build one out of card and a pencil before you design with it.

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The first iron bridge

Read this, then use it on the task pages.



THE FIRST IRON BRIDGE

Until the seventeen hundreds, bridges were built of stone or wood, because those were the materials anyone knew how to build a bridge from.

The bridge at Ironbridge, in England, was the world's first bridge built of iron, and UNESCO says it had a considerable influence on developments in technology and architecture. Ironbridge is known throughout the world as a symbol of the Industrial Revolution.

That is what a key event in design and technology looks like. Not a better bridge: a bridge made of something nobody had made a bridge from, after which everybody could.

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SAMPLE PAGES

You have read a few pages. The pack is longer.

What you are holding is a short sample, taken from different parts of the pack so that you can see how a week is planned and what a child is actually asked to do, before you decide.

The complete pack, and the rest of the academic materials, are on our website: schemes of work for a parent teaching at home, and practice packs for the skills children get stuck on.

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Members of the homeschool community do not buy these. If you have joined the community, the pack for the term you are working on is given to you at no cost.

Our Islamic Education classes are free. These packs are part of what pays the teachers who teach them.