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MUSLIM ACADEMY

Islamic and Academic Education

STAGE 6 · 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
- Products that are programmed
- Building the longest span in the world
- 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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Products that are programmed

Read this, then use it on the task pages.



PRODUCTS THAT ARE PROGRAMMED

Some products do not just move when you push them. They check something and decide.

That needs three parts: an input that measures something, a program that decides what counts, and an output that does something about it. A light that comes on in the dark has a light sensor as its input, a rule as its program, and a bulb as its output.

The program is a sequence of instructions, and it can use a condition: if the reading is below this number, switch the output on. Write it out in words first, in the order it happens, and the writing will show you the case you forgot.

Monitoring means it keeps checking. Controlling means it keeps acting on what it finds. A product that does both without a person watching is doing what computing is for.

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Building the longest span in the world

Read this, then use it on the task pages.



BUILDING THE LONGEST SPAN IN THE WORLD

The Forth Bridge, in Scotland, had the world's longest spans when it opened in 1890, and UNESCO calls it one of the greatest cantilever trussed bridges. It still carries passengers and freight.

Look at why it is shaped as it is. It is deepest where the bending is worst, over the supports, and thinnest where the two arms meet in the middle. The shape is a drawing of the forces in it.

That is the thing to take from it. A structure that is honest about its forces usually ends up looking like this, and engineers did not decide it was beautiful first.

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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.