THE STRIVING

MUSLIM ACADEMY

Islamic and Academic Education

STAGE 4 · 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
- Gears and pulleys
- 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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Gears and pulleys

Read this, then use it on the task pages.



GEARS AND PULLEYS

A gear is a wheel with teeth, and gears are used to trade speed for turning force.

A small gear driving a big one turns the big one slowly but with more force. A big gear driving a small one does the opposite. Count the teeth: twelve teeth driving thirty six means the big one turns once for every three turns of the small one.

Which way does the second gear go when you turn the first? Put two together and watch, then put a third gear between them and watch again. Write down what the third one changed, because it is not the speed.

A pulley does the same trade with a belt instead of teeth, and it can carry the movement much further, which is why it is used where the two shafts are far apart.

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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.

Notice what had to happen first. Somebody had to be able to make iron in that quantity and at that price. A design is never only a design; it waits on a material.

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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.