

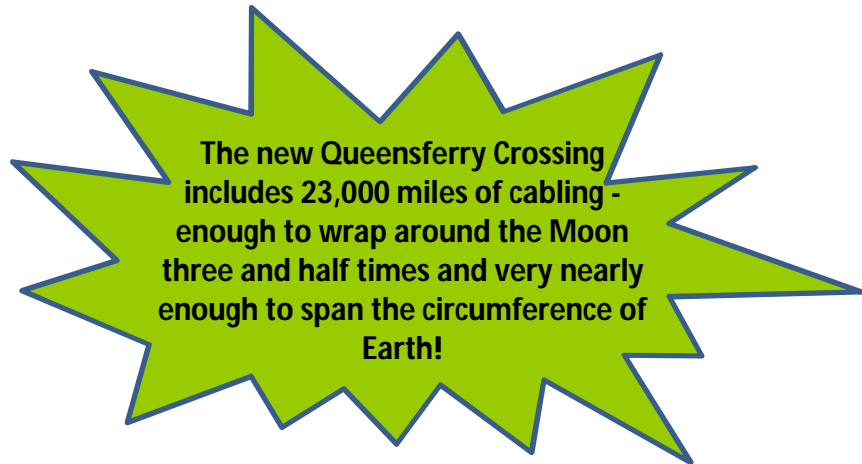


GO FORTH!

A CIVIL ENGINEERING BRIDGE-BUILDING CHALLENGE
TO COMMEMORATE THE NEW QUEENSFERRY CROSSING

There's Tension and Suspension
Built into the challenge this year
Giving you a chance to work
Like a Civil Engineer

May the Forth be with you
As you strive to Bridge the Gap
Just what load will your bridge hold
Before you hear a cable snap?



Thank you to all the schools who took part in the 2016 Go Forth! Challenge, commemorating the new Queensferry Crossing which will open in June 2017.
www.forth-bridges.co.uk

Here are a couple of photographs of the amazing bridges that were built.



The 2016 Go Forth! Challenge is now closed but if you want to have a go at building a bridge here is our suggested instructions.

Build a Bridge

Build a bridge (suspension or cable-stayed) to span a 2+ metre gap. We suggest the following for different age groups:

Age Group:	Primary 5-7	S1-S3	S4-S6
Gap Width:	2m	2.6m	3.2m

The Materials Required

1000 pre-drilled Lollipop sticks - Boxes of drilled lollipop sticks are now available from the Lighting Up the Curriculum for Excellence team. A box (containing minimum of 900 sticks) is available for £15, including postage. Please contact info@lightingupthecfe.com to order

500 Cable ties and Side Cutters – Rapid Electronics – Order number 04-0631, 85-0205

Roll of string – Rapid Electronics – Order Number 06-9272

Cardboard – Rapid Electronics – Order number 34-9208

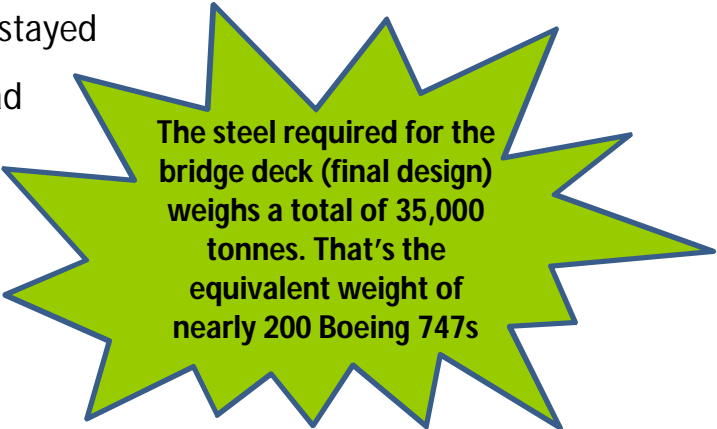
[Rapid Electronics](http://www.rapidelec.co.uk) supply good quality tools and STEM resources at cheap prices if you would like to order extra equipment. Schools registered with Young Engineers and Science Clubs Scotland can receive a 10% discount by using code SCDI10% - mark your order FAO Education Team or send an e-mail to education@rapidelec.co.uk to make sure you receive the discount.

The Design Brief

Your bridge should be a suspension or cable-stayed design. For inspiration, look at the Forth Road Bridge (suspension design) and the new Queensferry Crossing (cable stayed design).

Your bridge should support as many full 500ml water bottles as possible, standing upright on the roadway.

You must be able to push a car made from a standard 500ml water bottle along your bridge.



The steel required for the bridge deck (final design) weighs a total of 35,000 tonnes. That's the equivalent weight of nearly 200 Boeing 747s

The Gap

You will need two tables, 70-80cm high. Your bridge must span the gap between the tables (2m – primary, 2.6m S1/S3 and 3.2m S4/S6).

Two buckets of sand on the floor in between the tables, which you can move to suit your design, to fix a tower into.

Screw-eyes on the table, 1m apart and 50cm from the edge, which you can attach supporting strings to.

The new cable-stayed bridge will have three slender single column towers and will be 1.7miles (2.7km) long, including approach viaducts. The road carried by the bridge will be designated as a motorway



You will place up to 50 full 500ml water bottles, one at a time, onto your bridge until it breaks or you decide to stop.

Added Extras

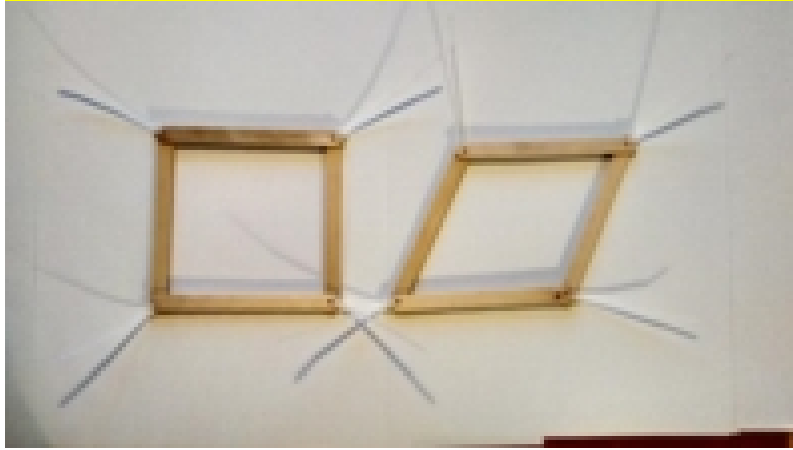
Make a poster about a bridge of your choice, highlighting key engineering features. Be creative and have fun!

Name your bridge!

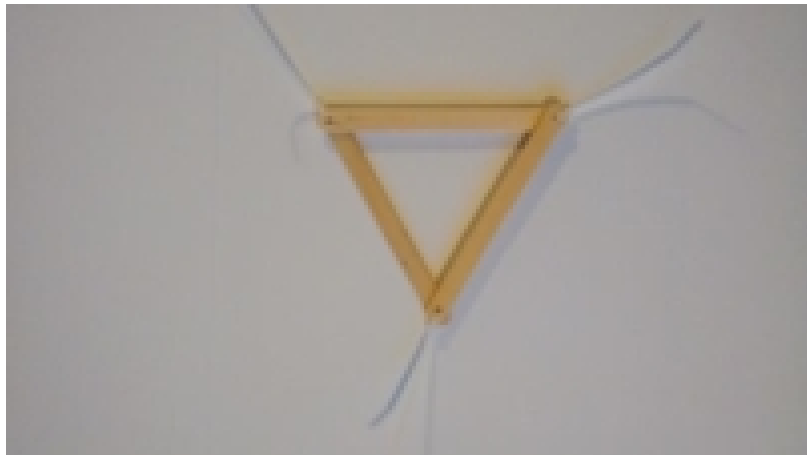
The combined steel required for North and South Viaducts weighs 7,000 tonnes, enough to make another 23 Kelpies

Getting Started

Link four lollipop sticks into a square using cable ties. Notice that it is not very strong and can be bent sideways.



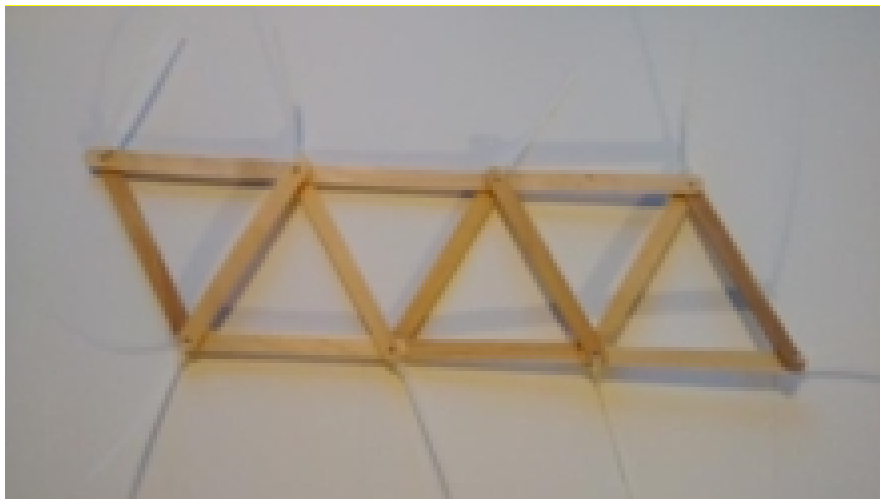
Now link three lollipop sticks into a triangle and notice that it is much more rigid.



Look around and you will see triangles are used everywhere to give strength. Electricity pylons are a great example! Can you spot triangles on all three of the Forth bridges?



You can extend triangles into flat struts using more lollipop sticks and cable ties:



You can make three struts into a triangular beam using more cable ties:



One side of the triangle can be string if it is in tension (being stretched rather than squashed):



Now look at bridge designs around you, have a Google and decide how you will span the gap!

Any Questions?

If you would like any help or advice please feel free to get in touch!

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It will be 207 metres above high tide (683ft), equivalent to approximately 22 London buses stacked end-to-end and 50 metres (25%) higher than the existing Forth Road Bridge (FRB)