

The Spaghetti Bridge Competition

The Spaghetti Bridge Competition is a problem-solving engineering challenge for students from Grades 7 to 12. Teams have two months to plan, design and build a bridge from store-bought spaghetti and glue. The Engineering Link Group will provide a professional development workshop for teachers

The event fosters team work, problem solving and hands-on learning.

Thanks to our sponsors, there are regional cash prizes and the overall winning team from Queensland will take away \$2000.

There is no entry fee¹.

Why Enter?

Teaching STEM requires innovative techniques that encourage students to learn. The Spaghetti Bridge Competition is designed to allow students, in a team environment, to learn through direct experience.

This process, also known as experiential learning, places the student at the heart of the learning process and engages both the intellectual and affective domains.

On an affective level, students become more invested in their work and begin to take ownership of the project. They will also learn more about themselves and how to cooperate with group members with whom they may have conflicting ideas.

High performance teams are those that are able to include effective social skills. As they work through the problem solving process they should become a more cohesive team.

The anticipated end result is a well-rounded learning environment, which produces creativity, critical thinking, and group cohesiveness.



¹ Each school will be provided with up to 3 load hooks, which can be used by all teams. Any additional hooks can be ordered at a cost of \$5 per hook, plus postage and handling. Hooks from previous years' competitions are permitted.

Spaghetti Bridge Resources

Curriculum Links:

These are not exhaustive, but do provide an insight into the potential that this competition has to be an integral part of the teaching and learning experience.

Even if you believe your school can't fit another thing into the curriculum, this competition makes a brilliant extra-curricular activity for your STEM, Science or Mathematics clubs.

Science:

	Science Understanding	Science as a Human Endeavour	Science Inquiry Skills
Year 7	Physical Sciences: Change to an object's motion is caused by unbalanced forces, including Earth's gravitational attraction, acting on the object.	Use and Influence of Science: People use science understanding and skills in their occupations and these have influenced the development of practices in areas of human activity.	Planning and conducting: Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed. Measure and control variables, select equipment appropriate to the task and collect data with accuracy. Processing and analysing data and information: Construct and use a range of representations, including graphs and models to represent and analyse patterns or relationships in data. Evaluating: Reflect on scientific investigations including evaluating the quality of data collected, and identifying improvements.

Physics:

Key Concept: F1 – The nature of a force.	Key Concept: F2 – Forces that act on objects influence their state of equilibrium	Key Concept: F3 – Forces are able to influence the motion and shape of objects
Key Ideas: F1.3 – Forces are vector quantities whose interactions can be analysed using vector algebra and/or graphical methods. F1.4 – Forces occur in pairs are equal in magnitude and opposite in direction.	Key Ideas: F2.1 – Systems of forces may be balanced or unbalanced. F2.2 – Vector methods can be used to determine the resultant force for given situations.	Key Ideas: F3.4 – At the macroscopic level, forces applied to matter may cause irreversible structural changes.

Mathematics C:

Vectors & Applications	
<p>Vectors as a single column or single row array</p> <ul style="list-style-type: none"> • Simple, life-related applications of vectors <p>Vectors describing situations involving magnitude and direction</p> <ul style="list-style-type: none"> • Resolution of vectors into components acting at right angles • Calculation of the angle between two vectors • Applications of vectors in both life-related and purely mathematical situations 	<p><i>Suggested Learning Experiences:</i> Use resolution of vectors to consider the equilibrium of a body subject to a number of coplanar forces acting at a point.</p>

Engineering Technology:

Context: Construction (Section 3.4.6 of the syllabus)
Study Topics: <ul style="list-style-type: none"> • Engineering Graphics • Materials Properties • Statics

Engineering Technology Sample Assessment Piece

QCCA Technical Engineering Report – Bridge:

https://www.qcaa.qld.edu.au/downloads/senior/snr_sample_ass_eng_tech_10.pdf

- Make changes to the task to fit the Spaghetti Bridge Competition requirements.

Websites to explore:

<http://www.42explore.com/bridge.htm> - heaps of links to resources and ideas (mainly US sites, but still useful)

Physics of Building Bridges:

http://ffden-2.phys.uaf.edu/212_spring2011.web.dir/Peter_Aumau/basic-physics.html

Using West Point Bridge Designer - <http://ecogamer.org/environmental-games/west-point-bridge-designer-construction-engineering-game>

(Download the software here: <http://www.cesdb.com/west-point-bridge-designer.html>)

Videos to watch:

<https://www.youtube.com/watch?v=dlvVpOSX1Gs> – Johns Hopkins Summer Program

Bridge Design and Construction:

<https://www.khanacademy.org/partner-content/mit-k12/mit-k12-physics/v/bridge-design-and-destruction-part-1> and <https://www.khanacademy.org/partner-content/mit-k12/mit-k12-physics/v/bridge-design-and-destruction-part-2> -

About the Competition:

You can download the relevant documents at the TELG website – <http://telg.com.au/spagbridgecomp/>

