



STEM AMBASSADORS

CONSTRUCTING TOWERS

PREP PACK FOR VOLUNTEERS

Suitability:

This activity would suit volunteers who have experience of supporting STEM sessions in schools.

EXPERIENCED





Objective

The object of this activity is to **introduce science and engineering principles linked to construction.**






Information to share with teachers

This session reinforces aspects of the KS2 National Curriculum around:

- ★ Scientific method
- ★ Design and testing
- ★ Measurement
- ★ Evaluation

[National Curriculum: science KS2](#)

Promoting links between the school and the RAF (things to say)

-  How the activity can help dispel myths about the RAF and illustrate available opportunities.
-  Broaden horizons about careers and options.
-  Help to enthuse and engage students.
-  Raise teacher awareness of what the RAF do.
-  How this activity can help the school develop closer links with RAF volunteers.

Activities in schools

Preparing to run the activity in a school

Typically teachers work to a lesson plan. Lesson plans detail the basic structure of the session, timings for each section and contingency plans for more and less able pupils. An example lesson plan is included in this pack.

Preparing yourself and agreeing timings, level of involvement for the school, for you and your colleagues

Make sure you get to the school in good time, allowing plenty of time for preparation and setting the room and your materials out. Check with your school link on what materials are provided and what you need to bring. If you require worksheets or photocopying, agree this with your school link well in advance of the session. Allow plenty of time to clear up at the end and make sure you have thought about a contingency plan if anything goes wrong. Identify the year group and level to pitch the activity at.

Most STEM Ambassador activity would typically be with years 5 – 9 (ages 9 – 13) and would cover aspects of the National Curriculum for Key stages 2 and 3.

The school science curriculum, part of the National Curriculum is detailed and schools would not expect you to know about this. However, you might like to take a look at some of its content to familiarise yourself with the areas covered.

[National curriculum in England: science programmes of study](#)

Schools run dedicated 'Career Day' events. You may be asked to incorporate a STEM session into these events. Take along career-linked resources where possible to hand out after the activity.




Planning this activity

The object of this activity is to introduce science and engineering principles linked to construction.

This activity requires planning in terms of securing the materials for the session and ensuring that it runs to time. It is designed for STEM Ambassadors with experience of running activities in schools.

RESOURCES REQUIRED

- + Large teaching space to build the towers.
- + 30 straws per tower.
- + Masking tape.
- + Blue tack.
- + Marbles.
- + Scissors.
- + Hand fan to judge the stability of the towers.
- + Prizes (optional) (for best layout etc).

 Powerpoint presentation 'Constructing Towers' that accompanies this Prep Pack.

We have provided an assessment/judging grid as part of this pack (this uses the criteria put forward in the session).

[Judging criteria for towers](#)



Assessing risks associated with the activity

The organiser (typically the school or other host organisation) of the activity is responsible for the health and safety of the young people on their site or property. However, because you as the STEM Ambassador also have a duty of care you may be asked by the teacher or organiser to contribute to their risk assessment. Discuss the activity with the organiser (school) and ask them to provide a copy of their risk assessment.

Risk assessment examples

Your school contact should be aware of other risk assessments used for activities in school, which could be adapted for this activity. If they are unsure of the risks involved in running practical STEM activities in school you could direct them to relevant resources produced by experts in the field. [STEM Learning](#) have lots of resources/templates and guidance on this. The link below provides details of actions they can take to manage risk in their school, along with some templates for STEM-related activities.

[A balanced approach to risk](#)

As this STEM Ambassador Prep Pack details your activity and all the resources required, the school may find the pack useful in helping them to construct an appropriate risk assessment.



ID on the day

Visitors to schools may be asked for their current DBS Certificate or the corresponding Certificate Number. Schools may also ask for some form of current photo identification if a DBS Certificate is not produced. Schools will typically issue a visitor ID at reception for each separate visit to the school. Visitor ID if issued, must be worn at all times whilst on site. You should always expect to be working alongside a member of school staff where children are involved. It is not good practice for a visitor to be left alone with a group or individual children. STEM Ambassadors are reminded that the use of student personal data, photographs, videos or other information about students is not permitted and must not be put on social media.

Differentiation for more able and less able pupils:

More able

Suggest further designs to make the tower more rigid and suggest what their tower could be used for.

Less able

Provide examples to follow and tips on triangulation.

Logistics

Schools are secure sites and access may be restricted. Ask your school contact before you visit about getting onto the site, where to park and where to report to. Schools may not provide lunch so it may be advisable to bring your own refreshments and snacks.

Parking at some schools can be difficult. Check with your schools contact about the availability of visitor parking.

Additional resources

If you are interested in adapting or enhancing this activity we've identified some additional online resources to help you with this. Click the weblinks below to find out more.

 [Perfect pylons](#)

 [Aiming for awesome: radar towers](#)

 [Buildings with design issues](#)

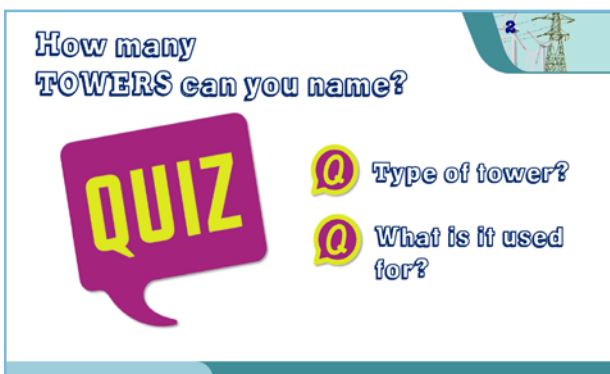
Running the activity: lesson plan

Session length: 50 minutes

🕒 10 minutes



Introduction to why we need towers and how they are built.

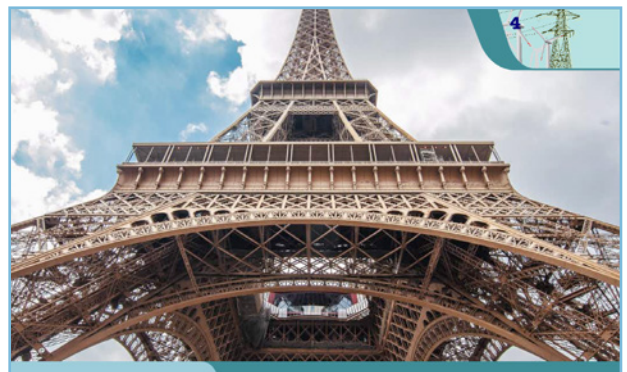


How many different types of towers can you name and what do they do? e.g. TV and radio masts, mobile phone masts, chimneys, radar towers, observation towers. Ask pupils to work in pairs and report back.



The RAF uses towers for its work. One of the most common is the Air Traffic Control Tower. But RADAR also works from towers.

The word RADAR is an acronym for RAdio Detection And Ranging, and in its simplest form it consists of a transmitted radio signal aimed by an antenna in a particular direction, and a receiver that detects the echoes off any objects in the path of the signal. It is used to 'see' where things are in the skies.



Towers are constructed in different ways. Ask pupils to think about what they might be made of? What are the strongest shapes. Ask them to look at the image of the Eiffel Tower - what shapes and structures can they see? A triangle structure is one of the strongest when making towers and bridges. What other shapes do pupils- think will be strong and why?



Rules:

- ❗ Student may only use the materials provided to their team for the structure.
- ❗ Teams must not interfere with other teams' work.

10 minutes

Plenary – discussing towers and providing summary of judging. Hand out prizes.

In pairs or small groups, ask pupils to identify which towers from the slide are well designed. As prompts ask them to look for strength, shape, materials used, size/height, how it fits with its surroundings.

🕒 30 minutes



Pupils to work in groups to design and build a tower, with the objectives of:

- ★ Building a robust tower that will withstand gusts of wind.
- ★ The tower has to be as tall as possible using only the materials provided and must have a structure on the top capable of holding a marble.
- ★ Teams of students should discuss designs before starting to build the project (stationery provided).
- ★ Towers will be judged on height, load capacity, resistance to wind, aesthetic appeal and ingenuity.



Judging criteria for towers

	Team A	Team B	Team C	Team D	Team E	Team F	Team G	Team H
Height*								
Load capacity*								
Resistance to wind*								
Aesthetic appeal* (looks nice?)								
Ingenuity* (good use of resources?)								
TOTAL (out of 50)								
Comments about particular designs:								

**Assessment in each area should be on a scale from 1 (poor) | to 10 (excellent).*