

SQUASHED TOMATO CHALLENGE

Teacher's Guide



practicalaction.org/squashed-tomato-challenge

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ACTION**

The Squashed tomato challenge is an exciting, hands-on challenge for pupils aged 8-16 years. It enables them to develop their own solutions to a transportation problem facing farmers living in mountainous areas in Nepal. It is based on Practical Action's project work in Mana, western Nepal.

The challenge can be used to deliver parts of the science, design and technology and maths curriculum in regular lessons, as an enrichment day, in a STEM/science club or part of a primary-secondary transition activity. Pupils can also gain a CREST Discovery Award or use the challenge as a starting point for a Bronze, Silver or Gold Award.

This Teacher's guide is supported by a PowerPoint (PPT) presentation, pupil activity sheets, a poster and certificates. They can all be downloaded for free from practicalaction.org/squashed-tomato-challenge.

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Learning objectives

Through engaging in the Squashed tomato challenge, pupils will:

- gain practical experience to reinforce their learning around forces and pulleys
- develop problem solving, team working and presentation skills
- discover how STEM can help solve global issues and achieve the UN Global Goals

Curriculum links

STEM subjects provide great opportunities for teachers to include authentic global contexts and global learning.

To see where the Squashed tomato challenge supports the delivery of the formal science curriculums for England, Northern Ireland, Scotland and Wales please go to: practicalaction.org/science-curriculum

Overview of the Squashed tomato challenge



Activity	Teaching materials	Timing
Introduction to context	PPT slide 2	5 mins
Starter activities		
a. Identifying challenges in Nepal	PPT slides 3 - 4 Pupil activity sheet (one per group) - <i>Photographs of Nepal</i>	10 mins
b. The Global Goals	PPT slides 5 - 6 String Activity Who's responsible? practicalaction.org/global-goals for details of activities	15 mins 30 mins
c. Moving tomatoes and the Global Goals	PPT slide 7 Pupil activity sheets (one per group) - <i>Moving tomatoes and the Global Goals Print A3</i> - <i>SDGs sheet</i>	20 mins
Main Activity – Squashed tomato challenge	PPT slides 8 - 9 Pupil activity sheet (one per group) - <i>Design sheets</i> Equipment	60/120 mins
Feedback	PPT slides 10 - 11 Pupil activity sheet (one per pupil) - <i>Team feedback</i>	20 mins
Solutions in Nepal	PPT slides 12 - 15 Access to YouTube for video (may need to download before lesson) Poster (optional) Pupil activity sheet (one per group) - <i>Suchana's story</i>	30 mins
Celebrating success	PPT slides 16 - 18	10 mins



Introduction to context

Use PPT slide 2 to introduce the context and problems faced by farmers and their families in Nepal, with a focus on the story of Suchana.

Extension/homework activity

Set pupils the task to find out more about life in Nepal. In particular, what crops farmers grow and some of the problems they face.

Starter activities

a. Identifying challenges in Nepal

Hand out the pupil activity sheets *Photographs of Nepal* to small groups of pupils and show PPT slides 3–4. Ask pupils if they can think of things that might be difficult for farmers and their families to access in a remote location on a mountainside. This includes a day to day living and issues connected to farmers' livelihoods. Hopefully, they will come up with clean water, electricity, schools, transport etc.

Resources

Pupil activity sheet (one per group)

— *Photographs of Nepal*

b. The Global Goals

Use PPT slides 5–6 to introduce the Sustainable Development Goals (SDGs) commonly referred to as the Global Goals. Do this by explaining that in 2015 the United Nations identified the same problems the pupils have come up with, plus a few more as essential in solving world poverty. The United Nations then came up with 17 Global Goals which they agreed to work towards to help solve world poverty by 2030. Ask pupils which Global Goal the problems they identified would come under, e.g. lack of electricity is Global Goal 7.



At this point you may like to include a starter activity to help understanding of the Global Goals. We suggest our *Global Goals string activity* and/or *Who's responsible?*
practicalaction.org/global-goals.

If you are interested in embedding the SDGs in your teaching we recommend a really useful guide from Oxfam called *The Sustainable Development Goals: A guide for teachers*. We are proud to have had a part in developing the guide and some of our activities, including the *Global Goals string activity* and another STEM challenge, *Ditch the Dirt*, are included in it.

c. Moving tomatoes and the Global Goals

This activity introduced in PPT 7 reinforces the message that making one change in the life of a farmer (Suchana) can have a big impact on lots of different areas of her life, helping make progress towards achieving different Global Goals.

Use the SDGs sheet to help pupils understand more about the Global Goals.

Hand out the *Moving tomatoes and the Global Goals* sheet and ask pupils to discuss and record how a better way of moving tomatoes down the mountainside will help achieve the five Global Goals. Finally, ask them to select a Global Goal of their own.

Resources

Pupil activity sheets (one per group)

- *Moving tomatoes and the Global Goals (A3)*
- *The Sustainable Development Goals sheet*

Main activity - Squashed tomato challenge

By now, your pupils should have a good understanding of the importance of transporting crops from mountainside to the market for farmers in Nepal.

Divide the class into small teams of up to 5 pupils. Introduce the challenge with PPT slide 9 and go over the feedback in PPT slides 10 - 11. Now hand out one set of *Design sheets* per group. Pupils can then begin designing and building their model systems.

Main ground rules for the challenge

- 🍅 The tomatoes need to be transported a minimum of one metre along the ground starting from desk height. However, the challenge is more spectacular (and you are more likely to get squashed tomatoes) if you set a height of more than 2m, and a horizontal distance of 1.5-2 metres. This can be done by starting from the top of a chair, desk, stool or bench.
- 🍅 Whilst they are moving the tomatoes cannot be touched, catapulted or 'flown' in any way. They must be moved in a controlled way so they don't just crash to the ground and get squashed.
- 🍅 The object of the challenge is to move the largest weight of tomatoes possible in two minutes. Pupils can transport more than one load of tomatoes during that 2 minutes if they have a system that can load and unload tomatoes.

Prompt questions during design and build

- Does your system enable you to transport more than one load of tomatoes?
- How can you make the tomatoes move in a more controlled way?
- How could you stabilise the basket?
- What could you do to make the basket move faster?

Resources

Pupil activity sheet (one per group)

— *Pupil design sheets*

Modelling equipment, e.g.

K'nex, pulleys, small plastic and polystyrene food trays, string, straws, card, doweling, cartons, corks, yoghurt cartons, lollipop sticks/wooden spills, straws.

Joining and cutting equipment, e.g.

Plasticine, string, sellotape, masking tape, elastic bands, Blu tack, scissors, glue, split pins, craft knives, paperclips.

Testing equipment

Cherry tomatoes, scales, stopwatch, metre rules.



Feedback

We suggest that pupils present their model to the rest of the class reflecting on how well they worked together, problems they solved, etc. (this will be necessary if you are planning for your pupils to gain a CREST Award). PPT slides 10 – 11 give information on feedback to share with pupils. Allow time for pupils to work on their presentations as well as building their model.

Resources

Pupil activity sheet (one per pupil)

– *Team feedback*

Solutions in Nepal

Once pupils have shared their solutions it's time to share the solutions that scientists and engineers in Nepal came up with. Show PPT slides 12 – 14 and the video clips. Hand out *Suchana's story* and discuss how her life has been improved as a result of an aerial ropeway.

Extension/homework activity

Ask pupils to research another ingenious solution Practical Action has helped a community install to help change their lives for good. Point them to the Practical Action website:
practicalaction.org/our-work

Resources

Videos

– www.youtube.com/watch?v=YAtIBXvnWfo

– www.youtube.com/watch?v=yJIxsUBIFuA

Pupil activity sheet (one per pair)

– *Suchana's story*

For older pupils who are interested in the details you can find a technical brief outlining how the aerial ropeway works at practicalaction.org/technical-briefs-schools-transport.

Celebrating success

PPT slides 16 – 17 show how pupils can share success in different ways. You may wish to print out the certificates for pupils to take home.

CREST Awards

Taking part in the Squashed tomato challenge is a great way for pupils to gain a CREST Award. The challenge is aligned to the Discovery Award, but can be used to gain a Superstar Award or as the starting point for a Bronze, Silver or Gold Award.

The CREST Discovery Award is generally undertaken by 9 – 14 year olds. It can be achieved in 3 – 5 hours.

CREST Bronze, Silver and Gold Awards are designed for pupils aged 11 – 18.

For further ideas for Bronze, Silver and Gold projects linked to global issues go to:

practicalaction.org/global-project-ideas

For more information on CREST Awards go to:
crestawards.org

Big Bang Competition

Pupils who have taken part in a STEM challenge can enter their work into the Big Bang Competition; a UK-wide Competition open to all 11–18-year olds in full-time education/training.

Prizes include industry/scientific site visits, mentoring, cash, and a chance to represent the UK at international contests.

Whether they make it to the finals or not, being a part of the competition is an inspiring and valuable experience for all young people involved and a chance to gain recognition for their hard work. To find out more, go to:
competition.thebigbangfair.co.uk

