The Smallpeice Trust

ENGINEERING @HOME

11

The Solar Tower Challenge

#EngineeringAtHome

Suitable for ages: 8+

Time needed: 1hr+

smallpeice
Dare to imagine

Curriculum links: Maths – shapes, measurement; Science – materials, renewable energy sources; D&T – design, make, evaluate

Skills learnt: Design, building, testing, evaluation

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Dare to imagine

Since our Smallpeice team can't visit schools, we've decided to challenge each other to make a solar tower.

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Learning Objectives

Create purposeful, functional and appealing designs

Select from a wide range of materials and use tools to perform practical tasks

Build structures, exploring how they can be made stronger and more stable

Evaluate your ideas and products against design criteria

Topics Covered

RENEWABLE ENERGY
https://bit.ly/2AD1Qmu

WHY HOT AIR RISES
https://bit.ly/3cAqr8P

WHAT IS THE GREENHOUSE EFFECT?
https://bit.ly/3eTDwf6

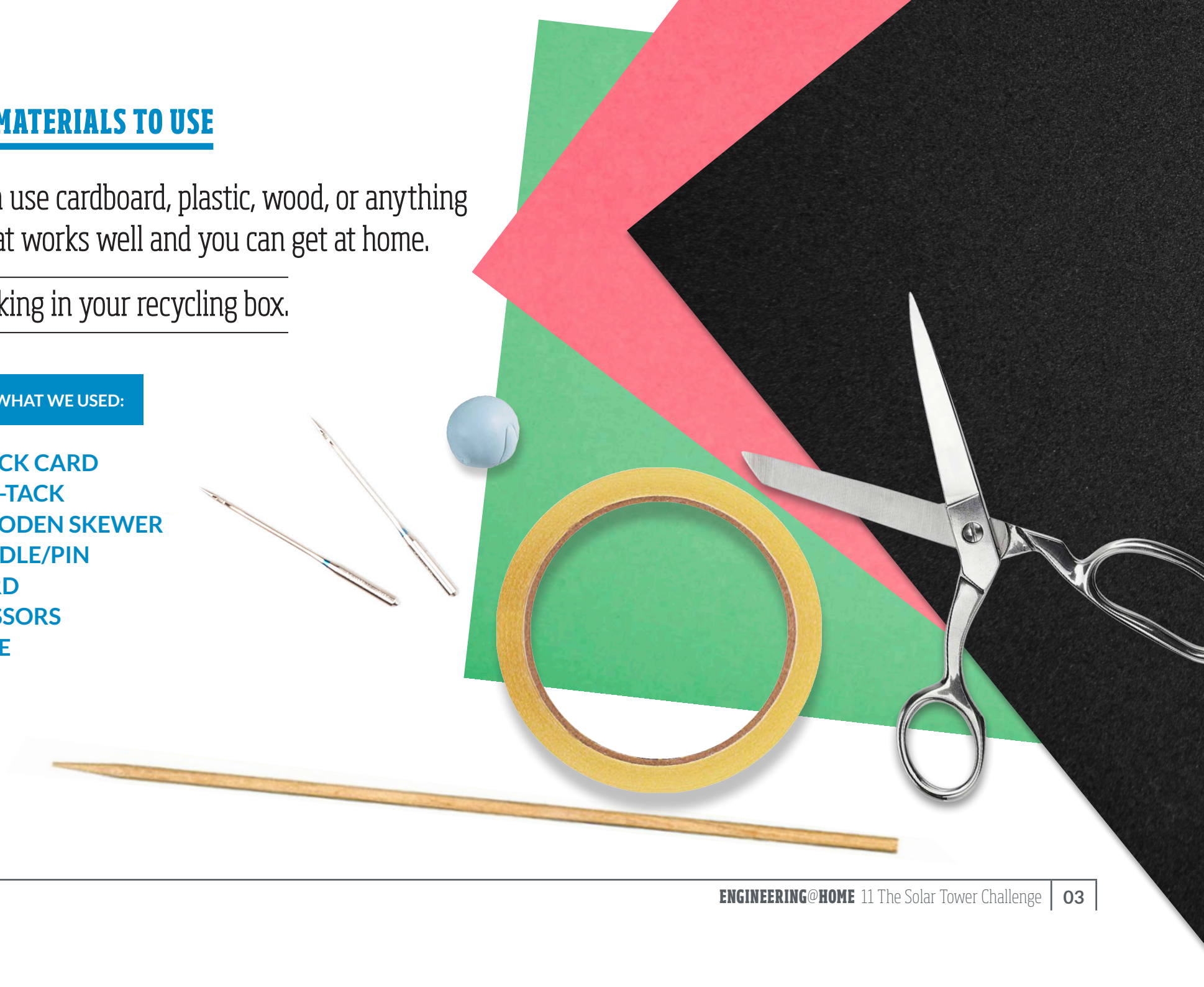
WHAT MATERIALS TO USE

You can use cardboard, plastic, wood, or anything else that works well and you can get at home.

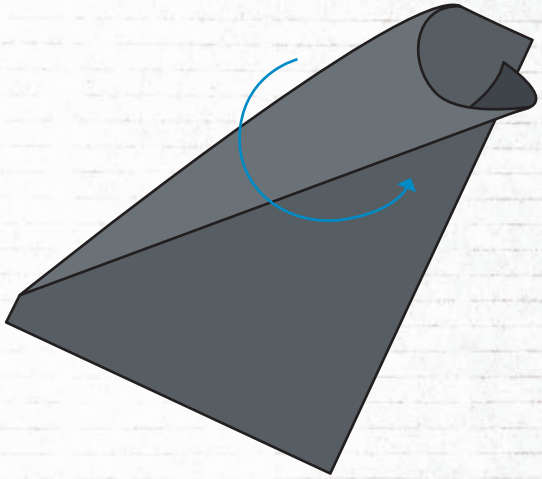
Try looking in your recycling box.

HERE'S WHAT WE USED:

1. BLACK CARD
2. BLU-TACK
3. WOODEN SKEWER
4. NEEDLE/PIN
5. CARD
6. SCISSORS
7. TAPE

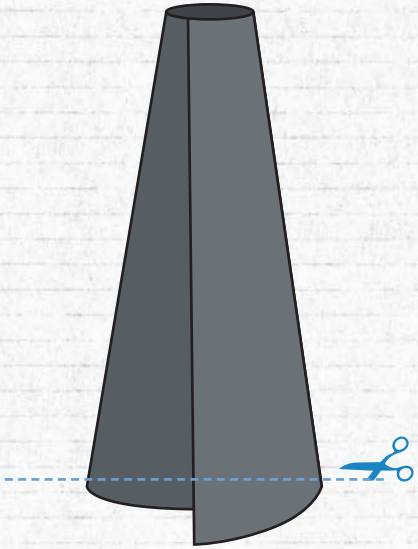


INSTRUCTIONS 1 OF 4



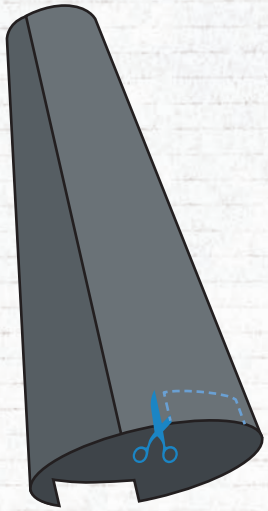
1.

Roll your black card into a cone shape, with an opening at the top of about 5 cm



2.

Tape this into this shape and trim the bottom to make sure it can stand freely



3.

Cut air vents into the bottom of your cone, about 2 centimetres by 5 centimetres

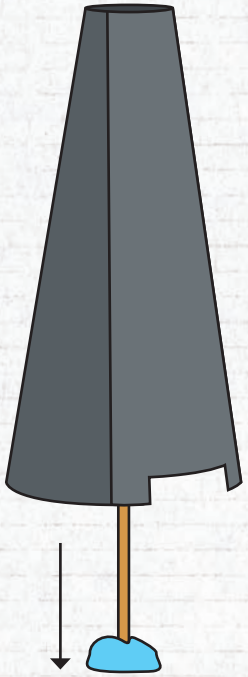
INSTRUCTIONS 2 OF 4

4.

Tape your needle to the wooden skewer

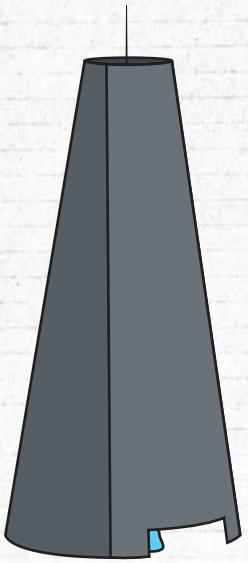
5.

Stick the skewer (be careful of the needle) into the blu-tack so that it can stand freely



6.

Place your cone over your skewer



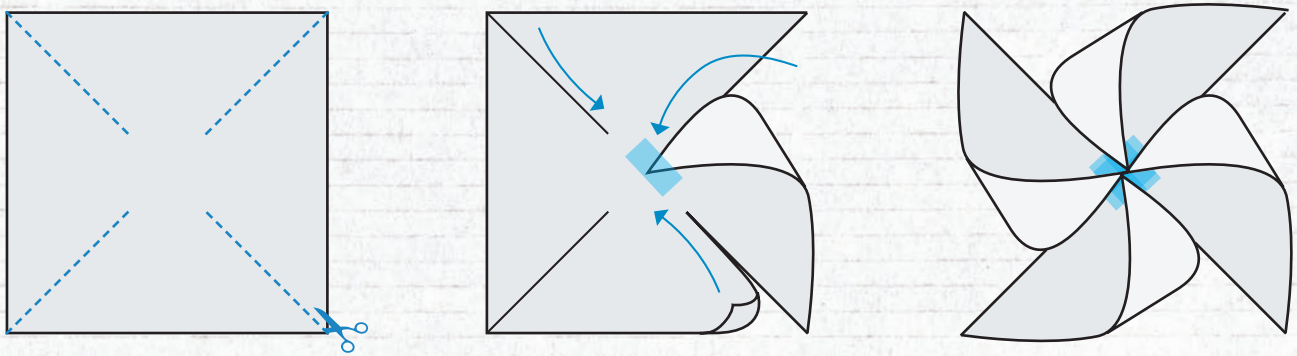
7.

Make sure there is only a few centimetres of space at the top where the needle is above the cone, you may need to trim either your cone or your skewer

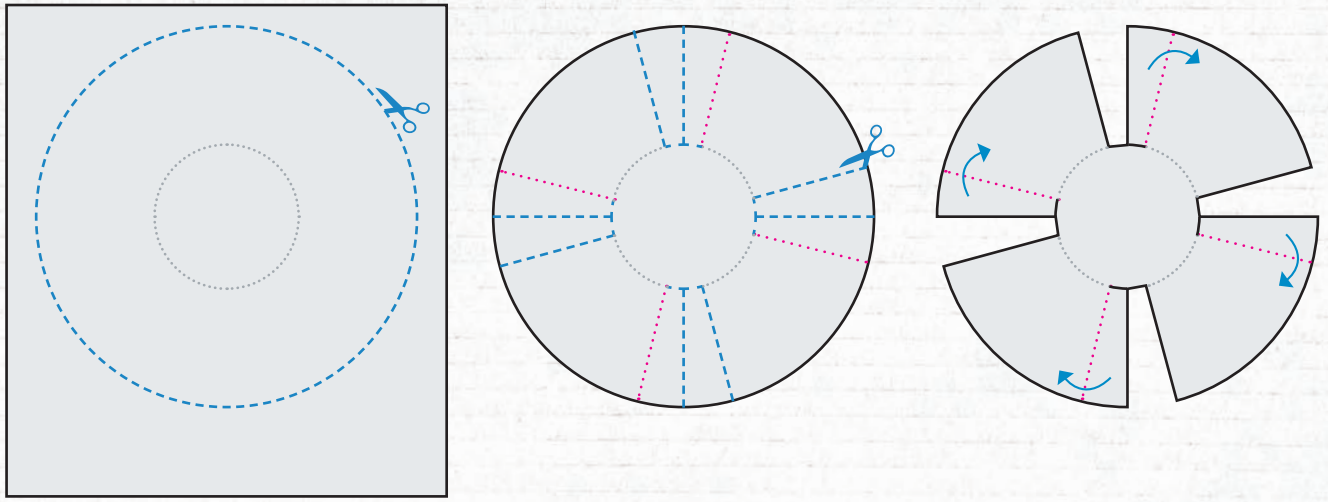
INSTRUCTIONS 3 OF 4

8.

Create your pinwheel or propeller:

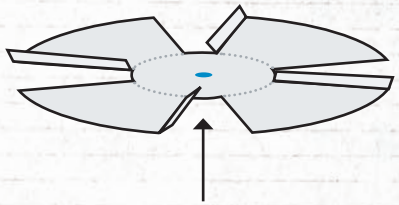


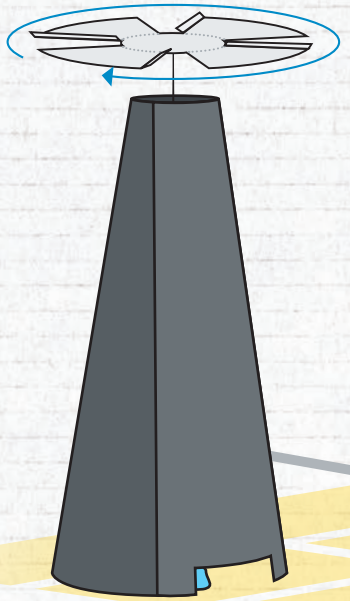
a **To make a pinwheel:** Cut a square piece of card from the corners towards the centre, stopping a few cm's away from the middle. Then fold alternate corners in and stick them to the middle



b **To make a propeller:** Cut out a circle and mark a smaller circle in the centre. Mark the outer ring into quarters and then cut out a gap to the left of all the quarter marks. Then cut a slit further along the inner circle. Bend the edge of each piece to a 45-degree angle

INSTRUCTIONS 4 OF 4





9.

Make an indent using a pencil in the centre of your propeller and use that to sit it on top of the needle

10.

Set it up in a sunny area with no wind (next to a window) and wait for the propeller to start moving.

If it's not sunny, set up a lamp aimed at the tower

NEED A CHALLENGE?

If you complete your solar updraft tower and want to challenge yourself further:

1. **Decorate your tower in the most imaginative way possible**
2. **Think about what other materials you could use to make the tower? Hint: they must absorb heat**
3. **Think of alternative designs of propellers to spin on the top of your tower**
4. **Can you work out how fast your propeller is spinning?**
5. **Measure the temperature inside the tower and outside the tower at different times**
6. **Film a video of your tower in action and send it to us!**

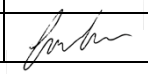
Once you've got your solar updraft tower performing at its optimum, film it in action and share your video on:

www.facebook.com/TheSmallpeiceTrust

www.twitter.com/SmallpeiceTrust
Use the hashtag **#EngineeringAtHome**

www.instagram.com/TheSmallpeiceTrust

STEM Day Risk Assessment

Risk Assessment for	Engineering at Home Projects
Assessment undertaken on	31/03/2020
Assessment undertaken by	Jessica Lee
Signed	

No.	Activity/area being assessed	Associated risk	Who is at risk?	Existing control measures in place?	Level of risk (low, medium, high)	Responsibility
1	General Activity and Workspace	**Slips, trips and falls:** Injury due to tripping over items	Students and adults	Activity supervised by adult supervisor. Deliverer reminds students about safety in video introduction.	M	Students and adults
2	Use of Materials: paper/card, plastic containers	**Injuries:** Injury due to paper cuts, cuts from sharp edges **Injuries:** Injury due to misuse	Students and adults	Activity supervised by adult supervisor.	L	Students and adults
3	Use of materials: elastic bands, sellotape, glue stick, blu-tack, small toys, paper fasteners, LEGO pieces, nuts & bolts or equivalent.	**Injuries:** Injury due to use as a missile **Slips, trips and falls:** Injury due to slipping on dropped items **Injuries:** Ingestion risk of choking.	Students and adults Students and adults Students and adults	Activity supervised by adult supervisor. Activity supervised by adult supervisor. Activity supervised by adult supervisor.	L	Students and adults
4	Use of materials: plastic, corrugated carboard	**Injuries:** Cuts from sharp edges	Students and adults	Activity supervised by adult supervisor.	L	Students and adults

No.	Activity/area being assessed	Associated risk	Who is at risk?	Existing control measures in place?	Level of risk (low, medium, high)	Responsibility
5	Use of sharp tools: Scissors, craft knives	**Injuries:** Cut to self	Students	Activity supervised by adult supervisor.	M	Students and adults
		Behaviour: Cut to others	Students and adults	Activity supervised by adult supervisor.	L	Students and adults
		Behaviour: Vandalism of property	School or home	Activity supervised by adult supervisor.	L	Students and adults
6	Testing of projects: bathtub, drop from height, items on floor	**Spillage of water on floor**: damage and injury due to slip	Students and adults	Activity supervised by adult supervisor.	L	Students and adults
		Slip, trip or fall: Injury due to falling from testing area, tripping over items in testing space	Students and adults	Activity supervised by adult supervisor.	L	Students and adults