LAND YACHT PROJECT

Learnit

A FRESH APPROACH TO EDUCATION

AT A GLANCE	
ITEMS YOU'LL REQUIRE (whether online or in person)	• **Something to generate wind** ie. A magazine, a book, a tray, a lid, a fan, a hairdryer etc. (at least one per 2 participant) • **Something to measure distance** ie. Ruler, measuring tape, a shoe (at least one per 2 participant) • **Arts and Crafts supplies** to create a sail with ie. Paper, card, plastic, cereal box, fabric, selotape etc. etc. (one per participant) • **A scissors** (the more the better, required for cutting out sails) • **Pens or Pencils** (one per participant) • **STEM in a Box Kit!** **Optional** Masking tape or similar to make out a track/start line Hole punch for punching out holes in sails Images of land yachts
CONNECT	Today we're building a land yacht We're going to learn about • Wind energy
CONSTRUCT & TEST	• Following the Instructions to build our test model and using the sails we have. Continue build and ask further questions • Have you tried different sails? • Which size sail works best? Which travelled furthest?
CHALLENGE	• Can we modify our land yacht to make it better? • Can we create our own sail? • How car can we get it to go?

Please note, everything below is a guide for you to adapt and modify for your setting and age range of participants.

SCIENTIFIC LANGUAGE		
• Renewable energy • Measuring area • Measuring distance • Measuring time • Forces • Friction	• Pressure • Scientific investigation • Area • Wind resistance • Gearing down • Friction	• Air resistance • Sails • Design • Weight

Introduction

Connect

Bring the children into a circle to explain their theme for the day (we have found it works best if we bring them together to sit on the floor in a group)

It is a windy weekend at the beach and Jack and Jill are out to have a bit of fun. They have this old cart they normally use, but today it's Jill's turn to push Jack and Zog the Dog, and the weather is really windy, which makes it very hard work for her.

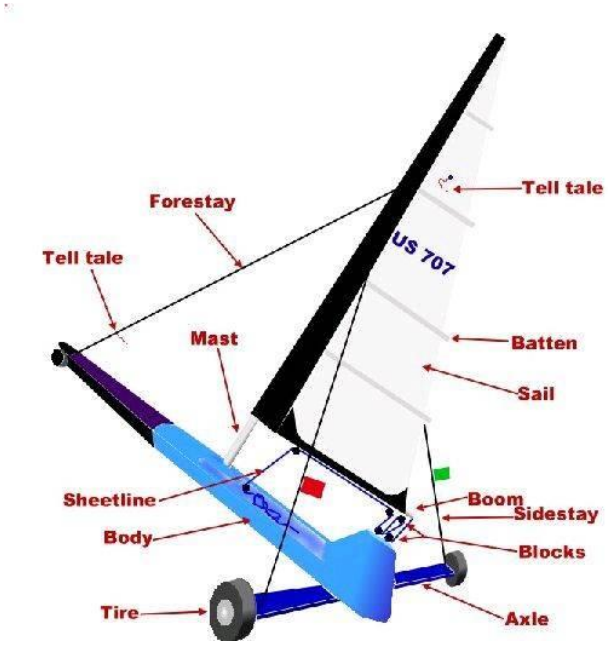
Jill gives up in the end and Jack can understand why. Zog the Dog does his best to help out and suddenly he sees an old sail half buried in the sand. Jill spots it at exactly the same time and they discuss between them how using the sail, the wind power and a few other things, it may be possible to make a kind of Land Yacht that will safely take them all for a fun ride.

How can you make a safe cart that is powered by the wind … and carries at least one person? Let's find out!

Trigger questions:

- *What is a land yacht?*
- *How will the sail work?*
- *How are we going to generate wind?*
- *How will we make them strong?*
- *What other kind of ways can we create energy?*
- *What other things use wind energy for power?*

WHAT IS A LAND YACHT?



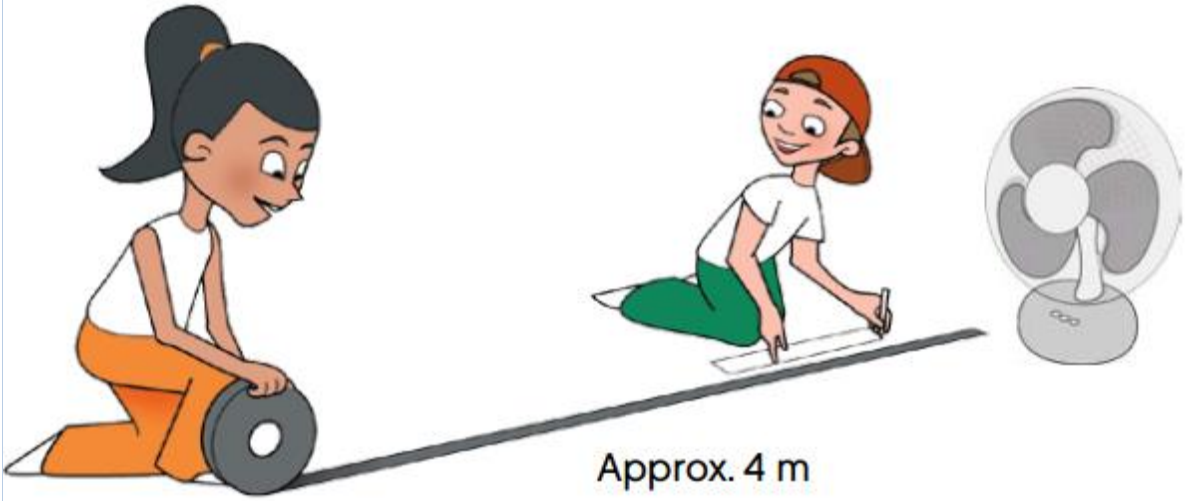
Land sailing on a yacht is similar to sailing on water in that the yacht is propelled forward by the force of the wind as it hits the sail.

However, land sailing yachts have three wheels and are driven over hard ground, which allows them to go much faster due to reduced friction, as compared to sailing in water.

Forces make things move, and forces can slow or stop moving objects. In sailing, the forces causing motion are the push of the wind on the sail and the pull of the air passing over the curve of the sail, creating lift much like on an airplane wing (but imagine it turned sideways). The forces holding back a water sailboat are the friction of the water on the hull and some friction of air on the boat and sails.

The sails on the land yacht should be slightly curved in order to “trap” the wind, helping to propel the yacht forward

BUILD A TEST TRACK (optional)



Make your test track Stick a 4-metre strip of masking tape across a stretch of floor and mark it off every 10 cm from the fan. Children will get the chance to test it multiple times over the course of the morning

Now we are ready to build models!

CONSTRUCT

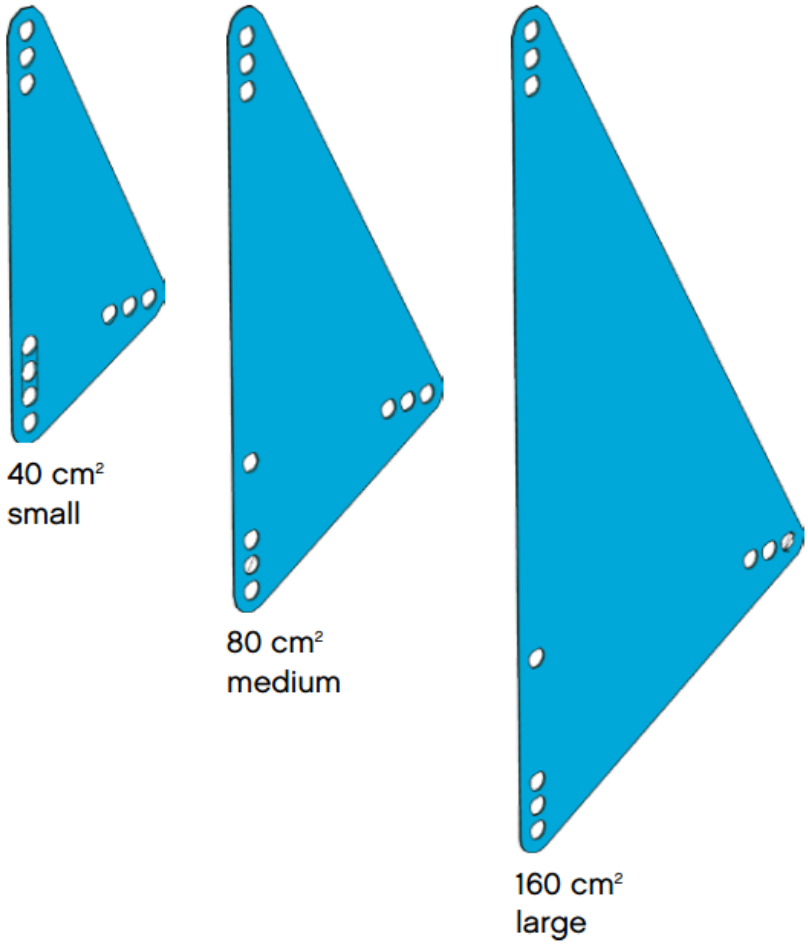
Following the build instructions and build tips/script, build your land yacht.

DIFFERENT SIZE SAILS

What difference does sail size make?

Predict and test: what difference could there be between the 80 (medium) and 160 (large) cm2 sails on the yacht. How far will each roll … and (optional) how fast?

Test at least 3 times with each sail attached to obtain a scientifically valid answer.



Double the area gathers more wind energy but does not double the distance.

Why? The further from the fan, the weaker the wind! Larger sails moved faster at first. But all the sail sizes stopped rolling after about 10 seconds. None of them sail faster than the wind – downwind!

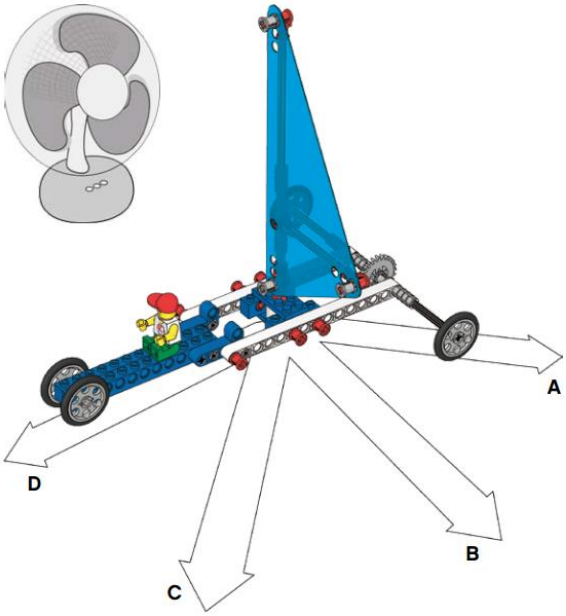
WIND DIRECTION

What if the wind is blowing from an angle?

Launch your Land Yacht at different angles across the wind stream. Can you explain what happens?

At most angles except D the yacht still moves forward! One part of the wind's force is 'deflected' off the sail, propelling it 'forward'. The other part of the force tries to blow it sideways.

In fact a Land Yacht sailing across the wind at angles B and C can go very fast – but could also flip over.



Using the STEM in a Box worksheet in the Octagon Guide, complete the tests on the medium and large sail and record your findings.

Create your own land yacht (optional)

Children will start working on their projects. Slowly make your way around each team, asking them what they're building, why, how it'll work, why it works, what would happen if you did this, changed that etc. **Constantly questioning them.**

Types of questions to ask:

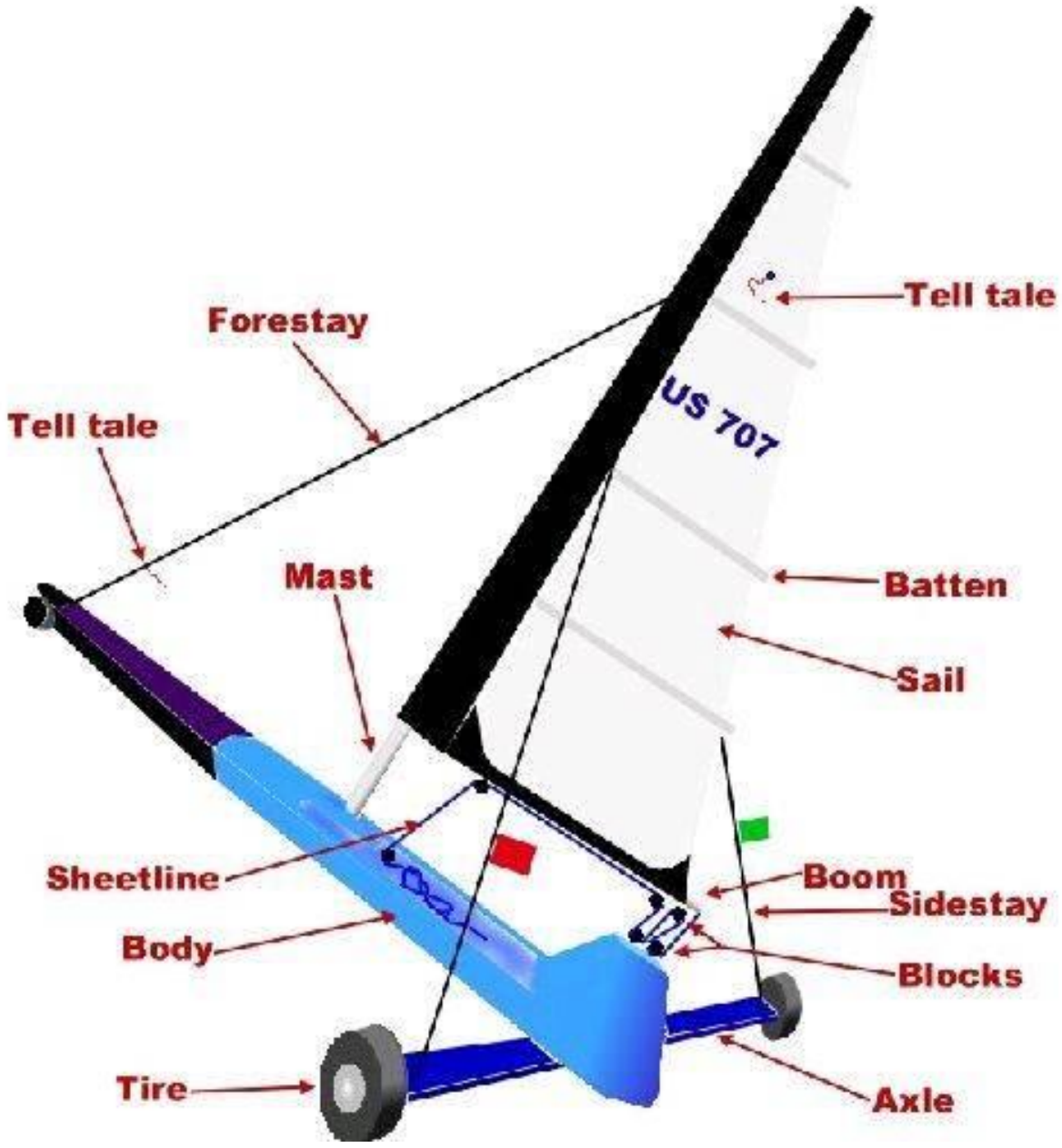
1. What kind of land yacht are you making?
2. How does the land yacht work?
3. Are you going to make the base heavy or light?
4. What kind of wheels will you use?
5. Which sail do they think will work best?
6. How are the team working together (if working in a team)
7. How will they test the distance it can travel?

You will also at times be required to work with some of the teams. This is something you will learn as the camp goes on. Some teams won't need any help and will fly along; some will need assistance/encouragement with building.

CONTEMPLATE

Things we will discuss:

- Which size sail worked best?
- How many wheels worked best?
- Where we able to get the land yacht to travel more than 1.5mtrs?
- What happened when we changed the direction of the wind?
- Was it better to keep the yacht heavy or light?


Tell tale
Forestay
US 707
Tell tale
Mast
Batten
Sail
Sheetline
Boom
Sidestay
Body
Blocks
Tire
Axle