Land Yacht

Design and technology
- Using mechanisms – gearing down
- Assembling components
- Combining materials

Science
- Renewable energy
- Measuring area
- Measuring distance
- Measuring time
- Forces
- Friction
- Air resistance
- Pressure
- Scientific investigation

Vocabulary
- Area
- Wind resistance
- Renewable energy
- Gearing down
- Friction

Other materials required
- 4-metre strip of smooth floor
- Masking tape
- Metre rule or measuring tape
- Timer or stopwatch
- 3-speed desk fan
- Optional: card, scissors, pencils and rulers to make your own sails

Connect

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.

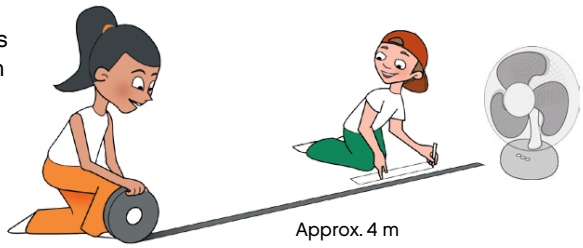
Jill gives up in the end and Jack can understand why. Zog the Dog does his best to help out and suddenly he sees an old towel half buried in the sand. Jill spots it at exactly the same time and they discuss between them how using the towel, the wind power and a few other things, it may be possible to 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!

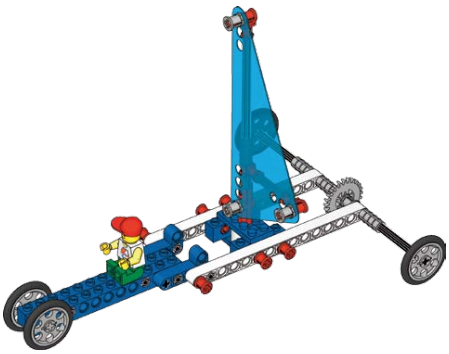
Construct

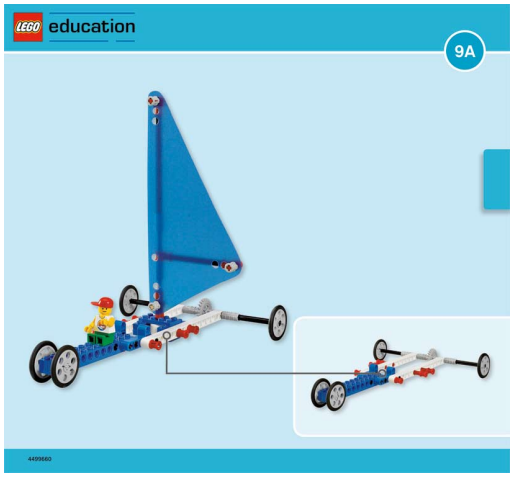
Warning!
Fans are potentially dangerous. Make sure that children handle them with great care!

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. Now we are ready to build models!



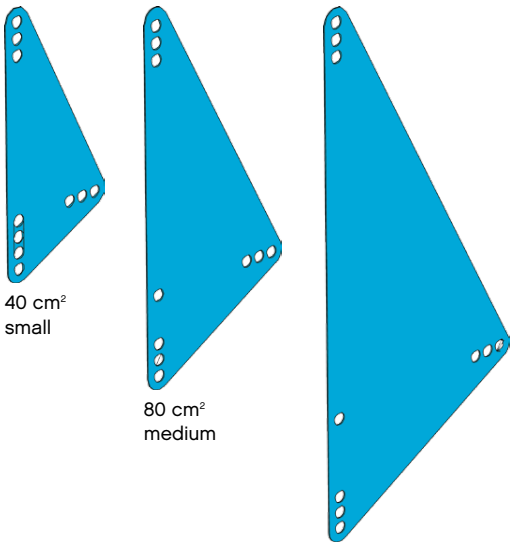
Build the Land Yacht
(all of Book 9A and book 9B to page 5, step 12).
Build it with the small sail first.





Contemplate

What difference does sail size make?
Predict and test: what difference could there be between the 40 (small), 80 (medium) and 160 (large) cm^2 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.

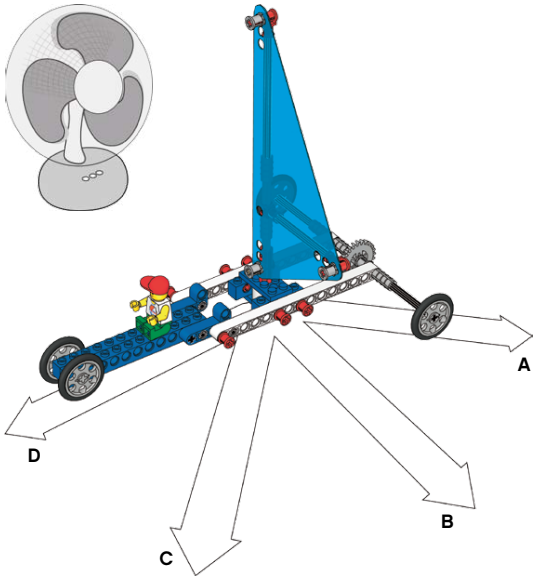


40 cm^2
small

80 cm^2
medium

160 cm^2
large

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?



Does sail shape matter?
Try making card or paper sails with the same area but a different shape. Find out about Square Riggers, Kon Tiki, Chinese Junks and Arab Dhows from books or by searching the internet.

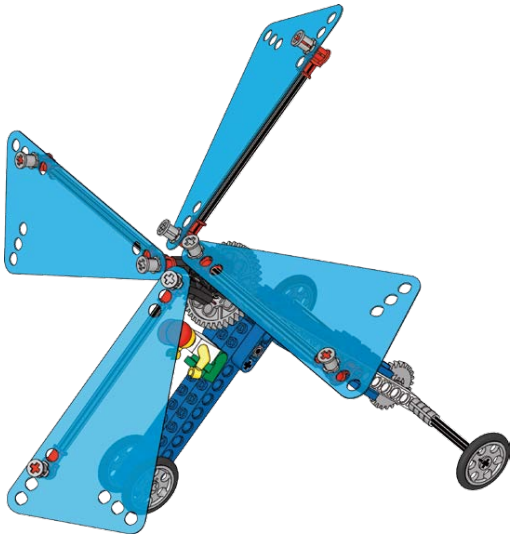
Tip:
Choose ONE speed setting to do all the tests. Any speed will do. We used high speed.

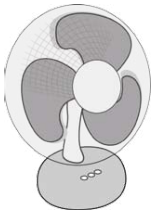
NB.
Your 'serious' scientists might also suggest testing the Land Yacht with just the bare mast, i.e. with no sail at all, so you might wish to try that as well.

Did you know?
The LEGO® figure weighs 3 g. The yacht weighs about 55 g. The weight brick is 53 g. Predict and test how the yacht would perform with a weight brick load.

Continue

The Wind Sucker
(all of book 9B to page 24, step 15).
Hold the model 2 m away facing the fan (set on high speed). Predict what will happen when you let go. Then try it! Can you explain?





About 2 m
from the fan

Idea:
Predict and test what would happen if you face it away from the fan.

Making it more efficient?
Add a weight brick and see what happens.
Swap the thin wheels for big wheels.