



Trundle Wheel

Design and technology

- Using mechanisms – gear ratios, gearing down
- Assembling components
- Combining materials

Science

- Measuring distance
- Calibrating scales
- Scientific investigations

Vocabulary

- Calibrating
- Scales
- Gearing down
- Errors
- Accuracy

Other materials required

- Ruler
- Three straight-edged objects less than 1 m long
- Space on a smooth floor to safely carry out a long jump
- Whiteboard markers

Connect

Jack and Jill are in the park preparing for the school sports' day. Their favourite discipline is the long jump. Jack has just made a huge jump. He is all excited and wants to know how long his jump is.

Jill has not got a ruler long enough to measure the distance so she is doing it in footsteps. Zog the Dog feels that he is much better at jumping so he is trying too.

Jill says that Jack's jump was 58 cm.

Jill takes her turn on the long jump. She says her jump was 4 metres, so Jack thinks she is just guessing ... and not very well, either!

They need some sort of device that can measure a long jump properly.

**What sort of measuring machine can you invent that could measure a long jump?
Let's find out!**

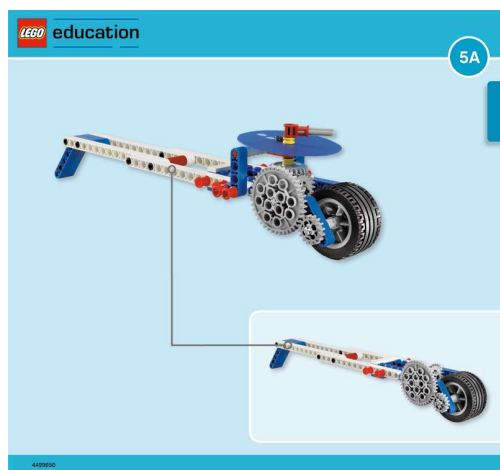
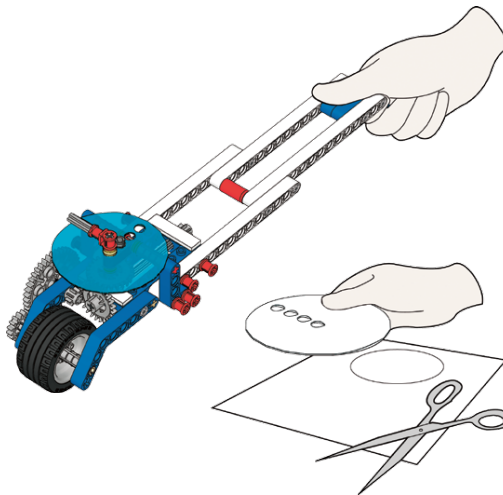


Construct

Build the Trundle Wheel

(all of book 5A and book 5B to page 6, step 11).

- Mark on the blue plastic disc or trace around it and cut out a paper copy. Put on scale markings and attach it on top of the blue plastic disc.
- Make sure that the pointer moves smoothly as you push the Trundle Wheel. If it is stiff, loosen overly tight axle bushings and make sure all other elements are firmly pressed together
- What is this measuring device good at measuring? Ask the children for ideas and draw up a list
- Mark on the blue plastic disc or trace around it and cut out a paper copy. Put on scale markings and attach it on top of the blue plastic disc.



Contemplate

Stepping out: Making a Foot Wheeler

How many 'feet' fit on the scale?
 Measure your shoe – several times! Mark 'zero' and then add a new mark to the dial each time you reach the end of your shoe until you've been around the scale (you won't get a whole number of 'shoes').

Predict

How many shoes wide is your desk! First use your foot wheeler to measure it! Then take off your shoe and measure it with your shoe. How accurate was your foot wheeler?

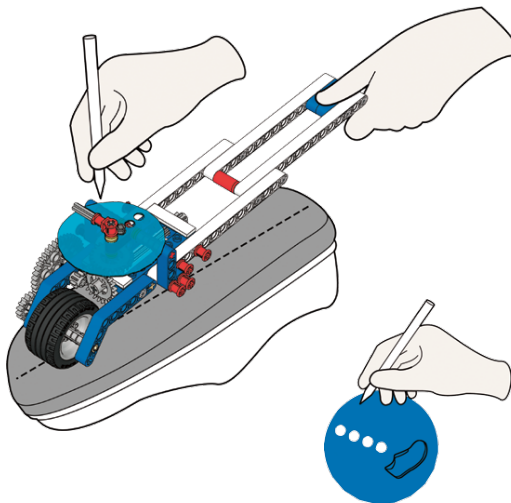
What are the problems of measuring in shoe lengths?

Metre Magic Trundle: is it better than a ruler?

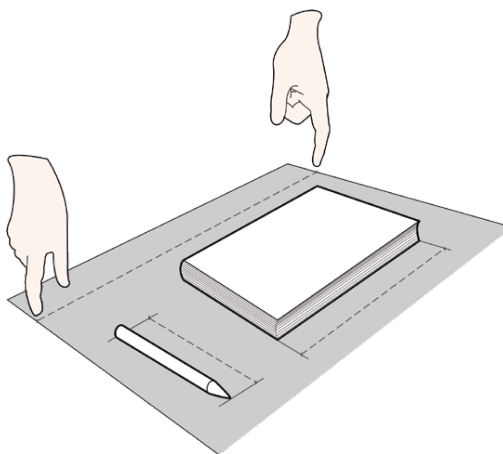
Collect 3 items that you believe are less than 1 metre long.

- Predict how long each is
- Measure with the Trundle Wheel
- Measure with a ruler
- What did you discover

But what happens for distances over 1 m?
 What happens with your perfect long jump?



- ◀ **NB.** Learn how to reset the pointer after each measurement
- ◀ **NB.** The accuracy of our scale depends on how much pressure the children place on the tyre. Light pressure is ideal. Try it and see.



Continue

How can we use the Trundle Wheel to measure long jumps of more than 1 m?

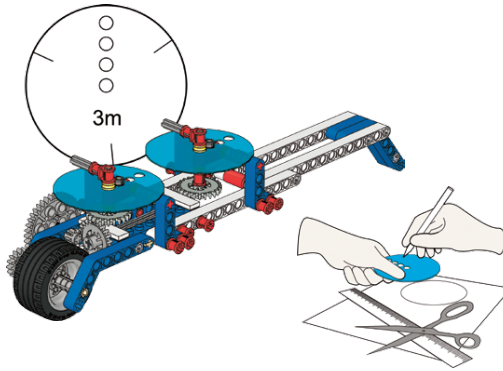
What might happen if we add another scale with a pointer that moves much slower than the first scale?

Build the model to page 12, step 11. Trace and cut out the 3 m scale in paper if you want to keep your scales. Wheel it further than 1 m. Practice reading both scales for extra accuracy.

Now it's time to start jumping!

- Students should practice their long jump skills, though obviously conditions in the classroom have to be taken into consideration and safety comes first. One possibility is to go outside and practice jumps on a lawn, another is to use a standing long jump

- Predict how far you'll jump. Then use the Trundle Wheel to measure the result. You could also try measuring with a ruler. What did you discover?



Gear facts

The 2 pointers are connected via an 8-tooth and a 24-tooth gear. This gears down the speed of the second pointer 3 times, allowing one dial to now cover 3 m.

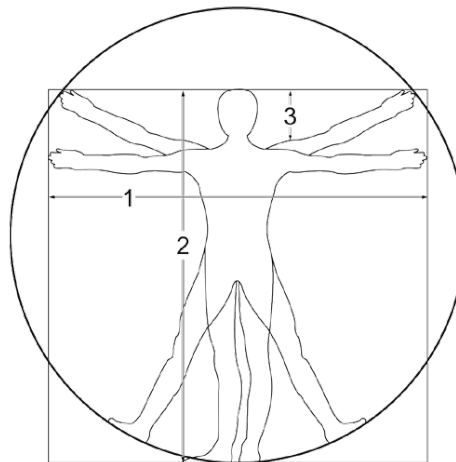
Leonardo's magic body facts

What does Leonardo da Vinci's famous symbol mean?

Try measuring all the distances shown.

See if you can spot any 'patterns'.

If another person tells you her height, can you tell how long her arm span will be – or how long her head will be?



Idea:

The wonderful thing about a trundle as opposed to a ruler is also that it is great at measuring around curves. Estimate your head and waist size – then measure and be amazed.

NB.

You may need to measure with the person standing against a wall and running the Trundle Wheel up the wall beside them.