

Engineering

Using a measuring tape

Content and alignment

Measuring tapes are important tools in many industries and professions. However, despite being a common tool in workplaces and workshops, the measuring tape is often a confusing and difficult tool to use. Using a measuring tape requires a combination of numeracy skills and practical knowledge of the tool, which develops from experience. Older learners are often uncomfortable admitting their lack of experience and difficulty using the measuring tape.

Intent

The intent of this resource is to provide learners with a knowledge of the features of a tape measure and to develop their confidence and accuracy when using the tool in the workplace. This teaching and learning sequence is suitable for learners who are unfamiliar with a measuring tape. If you are working with more experienced learners, then you might wish to skip the first two parts of the sequence.

This resource is best used in conjunction with resource [Engineering: Developing an understanding of the metric system](#).

It may be useful to ensure learners are familiar with the metric system before continuing. Diagnostic questions can be found on page 14 of 'Teaching Adults to Make Sense of Numbers to Solve Problems: Using the Learning Progressions', which can be found here:

<https://ako.ac.nz/knowledge-centre/make-sense-of-numbers/>

Sequence

This sequence is designed to support learners in developing their skill in using a measuring tape. It begins with a discussion regarding what learners already know. Second, learners begin to discuss and learn the names of the parts of a measuring tape. This helps familiarise learners with the tool. Third, learners engage in the conventions of reading the tape with the support of diagrams, pictures and place value charts. Finally, learners measure real objects, by first estimating the length and then comparing their estimate to the measured length. With experience, the learners' estimates will become more accurate.

There are four parts to this sequence. Learners will:

1. discuss what they know about measuring tapes
2. identify parts of the measuring tape
3. explore reading the measuring tape
4. estimate and measure a range of objects

Note: When selecting a measuring tape, if possible, select tapes that only show metric measures not dual metric and imperial. The dual systems often contribute to 'information overload'. Once learners have some experience, success and confidence you may want to introduce the imperial system.

1. Discuss what learners know about measuring tapes

Step one: Hand out measuring tapes to each learner. If limited by the quantity of tapes available, then one per table will also work. Ask learners to discuss in groups who has used measuring tapes, where they have used them and what for.

Note: In some cases the learners are distracted by the novelty of the tapes. If this is the case, you may wish to hand them out once you have had the discussion.

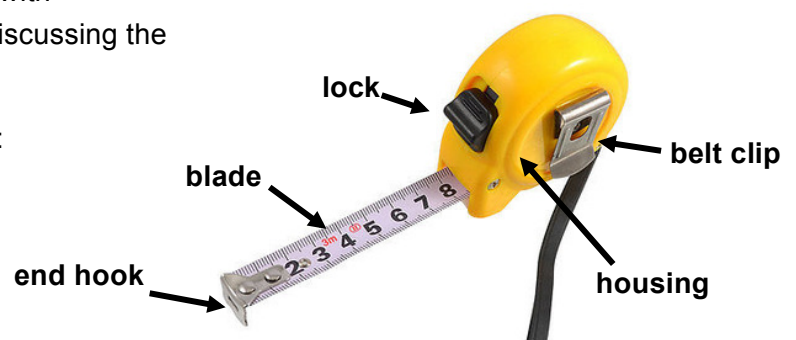
Step two: Have the learners share their experiences with the wider class, being sure to discuss the contexts in which the measuring tapes were used. Follow this up with a discussion on how measuring tapes are used in the engineering industry. Finally, discuss the difficulties many people have with measuring tapes. These usually include difficulties 'reading' the tape to identify the correct measure.

2. Identify parts of the measuring tape

If the majority of learners are unfamiliar with measuring tapes it may be worthwhile discussing the specific names of the component parts.

Write the following words on the boards:

- end hook
- belt clip
- housing
- blade
- lock



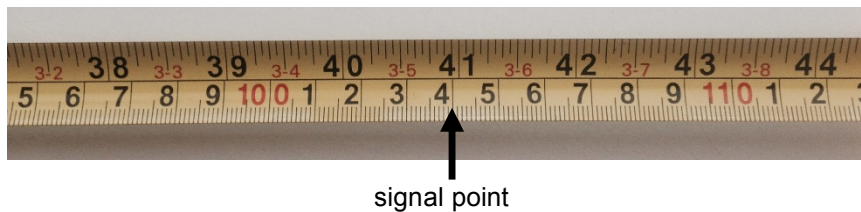
Ask learners to match the name of the component with the corresponding part of the measuring tape. A group discussion is often sufficient for learners to master the terms.

3. Explore reading the measuring tape

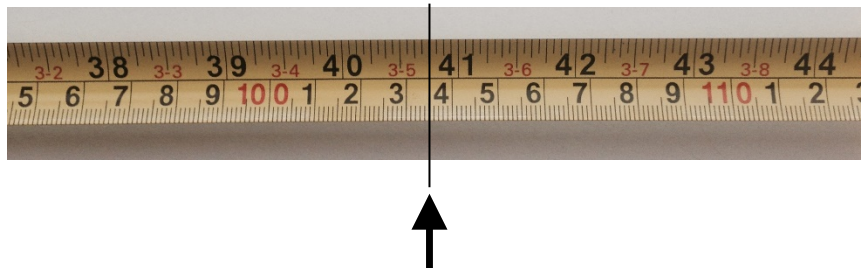
Reading a measuring tape in millimetres is a common practice and requires a knowledge of:

- place value: thousands, hundreds, tens and ones
- addition of thousands, hundreds, tens and ones.

Because of the limited size of the blade, measuring tapes use **signal points** to indicate larger units of measure. This requires learners to have to add, or count on, their measure, from the nearest whole number and includes some mental addition.



Note: A misconception which confuses many learners is believing they will read the measurement at the ‘mark’, rather than ‘reading up’ the measuring tape.



For example, this point is determined by reading up the tape: $1\text{m} + 3\text{cm} + 5\text{mm} = 1035\text{mm}$

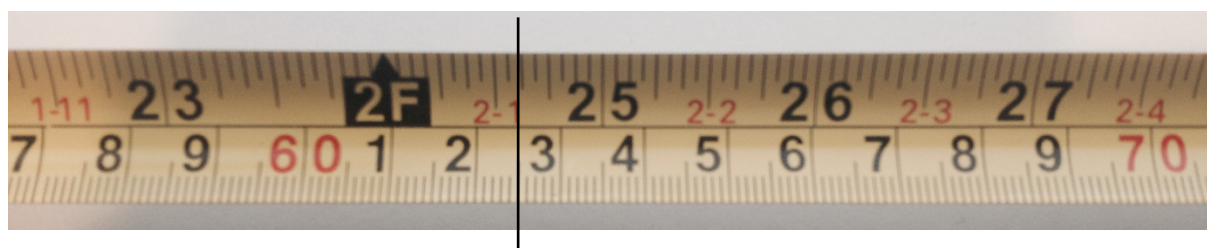
Activity: Explore reading the measuring tape

For this activity you will need:

- Pictures of measurements, see the related resource [Engineering: Measurement images](#).
- Place value charts, see [Engineering: Place value chart](#).

Step one: Explain that lengths will be measured in millimetres, the smallest measure indicated on this measuring tape. However, this measuring tape numbers the centimetres, and only marks the millimetres. This means that all measures will be multiplied by ten. For more on this concept see our online resource: [Engineering: Developing an understanding of the metric system](#).

Step two: Show the learners pictures of measurements that can be used as prompts for whole-class discussions. These are useful for working through the process of finding a measurement. Resource [Engineering: Measurement images](#) contains PowerPoint illustrations which may be useful.



Step three: Ask learners to contribute which numbers are important and why, and write these on the board. For example, in the picture above these numbers are important: 60, 2 and 5.

Step four: Show the learners the place value chart and tell them that it will be useful for recording the measurements. Demonstrate how the measuring tape is 'read up', talking through the process as you model it. For example:

First, I find the largest previous whole number which is 60. 60 centimetres is 600 mm. I then move up the tape to the next largest number, which is 2. 2 centimetres is 20mm. So I add 600 and 20mm, which is 620mm. Now, I count how many single millimetre, 1, 2, 3, 4, 5, which is 5mm. 620 plus 5mm is 625mm.

A second approach is to use a place value chart. For example:

Thousands	Hundreds	Tens	Units	Tenths
	6			•
		2		•
			5	•
Total	6	2	5	•

Step five: Hand out the place value charts and continue to work through the pictures with the learners. This allows you to give and receive immediate feedback. Additionally, model entering the numbers into the place value chart and then say the measurement aloud. In time, the place value chart can be removed and learners can write the measurement directly.

4. Estimate and measure a range of objects

The secret to mastering the measuring tape and other measurement skills is to use the tools repeatedly and receive feedback. The measurement recording chart can be printed and used for this activity: [Engineering: Measuring recording chart](#).

Step one: Hand out the measurement recording chart. Identify five items that learners are able to measure. The learners, as a class, may select the objects. A range of different sizes is recommended, including objects measuring several millimetres to objects of over one metre.

Step two: Learners work in pairs and first make an estimate of the length of the object, writing this estimate on the sheet with the correct units. Following this, they measure the object and record the measurement on the sheet. Then they compare the difference between their estimate and their measurement.

Step three: Once all the learners have finished, go through the measurements as a whole-class discussion. Ask learners from each group to state their measurements and write these on the board. There will be differences. Measure the object yourself, being sure to model the process to the learners and write your measurement on the board.

Learners may want to re-measure objects. This is to be encouraged.

Final note: Engineering tutors tend to view the skill of measuring as intuitive and easy. Yet for many learners the process is confusing and difficult. The solution is lots of practice, lots of friendly feedback and modelling, and the use of the place value chart to demonstrate the position of the different units.

Summary

This sequence begins with a discussion of learners' current knowledge. It then moves to the identification of the parts of a measuring tape, followed by a detailed overview of how a measuring tape is read. These skills take time to develop. They develop best in an environment in which learners are able to experiment and then receive feedback, including modelling the correct methods. Although the use of the place value chart may appear to add complexity to the process, the results in classrooms have been positive, as the charts provide a visual model for the learners.