

Measure for Measure

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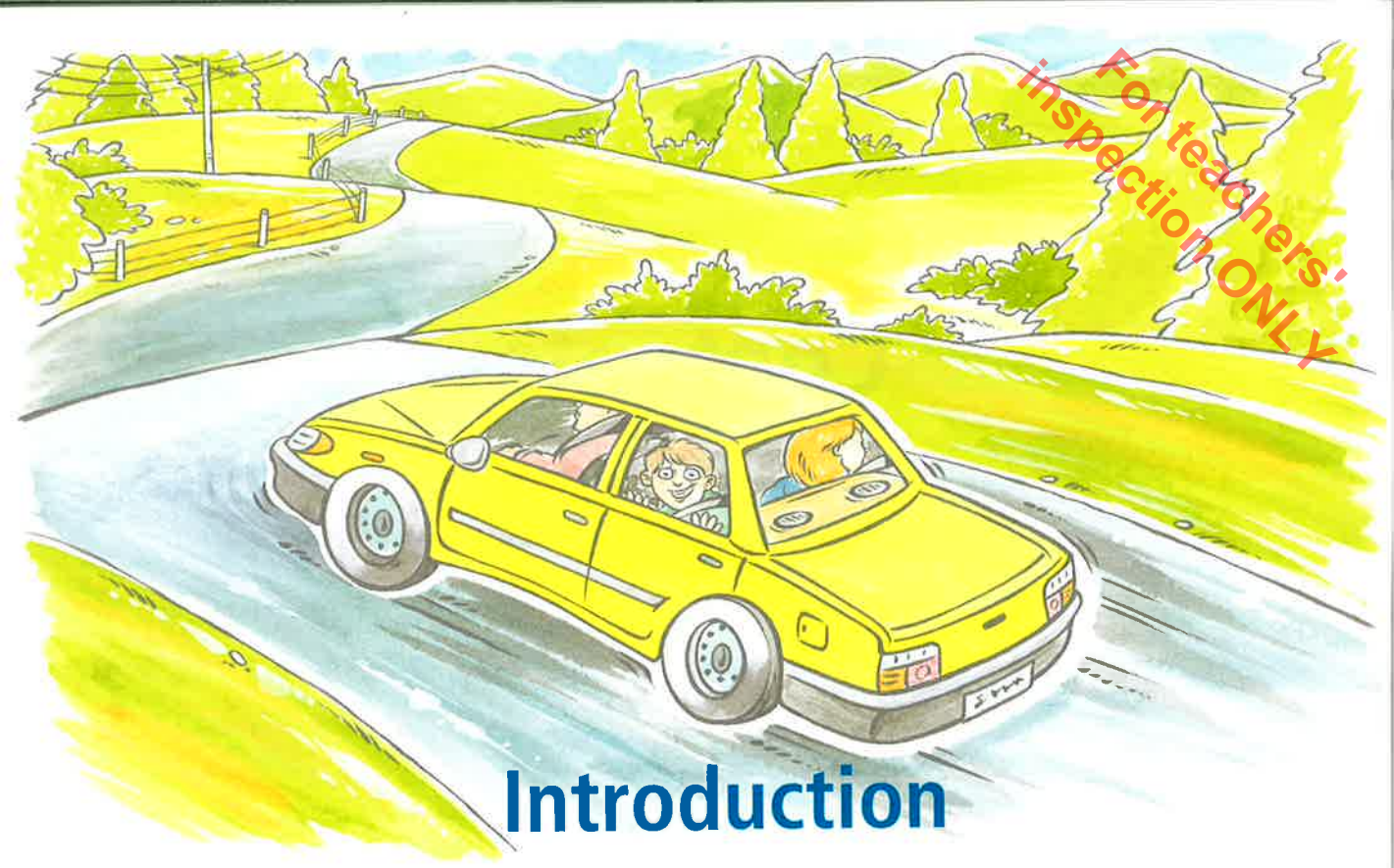
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Introduction

Your family is going on a holiday. After four hours of driving, you're still chugging along in the car.

'Are we there yet?' you call out.

'It shouldn't be much longer,' your mother says.

You gaze out the window. 'I wonder how tall those gum trees are.'

'And how far away would that mountain peak be?' asks your father, unfolding a road map.

The car passes a huge boulder on the side of the road. 'That's a gigantic rock!' your sister remarks. 'I wonder what it weighs.'

The car zooms across a bridge. 'How fast are we going?' you ask.

'Guess!' your mother says.

'Ninety kilometres an hour?'

'Close,' your mother replies, as she looks at the car's speedometer. 'We're going 95 kilometres an hour.'

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'What time is it?' your sister asks.

'Guess!' your father replies.

Your sister looks outside at the shadows of trees. 'I think it's four o'clock,' she announces.

Your father looks at his watch. 'Not bad. It's half-past four. We're getting close to the national park now.'

'What direction is the park from here?' you ask.

Your father studies the map. 'We go north a few kilometres, and then turn west into the park.'

At the top of a hill, your mother parks the car. Everyone gets out and gazes at a deep green valley below, and the snow-topped mountains in the distance.

Your father looks at the gathering clouds. 'We'd better get going. It looks like a storm is coming.'

'How do you know?' you ask.

'All these questions!' your father says. 'How tall are the trees? How far away is that mountain? How much does that rock weigh? How fast are we going? What time is it? What direction is the park? Is there a storm coming?'

You laugh. 'I guess we're just curious!'

'It's a good thing we have the technology these days to help us answer those questions,' says your mother.

You lean back in the seat and think. How did people long ago figure out the answer to those questions? What kinds of instruments do people use today? Who invented them?

Read on, and find out!

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Chapter 1

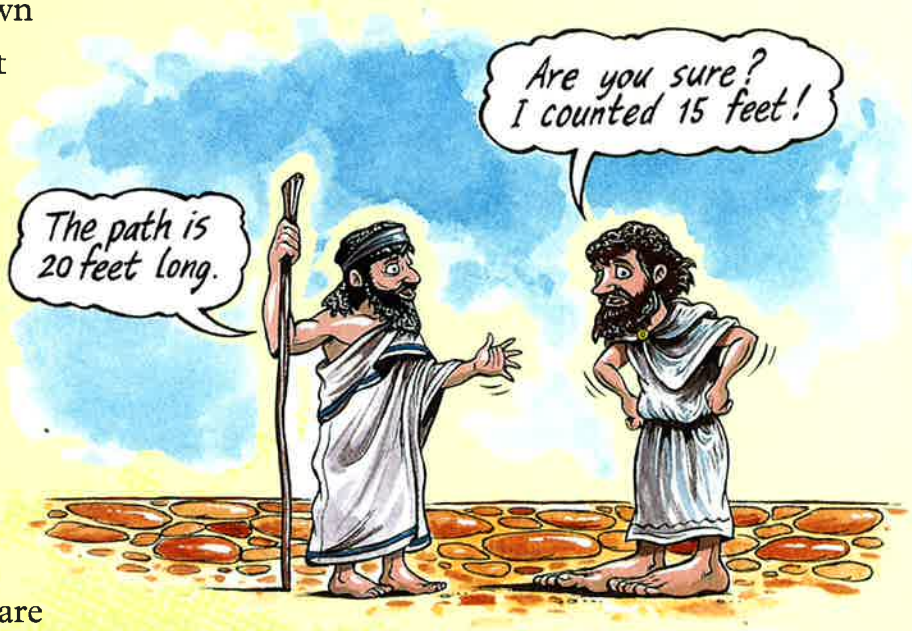
Distance

How far away is that mountain? How tall is that tree? These are questions about distance. Distance is the amount of space between one place and another.

In ancient times

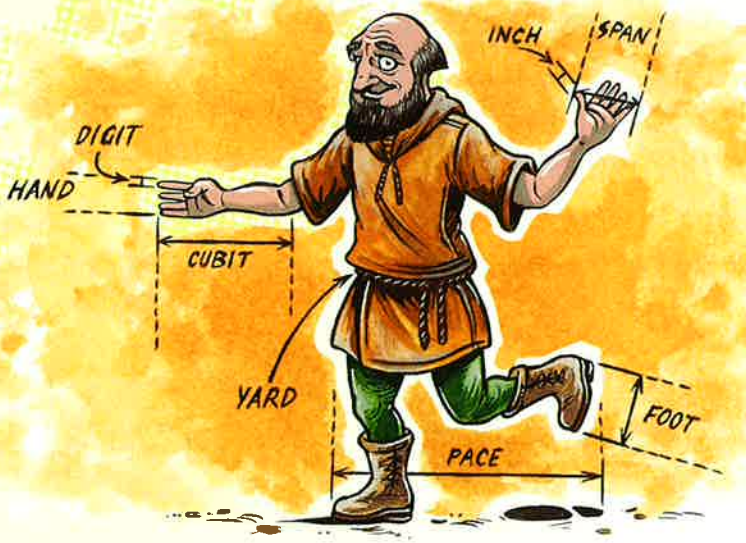
Long ago, people used their own bodies – arms, hands, fingers and feet — as the **units of measure** for distance.

The most common unit was the foot. To measure the distance of a path, someone walked heel-to-toe along it and counted each time they set down a foot. If they set down their feet 20 times, the path was 20 feet long.



However, there was a problem with using bodies as units of measure. People are not all the same size, so the units were not always the same. People with smaller feet would measure distances differently than people with larger feet.

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Historical measures

Unit	Original measure	Measure today
Finger (digit)	Width of a finger	1.91 cm
Inch, unch or uncia	Width of the thumb. Later, three grains of barley placed end to end.	2.54 cm
Hand	Distance across the width of a hand. Also, four fingers.	10.16 cm
Span	Distance between the tip of the thumb and the tip of the little finger with the hand stretched out	22.86 cm
Cubit	Distance from the elbow to the tip of the middle finger (cubitum is Latin for 'elbow')	50.8 cm
Yard	Length of a particular type of belt. Later, the distance from the chin or nose to the tips of the fingers.	90 cm
Foot	Length of adult male's foot	30.48 cm
Pace	Distance of two regular walking steps	1.8 m
Rod	Length of 16 men's feet put heel to toe	4.95 m
Furlong	40 rods long, or the length of a furrow made by a plough on a farm	198 m
Mile	1 000 paces	1 584 m

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Standard measures

As civilisations grew and people started settling other lands, they wanted the units of measure to be the same for everyone. To do this, they needed to agree on a length for each unit. Once a specific length was set, a **standard** was made.

The imperial, or English, system of measurement includes many of the ancient units of measure based on the body, such as inches, feet and miles. The United States still uses the imperial system.



*In 1592, the length of Queen Elizabeth's arm became the official **yard.***

The metric system

In 1791, the French created a new way of measuring called the metric system. The word 'metric' is Greek for 'measure'. The metric system is based on units of 10. All the units are related to each other. This makes it easy for people to change from one metric unit to another.

At first, many French people did not use the metric system because they were not used to it. However, in 1840, France made a law that required everyone to use it. Over the next hundred years, most countries switched to the metric system.