MEASURE

Exploring Speed

Adapted from 'How fast is fast?' (https://nzmaths.co.nz/resource/how-fast-fast)

Learning focus

- Measure distance and time to calculate speed
- Use benchmarks to work out approximate speed
- Convert between units of measurement.

Key vocabulary

- Metres
- Kilometres
- Seconds
- Minutes
- Hours
- Per
- Estimate

Resources

- Measuring tapes, metre rulers, trundle wheels
- Timing devices (such as stopwatches)
- Pencils, paper and clipboards

Activity

Ask children for suggestions of things that are fast. Ideas may include: a cheetah running, the speed of light, an Olympic sprinter, an aeroplane. Discuss and record any speeds that they mention, such as 100 kilometres per hour or 30 miles per hour.

Name something that is fast.
About how fast does it go?
How do you know which is faster/fastest?
What do all these speeds have in common?

Teaching point

Speed can be understood as the rate at which an object covers a distance. All speeds include both a distance and a time. A rate also includes the word 'per' which means 'for every'.

So 60 kilometres per hour means that 60 kilometres are travelled for every hour that elapses.

In the real world, the speed of an animal, vehicle or object is likely to vary. We assume that the speed given is the mean (average) speed.

Ask children to predict how fast they can run one kilometre. Record their predictions. Using a trundle wheel or Google Maps measurements of the school grounds, mark out a running track of length one kilometre.

Time children as they run this distance and have them record their timing when complete. They could work in pairs with one child running while the other uses the timing device.
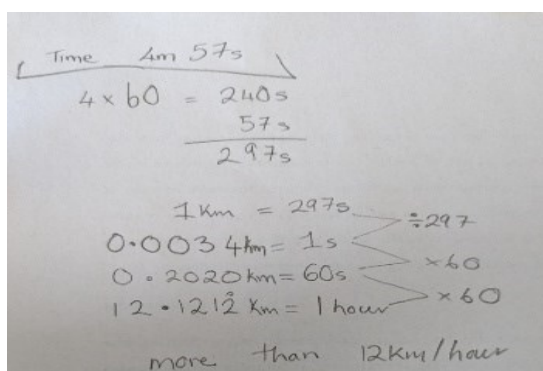
Allow children time to calculate their average speed, with or without calculators as appropriate. Then as a whole class discuss the different strategies used.

Teaching point

Encourage children to use approximations to support their estimations of speed. Using 'benchmarks' will make it easier for children to approximate their own speeds. Link working out how many 'lots of' a given time make 60 minutes with division.

For example, a child might say, "My time was 5 minutes 12 seconds, which is just over 5 minutes. There are 60 minutes in an hour, that is 12 lots of 5, so my speed was about 12 km an hour."

Children who use calculators can be expected to calculate speeds with more precision. They can be supported to (i) round their times to the nearest half a minute, and divide this into 60 minutes to see how many lots in an hour or (ii) express their time in seconds and use this to calculate the distance covered per second, before expressing this as km per hour.

Once children have found their speed in kilometres per hour, they can compare their speed with their original predictions.

The children's results can then be compared with the world records for the fastest kilometre: Kenyan runner Noah Ngeny ran one kilometre in 2:11:96 minutes in 1999; Russian athlete Svetlana Masterkoya ran one kilometre in 2:28:98 minutes in 1996.

How far around the track were you when these record holders finished?

Taking ideas further

The same approach can be used to explore other modes of travel and other distances. For example, the same teaching sequence might be followed but with a focus on exploring children's speed when cycling one kilometre.

Children could also measure the time it takes them to run 200 m, calculate their speed and compare this to (i) their speed over 1 kilometre and (ii) the speed of world-record holders over this distance.

Children could use digital devices to research speeds in the real world. They could research the speeds of different modes of travel (such as walking, running, swimming) or different forms of transport (such as a bicycle, car, train or aeroplane). They could make a display of interesting facts, For example, the speed of light is 300,000,000 metres per second; a cheetah can run at 80 – 130 kilometres per hour, and so on.

Assessment opportunities

Are the children able to:

- Make a sensible estimate of speed
- Accurately measure distance and time using appropriate measuring devices
- Calculate their average speed
- Record distance, time and speed using appropriate units
- Convert between different units of measurement