Girth and Gaps

Key Stage 2 Numeracy
Teachers' notes

This unit of work is based on elements of ***Solving Problems, Handling Data and Measures, Shape and Space*** from ***Years 5 and 6*** of the ***National Numeracy Strategy***.

Learning Objectives Covered by this Work

- Use, read and write standard metric units.
- Suggest suitable units and measuring equipment to estimate or measure length.
- Understand area measured in square metres.
- Solve a problem by representing and interpreting data in graphs.
- Find the mean of a set of data.
- Recognise and generalise relationships and explain reasoning in writing.

Before the Visit

Brainstorm features of trees and woodlands that could be measured, for example;

- Tree height
- Diameter, radius and girth (the circumference) of the trunk, branches and twigs
- The area covered by the canopy
- The distance between adjacent trees

Suggest suitable measuring equipment for each of these, for example tape measure for girth, callipers for diameter and trundle wheel for distances between trees. Decide on the most suitable standard units to use for each measurement.

In the Woodland

Choose two contrasting areas of woodland, for example, one with older, widely spaced trees, and another with a dense growth of young trees.

Using pegs and string, mark out a 25 by 25 metre square in each area. Count the number of trees within the area. Trees could be marked with stickers to ensure that none are counted twice.

Ask each child to choose **two** trees to study, one from each area.

Estimate and measure the diameter and girth (in centimetres) of each tree at a height of 1.5 metres above ground. Estimate the age of the two trees.

For each of the trees, estimate and measure the distance in metres to the nearest adjacent tree using a tape or trundle wheel.

Estimate the height of the two trees in metres. Consider different methods of measuring tree height. Although this can be done using triangulation, an easier way is to use the 'sighting' method shown on sheet Y6.3 from 'get, set ... Grow'. Measure the height (in metres) of the two trees.

Measure the canopy area of each of the trees. Use a compass to find the eight main compass directions (north, north-east, etc) from the trunk. Walk away from the trunk in each of these directions, until the edge of the canopy is reached. Using a tape, measure and record the distances from the trunk to the edge of the canopy in metres.

Follow-up Work

Investigate the relationship between girth and diameter (girth is approximately three times diameter because circumference is $2 \pi r$).

Use the girths of the trees to estimate their age. Multiply the tree's girth by 4 and then divide by 10. A simpler, though slightly less accurate method, is to divide the girth by 2.

Find the areas of the two tree canopies by drawing the distances from the trunk to the canopy edge at a scale of 1cm:1m on centimetre squared paper. Join the ends of the lines with a freehand curve and then determine area by counting squares.

Compare the following aspects of the two different areas of woodland.

- The number of trees within each square.
- The average (mean) gap between adjacent trees.
- Use grouped-data bar charts to compare the frequency of different girths in the two different areas of woodland.

Describe the difference between the two areas of woodland examined in words, making reference to the measurements made and graphs produced.

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Pupil sheet

Use the table below to collect information on your two trees and their two areas of woodland.
If an area on the table is shaded, you don't need to fill it in.

Measurement	Area A		Area B	
	Estimate	Measure	Estimate	Measure
Number of trees in the square				
Estimated age of tree				
Diameter of trunk at 1.5 metres				
Girth of trunk at 1.5 metres				
Distance to nearest tree				
Height of tree				
Distance to north edge of canopy				
Distance to north-east edge of canopy				
Distance to east edge of canopy				
Distance to south-east edge of canopy				
Distance to south edge of canopy				
Distance to south-west edge of canopy				
Distance to west edge of canopy				
Distance to north-west edge of canopy				