LARNE BOROUGH COUNCIL

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CARNFUNNOCK COUNTRY PARK

ENVIRONMENTAL MATHS GUIDANCE NOTES

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ACTIVITY 1: HOW OLD IS THAT TREE?

1

Children could be asked to imagine how old their chosen tree might be. Could it be as old as they are? Their parents? Their grandparents? Or even older?

ADDITIONAL ACTIVITIES

Activity 1: Make a Time Line
Make a time-line for the life time of the oldest tree found. Children could then mark family events or other historical events on it e.g. when they were born or when their grandparents were born.

Activity 2: Measure Branches
Try and find branches that are as old as the children e.g. 13 - 18cm in girth (5 – 7 years), 18 – 25cm (7 - 11 years).

MEASURING THE AGE OF A MATURE GROWING TREE

Equipment Needed: Tape measure, pencil and notebook (A 1.5 metre long stick is also useful to stand upright next to a tree for accurate measuring and to make a way through bracken or nettles).

While a tree is alive it increases its girth each year, just under the bark. Most trees in Northern Ireland add an extra 2.5 cm to their circumference each year. Dividing the total circumference by this amount should then give you the approximate age of a tree. There are exceptions to this general rule. Some pines and chestnuts grow more than this in a year, whilst yews, limes, oak and beech often do not grow as much. Palm like trees such as our cabbage trees often grow taller without increasing their trunk circumference. Also trees in an avenue may put on about 2 cm and trees in dense woodland perhaps only 1.5 cm in girth per year. This method of measurement is not as accurate when a tree is well over 100 years old.

Remember: Always make sure the tape is level horizontally. Never presume the first attempt is correct, the children should slide the tape around the tree a couple of times to obtain the smallest measurement.

MEASURING THE AGE OF A YOUNG TREE

Equipment Needed: Tape measure, pencil and notebook.

You can estimate the age of young trees by counting the layers of branches (whorls). This works well on species that form one distinct layer of branches each year such as pines. It does not work on cedars and alder because they lack this particular branching habit. It is easy to count the whorls for about the first 30 years, but trees growing closely together in dense stands often lose their lower branches because of natural pruning. In such cases, you can look for limb scars or knot indicators. Broken tops can cause you to underestimate age, and false whorls can cause you to overestimate age.

MEASURING THE AGE OF A FELLED TREE

Equipment Needed: Tape measure, pencil, notebook, hand lens or magnifying glass for diffuse porous woods.

The second most accurate way to estimate tree age is to count the annual rings of wood growth. This is only possible on trees that are dead and have been cut down.

In **ring porous species** of trees (distinct annual rings), the annual ring will contain both early or spring wood (large vessels) and late or summer wood (small vessels). For example: oak, ash, elm, chestnut, larch, yew and pine. In **diffuse porous woods**, it is much more difficult to see where the rings begin and end as the pores are scattered throughout the growth ring instead of being collected in a band or row. For example: beech, sycamore, alder, willow, maple and birch. Some species, such as cherry, are on the border between the two classes, forming an intermediate group.

Growth Rings

Tree rings form because during each growth season new water and food conducting cells are added around the perimeter of the tree trunk. Trees produce a burst of growth each spring, followed by slower growth in the summer and usually no growth in the winter. This summer wood is denser than the spring wood and this shows up as a "growth ring".

Understanding Rings

The width of a tree ring shows the amount of growth that has taken place during one year. This indicates the growing conditions for that year and provides a record of past climatic conditions:

Indicator	Explanation
Wide ring	Tree grew well in a particular year
Narrow ring	Poor weather conditions slowed tree's growth
Ring same width all around	Tree grew in the open and out of the wind
Ring wider on the side towards light or away from the wind	Tree grew shaded or buffeted by the wind

Remember: the width of an annual ring of wood for a particular species depends upon many factors, including:

- **Genetic differences**
- **Tree age**
- **Height above ground**
- **Local site and climatic conditions**
- **Competition from other trees**
- **Water availability / rainfall**
- **Temperature**
- **Soil fertility & nutrient availability**
- **Presence of insects or diseases**
- **General tree health**

In order to grow, trees require: Water; sunlight; mineral nutrients; oxygen; optimum temperature; less competition; ecological adaptations; soil or good substratum and a good local ecosystem.

ADDITIONAL ACTIVITIES

Activity 3: Tree Survival Game

Equipment Needed: Make a set of cards with 'sunshine', 'rain', 'nutrients', 'air' on them scattered around an area of woodland (not enough for every child).

Playing the game

1. Discuss with the children what a plant / tree needs to live
2. Explain that you have hidden the cards and the children are going to be mobile trees and try to find everything they need to survive.
3. On regrouping, look at how many of the trees survived by finding 4 different cards. This illustrates how hard it is to survive in certain conditions e.g. drought, competition from surrounding trees.

ACTIVITY 2: MEASURING THE HEIGHT OF A TREE

3

Equipment Needed: Tape measure, pencil, notebook, ruler / 1.5 metre long stick.

If you use the following golden rules you will be able to accurately measure the height of a tree:

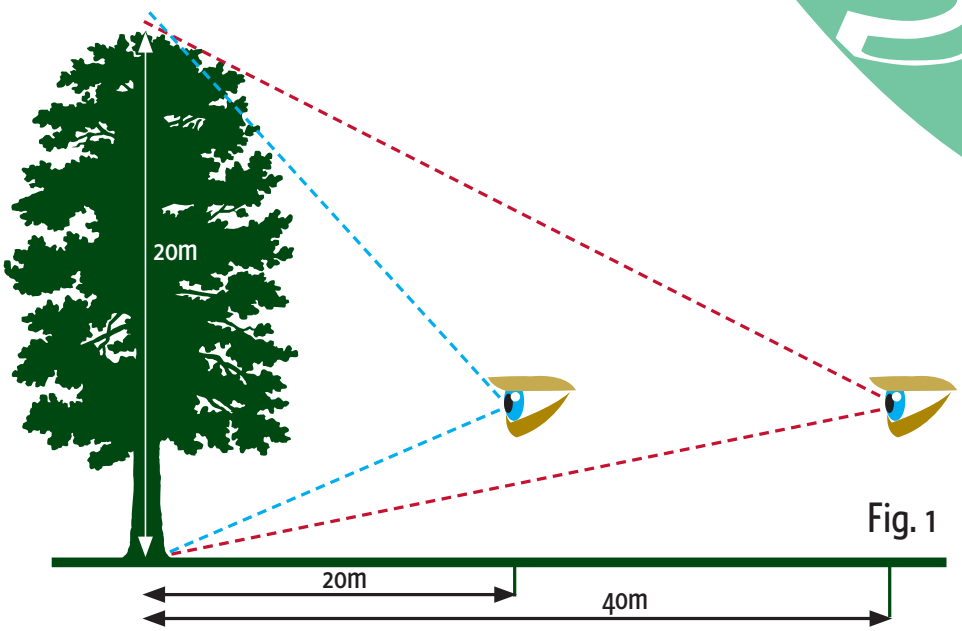


Fig. 1

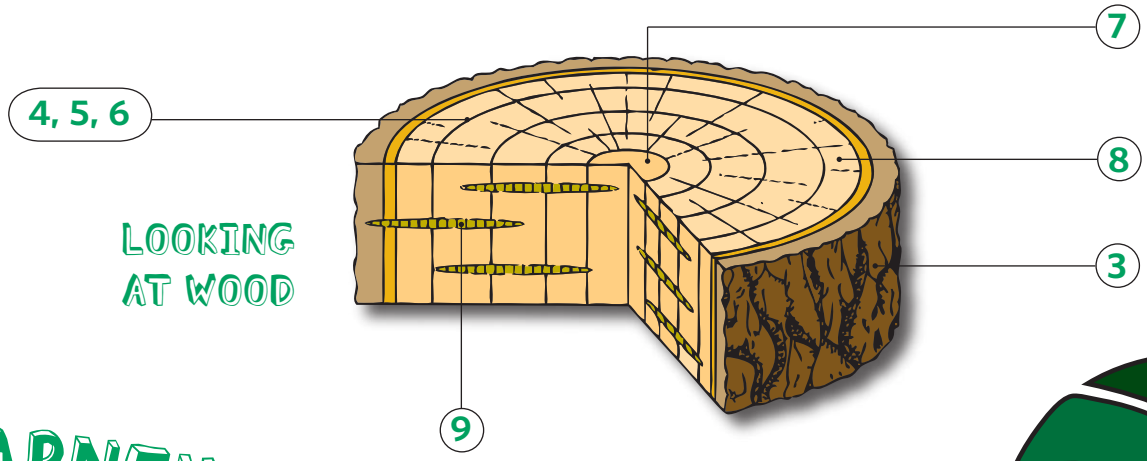
1. It is easier to measure a straight tree, as a leaning one will require adjustments to be made.
2. Always measure height using as long a baseline (distance from tree) as possible.
3. Generally try to be at a distance as great as the height of the tree and preferably twice the height. The tip or top most branches must be clearly visible.
4. Always stand on the same level of ground as the tree i.e. do not measure from up or down a slope but across the slope.
5. If possible, always check a height using more than one baseline taken in different directions from the tree. Always use more than one baseline to check the height if the tree is a champion!
6. If you obtain three or more different heights on different baselines it may be appropriate to average the heights. If there is a greater variation in heights than 2 - 3 metres, analyse which measurements you consider are the most accurate relating to, baseline distance, visibility, ground conditions and lean of tree. Average those measurements you consider to be most accurate.
7. If a tree is dead in its upper crown or dying back, the height recorded should be to the highest live branch, although the height it had reached will be of interest.
8. If your vision is obstructed to the tip or top most branches of the tree, either, take a different baseline or, estimate where the top is and record the height as estimated. An estimated figure is denoted by enclosing it in brackets i.e. (30m).

Remember:

- Height can fluctuate throughout a tree's life.
- A tree may be damaged physically by storms or reduced by tree surgery. It may then recover and continue to increase in height again. Any such damage if seen should be noted.
- Trees growing in positions where it is awkward to obtain level baselines or provide good visibility will always be difficult to measure accurately.

GLOSSARY OF TERMS

	Word	Meaning
1	Ring porous	A group of hardwoods in which the pores are comparatively large at the beginning of each annual growth ring and decrease in size, more or less abruptly, toward the outer portion of the annual growth ring. The large pores are springwood and the smaller pores are summerwood.
2	Diffuse porous	A hardwood species where pores are approximately the same size and are distributed evenly across each growth ring.
3	Bark	Protective external covering of the stems, roots, trunk and branches.
4	Cambium	Tissue which produces phloem and xylem cells.
5	Phloem cells	Cells that channel the food made by leaves around the tree.
6	Xylem cells	Cells which absorb water and nutrients up from the soil and take to the leaves.
7	Heartwood	The older, nonliving central wood of a tree, usually darker and harder than the younger sapwood. Also called *duramen*.
8	Sapwood	Newly formed, outer layer of wood between heartwood and bark containing the living elements of the wood.
9	Medullary Rays	Channels that connect the outer and inner layers of the trunk.



LOOKING AT WOOD

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