Tree rings: a climate record of the past (for pupils)

Introduction

Trees record climate change. Every year a tree produces a new layer of tissue which looks like a ring when the tree trunk is cut across. The number of rings tells you how old the tree is but can tell you much more than that: the width of each year's layer of tissue, or ring, reflects growing conditions such as temperature, water availability and sunlight. A wide ring indicates faster tree growth, enabled by good growing conditions, while a narrower ring indicates slower tree growth caused by poorer growing conditions. When a tree is cut, or a core is taken from the wood (spanning the whole radius of the tree from the very centre out to the bark) the rings can be read like a natural diary of climatic conditions in the past.

What you need

Sheet printed with three tree 'cores' (Figure 1)

Scissors

Ruler

Coloured pencil

Sticky tape

Sheet of graph paper

What to do

1. Cut out the three striped strips of paper (Figure 1). You can roll them lengthways to make cylindrical 'cores'. They represent cores taken from three different trees from the same woodland. B is from a living tree sampled at the end of 2002, C is from a fallen tree and A is from a tree used to build a log cabin. Note which end of the core has bark on – the youngest wood lies just under this. Calculate the growth-year of the tree rings indicated '?' in the core samples C and A in Figure 1. Each sample was taken from a tree of the same species that was found close by the others. So we can assume that they have grown under similar conditions. The last growth-year (2002) of sample B is known and is shown on the diagram.

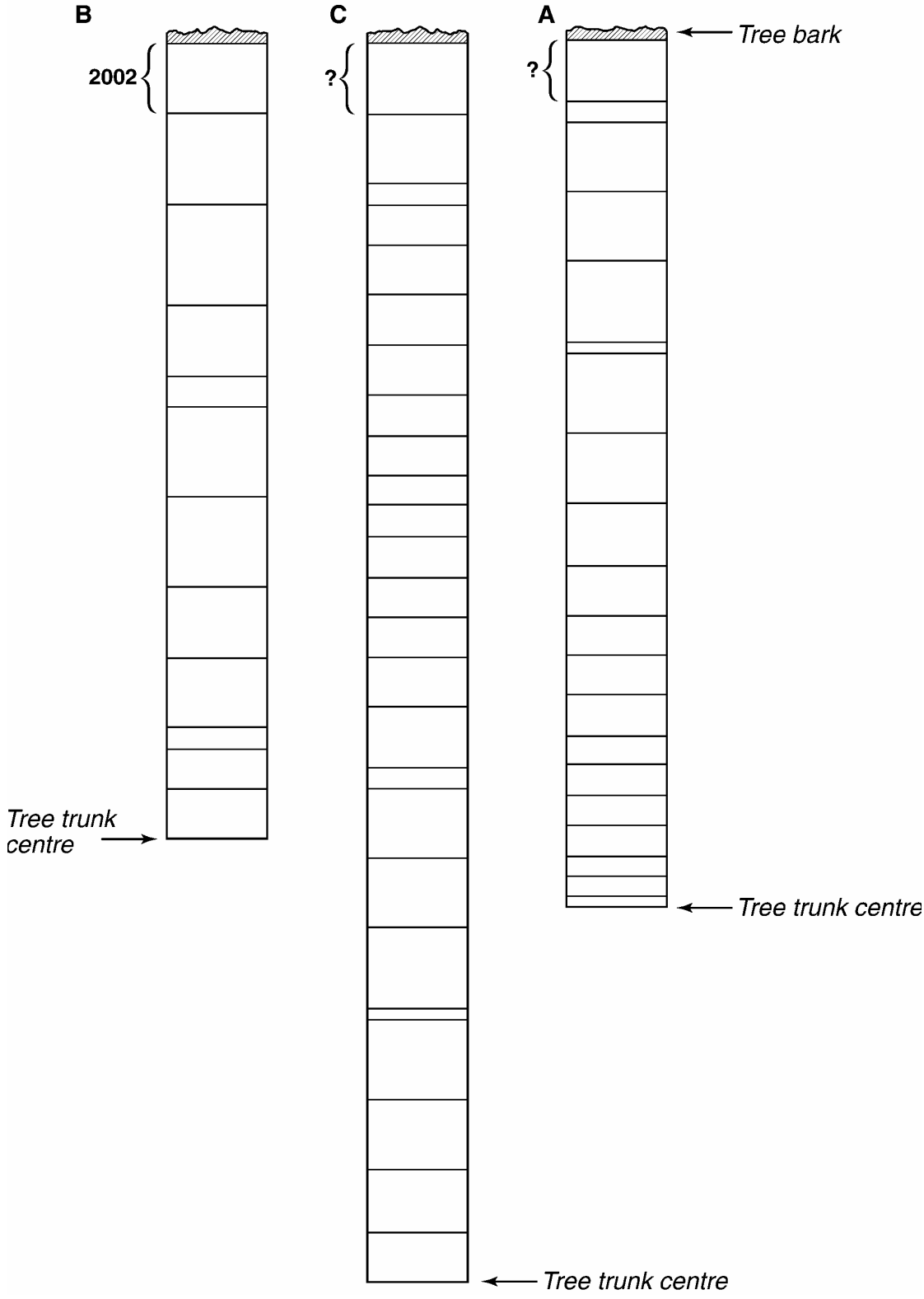

Figure 1 Simulated tree cores

2. Work out how old tree B was when the core was taken, and how old trees A and C were when they died. Record their ages in Table 1.

Tree	Age of tree
A	
B	
C	

Table 1 The ages of different trees

3. Use the ring patterns to match up the three samples. Tip: when two trees were alive at the same time in the same geographical area, they experienced the same growing conditions so should show the same pattern of tree rings. Once you have spotted the same patterns in two tree cores, line them up to make sure they are the same and lightly shade the overlapping section. Then match up the third one and shade the overlapping section of this one too. Tape the three cores together once you are sure they line up.
4. How much time do the lives of the three trees span altogether? Label the years on the paper strips as you count the rings.
5. Measure the width of all the tree rings and record them in Table 2 along with their year. Remember, only count the overlapping sections once.

Year	Tree ring width (mm)

Table 2 The widths of tree rings

6. Now plot a graph of the tree ring width data against time. Plot width on the y-axis and years on the x-axis. Put the year 2002 on the left of your graph, by the y-axis. Plot the points and then join them up.

Questions

Q 1. Compare the ring for the year you were born with the ring for 2002. How do they compare? Note down any similarities or differences. What might have caused these?

Q 2. What does your graph of tree-ring width against time represent?

Q 3. Give a brief and general description of how the climate (and growing conditions) might have changed during the period that your tree samples represent.

Q 4. How could we get climatic information further back in time than tree rings can provide?

Q 5.	If carbon dioxide levels are rising, and global warming continues, what difference would you expect to see in the tree rings between the modern ones and those laid down in 100 years time?