	Marks
• The ^{14}C specific activity of a tooth found in an archaeological dig is 0.34 Bq. The ^{14}C specific activity in living organisms is 15.3 Bq. How old is the tooth?	**4**

The ^{14}C age is given by:

$$^{14}\text{C age} = 8033 \ln\frac{A_0}{A_t}$$

Hence,

$$^{14}\text{C age} = 8033 \ln\left(\frac{15.3}{0.34}\right) = 31000 \text{ years}$$

Answer: **31000 years**

Give two reasons why the accuracy of radiocarbon dating is more uncertain for older objects.

The very low activities of very old objects means that errors in measurement are proportionally more significant.

Small amounts of contamination from modern organic material may have a larger proportional effect on the activity of older samples.

• Why are positron emitters the best type of radioisotope to use for tomography?	**2**

Positrons immediately annihilate when they collide with their antiparticles (electrons) and produce 2 gamma rays that propagate in opposite directions.

These are easily detected and, with the aid of computers, allow determination of the line along which the source must have been.

Statistical repetition allows a 3-dimensional image to be generated.