0 1

The average person in the UK receives an annual dose of roughly **2.7 mSv** from all sources of background radiation. The below table details the approximate dose which someone will someone will receive from a number of different activities.

Activity	Dose (mSv)
Eating a banana	0.0001
Having a dental X-ray	0.005
Flying from London to New York	0.08
Working in a nuclear power station for one year	0.18
Having a CT scan (full-body)	20
Spending six months in orbit on a space station	80

0 1 . 1

Calculate the number of bananas someone would have to eat in order to receive a radiation dose equivalent to their total annual background dose.

Answer = _____

[2 marks]

0 1 . 2

In hospitals, CT (Computed Tomography) scans involve the use of X-rays. Doctors will only ask for such scans to be performed when medically necessary. Explain why they are keen to avoid the use of such scans if possible.

_____

_____

[2 marks]

0 1 . 3

What effects can ionising radiation have on cells within the body?

_____

[2 marks]

0 1 . 4

Single doses of greater than one sievert (1 Sv) can lead to severe radiation sickness or death. How many times greater than the average annual UK background radiation dose is a dose of 1 Sv?

Answer = _____ times greater

[2 marks]

0 2

Carbon dating can be used to estimate the age of a fossil. This technique relies on the fact that a particular isotope of carbon called carbon-14 is radioactive.

0 2 . 1

Carbon-14 undergoes beta decay to form nitrogen-14. Complete the following nuclear equation for the beta decay of carbon-14.

$$^{14}_{6}\mathrm{C} \longrightarrow {}^{14}_{\square}\mathrm{N} + \square$$

[3 marks]

0 2 . 2

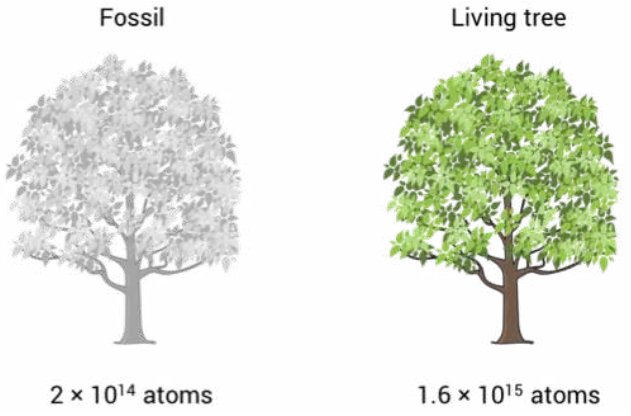
Outline the way in which carbon dating is used to estimate the age of a fossil.

[3 marks]

0 2 . 3

An archaeologist uncovers the fossil of a tree and wants to know its age.

The fossil is found to contain 2×10^{14} carbon-14 atoms. A living tree of the same size contains 1.6×10^{15} carbon-14 atoms.



Estimate the age of the fossil. The half-life of carbon-14 is 5700 years.

Age of fossil = _____ years

[3 marks]