

GCSE Physics B (Twenty First Century Science)
J259/04 Depth in physics (Higher Tier)

Question Set 20

1

A patient has been diagnosed with a very small cancerous growth on her neck.

A doctor gives the patient a leaflet with information on two possible treatments for her cancer: X-ray radiotherapy and brachytherapy. The information is shown in the table.

	Radiotherapy	Brachytherapy
How are the cancerous cells killed off?	An external beam of X-rays (or gamma rays) is used.	Beta-radiation from material placed in the body is used.
How long does the treatment take?	1 to 2 weeks	6 weeks
Are living cells damaged?	Yes	Yes

(a) The patient and her doctor decide to treat the cancer with **radiotherapy**.

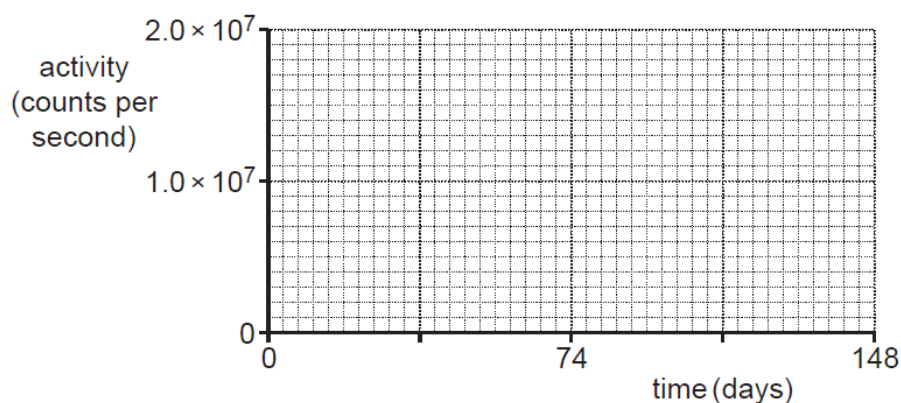
Why did they decide to treat the cancer with radiotherapy?
Use information from the table in your answer.

[2]

(b) Radioactive iridium-192 is used for the **brachytherapy** treatment.
The half-life of iridium-192 is 74 days.

The initial activity of the iridium source is 2.0×10^7 counts per second.

(i) Sketch a graph to show how the activity of the source changes with time.



[3]

(ii) The initial activity of another iridium-192 source is **different** from (b)(i).

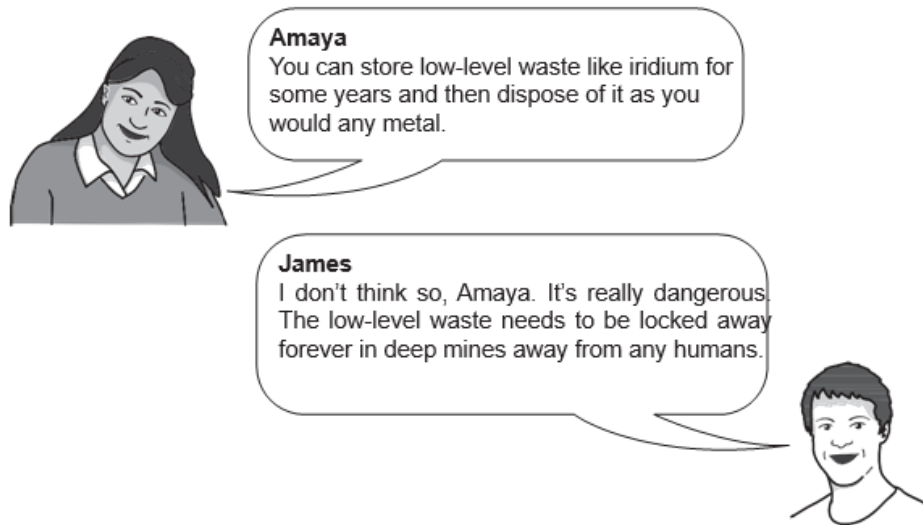
What fraction of the iridium nuclei are left in the new source after 3 half-lives?

Fraction = [3]

(c) Iridium-192 is a low-level waste product of fission reactions in a nuclear power station.

Low-level wastes, such as Iridium-192, have short half-lives.

Amaya and James are discussing what should happen with low-level wastes like iridium.



Who do you agree with? Justify your answer.

[2]

Total Marks for Question Set 20: 10

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