

MARK SCHEMES – Physics Unit 4 Homework

Q1 (a) horizontal line drawn from
92 000 Bq
allow 90 000–94 000

1

1600 years
allow 1500–1700

1

(b) only (119) years have passed

activity has not dropped by much

1

1

(c)

Level 3: Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	5-6
Level 2: Relevant points (reasons/causes) are identified, and there are attempts at logically linking. The resulting account is not fully clear.	3-4
Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1-2
No relevant content	0
<p>Indicative content</p> <p>properties</p> <ul style="list-style-type: none"> • alpha is the least penetrating • alpha is the most ionising • alpha has least range in air • beta is the second most penetrating • beta is the second most ionising • beta has the second longest range in air • gamma is the most penetrating • gamma is the least ionising • gamma has the greatest range in air <p>hazard (linked to correct property)</p> <ul style="list-style-type: none"> • short-range alpha most dangerous • mid-range beta most dangerous • long range gamma most dangerous 	

6

[10]

Q2 (a) atoms with the same number of protons
allow atoms of the same element 1

but with a different number of neutrons 1

(b) protons = 11 1

neutrons = 12 1

(c) electrons falling to a lower energy level 1

Q3 (a) any **one** from:
• heating
• electricity
• electromagnetic radiation 1

(b) electromagnetic radiation is emitted 1

in the (visible) region of the spectrum
allow as light 1

(c) $(3.0 \times 10^{-2} =) 0.03$ 1

 $(2.7 / 0.03 =) 90$
an answer of 90 scores 2 marks 1

(d) any **one** from:
• can't see X-rays
• not common experience
• experience of cancer / severity of consequence
• lack of understanding of probability
allow people are scared of X-rays / radiation 1

(e)

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No relevant content	0
Indicative content	

<p>uses</p> <ul style="list-style-type: none"> • used to diagnose problems • X-rays and CT scans • sterilising instruments • because it kills bacteria • radiotherapy • to treat <u>cancer</u> • used to kill cancer cells • medical tracers • gamma knives <p>harm</p> <ul style="list-style-type: none"> • can change / mutate DNA • causing cells to grow uncontrollably • causing tumours / cancer • from regular exposure causing increased dose • to eggs / sperm / embryos 	
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Q4 (a) 1×10^{-10} m

1

(b) (a helium atom) has 2 electrons
accept it has more mass
allow it is not charged

1