

Name of the Student: _____

Max. Marks : 21 Marks

Time : 21 Minutes

Mark Schemes

Q1.

(a) (i) protons 1

neutrons
answers may be in either order 1

(ii) 86 1

(iii) two fewer protons and two fewer neutrons
do not accept two fewer protons and neutrons
or 84 protons 134 neutrons
do not accept 218 protons and neutrons 1

(b) (i) 0.4
 $\frac{2}{5}$ / accept 40 % for 2 marks
allow 1 mark for correct totalling = 1.8
allow 1 mark for a clearly correct method with a clearly incorrect total 2

(ii) any **one** from:
• nuclear weapon testing
do not accept nuclear
• nuclear power (stations)
accept nuclear/ radioactive waste
• nuclear accidents
• medical
accept X-rays 1

(c) (i) 2
accept 2:1

accept twice as big
ignore units

1

- (ii) No with a reasonable reason explained

only going for two weeks so

or even staying for a year

total exposure well under lowest limit for causing cancer

1 mark is for a time frame

1 mark is for correctly relating to a dose

1

or Yes with a reasonable reason explained

all levels of radiation are (potentially) hazardous (1)

accept low doses could still cause cancer

accept all levels affect you

*do **not** accept radiation dose is high(er)*

*do **not** accept level of background radiation is higher in Germany*

harm caused by lower doses may not have been recorded (1)

or evidence may not be complete

or insufficient research into effect of small doses

1

[10]

Q2.

- (i) 50 ± 5

1

- (ii) 50 ± 5

accept their (b)(i)

1

- (iii) less

accept any way of indicating the correct answer

1

[3]

Q3.

- (a) (i) electromagnetic (wave / radiation)
accept em (wave / radiation)
ignore reference to frequency

1

- (ii) gamma can penetrate the crate / box / packaging
accept converse (but must relate to both alpha and beta)
ignore just gamma radiation kills bacteria
accept can get through to food

1

- (iii) neutrons 1
- (b) (i) absorb gamma / radiation
accept it stops / reduces the radiation 1
- (ii) any **one** from:
- slow down the conveyor belt
 - food does more than one circuit
 - stay on the conveyor belt longer
 - food closer to the source / radiation
ignore larger doses / use more of the source
ignore thinner packaging 1
- (c) (i) idea of testing food on humans / animals 1
- no (measured) ill effects **or** monitor their health
accept monitor people that have eaten the food
accept a measurement / comparison for 1 mark
eg measure the amount of radiation in treated food
comparison plus a reason for the comparison would get 2 marks
*eg idea of measuring level of radiation in treated food **with** no*
*measurable increase in level = 2 marks **or** comparing it to*
untreated food = 2 marks 1
- (ii) so can make own decision about eating or not eating treated food
accept may be against their religious / moral views
accept some people prefer food that hasn't been tampered with
ignore in case they don't like the idea of eating treated food
accept don't want to eat treated food
ignore might be allergic to the food
eg think it will give them cancer = 0 marks
think it will give you cancer so I need to know so that I can choose = 1
mark1 1

[8]