

# Nuclear Radiations and Isotopes 2 MS

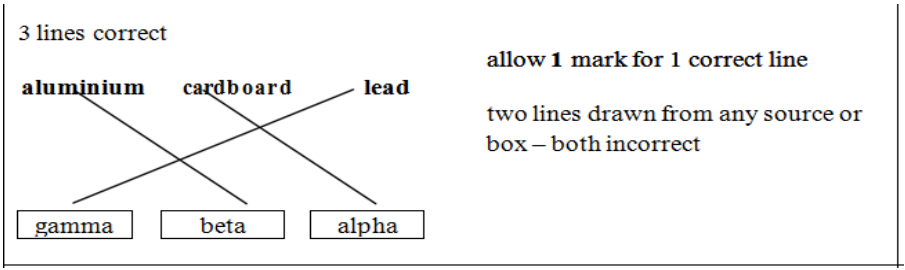
## QUESTION 1

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	<p>3 correct lines drawn</p>	<p>any box in list A with 2 or more lines, all lines for that box do not score</p>	3
b)	radiation damages our cells	<p>accept radiation can cause cancer            accept kills cells            accept changes DNA / causes mutations            accept dangerous / poisonous / harmful / toxic            accept so precautions can be taken</p>	1
c)	it can pass through the human body		1
d)i)	6 (hours)	no tolerance	1
d)ii)	6 (hours)		1
Total marks			7

## QUESTION 2

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	alpha		1
b)	damages them / changes DNA	<p>accept kills them / destroys            accept causes cancer            accept causes cell mutations            do not accept they ionise cells on its own</p>	1
Total marks			2

### QUESTION 3

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	P		1
a)ii)	Q		1
b)	 <p>3 lines correct</p> <p>aluminium    cardboard    lead</p> <p>gamma    beta    alpha</p>	<p>allow <b>1</b> mark for 1 correct line</p> <p>two lines drawn from any source or box – both incorrect</p>	2
Total marks			4

### QUESTION 4

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	C		1
b)	<p>Beta</p> <p>any two from:</p> <p>range in air for beta is (at least) 50 cm</p> <p>count-rate does not drop (much) in first 40 cm</p> <p>count-rate does not fall much until distance is 60 cm</p> <p>alphas cannot travel more than 5 cm in air / alphas could not travel 100 cm in air</p> <p>alphas would not be detected</p> <p>gammas not absorbed by 100 cm of air</p>	<p>Accept gamma</p> <p>if answer alpha can still gain marks</p> <p>for saying why not beta or gamma</p> <p>must have at least one quantitative statement to get <b>2</b> marks</p> <p>accept alphas cannot travel that far</p> <p>accept gammas not stopped by air</p> <p>accept gammas travel further than alphas and betas</p> <p>strength of source is neutral</p> <p>references to penetrating power is neutral</p>	<p>1</p> <p>2</p> <p>2</p>
c)i)	increases		1
c)ii)	<p>Group A think that (even a very small level of exposure) gives some risk</p> <p>Group B think that there is no risk</p>	<p>accept there is always a risk, no matter how small the level of exposure</p> <p>accept below a certain level of</p>	<p>1</p> <p>1</p>

	(from a very low level of exposure)	exposure there is no risk no marks for a simple graph description	
Total marks			7

### QUESTION 5

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	alpha (particle)		1
a)ii)	(unstable) nucleus	accept (unstable) nuclei do not accept middle do not accept helium nucleus	1
a)iii)	same number of protons	accept same number of electrons accept same atomic / proton number accept they both have 92 protons  same number of neutrons negates answer	1
Total marks			3

### QUESTION 6

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	<p>1 mark for each correct line</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>List A</b> Type of nuclear radiation</p> <div style="border: 1px solid black; padding: 2px; width: 60px; margin: 5px auto;">Alpha</div> <div style="border: 1px solid black; padding: 2px; width: 60px; margin: 5px auto;">Beta</div> <div style="border: 1px solid black; padding: 2px; width: 60px; margin: 5px auto;">Gamma</div> </div> <div style="text-align: center;"> <p><b>List B</b> Property of radiation</p> <div style="border: 1px solid black; padding: 2px; width: 150px; margin: 5px auto;">Has the same mass as an electron</div> <div style="border: 1px solid black; padding: 2px; width: 150px; margin: 5px auto;">Very strongly ionising</div> <div style="border: 1px solid black; padding: 2px; width: 150px; margin: 5px auto;">Passes through 10cm of aluminium</div> <div style="border: 1px solid black; padding: 2px; width: 150px; margin: 5px auto;">Deflected by a magnetic field but not deflected by an electric field</div> </div> </div> <p style="text-align: center; margin-top: 20px;">if more than 1 line is drawn from any box in List A, none of those lines gain any credit</p>		3
b)i)	(the detector) reading had gone down	'it' equals detector reading accept the reading in the table is	1

	more beta (particles / radiation) is being absorbed / stopped	the smallest accept 101 is (much) lower than other readings / a specific value eg 150 do not accept this answer if it indicates the readings are the thickness accept radiation for beta particles / radiation accept fewer particles being detected	1
b)ii)	six years		1
b)iii)	alpha would not penetrate the cardboard	accept the basic property- alpha (particles) cannot pass through paper / card accept alpha (particles) are less penetrating (than beta) range in air is neutral	
Total marks			7