Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Mark Schemes

Q1.

(i) any **one** from:

the ground
the air
radon (gas)
building materials
buildings
rocks / granite
food
cosmic rays or solar rays

*do **not** accept mobile phones*

X-rays
nuclear weapons testing
nuclear power stations / accidents

accept from outer space
*accept sun but **not** sunlight*
accept medical uses

1

(ii) 2

allow $\frac{1200}{60 \times 10}$ **or** $\frac{120}{600}$ **or** 120

2

[3]

Q2.

answers must be comparative
accept converse answers throughout

alpha: the count rate is (greatly) reduced
by the card **or** the card absorbs alphas but not betas

accept paper for the card

1

beta: the count rate is (greatly) reduced by the metal **or** the thin metal absorbs alphas and betas **or** the thin metal absorbs all of the radiation (from the source)

accept aluminium for the metal

1

gamma: would pass through the thin

accept aluminium for the metal

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metal but count rate is background **or** no radiation passing through **or** a higher reading would be recorded **or** to reduce the count to 2 would require <u>much more</u> than 3 mm of metal

accept lead / aluminium for the metal

1

[3]

Q3.

The answer to this question requires ideas in good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme.

*Maximum of **1** mark if ideas not well expressed*

any **two** from:

dust <u>and</u> gas **or** remnants of a super nova

accept hydrogen for dust and gas
*do **not** accept hydrogen burns*

pulled together by (force of) <u>gravity</u>

nuclear fusion starts

although candidates may include more detail these points are essential to score the credit

[2]

Q4.

(a) **Y** and **Z**

1

they have the same number of protons **or** same atomic number

*accept they have the same number of electrons **or** same number of protons **and** electrons*
allow only different in number of neutrons N.B. independent marks

1

(b) **Quality of written communication**

*for correct use of terms underlined in B **or** C*

Q ✓ *Q* ✗

1

A – alpha particle passes straight through the empty space of the atom
or it is a long way from the nucleus

*describes 3 tracks correctly for **2** marks*
*describes 2 or 1 track correctly for **1** mark*

B – alpha particle <u>deflected</u> / <u>repelled</u> / <u>repulsed</u> by the (positive) <u>nucleus</u>

C – alpha particle heading straight for the <u>nucleus</u> is <u>deflected</u> / <u>repelled</u> / <u>repulsed</u> backwards

*do **not** accept hits the nucleus*
*do **not** accept answers referring to refraction*
*do **not** accept answers in terms of reflected backwards unless qualified in terms of repulsion*

mention of difference in charge on nucleus negates that track

max 2

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[5]

Q5.

(i) any **one** from

cosmic rays

rocks

food

air

1

(ii) any **one** from

medical

nuclear power stations

nuclear weapons testing

food

***but** do **not** accept food in both (1) and (ii)*

1

[2]

Q6.

(a) X emits beta

accept β

1

Y emits alpha, beta, gamma

must have all three accept α, β, γ

1

(b) gamma

accept beta and gamma
any mention of alpha loses first mark

1

radiation can penetrate (the plastic)

1

kills bacteria **or** microbes **or** micro-organisms **or** viruses

***not** germs*

1

[5]

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