

Mark schemes

Q1.

C

 7.5 MeV **[1]****Q2.**

A

${}_{57}^{146}\text{La}$ has the greatest binding energy per nucleon of the three nuclides.

[1]**Q3.**

C

 $2.2 \times 10^{-10} \text{ kg}$ **[1]****Q4.**

D

$$r \left(\frac{y}{x} \right)^{\frac{1}{3}}$$

[1]**Q5.**

A

 $r < 10^{-14} \text{ m}$ **[1]****Q6.**

C

 β^- emission.**[1]****Q7.**

B

145

[1]

Q8.

A

0.23 billion years

[1]

Q9.

C

$4.0 \times 10^{-14} \text{ m}$

[1]

Q10.

D

gamma radiation from nuclides with a small decay constant.

[1]

Q11.

C

The number of alpha particles deflected backwards is greater than the number that pass straight through the foil.

[1]

Q12.

A

when a particular nucleus will decay.

[1]

Q13.

B

β^-

[1]

Q14.

C

16 MBq

[1]

Q15.

B

$$1.0 \times 10^8 \text{ W}$$

[1]

Q16.

D

$$6.1 \times 10^8$$

[1]

Q17.

C

[1]

Q18.

A

[1]

Q19.

C

[1]

Q20.

B

[1]

Q21.

C

[1]

Q22.

D

[1]

Q23.

C

[1]