

Mark schemes

Q1.

C

$$7.5 \text{ MeV}$$

[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]