**Fission and Fusion**

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

Fission splits a heavy nucleus into smaller nuclei. Fusion joins light nuclei into a heavier nucleus. Balance total mass number A and total atomic number Z.

**1** Which description represents fission?

(1) A heavy nucleus splits into smaller nuclei.

(2) Two light nuclei join into a larger nucleus.

(3) A neutral atom loses a valence electron.

(4) Two molecules form a hydrogen bond.

**2** Explain why two hydrogen nuclei joining to produce a helium nucleus is an example of fusion. [1]

Answer and work

**3** Which values represent a neutron in an A and Z balance?

(1) A = 0, Z = 1

(2) A = 1, Z = 0

(3) A = 1, Z = 1

(4) A = 4, Z = 2

**4** Explain why each side of a nuclear equation can have a different number of individual particles while its total A and Z still balance. [1]

Answer and work

**Sorting Nuclear Reaction Models**

Use the information below to answer the questions.

Use the following records. Each pair lists (A, Z), and a coefficient counts how many times that pair occurs.

| Model | Before | After |
|---|---|---|
| P | (235, 92) + (1, 0) | (141, 56) + (92, 36) + 3(1, 0) |
| Q | (2, 1) + (3, 1) | (4, 2) + (1, 0) |

**5** Which model shows fusion?

(1) P only

(2) Q only

(3) Both P and Q

(4) Neither model

**6** Check the A balance for P, including the emitted neutrons. [1]

Answer and work

**7** What is the total Z on the product side of Q?

(1) 0

(2) 1

(3) 2

(4) 4

**8** Use the particle identities in P to explain why it is fission. [1]

Answer and work