Tracking a Reagent Returned in Step Two

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A process model uses U and V to form an intermediate W. Each W contains two U units and one V unit. The second step converts each W into one Z unit containing both U units and returns the V unit unchanged. Returned V can be used again. The process has no losses or other changes.

$2\ U + V \rightarrow W$

$W \rightarrow Z + V$

Quantity at the start	**Count (model units)**
U	12
V	3

1 How many W units can form in the first pass before any V is returned?

(1) Three

(2) Six

(3) Nine

(4) Twelve

2 Find how many U units remain and how many V units are available after the first W units complete the second step. [1]

Answer and work

3 A student says the display can produce no more than three Z units from the starting amounts. Use the two reactions to determine the maximum number of Z units. [1]

Answer and work

A repeat starts with the same 12 U units but only two V units. It runs each pass to the limit and returns all available V before the next pass.

4 Find how many complete passes are needed to turn all the U into Z and how much V remains when finished. [1]

Answer and work