

Stellar Element Cycle

Trace how a massive star makes and returns elements.

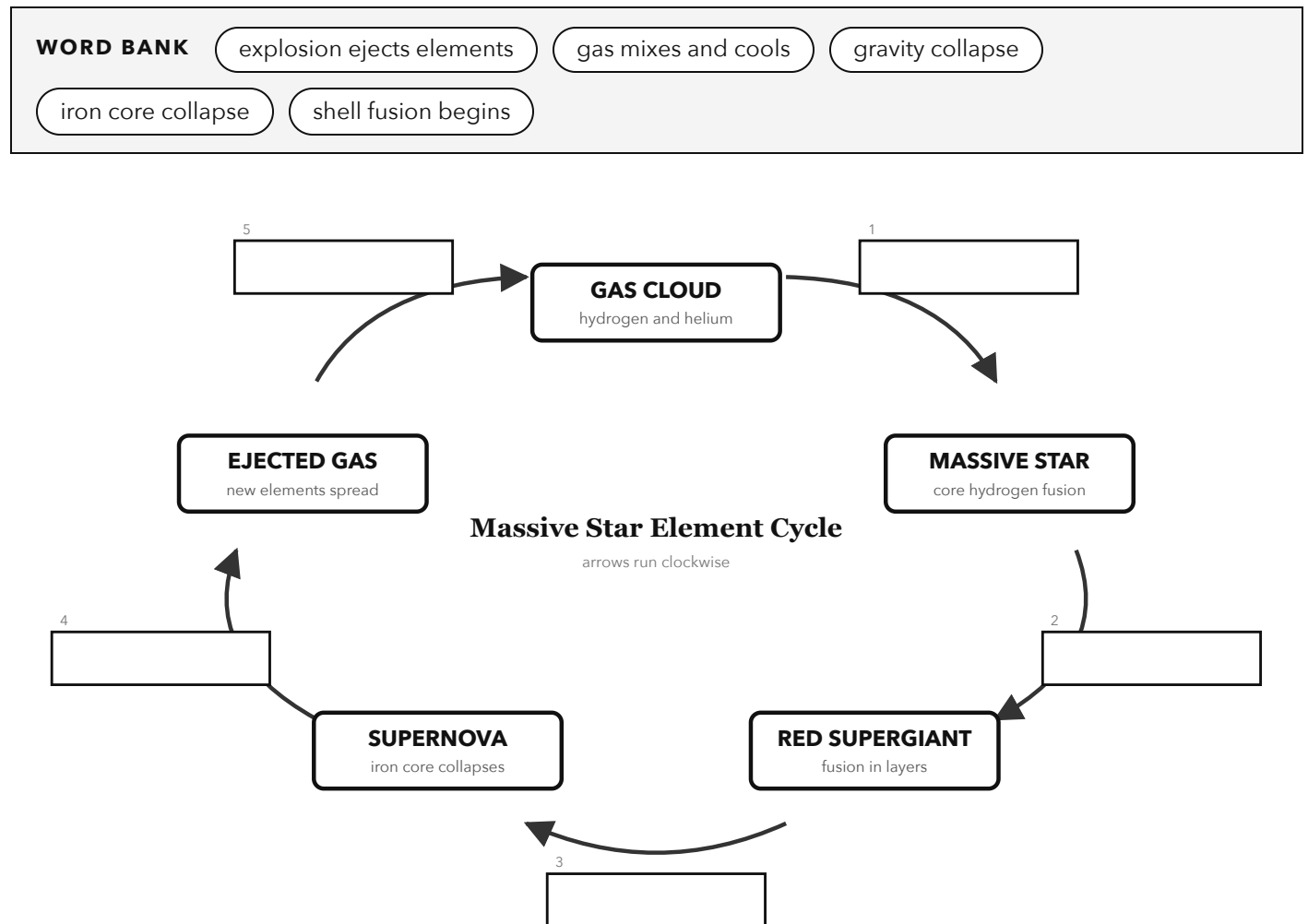
HS-ESS1-3 "Communicate scientific ideas about the way stars, over their life cycle, produce elements. Clarification Statement: Emphasis is on the way nucleosynthesis, and therefore the different elements created..."

NAME _____

DATE _____

1 LABEL THE MODEL _____ Word bank below

Write one process from the word bank in each numbered box. Follow each arrow from one stage to the next, including the arrow that returns to the gas cloud.



2 RUN THE MODEL Use your finished diagram

1 Which numbered process turns a red supergiant into a supernova?

2 At which stage does fusion in layers make elements heavier than helium?

3 How can a gas cloud in a later cycle contain elements made by an earlier star?

3 CHECK IT Before you turn it in

☐ I placed all five processes by following the arrows.

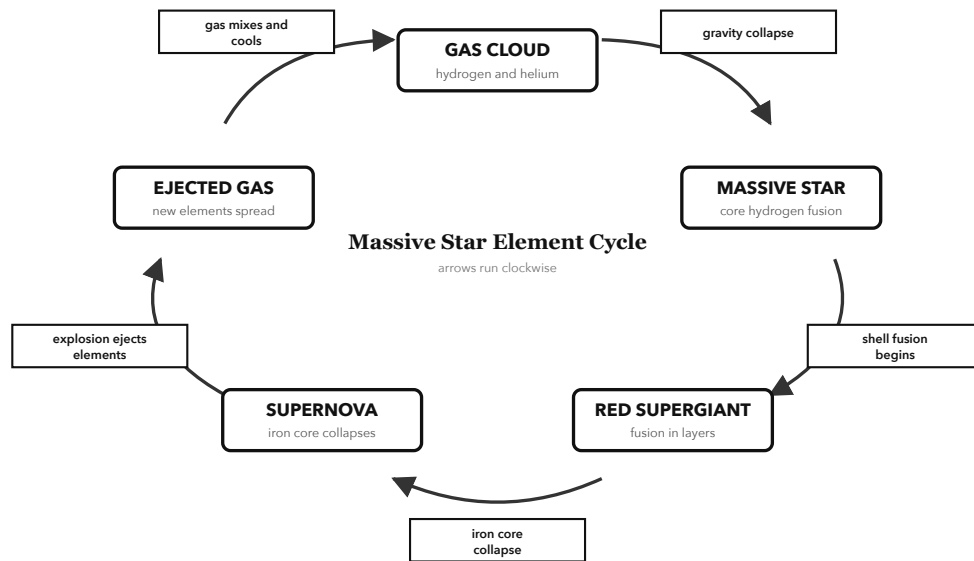
☐ I can identify where fusion makes heavier elements.

☐ I can explain how elements return to a gas cloud.

TEST THE MODEL

What important difference between low-mass and massive stars does this model leave out?

PART 1 • COMPLETED MODEL



PART 2 • RUN THE MODEL

1. **Process 3, iron core collapse.** (Which numbered process turns a red supergiant into a supernova?)
2. **RED SUPERGIANT.** (At which stage does fusion in layers make elements heavier than helium?)
3. **A supernova ejects elements into gas, and the gas mixes and cools into a new cloud.** (How can a gas cloud in a later cycle contain elements made by an earlier star?)

TEST THE MODEL (SAMPLE ANSWERS)

- Low-mass stars do not become red supergiants or explode as supernovas.
- Low-mass stars shed outer layers and leave white dwarfs instead of having core-collapse supernovas.

This cycle represents stars massive enough to form an iron core and undergo a core-collapse supernova. It simplifies the detailed fusion pathways and does not show the different life cycle of low-mass stars.