NOTE:
This document contains both the pre- and post-test and the pages are labeled accordingly.

Before giving the pre-test, please inform the students that you do not expect them to know all or even many of the answers, but that the pre-test is simply to gauge their previous knowledge of the subject.
Dying Stars and the Birth of the Elements
Pre-Test

Name ____________________ Major ____________________
Graduation Date ____________________

Circle the correct answer or fill in the blank.

1. Where did the iron in the Earth and in your blood come from?
   a) It was created in the Big Bang.
   b) It has always existed.
   c) It was created in supernova explosions.
   d) It is not known where it came from.

2. X-ray spectra from a supernova remnant (the gas expanding after a star explodes) can
   tell us
   a) the temperature of the gas.
   b) the elemental composition of the gas.
   c) the amount of absorbing material between us and the gas.
   d) none of the above
   e) all of the above

Figure 1: An X-ray spectrum of a supernova remnant
3. Figure 1 shows a spectrum of a supernova remnant. If the amount of silicon in the gas were to increase, the two bumps in the spectrum labeled “silicon” would
   a) be higher.
   b) be lower.
   c) remain unchanged.
   d) disappear.

4. Looking again at Figure 1, if you measured the x-ray spectrum of a different part of the supernova remnant, the intensities (heights) of the peaks shown in the figure would
   a) stay the same.
   b) all increase.
   c) all decrease.
   d) some peaks would increase and some would decrease
   e) all of the above are possible

5. Massive stars explode because they
   a) contain oxygen which is flammable.
   b) run out of fuel.
   c) collide with other stars.
   d) massive stars don’t explode

6. What happens to the iron in a supernova remnant?
   a) It all falls back onto the newly formed black hole.
   b) It combines to form a new star at the center of the remnant.
   c) It gets dispersed into the Galaxy and becomes part of newly forming stars and planets.
   d) It disappears.
Dying Stars and the Birth of the Elements
Post-Test

Name ______________________ Major ______________________
Graduation Date ______________________

Circle the correct answer or fill in the blank.

1. Where did the iron in the Earth and in your blood come from?
   a) It was created in the Big Bang.
   b) It has always existed.
   c) It was created in supernova explosions.
   d) It is not known where it came from.

2. X-ray spectra from a supernova remnant (the gas expanding after a star explodes) can tell us
   a) the temperature of the gas.
   b) the elemental composition of the gas.
   c) the amount of absorbing material between us and the gas.
   d) none of the above
   e) all of the above

Figure 1: An X-ray spectrum of a supernova remnant
3. Figure 1 shows a spectrum of a supernova remnant. If the amount of silicon in the gas were to increase, the two bumps in the spectrum labeled “silicon” would
   a) be higher.
   b) be lower.
   c) remain unchanged.
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4. Looking again at Figure 1, if you measured the x-ray spectrum of a different part of the supernova remnant, the intensities (heights) of the peaks shown in the figure would
   a) stay the same.
   b) all increase.
   c) all decrease.
   d) some peaks would increase and some would decrease.
   e) all of the above are possible.

5. Massive stars explode because they
   a) contain oxygen which is flammable.
   b) run out of fuel.
   c) they collide with other stars.
   d) massive stars don’t explode.

6. What happens to the iron in a supernova remnant?
   a) it all falls back onto the newly formed black hole.
   b) it combines to form a new star at the center of the remnant.
   c) it gets dispersed into the Galaxy and becomes part of newly forming stars and planets.
   d) it disappears.