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Exercise 21

Nevelson says, "I have always wanted to show the world that art is everywhere, except that it has to pass through a creative mind." Using mostly discarded wooden objects like packing crates, broken pieces of furniture, and abandoned architectural ornaments, all of which she has hoarded for years, she assembles architectural constructions of great beauty and power. Creating very freely with no sketches, she glues and nails objects together, paints them black, or more rarely white or gold, and places them in boxes. These assemblages, walls, even entire environments create a mysterious, almost awe-inspiring atmosphere. Although she has denied any symbolic or religious intent in her works, their three-dimensional grandeur and even their titles, such as *Sky Cathedral* and *Night Cathedral*, suggest such connotations. (124 words)

1. Which of the following is one way in which Nevelson's art illustrates her theory as it is expressed in the first sentence?

(A) She sculpts in wood rather than in metal or stone.

(B) She paints her sculptures and frames them in boxes.

(C) She makes no preliminary sketches but rather allows the sculpture to develop as she works.

(D) She puts together pieces of ordinary objects once used for different purposes to make her sculptures.

(E) She does not deliberately attempt to convey symbolic or religious meanings through her sculpture.

Until recently astronomers have been puzzled by the fate of red giant and supergiant stars. When the core of a giant star whose mass surpasses 1.4 times the present mass of our Sun ($M_\odot$) exhausts its nuclear fuel, it is unable to support its own weight and collapses into a tiny neutron star. The gravitational energy released during this implosion of the core blows off the remainder of the star in a gigantic explosion, or a supernova.

Since around 50 percent of all stars are believed to begin their lives with masses greater than $1.4M_\odot$, we might expect that one out of every two stars would die as a supernova. But in fact, only one star in thirty dies such a violent death. The rest expire much more peacefully as planetary nebulas. Apparently most massive stars manage to lose sufficient material that their masses drop below the critical value of 1.4 $M_\odot$ before they exhaust their nuclear fuel. Evidence supporting this view comes from observations of IRC+10216, a pulsating giant star located 700 light-years away from Earth. A huge rate of mass loss (1 $M_\odot$ every 10,000 years) has been deduced from infrared observations of ammonia ($NH_{3)}$ molecules located in the circumstellar cloud around IRC+10216.

Recent microwave observations of carbon monoxide (CO) molecules indicate a similar rate of mass loss and demonstrate that the escaping material extends outward from the star for a distance of at least one light-year. Because we know the size of the cloud around IRC+10216 and can use our observations of either NH_3 or CO to measure the outflow velocity, we can calculate an age for the circumstellar cloud. IRC+10216 has apparently expelled, in the form of molecules and dust grains, a mass equal to that of our entire Sun within the past ten thousand years. This implies that some stars can shed huge amounts of matter very quickly and thus may never expire as supernovas. Theoretical models as well as statistics on supernovas and planetary nebulas suggest that stars that begin their lives with masses around 6 $M_\odot$ shed sufficient material to drop below the critical value of $1.4M_\odot$. IRC+10216, for example, should do this in a mere 50,000 years from its birth, only an instant in the life of a star.

But what place does IRC+10216 have in stellar evolution? Astronomers suggest that stars like IRC+10216 are actually "protoplanetary nebulas" –old giant stars whose dense cores have almost but not quite rid themselves of the fluffy envelopes of gas around them. Once the star has lost the entire envelope, its exposed core becomes the central star of the planetary nebula and heats and ionizes the last vestiges of the envelope as it flows away into space. This configuration is a full-fledged planetary nebula, long familiar to optical astronomers.

2. The primary purpose of the passage is to
   (A) offer a method of calculating the age of circum-stellar clouds
   (B) describe the conditions that result in a star's expiring as a supernova
   (C) discuss new evidence concerning the composition of planetary nebulas
   (D) explain why fewer stars than predicted expire as supernovas
   (E) survey conflicting theories concerning the composition of circumstellar clouds

3. The view mentioned in the middle of the second paragraph serves to
   (A) reconcile seemingly contradictory facts
   (B) undermine a previously held theory
   (C) take into account data previously held to be insignificant
   (D) resolve a controversy
   (E) question new methods of gathering data

4. It can be inferred from the passage that the author assumes which of the following in the discussion of the rate at which IRC+10216 loses mass?

(A) The circumstellar cloud surrounding IRC+10216 consists only of CO and NH_3 molecules.

(B) The circumstellar cloud surrounding IRC+10216 consists of material expelled from that star.

(C) The age of a star is equal to that of its circumstellar cloud.

(D) The rate at which IRC+10216 loses mass varies significantly from year to year.

(E) Stars with a mass greater than 6 $M_\odot$ lose mass at a rate faster than stars with a mass less than 6 $M_\odot$ do.

5. According to information provided by the passage, which of the following stars would astronomers most likely describe as a planetary nebula?

(A) A star that began its life with a mass of 5.5 $M_\odot$, has exhausted its nuclear fuel, and has a core that is visible to astronomers

(B) A star that began its life with a mass of 6 $M_\odot$, lost mass at a rate of 1 $M_\odot$ per 10,000 years, and exhausted its nuclear fuel in 40,000 years

(C) A star that has exhausted its nuclear fuel, has a mass of 1.2 $M_\odot$, and is surrounded by a circumstellar cloud that obscures its core from view

(D) A star that began its life with a mass greater than 6 $M_\odot$, has just recently exhausted its nuclear fuel, and is in the process of releasing massive amounts of gravitational energy

(E) A star that began its life with a mass of 5.5 $M_\odot$, has yet to exhaust its nuclear fuel, and exhibits a rate of mass loss similar to that of IRC+10216

"Popular art" has a number of meanings, impossible to define with any precision, which range from folklore to junk. The poles are clear enough, but the middle tends to blur. The Hollywood Western of the 1930's, for example, has elements of folklore, but is closer to junk than to high art or folk art. There can be great trash, just as there is bad high art. The musicals of George Gershwin are great popular art, never aspiring to high art. Schubert and Brahms, however, used elements of popular music—folk themes—in works clearly intended as high art. The case of Verdi is a different one: he took a popular genre—bourgeois melodrama set to music (an accurate definition of nineteenth-century opera)—and, without altering its fundamental nature, transmuted it into high art. (133 words)

6. The author refers to Schubert and Brahms in order to suggest
(A) that their achievements are no less substantial than those of Verdi
(B) that their works are examples of great trash
(C) the extent to which Schubert and Brahms influenced the later compositions of Verdi
(D) a contrast between the conventions of nineteenth-century opera and those of other musical forms
(E) that popular music could be employed in compositions intended as high art

7. On turning 65 years old, everyone living in the town of Malton becomes eligible to receive a card that guarantees discounts on most goods and services sold in the town. Census records for 1990 show that 2, 450 inhabitants of Malton turned 64 in that year. Yet . in 1991 over 3,000 people applied for and properly received discount cards. So clearly some of Malton's population growth between 1990 and 1992 must be attributable to migration into the city by people in their mid -60's

Which of the following is an assumption on which the argument depends?

(A) The town of Malton has no complete census records for 1991.
(B) The overall size of the population of Malton grew by over 500 during 1990.
(C) Fewer people applied for and received discount cards in 1991 than did so in 1992.
(D) Among the people 65 years old or older who moved into Malton in 1991. there was no one who did not apply for a discount card .
(E) In general. people who applied for and received discount cards in 1991 first became eligible to do so in that year

One of the questions of interest in the study of the evolution of spiders is whether the weaving of orb webs evolved only once or several times. About half the 35,000 known kinds of spiders make webs; a third of the web weavers make orb webs. Since most orb weavers belong either to the Araneidae or the Uloboridae families, the origin of the orb web can be determined only by ascertaining whether the families are related.

Recent taxonomic analysis of individuals from both families indicates that the families evolved from different ancestors, thereby contradicting Wiehle's theory. This theory postulates that the families must be related, based on the assumption that complex behavior, such as web building, could evolve only once. According to Kullman, web structure is the only characteristic that suggests a relationship between families. The families differ in appearance, structure of body hair, and arrangement of eyes. Only Uloborids lack venom glands. Further identification and study of characteristic features will undoubtedly answer the question of the evolution of the orb web. (172 words)

8. The primary purpose of the passage is to
   (A) settle the question of whether orb webs evolved once or more than once
   (B) describe scientific speculation concerning an issue related to the evolution of orb webs
   (C) analyze the differences between the characteristic features of spiders in the Araneidae and Uloboridae families
   (D) question the methods used by earlier investigators of the habits of spiders
   (E) demonstrate that Araneidae spiders are not related to Uloboridae spiders

For the following question, consider each of the choices separately and select all that apply

9. According to the passage, members of the Araneidae family can be distinguished from members of the Uloboridae family by all of the following

   A the presence of venom glands
   B the structure of their body hair
   C the arrangement of their eyes

10. Which of the following statements, if true, most weakens Wiehle's theory that complex behavior could evolve only once?
   (A) Horses, introduced to the New World by the Spaniards, thrived under diverse climatic conditions.
   (B) Plants of the Palmaceae family, descendants of a common ancestor, evolved unique seed forms even though the plants occupy similar habitats throughout the world.
   (C) All mammals are descended from a small, rodentlike animal whose physical characteristics in some form are found in all its descendants.
   (D) Plants in the Cactaceae and Euphorbiaceae families, although they often look alike and have developed similar mechanisms to meet the rigors of the desert, evolved independently.
   (E) The Cuban anole, which was recently introduced in the Florida wilds, is quickly replacing the native Florida chameleon because the anole has no competitors.


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