**Extinction of the Mammoths**

Ancient relatives of modern-day African and Asian elephants, mammoths reigned as giants on land for more than three million years. Most mammoths lived during the Pleistocene epoch – a span of time approximately 1.8 million to ten thousand years ago, when long periods of intense cold were occasionally interrupted by shorter cycles of warmer weather. By the time the Pleistocene ended, about eleven thousand years ago, the mammoths had nearly vanished. Some scientists blame a natural climatic event for the extinction of these Ice-Age giants. “Overchill” is a popular term to describe this theory.

The climate model of extinction suggests that about thirteen thousand years ago, worldwide temperatures increased by as much as 11 degrees Fahrenheit (6 degrees Celsius) within just a decade or two, and moisture and temperature extremes between summer and winter became more pronounced. While summers became much hotter and drier, winters may have been colder and wetter. The change in climate meant a shorter growing season for plants.

To endure, plant species became limited to those habitats where they grew best. As a result, the kinds and diversity of plants in many parts of the world changed drastically. To illustrate this point, let’s say that during the ice ages, mammoths and other large herbivores feasted on a diet of plants A, B, and C. When the climate changed in the Late Pleistocene, plant A shifted northward to land where it could grow better. Meanwhile, plant B shifted westward, and Plant C shifted southward. The ABC combination of plants was no longer available.

As plants became isolated and restricted to certain areas, so did herbivore populations. This could have had tragic consequences for mammoths and other large mammals. Segregated populations reduce crossbreeding between different populations and increase inbreeding. As a result, defective genes could have spread quickly through the animal populations, leading to eventual extinction. Even without inbreeding, the squeezing of mammoth habitat into smaller areas could have pushed the animals to extinction.

It is also possible that the ABC combination of plants provided a necessary mix of nutrients that the mammoths needed to survive. If mammoths moved to a place rich in plant A, they would not get the nutrients that only Plants B and C contained. The result would have been dietary stress, which could have led to the animals’ demise.

The climate model for extinction works especially well for the woolly mammoths in Eurasia. In Siberia, for example, the woolly mammoth was adapted to the arctic steppes – cold, dry grasslands. ■ As temperatures warmed at the end of the Pleistocene, permafrost started melting. ■ The arctic steppes gave way to mossy bogs with only small “islands” of grassland. ■ As the climate became warmer and wetter, forests advanced, further reducing the woolly mammoth’s grassland habitat. Eventually, the steppes were replaced by boggy tundra in the north and coniferous forests in the south. ■ The tundra’s slow-growing, water-soaked clumps of mosses, sedges, and shrubs contained few nutrients. While reindeer and musk oxen could live on the tundra vegetation, woolly mammoths may have had a hard time surviving on such a diet.

The climate model does not hold up as well in other parts of the world. For example, in North America, the warmer, wetter climate encouraged grasslands to expand. Although these expanding grasslands may not have had the same mix of grasses that existed earlier, Columbian mammoths in North America shouldn’t have suffered much. They could easily migrate 100 miles (160 kilometers) or more in a matter of days. The animals could have spent time grazing on one kind of grass and then traveled to the next valley or hillside to munch on other vegetation.

There’s another problem with the climate model of extinction. The Late Pleistocene interglacial was not the first warming period endured by mammoths and other now-extinct animals. Warming periods had occurred many times during the previous 1.7 million years. The Pleistocene was marked by at least twenty-two major climatic cycles and thousands of smaller ones, but there is no evidence of any other mass extinctions during that epoch.

1. The word “occasionally” in the passage is closest in meaning to

A) surprisingly

B) apparently

C) suddenly

D) sometimes

2. According to paragraph 1, all of the following are true of mammoths EXCEPT:

A) They are related to modern elephants.

B) They lived during a period of mostly cold weather.

C) They were nearly extinct by the end of the Pleistocene.

D) They began decreasing in numbers about 1.8 million years ago.

3. In paragraph 2, all of the following are mentioned in the climate model of extinction EXCEPT

A) shorter summers and longer winters

B) an overall increase in global temperatures

C) less rain in the summer and more rain and snow in the winter

D) a decrease in winter temperatures and an increase in summer temperatures

4. The word “drastically” in the passage is closest in meaning to

A) extremely

B) gradually

C) unexpectedly

D) uncontrollably

5. It can be inferred from paragraph 3 that, during most of the Pleistocene, plants A, B, and C

A) were in too short supply to feed both mammoths and other herbivores

B) were each limited to the habitats where they grew best

C) would all have been available in the same location

D) slowly shifted their locations over time

6. The word “Segregated” in the passage is closest in meaning to

A) Related

B) Separated

C) Stressed

D) Reduced

7. According to paragraph 4, why might the restriction of plant and animal species to smaller areas have resulted in extinction for mammoths?

A) Mammoths would have had to compete with other large animals for limited plant resources.

B) Crossbreeding would have occurred between mammoth populations with dissimilar genes.

C) Plant species would have acquired defective genes, making them less nutritious for mammoths.

D) More mammoth inbreeding would have occurred, resulting in the spread of defective genes.

8. According to paragraph 6, woolly mammoths in Siberia may have eventually died out because

A) animals attracted to warmer temperatures competed for limited resources

B) grasslands became colder and drier, while forests became hotter and wetter

C) the forests where they lived became water-soaked when temperatures rose

D) their preferred habitats were replaced by either tundras or forests

9. In paragraph 6, what is the author’s purpose in discussing climate changes in Siberia during the end of the Pleistocene?

A) To illustrate how dramatically climates changed throughout the world at the end of the Pleistocene

B) To give an example of a place where the climate model provides a good explanation for extinction patterns

C) To compare the effects of climate change among woolly mammoths, reindeer and oxen

D) To introduce a new climate change model that better explains extinction patterns in Eurasia

10. What can be inferred from paragraph 6 about reindeer and musk oxen?

A) Their diet did not change as a result of late Pleistocene warming.

B) They preferred the tundra over other types of habitats.

C) They died out in large numbers at the end of the Pleistocene.

D) The Pleistocene warming did not affect their ability to get adequate nutrients.

11. According to paragraph 7, why doesn’t the climate model hold up as well in North America as it does in other places?

A) North American mammoths would have had easy access to grasses.

B) The climate in North America remained the same throughout the Pleistocene.

C) North American mammoths were capable of migrating longer distances than mammoths in other places.

D) The mix of grasses changed in North America as a result of Pleistocene warming.

12. What is the author’s purpose in mentioning the “twenty-two major climatic cycles and thousands of smaller ones” that occurred during the Pleistocene?

A) To argue against the evidence supporting the climate model of extinction

B) To suggest that Late Pleistocene warming was more severe than earlier periods of warming

C) To illustrate how much our knowledge of Pleistocene climate change has advanced in recent years

D) To argue that other mass extinctions must have occurred throughout the Pleistocene

13. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

**These isolated grassland areas could not survive the changing climate conditions.**

Where would the sentence best fit?

14. Prose Summary

**Climate events may have caused the extinction of mammoths at the end of the Pleistocene.**

**Answer Choices:**

A) As temperatures warmed, the variety of plant species available in any one location was limited and this limited herbivores to certain areas, worsening their diet and increasing inbreeding.

B) An alternative to the climate model of extinction suggests that too much crossbreeding between mammoths and other species may have been responsible for mass extinctions.

C) Because the climate of North America did not change significantly during the Pleistocene, mammoths in North America did not become extinct.

D) Reindeer, oxen, and other large mammals did not become extinct, suggesting that factors other than climate may have caused the extinction of mammoths at the end of the Pleistocene.

E) Climate change provides a good explanation for the extinction of mammoths in some parts of the world, such as Eurasia, but not necessarily in other parts of the world.

F) The climate model does not explain why mass extinctions occurred only at the end of the Pleistocene and not during earlier periods of warming.

**參考答案**

1. D 2. D 3. A 4. A 5. C 6. B 7. D 8. D 9. B 10. D

11. A 12. A 13. C 14. A,E,F

**Electric Lighting and the American Home**

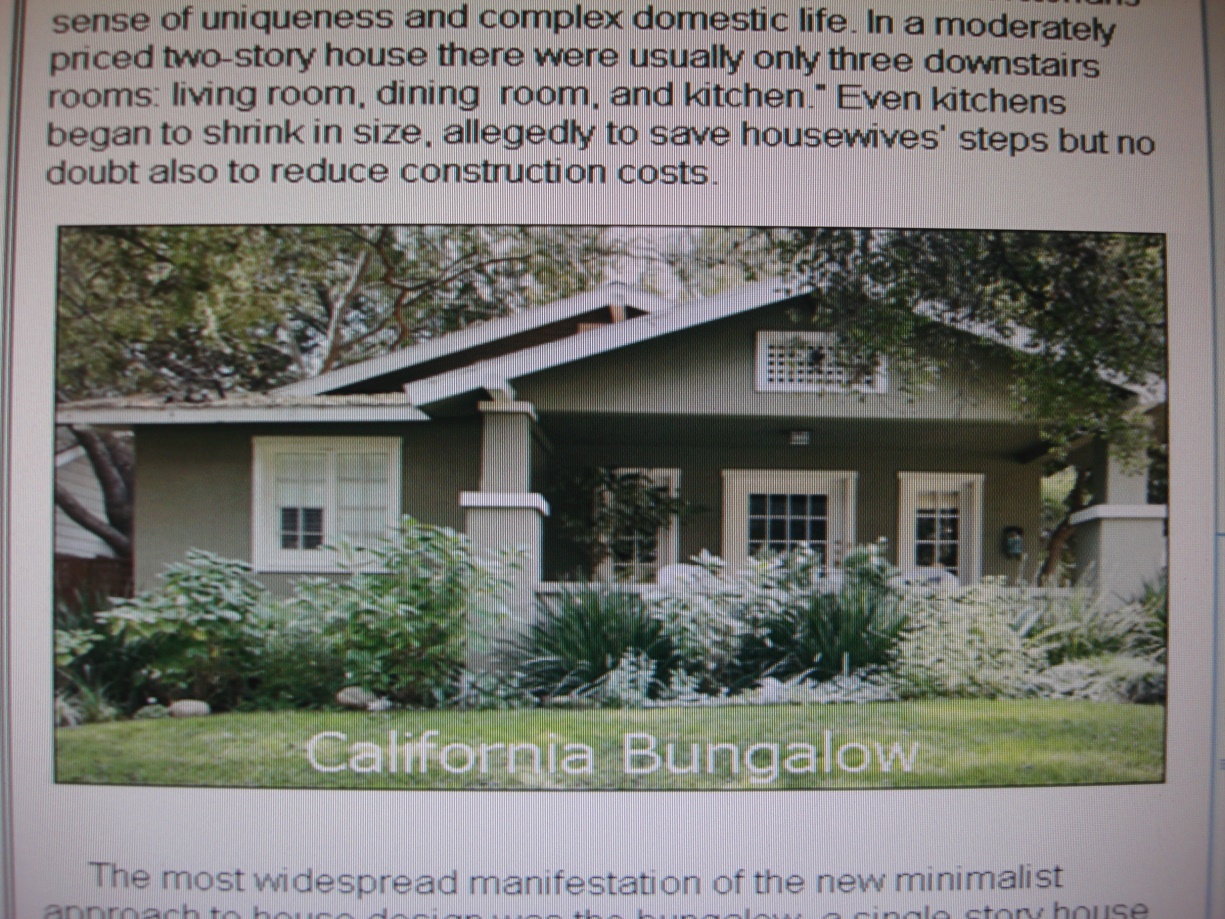
The introduction of home lighting substantially altered domestic life in the United States. ■ Industry and street railway use of electricity peaked during the day, encouraging power suppliers to seek off-hours customers. ■ Meanwhile the spread of transmission lines for industrial and transportation purposes made residential connections less expensive. ■ After 1910 falling prices helped home electrification to spread rapidly beyond the small proportion of homes, mainly residences of the urban wealthy class, which had enjoyed it for some time. ■

American home design was transformed as architects and builders came to appreciate the possibilities of electricity. Late nineteenth-century gas-equipped Victorian homes tended to be dark and divided into many rooms. Gas burned oxygen, produced odors and soot (black dust), and required gas jets that could ignite fires or, if snuffed out, release poisonous fumes and cause explosions. Gas-fueled houses were most functional, appealing, and safe if individual rooms could be shut off for airing out and minimizing drafts (air currents in an enclosed area). Interiors decorated in deep reds, blues, greens, and browns were preferred for their capacity to conceal soot.

**Victorian**: The elaborate style of architecture popular in Britain and the United States during the reign of Queen Victoria (1837 to 1901)

Around the turn of the century a few architects, the best known of whom today is Frank Lloyd Wright, began to recognize the superior properties of electricity and take advantage of its adaptability and relative safety. They started designing houses with open interior plans in which living rooms, dining rooms, and kitchens flowed together. The only isolated and private spaces in these designs were bedrooms and bathrooms, the latter newly developed as piped water and sanitary-waste disposal sewers made practical and appealing the consolidation in one room of sinks, toilets, and bathtubs previously placed in different locations inside and outside the house. Houses illuminated by electricity could have more numerous and flexible light sources, thus more freedom in furniture arrangement. Also, since electric lights did not product soot, electrified homes could also have lighter-colored carpets, walls, and ceilings, making their interiors much brighter than before.

Electric wiring, together with indoor plumbing, added substantially to the cost of house construction. To keep housing prices stable while adding these new technologies, builders proved eager to cut costs elsewhere by reducing the size and number of rooms. Early twentieth-century house plans began to eliminate formal front parlors (rooms set aside for entertaining guests), merging them with the family sitting room to create a single living room, often opening directly onto a dining room. Large entrance halls were reduced in size or even eliminated. As Gwendolyn Wright pointed out in *Building the Dream*, “By 1910 it was rare to have single-purpose rooms such as libraries, pantries, sewing rooms, and spare bedrooms, which had comprised the Victorians’ sense of uniqueness and complex domestic life. In a moderately priced two-story house there were usually only three downstairs rooms: living rooms, dining room, and kitchen.” Even kitchens began to shrink in size, allegedly to save housewives’ steps but no doubt also to reduce construction costs.



The most widespread manifestation of the new minimalist approach to house design was the bungalow, a single-story house which first appeared in California at the start of the twentieth century and spread rapidly eastward. Small, simple, informal, efficient, and intended to be sparsely furnished, the bungalow was quickly proclaimed to be a new standard of sensible and thrifty family living. Between 1910 and 1920 nearly 7.5 million new urban dwellings were added to a turn-of-the-century total of 10 million. In the 1920s another 5.7 million were occupied. Thus by 1930 a majority of urban homes had been built within the past thirty years. During that period changes in house design had the result of reducing the amount of privacy within homes and drawing residents into an increasingly electrified common realm.

One of the less apparent but most profound consequences of domestic electric lighting was the encouragement of reading at home. Increased reading broadened knowledge, stirred new interest, and created a more sophisticated society, especially away from centers of culture, which in turn increased demand for electricity. Persons who had trouble reading by dim fire- or candlelight, and especially young children who could not be left alone to regulate gaslights, could easily and safely read by electric light. Partly for this reason, the Muncie, Indiana, public library loaned out eight times as many books per inhabitant in 1925 as it had in 1890.

1. Paragraph 1 supports which of the following about electrical power before 1910?

A) The peak production time for electrical energy was at night.

B) Customers feared the changes that electricity would create in their domestic lives.

C) The primary uses of electrical power were for industry and transportation.

D) Increased demand for residential power was just starting to drive up prices.

2. The word “properties” in the passage is closest in meaning to

A) contributions

B) characteristics

C) possibilities

D) advantages

3. According to paragraph 2, which of the following was a practice used in gas-fueled houses?

A) Keeping windows closed to prevent drafts from blowing out lights

B) Ensuring that air circulated freely throughout the house

C) Using colors that made soot less visible

D) Making larger rooms with exposure to light in order to reduce the need for gas

4. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

A) Only after the development of piped water and sanitary-waste disposal systems were new locations for bedrooms and bathrooms appealing.

B) The invention of piped water and sewers made possible bathrooms that included sinks, tubs, and toilets, and, along with bedrooms, these rooms became the only private spaces in homes.

C) There were few isolated and private spaces in these designs, but they did have the advantage of piped water and sanitary-waste disposal systems.

D) The new designs made it practical and appealing to increase private spaces in different locations both inside and outside the house.

5. According to paragraph 3, which of the following is NOT one of the advantages electrified homes had over gas-lit homes?

A) A greater number of rooms for separate purposes

B) More sources of light

C) More flexibility in how furniture could be arranged

D) Brighter interiors

6. The word “substantially” in the passage is closest in meaning to

A) frequently

B) predictably

C) somewhat

D) significantly

7. The word “allegedly” in the passage is closest in meaning to

A) supposedly

B) primarily

C) conveniently

D) probably

8. According to paragraph 4, in the early twentieth-century which of the following changes in home design began to take place?

A) An increased number of libraries, pantries, sewing rooms, and spare bedrooms

B) The presence of a single living room designed for both family use and entertaining guests

C) The enlargement of the kitchen

D) The inclusion of a large entrance hall

9. According to paragraph 5, all of the following are true of the bungalow EXCEPT

A) It was small and informal.

B) All the rooms were on the same floor.

C) The first homes of this type were built in California.

D) Its design changed as it spread eastward from California.

10. In paragraph 5, the author provides the information that 5.7 million homes were occupied in the 1920s in order to

A) offer evidence that more homes were built between 1900 and 1920 than in the period before or after

B) help illustrate the dramatic rise in the number of homes constructed in a thirty-year period

C) explain why Americans in the 1930s had become concerned about a lack of privacy

D) identify the specific decade in which it became common for homes to become electrified

11. The word “apparent” in the passage is closest in meaning to

A) known

B) immediate

C) obvious

D) mentioned

12. The author includes the information on that “the Muncie, Indiana, public library loaned out eight times as many books per inhabitant in 1925 as it had in 1890” in order to

A) provide evidence that Muncie, Indiana, was a rising center of culture

B) show that electric lighting had a great impact on public institutions as well as on private homes

C) argue that the expansion of public libraries more than anything else was the likely reason children began reading more

D) provide evidence for the claim that electric lighting contributed to increased reading at home

13. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

**In fact, a couple of decades later around ninety percent of houses in cities and big towns had electricity.**

Where would the sentence best fit?

14. Prose Summary

**The introduction of electric lighting at the turn of the twentieth century fundamentally changed the design of American homes.**

**Answer Choices:**

A) Because gas lighting involved odors, soot, and the threat of explosions, Victorian houses were built with many small rooms that could be shut off.

B) As electricity brightened homes, it sparked a new interest in interior design, including elaborate decoration, more vivid colors, and fancier home furnishings.

C) Electric lighting allowed for more flexible use of space but it was also expensive, so new homes tended to have fewer rooms and fewer barriers between rooms.

D) Bathrooms were an innovation of the time, which arose out of the rising interest in dedicating specific spaces to specific purpose.

E) In terms of lifestyle, changes resulting from electrification meant that family members had less privacy and spent more time in common areas, and they also tended to read more.

F) The bungalow was a new type of home first designed by Frank Lloyd Wright, which immediately appealed to the stylish and wealthy.

**參考答案**

1. C 2. B 3. C 4. B 5. A 6. D 7. A 8. B 9. D 10. B

11. C 12. D 13. D 14. A,C,E

The Beginning of Planet Formation

The four innermost planets of our solar system – Mercury, Venus, Earth, and Mars – are terrestrial, or rocky, planets. ■ The beginning of their creation process occurred when the cloud of leftover material from the formation of the Sun settled into a disc around the young star. ■ Most of the material in the cloud, like the material of the Sun itself, was in the form of hydrogen and helium. ■ But there was a trace of dust, no more than 2 percent of the original material, in the form of particles as fine as the particles in smoke. ■ Heat from the young Sun blew much of the gas away, but the rotation of the original cloud ensured that the dust settled into a disc around the young Sun – a protoplanetary disc like the ones seen around young stars today.

Within the disc, all the particles were moving in the same direction around the Sun, like runners going round a track. This meant that when they bumped into one another, they did so relatively gently, not in head-on collisions, giving the particles a chance to stick to one another. The tendency to stick may have been helped by electric forces produced by particles rubbing against one another, in the same way that you can make a child’s balloon stick to the ceiling after rubbing it on a woolen sweater. Another important factor was turbulence in the gas, creating swirling structures like whirlwinds which gathered pieces of material together and gave them a chance to interact. Computer simulations show how objects as big as Ceres can form in this way – provided the particles can stick together.

**Ceres**: one of the biggest asteroids in the solar system

Something else may also have helped the particles to stick together – something else that is special about the solar system. Studies of pieces of rock from meteorites show that the dusty disc around the young Sun contained tiny globules of material, known as chondrules, formed by melting at temperatures between 1,200 degrees centigrade and 1,600 degrees centigrade. Molten, or partly molten, blobs would be more sticky and encourage the buildup of larger lumps of stuff in the disc. But how did they get so hot? The most likely explanation is that the heat was released by radioactive elements that had been sprayed by a nearby star in the process of dying into the gas cloud from which the planets formed. One possibility is that a supernova occurred close to the cloud that became the Sun just before the Sun formed; it is even possible that the blast wave from this explosion triggered the collapse of the gas cloud that became the Sun and solar system. Supporting evidence for this idea comes from measurements of the proportions of various isotopes (different forms of an element) found in meteorites. Radioactive aluminium-26 seems to have been present in the proto-solar system from the beginning, but a pulse of iron-60 arrived about a million years later. This matches what we know about the fate of a very large star, with more than 30 times as much mass as the Sun. In the late stages of its life, the star first blows away much of the outer layers of material, which by then is relatively rich in aluminium-26, in a wind easily strong enough to cause any nearby gas cloud to collapse. The star only explodes at the very end of its life, showering the neighborhood with elements including iron-60.

**supernova**: explosion of a very large star

There is a rival idea, developed in Barcelona by Josep Trigo-Rodriguez and colleagues, which suggests that the radioactive material was fed into the solar system as it was forming from a much less massive star which came much closer to the Sun. The right proportion of isotopes could have come in the wind of material being blown away from a star with only six times as much mass as our Sun in the last stages of its life. But the star would have to be very close to the Sun for this to happen – closer than 10 light-years – which makes such an event unlikely, statistically speaking.

1. The word “leftover” in the passage is closest in meaning to

A) gathering

B) spreading

C) remaining

D) floating

2. The word “ensured” in the passage is closest in meaning to

A) showed

B) suggested

C) confirmed

D) guaranteed

3. According to paragraph 1, the cloud of material from the formation of the Sun consisted of TWO of the following. To receive credit, you must select TWO answers.

A) A very large amount of hydrogen and helium

B) Material blown from other young stars

C) Small particles of dust

D) Particles that are also found in smoke

4. Why does the author mention “runners going round a track,” “a child’s balloon,” and “whirlwinds” in the discussion of the interaction of particles in the Sun’s protoplanetary disc?

A) To argue that interactions among the particles were no different from certain phenomena observed on Earth

B) To help explain how different types of particle interactions were actually very similar to one another

C) To suggest that the interactions among the particles were simpler than astronomers once believed

D) To use relatively familiar concepts to illustrate particle interactions that contributed to planet formation

5. Which of the following is NOT mentioned in paragraph 2 as a characteristic of the particle interactions in the Sun’s protoplanetary disc?

A) The particles collided with one another violently.

B) The particles all traveled in the same direction.

C) The particles rubbed against one another.

D) The particles were pulled together by turbulence.

6. The word “matches” in the passage is closest in meaning to

A) agrees with

B) supports

C) challenges

D) adds to

7. According to paragraph 3, all of the following are true about chondrules EXCEPT:

A) They were very small pieces of material found in the disc around the young Sun.

B) They were formed from material that melted at very high temperatures.

C) They caused radioactive elements to be released from a supernova.

D) They played a significant role in the formation of larger pieces of material within the Sun’s protoplanetary disc.

8. Paragraph 3 suggests which of the following about iron-60 and aluminium-26 in the proto-solar system?

A) They are both materials that tend to stick together.

B) They both originated from the same large source star.

C) They were both present in the gas cloud before the Sun’s formation began.

D) They were both released into the proto-solar system at the same time.

9. According to paragraph 3, why is the timing of the arrival of iron-60 in the proto-solar system significant?

A) It provides evidence in favor of the theory that a nearby supernova had a role in the formation of the solar system.

B) It provides information about the force of the winds that blew away a very large star’s outer layers.

C) It suggests that the formation of the solar system began earlier than scientists once believed.

D) It shows that the presence of aluminium-26 was not enough to cause the collapse of the gas cloud.

10. Which of the following most accurately describes the relationship of paragraph 4 to paragraph 3?

A) Paragraph 4 explains why the hypothesis discussed in paragraph 3 is most likely inaccurate.

B) Paragraph 4 provides additional data to support the argument introduced in paragraph 3.

C) Paragraph 4 discusses a possible alternative to the hypothesis introduced in paragraph 3.

D) Paragraph 4 describes conditions under which the hypothesis in paragraph 3 would be true.

11. The word “rival” in the passage is closest in meaning to

A) new

B) competing

C) interesting

D) popular

12. According to paragraph 4, which of the following is a weakness in the explanation proposed by Rodriguez and colleagues?

A) A star of the required size was unlikely to contain the right proportion of isotopes.

B) Stars that are six times more massive than the Sun are statistically unusual.

C) It is unlikely that a star of the required size would be close enough to the Sun.

D) Much of the material in the solar system would have been blown away by a star coming very close to it.

13. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

**Several important steps were involved in their formation.**

Where would the sentence best fit?

14. Prose Summary

**Scientists have attempted to explain the formation of the rocky planets in the solar system.**

**Answer Choices:**

A) Fine particles of dust released from the formation of the Sun settled around it in a disc and eventually stuck together to form the innermost planets.

B) The young Sun was extremely hot and blew away much of the radioactive materials that surrounded it, leaving behind only rocky particles.

C) Electric forces resulting from the rubbing together of particles in the Sun’s protoplanetary disc caused pieces of material to move in the same direction.

D) Heat from certain radioactive materials may have increased the tendency of particles in the Sun’s protoplanetary disc to stick together.

E) Evidence from meteorites suggests that a nearby supernova created the special conditions that existed during the formation of the solar system.

F) Several theories have been proposed to explain the formation of radioactive materials during supernova explosions.

**參考答案**

1. C 2. D 3. AC 4. D 5. A 6. A 7. C 8. B 9. A 10. C

11. B 12. C 13. A 14. A,D,E