26. **Directions:** An introduction for a short summary of the passage appears below. Complete the summary by selecting the THREE answer choices that mention the most important points in the passage. Some sentences do not belong in the summary because they express ideas that are not included in the passage or are minor points from the passage. *This question is worth 2 points.*

Because weather is a chaotic system, it is very difficult to predict.

- •
- •
- .

P1

Answer Choices

- A The accuracy of weather prediction will improve as we make progress in the application of computers to equations.
- It is very easy to make predictions about the location of a car when you know where it is and how fast it is going.
- C A slight variation in initial conditions will cause a very different prediction for weather over the long term.
- Because weather is chaotic but not random, it may be described by nonlinear equations that provide for sensitive interactions.
- E The economic system demonstrates chaotic behavior, and it must be represented by a nonlinear equation.
- F Weather is predictable only within a time frame of a few weeks because of the nature of scientific prediction.

Reading 3 "Building with Arches"

Round Arch and Vault

→ Although the round arch was used by the ancient peoples of Mesopotamia several centuries before our common era, it was most fully developed by the Romans, who perfected the form in the 2nd century B.C.E. The arch has many virtues. In addition to being an attractive form, it enables the architect to open up fairly large spaces in a wall without risking the building's structural soundness. These spaces admit light, reduce the weight of the walls, and decrease the amount of material needed. As utilized by the Romans, the arch is a perfect semicircle, although it may seem elongated if it rests on columns. It is constructed from wedge-shaped pieces of stone that meet at an angle always perpendicular to the curve of the arch. Because of tensions and compressions inherent in the form, the arch is stable only when it is complete, when the topmost stone, the **keystone**, has been set in place. For this reason an arch under construction must be supported from below, usually by a wooden framework.

328 MODEL TEST 4: PROGRESS TEST

P2 → Among the most elegant and enduring of Roman structures based on the arch is the Pont du Gard at Nimes, France, built about 15 c.E. when the empire was nearing its farthest expansion. At this time, Roman industry, commerce, and agriculture were at their peak. Engineering was applied to an ambitious system of public-works projects, not just in Italy but in the outlying areas as well. The Pont du Gard functioned as an aqueduct, a structure meant to transport water, and its lower level served as a footbridge across the river. That it stands today virtually intact after nearly two thousand years (and is crossed by cyclists on the route of the famous Tour de France bicycle race) testifies to the Romans' brilliant engineering skills. Visually, the Pont du Gard exemplifies the best qualities of arch construction. Solid and heavy, obviously durable, it is shot through with open spaces that make it seem light and its weight-bearing capabilities effortless.

P3 → When the arch is extended in depth—when it is, in reality, many arches placed flush one behind the other—the result is called a **barrel vault**. This vault construction makes it possible to create large interior spaces. The Romans made great use of the barrel vault, but for its finest expression we look many hundreds of years later, to the churches of the Middle Ages.

P4 → The church of Sainte-Foy, in the French city of Conques, is an example of the style prevalent throughout Western Europe from about 1050 to 1200—a style known as Romanesque. Earlier churches had used the Roman round arch and barrel vault so as to add height to their churches. Until this period most churches had beamed wooden roofs, which not only posed a threat of fire but also limited the height to which architects could aspire. With the stone barrel vault, they could achieve the soaring, majestic space we see in the <u>nave</u> of Sainte-Foy to span the spaces between the interior columns that ultimately held up the roof. With the Romanesque style, builders set a stone barrel vault as a ceiling over the <u>nave</u>, hiding the roof structure from view. The barrel vault unified the interior visually, providing a soaring, majestic climax to the rhythms announced by the arches below.

Pointed Arch and Vault

P5 → While the round arch and vault of the Romanesque era solved many problems and made many things possible, they nevertheless had certain drawbacks. For one thing, a round arch, to be stable, must be a semicircle; therefore, the height of the arch is limited by its width. Two other difficulties were weight and darkness. Barrel vaults are both literally and visually heavy, calling for huge masses of stone to maintain their structural stability. They exert an outward thrust all along their base, which builders countered by setting them in massive walls that they dared not weaken with light-admitting openings. The Gothic period in Europe, which followed the Romanesque, solved these problems with the pointed arch. [A]

P6 The pointed arch, while seemingly not very different from the round one, offers many advantages. B Because the sides arc up to a point, weight is channeled down to the ground at a steeper angle, and therefore the arch can be

taller. The vault constructed from such an arch also can be much taller than a barrel vault. \square Architects of the Gothic period found they did not need heavy masses of material throughout the curve of the vault, as long as the major points of intersection were reinforced. \square

Glossary

nave: the long central area in a church with aisles on each side

- 27. Why does the author mention the "keystone" in paragraph 1?
 - To explain the engineering of an arch
 - To provide historical background on arches
 - C To point out one of the virtues of arches
 - To suggest an alternative to the arch

Paragraph 1 is marked with an arrow $[\rightarrow]$.

- 28. The word inherent in the passage is closest in meaning to
 - uncertain
 - unsatisfactory
 - © expansive
 - essential
- 29. The Pont du Gard mentioned in paragraph 2 has all of the following characteristics EXCEPT
 - It was an aqueduct.
 - It is still being used.
 - © It was built 2000 years ago.
 - It was repaired recently.

Paragraph 2 is marked with an arrow $[\rightarrow]$.

30. The word virtually in the passage is closest in meaning to

- obviously
- accurately
- © routinely
- D practically

31. According to paragraph 3, what is the advantage of a barrel vault?

- It was used in the Middle Ages.
- B Many arches were joined.
- C The space inside was larger.
- It was a typical Roman look.

Paragraph 3 is marked with an arrow $[\rightarrow]$.

330 MODEL TEST 4: PROGRESS TEST

- 32. What can be inferred from paragraph 4 about Romanesque architecture?
 - Arches and barrel vaults were used in the designs.
 - ^(B) Wood beams characterized the buildings.
 - © The structures were smaller than those of Roman style.
 - The architecture was popular during the Roman occupation.

Paragraph 4 is marked with an arrow $[\rightarrow]$.

- 33. Which of the sentences below best expresses the information in the highlighted statement in the passage? The other choices change the meaning or leave out important information.
 - Architects wanted to build higher ceilings in churches, but they were limited because of the fire hazard caused by wooden beams in the roofs.
 - The majority of the churches prior to this time were constructed with wooden roofs that caused a considerable fire hazard because of their height.
 - C The wood beams in the roofs of most churches before this period were a concern because of fire and the constraints they imposed on the height of the ceiling.
 - The limitations on the architecture of the churches were a result of the construction materials and the limited vision of the architects.

34. The word achieve in the passage is closest in meaning to

- retain
- accomplish
- © decorate
- Interpreter finance

35. The word their in the passage refers to

- A masses
- B builders
- © stone
- vaults

36. According to paragraph 5, why are Romanesque churches so dark?

- It was a characteristic of construction with pointed arches.
- It was too difficult to make windows in the heavy materials.
- © Openings for light could have compromised the structure.
- Reinforcements covered the areas where light could shine in.

Paragraph 5 is marked with an arrow $[\rightarrow]$.

- 37. Gothic architects extended the height of their arches by
 - using barrel vaults
 - B designing pointed arches
 - © including a nave
 - ① adding windows