

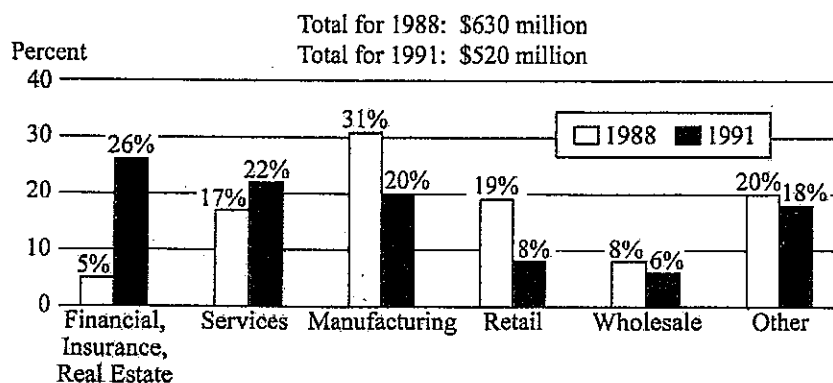
※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

I. Verbal and Quantitative Test (Multiple Choice Question: 30%)

1. Congress is having great difficulty developing a consensus on energy policy, primarily because the policy objectives of various members of Congress rest on such _____ assumptions.
(A) commonplace (B) trite (C) fundamental (D) divergent (E) trivial
2. Only by ignoring decades of mismanagement and inefficiency could investors conclude that a fresh infusion of cash would provide anything other than a _____ solution to the company's financial woes.
(A) complete (B) premature (C) momentary (D) trivial (E) total
3. An investigation that is _____ can occasionally yield new facts, even notable ones, but typically the appearance of such facts is the result of a search in a definite direction.
(A) timely (B) unguided (C) consistent (D) uncomplicated (E) subjective
4. During the opera's most famous aria, the tempo chosen by the orchestra's conductor seemed _____, without necessary relation to what has gone before.
(A) arbitrary (B) cautious (C) compelling (D) exacting (E) meticulous
5. If k is the smallest prime number greater than 21 and b is the largest prime number less than 16, then $kb =$
(A) 299 (B) 323 (C) 330 (D) 345 (E) 351
6. If c and d are positive integers and m is the greatest common factor of c and d , then m must be the greatest common factor of c and which of the following integers?
(A) $c+d$ (B) $2+d$ (C) cd (D) $2d$ (E) d^2
7. In State X , all vehicle license plates have 2 letters from the 26 letters of the alphabet followed by 3 one digit numbers. How many different license plates can State X have if repetition of letters and numbers is allowed?
(A) 23,400 (B) 60,840 (C) 67,600 (D) 608,400 (E) 676,000

Noted that Questions 8 through 10 are based on the following figure.

Corporate Support for the Arts by Sector in 1988 and 1991



8. How many of the six corporate sectors listed each contributed more than \$60 million to the arts in both 1988 and 1991 ?
(A) One (B) Two (C) Three (D) Four (E) Five
9. From 1988 to 1991, which corporate sector decreased its support for the arts by the greatest dollar amount?
(A) Services (B) Manufacturing (C) Retail (D) Wholesale (E) Other
10. Of the retail sector's 1991 contribution to the arts, $\frac{1}{4}$ went to symphony orchestras and $\frac{1}{2}$ of the remainder went to public television. Approximately how many million dollars more did the retail sector contribute to public television that year than to symphony orchestras?
(A) 5.2 (B) 6.3 (C) 10.4 (D) 13.0 (E) 19.5

II. Reading Test (Multiple Choice Question: 40%)

Article I for Question 11-15

The wide variety of climates in North America has helped spawn a complex pattern of soil regions. In general, the realm's soils also reflect the broad environmental partitioning into "humid America" and "arid America." Where annual precipitation exceeds 20 inches (50 centimeters), soils in humid areas tend to be acidic in chemical content. Since crops do best in soils that are neither acidic (higher in acid content) nor alkaline (higher in salt content), fertilization is necessary to achieve the desired level of neutrality between the two. Arid America's soils are typically alkaline and must be fertilized back toward neutrality by adding acidic compounds. Although many of these dryland soils, particularly in the Great Plains, are quite fertile, European settlers learned over a century ago that water is the main missing ingredient in achieving their agricultural potential. In the 1970's, certain irrigation methods were perfected and finally provided a real opportunity to expand more intensive farming west from the Central Lowland into the drier portions of the Great Plains. Glaciation also enhanced the rich legacy of fertile soils in the central United States, both from the deposition of mineral-rich glacial debris left by meltwater and from thick layers of fine wind-blown glacial material, called loess, in and around the middle Mississippi Valley. Natural vegetation patterns could be displayed on a map of North America, but the enormous human modification of the North American environment in modern times has all but reduced this regionalization scheme to the level of the hypothetical. Nonetheless, the humid America-arid America dichotomy is still a valid generalization: the natural vegetation of areas receiving more than 20 inches of water yearly is forest, whereas the drier climates give rise to a grassland cover. The forests of North America tend to make a broad transition by latitude. In the Canadian North, needle-leaf forests dominate, but these coniferous trees become mixed with broadleaf deciduous trees as one crosses the border into the Northeast United States. As one proceeds toward the Southeast, broadleaf vegetation becomes dominant. Arid America mostly consists of short-grass prairies or steppes. The only areas of true desert are in the Southwest.

11. What aspect of North America does the passage mainly discuss?
(A) The wide variety of climates
(B) Soil types and vegetation patterns
(C) Improved irrigation methods and the expansion of agriculture
(D) The change in precipitation patterns
12. The word "spawn" in line 1 is closest in meaning to
(A) distinguish
(B) eliminate
(C) protect
(D) create
13. According to the passage, acidic soils tend to be associated with
(A) a high salt content
(B) an increase in farming
(C) large amounts of rain
(D) glacial meltwater
14. How did glacial meltdown affect the soil in North America?
(A) It redistributed the soil types
(B) It added salt to the soil
(C) It made the soil more neutral in content
(D) It added minerals to the soil
15. The passage supports which of the following statements?
(A) Arid America is not necessarily characterized by the presence of deserts
(B) Most of Canada and the northeastern United States consists of short-grass prairies wherever natural vegetation has not been modified by humans
(C) The accumulation of loess is primarily the result of irrigation
(D) Glaciation removed the fertile layer of soil from much of the Mississippi Valley

Article II for Question 16-20

Some animal behaviorists argue that certain animals can remember past events, anticipate future ones, make plans and choices, and coordinate activities within a group. These scientists, however, are cautious about the extent to which animals can be credited with conscious processing. Explanations of animal behavior that leave out any sort of consciousness at all and ascribe actions entirely to instinct leave many questions unanswered. One example of such unexplained behavior: Honeybees communicate the sources of nectar to one another by doing a dance in a figure-eight pattern. The orientation of the dance conveys the position of the food relative to the sun's position in the sky, and the speed of the dance tells how far the food source is from the hive. Most researchers assume that the

ability to perform and encode the dance is innate and shows no special intelligence. But in one study, when experimenters kept changing the site of the food source, each time moving the food 25 percent farther from the previous site, foraging honeybees began to anticipate where the food source would appear next. When the researchers arrived at the new location, they would find the bees circling the spot, waiting for their food. No one has yet explained how bees, whose brains weigh four ten-thousandths of an ounce, could have inferred the location of the new site. Other behaviors that may indicate some cognition include tool use. Many animals, like the otter who uses a stone to crack mussel shells, are capable of using objects in the natural environment as rudimentary tools. One researcher has found that mother chimpanzees occasionally show their young how to use tools to open hard nuts. In one study, chimpanzees compared two pairs of food wells containing chocolate chips. One pair might contain, say, five chips and three chips, the other four chips and three chips. Allowed to choose which pair they wanted, the chimpanzees almost always chose the one with the higher total, showing some sort of summing ability. Other chimpanzees have learned to use numerals to label quantities of items and do simple sums.

16. What does the passage mainly discuss?

- (A) The role of instinct in animal behavior
- (B) Observations that suggest consciousness in animal behavior
- (C) The use of food in studies of animal behavior
- (D) Differences between the behavior of animals in their natural environments and in laboratory experiments.

17. What did researchers discover in the study of honeybees discussed in paragraph 2?

- (A) Bees are able to travel at greater speeds than scientists thought.
- (B) The bees could travel 25% farther than scientists expected.
- (C) The bees were able to determine in advance where scientists would place their food.
- (D) Changing the location of food caused bees to decrease their dance activity.

18. It can be inferred from the passage that brain size is assumed to

- (A) be an indicator of cognitive ability
- (B) vary among individuals within a species
- (C) be related to food consumption
- (D) correspond to levels of activity

19. It can be inferred from the statement about mother chimpanzees and their young (lines 21-23) that young chimpanzees have difficulty

- (A) communicating with their mothers
- (B) adding quantities
- (C) making choices
- (D) opening hard nuts

20. Scientists concluded from the experiment with chimpanzees and chocolate chips that chimpanzees
- (A) lack abilities that other primates have
 - (B) prefer to work in pairs or groups
 - (C) exhibit behavior that indicates certain mathematical abilities
 - (D) have difficulty selecting when given choices

III. Writing Test (Translate the Following Paragraphs into Chinese: 30%)

Claude Shannon and Information Theory

In the late 1940s Claude Shannon, a research mathematician at Bell Telephone Laboratories, invented a mathematical theory of communication that gave the first systematic framework in which to optimally design telephone systems. The main questions motivating this were how to design telephone systems to carry the maximum amount of information and how to correct for distortions on the lines. His ground-breaking approach introduced a simple abstraction of human communication, called the channel. Shannon's communication channel consisted of a sender (a source of information), a transmission medium (with noise and distortion), and a receiver (whose goal is to reconstruct the sender's messages).

In order to quantitatively analyze transmission through the channel he also introduced a measure of the amount of information in a message. To Shannon the amount of information is a measure of surprise and is closely related to the chance of one of several messages being transmitted. For Shannon a message is very informative if the chance of its occurrence is small. If, in contrast, a message is very predictable, then it has a small amount of information---one is not surprised to receive it. To complete his quantitative analysis of the communication channel, Shannon introduced the entropy rate, a quantity that measured a source's information production rate and also a measure of the information carrying capacity, called the communication channel capacity.

He showed that if the entropy rate, the amount of information you wish to transmit, exceeds the channel capacity, and then there were unavoidable and uncorrectable errors in the transmission. He also showed that if the sender's entropy rate is below the channel capacity, then there is a way to encode the information so that it can be received without errors. This is true even if the channel distorts the message during transmission. Shannon adapted his theory to analyze ordinary human (written) language. He showed that it is quite redundant, using more symbols and words than necessary to convey messages. Presumably, this redundancy is used by us to improve our ability to recognize messages reliably and to communicate different types of information.