DIRECTIONS

Each question or group of questions is based on a passage or set of conditions. In answering some of the questions, it may be useful to draw a rough diagram. For each question, select the best answer choice given.

There are 50 questions. Each question is worth 2 points. No points for will be taken off for wrong answers. You have 100 minutes for this exam.

For Questions 1-7

At a car show, there is only enough space to display five cars. The cars must be placed along a single wall on five stands numbered consecutively from 1 to 5. The cars to be displayed are to be selected from a total of eight cars — M, N, P, Q, R, S, T, and U — and displayed, one car on each stand, and must be done in such a way as to satisfy all of the following conditions:

Either M or U or both must be selected.
If M is selected, M must be on stand 1.
Either R or S must be on stand 3.
If T is selected, then P must also be selected, and T and P must then be on stands that are immediately adjacent to one another.

1. If S is on stand 1, then which of the following must be true?
   (A) U is on stand 5.
   (B) T is on stand 2.
   (C) R is on stand 3.
   (D) T is on stand 4.
   (E) P is on stand 4.

2. If P is not selected and R is on stand 1, then which of the following lists, in alphabetical order, those cars that must also be selected?
   (A) M, Q, T, and U
   (B) N, Q, S, and T
   (C) Q, S, T, and U
   (D) N, S, T, and U
   (E) N, Q, S, and U

3. If T is on stand 5, then which of the following pairs of cars can also be on stands that are immediately adjacent to each other?
   (A) M and P
   (B) Q and N
   (C) U and R
   (D) R and T
   (E) Q and P
4. If U is on stand 4, then any of the following can be on stand 5 EXCEPT
   (A) P
   (B) N
   (C) R
   (D) Q
   (E) T

5. If Q is placed on the stand immediately adjacent to a stand on which R is displayed and immediately adjacent to a stand on which S is displayed, then which of the following must be true?
   (A) N is on either stand 4 or stand 5.
   (B) Q is on either stand 2 or stand 4.
   (C) S is on either stand 3 or stand 5.
   (D) R is on either stand 1 or stand 3.
   (E) U is on either stand 2 or stand 4.

6. Which one of the following arrangements is an acceptable selection of cars to be displayed on stands 1 through 5.

   \[
   \begin{array}{cccc}
   1 & 2 & 3 & 4 \\
   M & R & T & P & Q \\
   P & T & W & R & U \\
   N & T & S & U & Q \\
   U & N & Q & P & T \\
   T & P & R & S & M
   \end{array}
   \]
   (A) M R T P Q
   (B) P T W R U
   (C) N T S U Q
   (D) U N Q P T
   (E) T P R S M

7. If T is on stand 2, then which of the following cars must be selected?
   (A) S
   (B) R
   (C) N
   (D) M
   (E) U

8. A person who agrees to serve as a mediator between a husband and a wife wanting a divorce at the request of both, abandons by so agreeing the right later to take sides. To take sides at a later point would be to suggest that the earlier impartiality was a fake.

   This passage above emphasizes which of the following points about mediators?
   (A) They should try to form no opinions of their own about any issue that is related to the dispute.
   (B) They should not agree to serve unless they are equally acceptable to all parties to a dispute.
   (C) They should not agree to serve unless they are committed to maintaining a stance of impartiality.
   (D) They should reserve the right to abandon their impartiality so as not to be open to the charge of having been deceitful.
   (E) They should feel free to take sides in the dispute right from the start, provided that they make their biases publicly known.
9. Restoration of the original paint colors in Tang Dynasty-era rooms has until now relied on the technique of scraping paint in a small area down to the chronological level that represents the paint layer of the Tang Dynasty period and then matching the color found at that level. This color was most often the color of putty.

Which of the following, if true, most seriously weakens the validity of the procedure described above?

(A) It is possible to distinguish the paint used in stenciled border designs, such as those used in the Tang Dynasty period, from the underlying paint layer.
(B) In the Tang Dynasty period, it was customary to paint all the walls of a room the same solid color.
(C) If the scraping is too deep, a scratch will be made in the surface of the original paint.
(D) The original colors were altered over the years by reactions with air, light, and dirt to become putty-colored.
(E) Contemporary paint materials include many that did not exist in Tang Dynasty times.

10. Puppies born deaf and blind or just blind begin barking on roughly the same schedule as most puppies, by about one months of age.

The information above provides evidence to support which of the following hypotheses?

(A) When a puppy begins barking, its mother begins responding to it as it would to another puppy wanting to be fed.
(B) The barking response depends on an inborn trait determining a certain pattern of development.
(C) Puppies do not bark when no one else is present.
(D) Barking between dogs basically signals a mutual lack of aggressive intent.
(E) For puppies, the survival advantage of barking consists in bonding the mother to the puppy.

For Questions 11-16

Three women --- R, S, and T, two men --- U and V, and four children --- W, X, Y, and Z --- are going to a concert. They have a total of nine seats for the concert, but the seats are in three different sections of the concert hall; they have a group of three adjacent seats in each section. For the concert, the nine people must divide into groups of three according to the following restrictions:

No adults of the same sex can be together in any group.

W cannot be in R’s group.

X must be in a group with S or U or both.

11. If R is the only adult in one group, the other members of her group must be

(A) X and Y
(B) W and Y
(C) W and X
(D) Y and Z
(E) X and Z
12. Any of the following pairs of people could be in X's group EXCEPT

(A) S and T
(B) R and U
(C) T and U
(D) S and W
(E) S and U

13. If T, Y, and Z are in one group, which of the following must be together in one of the other groups?

(A) R, S, V
(B) U, V, X
(C) S, V, W
(D) S, U, W
(E) R, U, W

14. If R and U are two of the three people in the first group, who can be in the second and third groups, respectively?

(A) S, X, Y; T, W, Z
(B) S, W, Z; T, V, X
(C) S, T, W; V, Y, Z
(D) W, X, Y; S, V, Z
(E) T, Y, W; S, Y, Z

15. Which of the following must be true?

(A) One of the two men is in a group with W.
(B) One of the women is in a group with two children.
(C) T's group includes exactly one child.
(D) R is in a group with a man.
(E) One of the groups includes no children.

16. Which of the following pairs of people can be in the same group as W?

(A) X and Z
(B) S and U
(C) U and V
(D) S and V
(E) R and Y
For Questions 17-22

The art director of an advertising company is preparing a sales brochure for a shoe-manufacturing company. To represent her client’s line of products, she wants to separate full-page color advertisements in the brochure for each of the following five types of shoes: M, N, P, R, and S. Thus, there will be exactly five printed pages, numbered consecutively one through five, in the brochure. Because she also wants to show the range of colors that the manufacturer uses, one of the shoes must be black, one must be orange, one must be tan, one must be white, and one must be red. In designing the brochure, she has made the following decisions:

Type N will be advertised on a lower-numbered page than type P.
Type S will be advertised on a lower-numbered page than type M.
The white shoe will be advertised on a lower-numbered page than the red shoe.
The orange shoe will be advertised on page three.
Type P advertised will be tan.

17. Any of the shoes could be advertised on page 3 EXCEPT type

(A) M  
(B) N  
(C) R  
(D) P  
(E) S

18. If type M is advertised on a lower-numbered page than the orange shoe, which of the following must be true?

(A) Type S is advertised on page 1.  
(B) Type N is advertised on page 2.  
(C) Type P is advertised on page 5.  
(D) Type R is advertised on page 3.  
(E) Type M is advertised on page 1.

19. Which of the following could be the colors of the shoes advertised on pages 1 through 5, respectively?

(A) Tan, red, orange, black, white  
(B) Black, orange, white, red, tan  
(C) Black, tan, orange, red, white  
(D) Orange, red, white, tan, black  
(E) White, tan, orange, black, red

20. If type S is advertised on page 2 and the black shoe is advertised on page 5, type S must be

(A) black  
(B) orange  
(C) tan  
(D) red  
(E) white
21. If type N is black and is advertised on page 4, which of the following must be true?

(A) Type M is advertised on page 2.
(B) Type R is advertised on page 3.
(C) Type S is advertised on page 1.
(D) The tan shoe is advertised on page 2.
(E) The white shoe is advertised on page 1.

22. If type M is black, the shoe advertised on page 1 must be

(A) black
(B) orange
(C) white
(D) tan
(E) red

23. The greatest chance for the existence of life on the Earth is on a planet that does not also circle our sun. The Milky Way galaxy, which our sun belongs to, alone contains 100 billion other suns, many of which could be accompanied by planets similar enough to Earth to make them suitable places for life.

The statement above assumes which of the following?

(A) Living creatures on another planet would probably have the same appearance as those on Earth.
(B) It is likely that life on another planet would require conditions similar to those on Earth.
(C) More than one of the suns in the galaxy is accompanied by an Earth-like planet.
(D) If the appropriate physical conditions exist, life is an inevitable consequence.
(E) Life cannot exist on other planets circling our sun.

24. Many researchers believe that the presence of salt in brain cells is the biochemical basis of memory; that is, the presence of salt enables us to remember. Because certain chemicals are known to reduce the amount of salt in the body, we can test this hypothesis. Animals that have learned particular responses can be injected with these salt reduction chemicals and then tested for memory of the learned response.

Which of the following test results would most seriously weaken the case for salt as the basis of memory?

(A) After injection of a salt reducer, some animals lost memory of the learned responses totally but others lost it only partially.
(B) After an injection of a salt reducer, animals could not learn a new response.
(C) After an injection of a salt reducer, a wide range of behaviors in addition to the learned responses were affected.
(D) After a small injection of a salt reducer, animals responded well, but as the size of the injection increased, they gave fewer of the learned responses.
(E) After an injection of a salt reducer, animals that had not consistently been giving the learned responses were able to give them consistently.
25. A ten-year comparison between the United States and the Soviet Union in terms of crop yields per acre (the amount of crops harvested per acre) revealed that when only planted acreage is compared, Soviet yields are equal to 68 percent of United States yields. When total agricultural acreage, which is planted acreage plus fallow acreage (acres left empty), is compared, however, Soviet yield is 114 percent of United States yield.

From the information above, which of the following can be most reliably inferred about United States and Soviet agriculture during the ten-year period?

(A) The Soviet Union had more planted acreage than fallow acreage.
(B) The Soviet Union produced a greater volume of crops than the United States produced.
(C) Fewer total acres of available agricultural land were fallow in the Soviet Union than in the United States.
(D) A higher percentage of total agricultural acreage was fallow in the United States than in the Soviet Union.
(E) The United States had more fallow acreage than planted acreage.

For Questions 26-28

Samples of a yellow bean must be tested for contamination by one or more of the poisons R, S, and T. The following is true about the testing procedure:

A sample of beans retains the color it acquires from a test unless another test changes the color of the sample.

Test X turns a sample green if the sample contains R or S, or both, and orange if it contains neither R nor S.

Test Z turns a sample purple if the sample contains T; if not, the sample retains the color it had prior to test Z.

26. A sample that contains R and S but not T will yield which of the following sequences of colors, the first after test X is used and the second after test Z is used?

(A) Orange, yellow
(B) Green, purple
(C) Green, green
(D) Orange, orange
(E) Orange, purple

27. The two tests will NOT distinguish between two samples containing which of the following?

<table>
<thead>
<tr>
<th>Sample 1</th>
<th>Sample 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) R, S, and T</td>
<td>R and S, but not T</td>
</tr>
<tr>
<td>(B) R and S, but not T</td>
<td>S and T, but not R</td>
</tr>
<tr>
<td>(C) R, but neither S nor T</td>
<td>Neither R nor S nor T</td>
</tr>
<tr>
<td>(D) R and T, but not S</td>
<td>S and T, but not R</td>
</tr>
<tr>
<td>(E) S, but neither R nor T</td>
<td>Neither R nor S nor T</td>
</tr>
</tbody>
</table>
28. A sample that remains yellow when subjected to test Z and turns green when subjected to test X could be a sample containing

(A) S, but containing neither R nor T
(B) S and T, but not containing R
(C) T, but containing neither R nor S
(D) R, S, and T
(E) neither R nor S nor T

For Question 29-33

A postal system has exactly four post offices: W, X, Y, Z. Letters travel from one post office directly to another post office only as follows:

From W to X, but no vice versa
From W to Y, but not vice versa
From W to Z, and vice versa
From X to Y, and vice versa
From X to Z, but not vice versa
From Z to Y, but not vice versa

A single direct path going in one direction from one post office to another is called a leg.

29. If a letter is to travel from Y to X over as few legs as possible, it must travel in which of the following ways?

(A) Going through W but no other post office
(B) Directly from Y to X
(C) Going through W and Z, in that order
(D) Going through Z but no other post office
(E) Going through Z and W, in that order

30. Which of the following sequences of legs is a path over which a letter could travel from X back to X?

(A) From X to Z, from Z to Y, from Y to W, from W to X
(B) From X to Z, from Z to W, from W to Y, from Y to X
(C) From X to Y, from Y to Z, from Z to W, from W to X
(D) From X to Y, from Y to W, from W to Z, from Z to X
(E) From X to W, from W to X

31. If all of the legs in the system are equal in length, and if letters always travel the shortest possible path, then the longest path any letter travels in the system is the path from

(A) X to W
(B) Y to Z
(C) Y to W
(D) Z to X
(E) Z to W
32. Which of the following is a complete and accurate list of post offices to which a letter can be sent along exactly one leg from Z?

(A) Y
(B) W
(C) X, Y
(D) W, Y
(E) W, X, Y

33. If certain high priority letters cannot travel any further than one leg, and if an addition of one leg is to be made to the system so that such high priority letters can be sent from each post office to at least two others and also be received by each post office from at least two others, then the additional leg must be from

(A) Y to W
(B) X to W
(C) Z to W
(D) Z to X
(E) Y to Z

34. When making plastic, fairly complex molecules must be made to link up, in a process called polymerization. Each time molecules link, a small quantity of heat is generated. In addition, the rate of linking speeds up as temperature increases.

Which of the following can be inferred from the passage above?

(A) The method used to start the process of polymerization is a sharp increase in temperature of the surrounding air.
(B) If air temperatures are kept steady when plastic is made, the rate at which the molecules link remains constant.
(C) Once the process of polymerization has been started, it cannot be slowed before all possible links among molecules have been formed.
(D) Unless the heat that results from the linking of molecules is drawn off promptly, there will be a heat buildup at an accelerating rate as acrylic is made.
(E) In the making of thin sheets of plastic, which lose heat quickly to the surrounding air, polymerization proceeds much faster than it does in the making of thick pieces.

35. Any lender about to make a loan wishes to know the real rate of interest; i.e., the contractual rate of interest less the rate of inflation. But what rate of inflation to use, past or expected? Past inflation is the better choice, because we have specific firm figures for it so that the real rate of interest will also emerge as a specific figure.

Which of the following, if true, is the strongest point that an opponent of the position above might make in arguing that the rate of expected inflation is the proper figure to use?

(A) Since estimating the rate of expected inflation presupposes careful economic analysis, lenders might derive indirect benefits from doing such an estimate.
(B) Since the contractual interest is future income to a prospective lender, it is more appropriate to adjust that income in terms of inflation expected for the future.
(C) The official rate of past inflation is a figure that depends on which commodities, in what proportions, determine the official price index.
(D) No official rate of past inflation is computed for any period shorter than a month.
(E) The rate of expected inflation will differ little from the rate of past inflation when inflation is steady.
36. A steady decline in annual airline-ticket sales is about to begin. More than half of the tickets sold last year were sold to the age group under thirty years of age, representing twenty-seven percent of the population. However, the number of individuals under thirty will steadily decline during the next decade.

Which of the following, if true, casts most doubt on the prediction above regarding future airline-ticket sales?

(A) Airline-ticket sales tend to increase as the work force increases, and the size of the work force will increase annually during the next decade.
(B) Many people gradually lose interest in traveling by air after they reach thirty years of age.
(C) Experts agree that people under thirty years of age will continue to account for more than half of the total number of tickets sold in each of the next ten years.
(D) Medical advances have lowered the death rates for those who are forty to sixty years of age.
(E) The number of airports has been increasing, and this trend is expected to continue during the next ten years.

For Questions 37-42

Three sizes of shirts --- small, medium, and large --- are stored in four sealed boxes. For each of the three sizes of shirts, there are exactly three boxes that contain that size. Four labels accurately reflecting the contents of the boxes were prepared. However, only two of the labels were placed on the correct boxes, and the other two labels were placed on the wrong boxes.

As a result, the boxes are labeled as follows:

Box 1 --- Small and medium
Box 2 --- Small and large
Box 3 --- Medium and large
Box 4 --- Small, medium, and large

37. If box 3 actually contains no small shirts, then which of the following must be true?

(A) Box 1 is correctly labeled.
(B) Box 2 is correctly labeled.
(C) Box 2 contains no medium-sized shirts.
(D) Box 1 contains no small shirts.
(E) Box 3 is correctly labeled.

38. If at least small and medium-sized shirts are known to be in box 4, then which of the following must be true?

(A) If box 1 contains only small and medium-sized shirts, box 2 contains small shirts.
(B) If box 1 contains at least small and medium-sized shirts, box 2 contains large shirts.
(C) If box 2 contains only small and medium-sized shirts, box 1 does not contain small shirts.
(D) If box 2 contains at least medium-sized and large shirts, box 4 does not contain large shirts.
(E) If box 3 contains at least small and large shirts, box 2 does not contain large shirts.
39. If box 1 and box 4 are the correctly labeled boxes, then which of the following must be true?

(A) Both box 1 and box 2 contain medium-sized shirts.
(B) Both box 1 and box 2 contain small shirts.
(C) Both box 1 and box 3 contain medium-sized shirts.
(D) Both box 2 and 3 contain small shirts.
(E) Both box 3 and 4 contain medium-sized shirts.

40. If box 1 and box 4 are mislabeled boxes, then which of the following must be true?

(A) Box 3 contains no large shirts.
(B) Box 2 contains some shirts of all three sizes.
(C) Box 3 contains some shirts of all three sizes.
(D) Box 3 contains no medium-sized shirts.
(E) Box 1 contains some shirts of all three sizes.

41. If box 1 is correctly labeled, then which of the following must be true?

(A) Box 4 contains some large shirts.
(B) Box 2 contains no medium-sized shirts.
(C) Box 2 contains no large shirts.
(D) Box 4 contains some small shirts.
(E) Box 2 contains no small shirts.

42. If box 4 actually contains no small shirts, then which of the following must be true?

(A) Box 3 is correctly labeled.
(B) Box 4 is correctly labeled.
(C) Box 3 is incorrectly labeled.
(D) Box 2 is incorrectly labeled.
(E) Box 1 is incorrectly labeled.

For Question 43-47

The editors of a journal that publishes three issues a year will devote the upcoming winter, spring, and fall issues — in that order — exclusively to articles written by seven authors: J, K, L, M, N, O, and P. Each of the seven authors will have at least one article published, but some may have more than one article published. The following restrictions apply to the publications of their articles:

- If an article by J appears in an issue, then an article by K must also appear in that issue.
- If an article by M appears in an issue, then an article by O must appear in the immediately preceding issue.
- An article by O cannot be published in an issue that contains an article by P.
- No author may publish in each of two consecutively published issues or twice in the same issue.
- Each of the issues being prepared must contain at least two articles.
- The seven authors’ articles can only appear in the upcoming winter, spring, and fall issues.

43. The winter issue of the journal can consist exclusively of articles by which of the following groups of authors?

(A) M and O
(B) J and L
(C) J, O, and P
(D) L, N, and O
(E) J, K, N, O, and P
44. If the fall issue consists exclusively of articles by K, L, and M, then the spring issue must have consisted of articles by which of the following groups of authors?

(A) N and O  
(B) J and P  
(C) K and O  
(D) J and N  
(E) N and P  

45. If the winter issue consists exclusively of articles by J and K, then the spring issue can consist exclusively of articles by which of the following groups of authors?

(A) J, O, and P  
(B) M and O  
(C) L and N  
(D) J, K, and P  
(E) L, O, and P  

46. Which of the following authors CANNOT contribute to the winter issue of the journal?

(A) L  
(B) M  
(C) O  
(D) N  
(E) P  

47. If the winter issue consists exclusively of articles by K, L, and P, then the fall issue must contain an article by which of the following authors?

(A) O  
(B) L  
(C) N  
(D) K  
(E) P  

48. The overall operating costs of many small farmers are reduced when the farmers eliminate expensive commercial chemical fertilizers and pesticides in favor of crop rotation and the twice-yearly use of manure as fertilizer. Therefore, large farmers should adopt the same measures. They will then realize even greater total savings than do the small farmers.

The argument above assumes that

(A) the smaller the farm, the more control the farmer has over operating costs  
(B) large farmers would not realize similar cost benefits by using treated sewage sludge instead of commercial chemical fertilizers  
(C) a sufficient amount of manure will be available for the fields of large farmers  
(D) large farmers generally look to small farmers for innovative ways of increasing crop yields or reducing operating costs  
(E) it is more cost-effective for small farmers to eliminate the use of commercial fertilizers and pesticides than it is for large farmers to do so.
49. The greater the division of labor in an economy, the greater the need for coordination. This is because increased division of labor entails a larger number of specialized producers, which results in a greater burden on managers and, potentially, in a greater number of disruptions of supply and production.

There is always more division of labor in market economies than planned economies.

If all of the statements above are true, then which of the following must also be true?

(A) Disruptions of supply and production are more frequent in planned economies than in market economies.
(B) The need for coordination in market economies is greater than in planned economies.
(C) There are more specialized producers in planned economies than in market economies.
(D) Division of labor functions more effectively in market economies than in planned economies.
(E) A manager’s task is easier in a market economy than in a planned economy.

50. Clay absorbs radiation with time, releasing it only when heated. By heating a clay pot and measuring the radiation it releases, experts can determine to within a century when the pot was last heated. The original firing of the finished pot might be the occasion of that most recent heating.

Experts who obtain the year A.D. 1450 as an estimate for a given pot using the method described above would thereby most seriously weaken any claim that the pot was made in

(A) A.D. 1000
(B) A.D. 1400
(C) A.D. 1450
(D) A.D. 1500
(E) A.D. 1900