

# GRE

## General Test

1990~1991

### 全真试题

(附答案)

**THE GRADUATE RECORD  
EXAMINATIONS**

**General Test**



*Do not break the seal  
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**G R E**

**General    Test**

**1990.10**



# SECTION I

Time—30 minutes

30 Questions

**Numbers:** All numbers used are real numbers.

**Figures:** Position of points, angles, regions, etc. can be assumed to be in the order shown; and angle measures can be assumed to be positive.

Lines shown as straight can be assumed to be straight.

Figures can be assumed to lie in a plane unless otherwise indicated.

Figures that accompany questions are intended to provide information useful in answering the questions. However, unless a note states that a figure is drawn to scale, you should solve these problems NOT by estimating sizes by sight or by measurement, but by using your knowledge of mathematics (see Example 2 below).

**Directions:** Each of the Questions 1-15 consists of two quantities, one in Column A and one in Column B. You are to compare the two quantities and choose

- A if the quantity in Column A is greater;
- B if the quantity in Column B is greater;
- C if the two quantities are equal;
- D if the relationship cannot be determined from the information given.

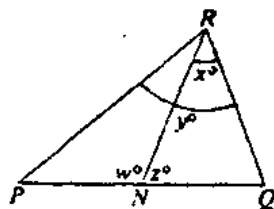
**Note:** Since there are only four choices, NEVER MARK (E).

**Common**

**Information:** In a question, information concerning one or both of the quantities to be compared is centered above the two columns. A symbol that appears in both columns represents the same thing in Column A as it does in Column B.

	Column A	Column B	Sample Answers
Example 1:	$2 \times 6$	$2 + 6$	<input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D <input type="radio"/> E

Examples 2-4 refer to  $\triangle PQR$ .

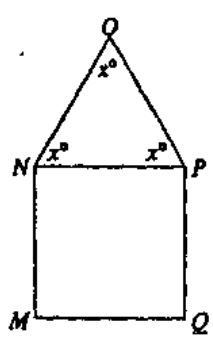


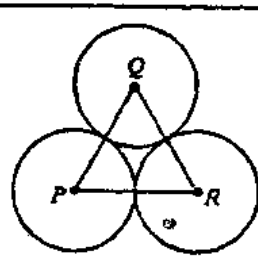
Example 2:	$PN$	$NQ$	<input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input checked="" type="radio"/> D <input type="radio"/> E (since equal measures cannot be assumed, even though $PN$ and $NQ$ appear equal)
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Example 3:	$x$	$y$	<input type="radio"/> A <input checked="" type="radio"/> B <input type="radio"/> C <input type="radio"/> D <input type="radio"/> E (since $N$ is between $P$ and $Q$ )
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Example 4:	$w + z$	$180$	<input type="radio"/> A <input type="radio"/> B <input checked="" type="radio"/> C <input type="radio"/> D <input type="radio"/> E (since $PQ$ is a straight line)
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- A if the quantity in Column A is greater;  
 B if the quantity in Column B is greater;  
 C if the two quantities are equal;  
 D if the relationship cannot be determined from the information given.

Column A	Column B
1. $3^4$	$4^3$
$x = 2y + 3$ $y = -2$	
2. $x$	$-1$
$d \approx 5.03894$ and $[d]$ is the decimal expression for $d$ rounded to the nearest thousandth.	
3. The number of decimal places where $d$ and $[d]$ differ	4
$x + 2y > 8$	
4. $2x + 4y$	20
 <p>Square <math>MNPQ</math> has area 36.</p>	
5. The perimeter of pentagon $MNOPQ$	30
$p$ and $q$ are different prime numbers. $r$ is the least prime number greater than $p$ , and $s$ is the least prime number greater than $q$ .	
6. $r - p$	$s - q$

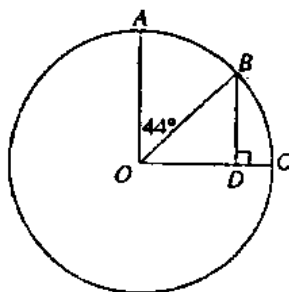
Column A	Column B
$ -3  = -m$	
7. $m$	$n$ is an even integer and a multiple of 3.
8. The remainder when $n$ is divided by 12	6
 <p>Equilateral triangle <math>PQR</math> is formed by joining centers <math>P</math>, <math>Q</math>, and <math>R</math> of the circles. Each pair of circles has exactly one point in common.</p>	
9. The perimeter of triangle $PQR$	The circumference of the circle with center $Q$
10. The volume of a cylindrical tank that has a radius of 2 meters and a height of 10 meters	The volume of a cylindrical tank that has a radius of 1 meter and a height of 20 meters

GO ON TO THE NEXT PAGE.

- A if the quantity in Column A is greater;  
 B if the quantity in Column B is greater;  
 C if the two quantities are equal;  
 D if the relationship cannot be determined from the information given.

Column A	Column B
$ds \neq 0$	
11. The time required to travel $d$ miles at $s$ miles per hour	The time required to travel $\frac{d}{2}$ miles at $2s$ miles per hour
$\triangle RST$ is isosceles and $\angle RST = 40^\circ$	
12. The sum of the measures of the two angles of $\triangle RST$ that have equal measure	$120^\circ$
13. $\sqrt{x^4 + 6x^2 + 9}$	$x^2 + 3$

Column A	Column B
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$O$  is the center of the circle and  $\angle AOC$  is a right angle.

14.	$OD$	$BD$
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Before Maria changed jobs, her salary was 24 percent more than Julio's salary. After Maria changed jobs, her new salary was 24 percent less than her old salary.

15.	Julio's salary	Maria's new salary
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GO ON TO THE NEXT PAGE.



Directions: Each of the Questions 16-30 has five answer choices. For each of these questions, select the best of the answer choices given.

16.  $(19 - 18 - 17 - 16) - (20 - 19 - 18 - 17) =$

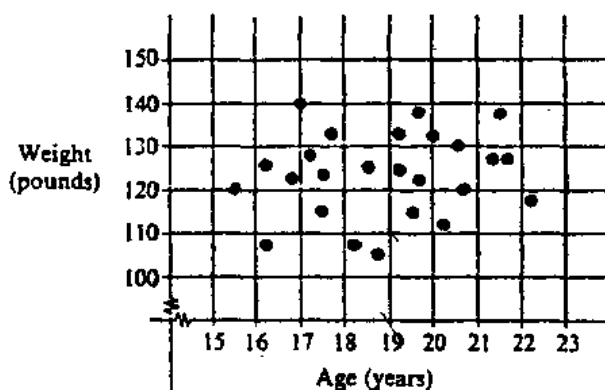
- (A) -36
- (B) -6
- (C) -4
- (D) 1
- (E) 2

17. If  $3x - 2 = 7$ , then  $4x =$

- (A) 3
- (B) 5
- (C)  $\frac{20}{3}$
- (D) 9
- (E) 12

18. Of the following, which is closest to  $\sqrt[3]{30}$ ?

- (A) 6
- (B) 5
- (C) 4
- (D) 3
- (E) 2



19. The dots on the graph above indicate age and weight for a sample of 25 students. What percent of these students are less than 19 years old and weigh more than 110 pounds?

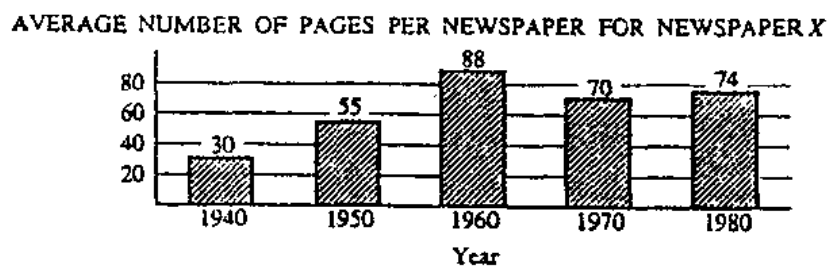
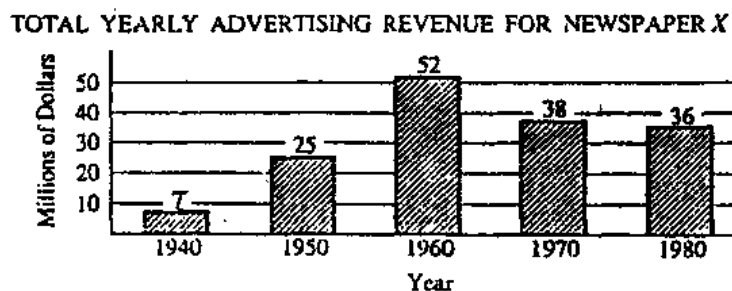
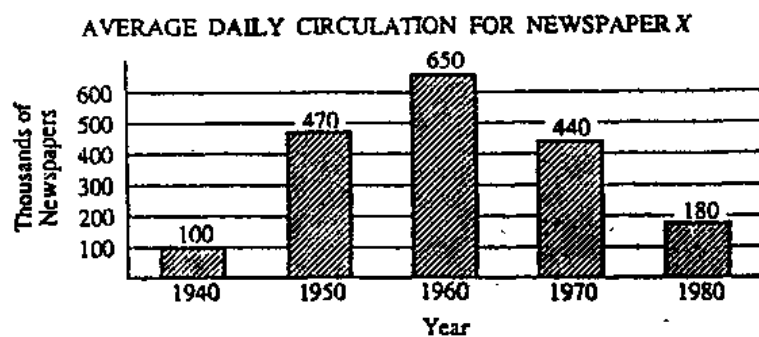
- (A) 36%
- (B) 40%
- (C) 44%
- (D) 48%
- (E) 52%

20. The greatest number of diagonals that can be drawn from one vertex of a regular 6-sided polygon is

- (A) 2
- (B) 3
- (C) 4
- (D) 5
- (E) 6

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Questions 21-25 refer to the following graphs.



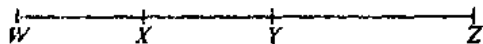
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21. In how many of the years shown was the average number of pages per newspaper at least twice as much as the average in 1940?
- (A) Four  
(B) Three  
(C) Two  
(D) One  
(E) None
22. In 1950, if the printing cost per newspaper was \$0.05, what would have been the total cost of printing the average daily circulation?
- (A) \$32,500  
(B) \$26,000  
(C) \$23,500  
(D) \$22,000  
(E) \$2,600
23. In 1980 the number of dollars of advertising revenue was how many times as great as the average daily circulation?
- (A) 500  
(B) 200  
(C) 100  
(D) 50  
(E) 20
24. The percent decrease in average daily circulation from 1960 to 1970 was approximately
- (A) 10%  
(B) 12%  
(C) 20%  
(D) 26%  
(E) 32%
25. Which of the following statements can be inferred from the data?
- I. The greatest increase in total yearly advertising revenue over any 10-year period shown was \$27 million.  
II. In each of the 10-year periods shown in which yearly advertising revenue decreased, average daily circulation also decreased.  
III. From 1970 to 1980 the average number of pages per newspaper increased by 10.
- (A) I only  
(B) II only  
(C) III only  
(D) I and II  
(E) II and III

GO ON TO THE NEXT PAGE.

26. If  $0 < st < 1$ , then which of the following can be true?

(A)  $s < -1$  and  $t > 0$   
 (B)  $s < -1$  and  $t < -1$   
 (C)  $s > -1$  and  $t < -1$   
 (D)  $s > 1$  and  $t < -1$   
 (E)  $s > 1$  and  $t > 1$



27. On segment  $WZ$  above, if  $WY = 21$ ,  $XZ = 26$ , and  $YZ$  is twice  $WX$ , what is the value of  $XY$ ?

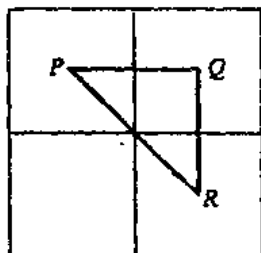
(A) 5  
 (B) 10  
 (C) 11  
 (D) 16  
 (E) It cannot be determined from the information given.

28. To reproduce an old photograph, a photographer charges  $x$  dollars to make a negative,  $\frac{3x}{5}$  dollars for each of the first 10 prints, and  $\frac{x}{5}$  dollars for each print in excess of 10 prints. If \$45 is the total charge to make a negative and 20 prints from an old photograph, what is the value of  $x$ ?

(A) 3  
 (B) 3.5  
 (C) 4  
 (D) 4.5  
 (E) 5

29. Which of the following is equal to  $\frac{1}{4}$  of 0.01 percent?

(A) 0.000025  
 (B) 0.00025  
 (C) 0.0025  
 (D) 0.025  
 (E) 0.25



30. In the figure above, each of the four squares has sides of length  $x$ . If  $\triangle PQR$  is formed by joining the centers of three of the squares, what is the perimeter of  $\triangle PQR$  in terms of  $x$ ?

(A)  $2x\sqrt{2}$   
 (B)  $\frac{x\sqrt{2}}{2} + x$   
 (C)  $2x + \sqrt{2}$   
 (D)  $x\sqrt{2} + 2$   
 (E)  $2x + x\sqrt{2}$

**STOP**

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY.  
 DO NOT TURN TO ANY OTHER SECTION IN THE TEST.

## SECTION 2

Time—30 minutes

25 Questions

**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.

### Questions 1-7

In a game, exactly six inverted cups stand side by side in a straight line, and each has exactly one ball hidden under it. The cups are numbered consecutively 1 through 6. Each of the balls is painted a single solid color. The colors of the balls are green, magenta, orange, purple, red, and yellow. The balls have been hidden under the cups in a manner that conforms to the following conditions:

The purple ball must be hidden under a lower-numbered cup than the orange ball.

The red ball must be hidden under a cup immediately adjacent to the cup under which the magenta ball is hidden.

The green ball must be hidden under cup 5.

1. Which of the following could be the colors of the balls under the cups, in order from 1 through 6?
  - (A) Green, yellow, magenta, red, purple, orange
  - (B) Magenta, green, purple, red, orange, yellow
  - ✓ (C) Magenta, red, purple, yellow, green, orange
  - (D) Orange, yellow, red, magenta, green, purple
  - (E) Red, purple, magenta, yellow, green, orange
2. If the magenta ball is under cup 4, the red ball must be under cup
  - (A) 1
  - (B) 2
  - (C) 3
  - (D) 5
  - (E) 6
3. A ball of which of the following colors could be under cup 6?
  - (A) Green
  - (B) Magenta
  - (C) Purple
  - (D) Red
  - (E) Yellow
4. If the purple ball is under cup 4, the orange ball must be under cup
  - (A) 1
  - (B) 2
  - (C) 3
  - (D) 5
  - (E) 6
5. Which of the following must be true?
  - (A) The green ball is under a lower-numbered cup than the yellow ball.
  - (B) The orange ball is under a lower-numbered cup than the green ball.
  - (C) The purple ball is under a lower-numbered cup than the green ball.
  - (D) The purple ball is under a lower-numbered cup than the red ball.
  - (E) The red ball is under a lower-numbered cup than the yellow ball.
6. If the orange ball is under cup 2, balls of which of the following colors could be under cups immediately adjacent to each other?
  - (A) Green and magenta
  - (B) Green and purple
  - (C) Orange and yellow
  - (D) Purple and red
  - (E) Red and yellow
7. If the magenta ball is under cup 1, balls of which of the following colors must be under cups immediately adjacent to each other?
  - (A) Green and orange
  - (B) Green and yellow
  - (C) Purple and red
  - (D) Purple and yellow
  - (E) Red and yellow

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8. The company should not be held responsible for failing to correct the control-panel problem that caused the accident. Although the problem had been mentioned earlier in a safety inspector's report, companies receive hundreds of reports of such problems, and Industry Standard No. 42 requires action on these problems only when an accident is foreseeable.

If the second sentence in the paragraph above is factually correct, the answer to which of the following questions is most relevant in helping to determine whether or not the company violated Industry Standard No. 42 when it failed to correct the control-panel problem?

- (A) Was the accident serious?
  - (B) Was the control-panel problem of a type that is known to indicate that an accident is likely?
  - (C) Since the accident, has the company done a special safety check on all control panels?
  - (D) Did the safety inspector mention more than one problem in the same report?
  - (E) How long was the control panel in use before the problem was discovered?
9. Riothamus, a fifth-century king of the Britons, was betrayed by an associate, fought bravely against the Goths but was defeated, and disappeared mysteriously. Riothamus' activities, and only those of Riothamus, match almost exactly those attributed to King Arthur. Therefore, Riothamus must be the historical model for the legendary King Arthur.

The argument above requires at least one additional premise. Which of the following could be such a required premise?

- (A) Modern historians have documented the activities of Riothamus better than those of any other fifth-century king.
- (B) The stories told about King Arthur are not strictly fictitious but are based on a historical person and historical events.
- (C) Riothamus' associates were the authors of the original legends about King Arthur.
- (D) Legends about the fifth century usually embellish and romanticize the actual conditions of the lives of fifth-century nobility.
- (E) Posterity usually remembers legends better than it remembers the actual historical events on which they are based.

10. A worldwide ban on the production of certain ozone-destroying chemicals would provide only an illusion of protection. Quantities of such chemicals, already produced, exist as coolants in millions of refrigerators. When they reach the ozone layer in the atmosphere, their action cannot be halted. So there is no way to prevent these chemicals from damaging the ozone layer further.

Which of the following, if true, most seriously weakens the argument above?

- (A) It is impossible to measure with accuracy the quantity of ozone-destroying chemicals that exist as coolants in refrigerators.
- (B) In modern societies, refrigeration of food is necessary to prevent unhealthy and potentially life-threatening conditions.
- (C) Replacement chemicals that will not destroy ozone have not yet been developed and would be more expensive than the chemicals now used as coolants in refrigerators.
- (D) Even if people should give up the use of refrigeration, the coolants already in existing refrigerators are a threat to atmospheric ozone.
- (E) The coolants in refrigerators can be fully recovered at the end of the useful life of the refrigerators and reused.

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Questions 11-15

A government is assigning each of six embassy office workers—Farr, Golden, Hayakawa, Inserra, Jones, and Kovacs—to embassies. There are four embassies. Embassies L and M are located in countries with dry climates, whereas embassies P and T are located in countries with humid climates. The office workers must be assigned according to the following rules:

- Each embassy must have at least one of the workers assigned to it.
- At least one embassy in a humid climate must have at least two workers assigned to it.
- Golden cannot be assigned to the same embassy as Kovacs.
- Inserra must be assigned to an embassy in a dry climate.
- Jones must be assigned to an embassy in a humid climate.

11. Which of the following is an acceptable assignment of the workers to the embassies?

<u>L</u>	<u>M</u>	<u>P</u>	<u>T</u>
(A) Farr, Golden	Inserra, Kovacs	Hayakawa	Jones
(B) Golden, Kovacs	Inserra	Jones	Farr, Hayakawa
(C) Golden	Farr, Inserra	Kovacs	Jones, Hayakawa
(D) Jones	Golden, Inserra	Hayakawa	Farr, Kovacs
(E) Kovacs	Farr, Hayakawa	Inserra	Golden, Jones

12. Which of the following must be assigned either to embassy L or to embassy M?

- (A) Farr
- (B) Golden
- (C) Hayakawa
- (D) Inserra
- (E) Kovacs

13. Which of the following CANNOT be true?

- (A) One worker is assigned to L.
- (B) Two workers are assigned to P.
- (C) Two workers are assigned to L.
- (D) Three workers are assigned to M.
- (E) Three workers are assigned to T.

14. If Golden and Kovacs are assigned to L and M, respectively, which of the following must be true?

- (A) Farr is assigned to either P or T.
- (B) Inserra is assigned to either P or T.
- (C) P and T each have two workers assigned to them.
- (D) Hayakawa is assigned to L.
- (E) Hayakawa is assigned to T.

15. If Golden, Hayakawa, and Kovacs are among the workers assigned to embassies in humid climates, which of the following must be true?

- (A) Farr is assigned to an embassy to which none of the other five office workers is assigned.
- (B) Golden is assigned to an embassy to which none of the other five office workers is assigned.
- (C) Jones is assigned to the same embassy as Kovacs.
- (D) Hayakawa is assigned to the same embassy as Golden.
- (E) Hayakawa is assigned to the same embassy as Kovacs.

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Questions 16-19

A volunteer uses a truck to pick up donations of unsold food and clothing from stores and to deliver them to locations where they can be distributed. He drives only along a certain network of roads.

In the network there are two-way roads connecting each of the following pairs of points: 1 with 2, 1 with 3, 1 with 5, 2 with 6, 3 with 7, 5 with 6, and 6 with 7. There are also one-way roads going from 2 to 4, from 3 to 2, and from 4 to 3. There are no other roads in the network, and the roads in the network do not intersect.

To make a trip involving pickups and deliveries, the volunteer always takes a route that for the whole trip passes through the fewest of the points 1 through 7, counting a point twice if the volunteer passes through it twice.

The volunteer's home is at point 3. Donations can be picked up at a supermarket at point 1, a clothing store at point 5, and a bakery at point 4. Deliveries can be made as needed to a tutoring center at point 2, a distribution center at point 6, and a shelter at point 7.

16. If the volunteer starts at the supermarket and next is to go to the shelter, the first intermediate point his route passes through must be
- (A) 2  
(B) 3  
(C) 5  
(D) 6  
(E) 7
17. If, starting from home, the volunteer next is to make pickups for the shelter at the supermarket and the bakery (in either order), the first two intermediate points on his route, beginning with the first, must be
- (A) 1 and 2  
(B) 1 and 3  
(C) 2 and 1  
(D) 2 and 4  
(E) 4 and 2
18. If, starting from the clothing store, the volunteer next is to pick up bread at either the supermarket or the bakery (whichever stop makes his route go through the fewest of the points) and then is to go to the shelter, the first two points he reaches after the clothing store, beginning with the first, must be
- (A) 1 and 2  
(B) 1 and 3  
(C) 4 and 2  
(D) 6 and 2  
(E) 6 and 4
19. If the volunteer is to make a trip starting at the shelter, next going to the bakery for a pickup, and then ending at the distribution center, the first two intermediate points on his route, beginning with the first, can be
- (A) 3 and 1  
(B) 3 and 4  
(C) 4 and 2  
(D) 6 and 2  
(E) 6 and 5

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Questions 20-22

A developer is planning to build a housing complex on an empty tract of land. Exactly seven different styles of houses—Q, R, S, T, W, X, and Z—will be built in the complex. The complex will contain several blocks, and the developer plans to put houses of at least three different styles on each block. The developer will build the complex according to the following rules:

Any block that has style Z on it must also have style W on it.

Any block adjacent to one that has on it both style S and style X must have on it style T and style Z.

No block adjacent to one that has on it both style R and style Z can have on it either style T or style W.

No block can have on it both style S and style Q.

20. Which of the following can be the complete selection of house styles on a block?
- (A) Q, R, S  
(B) Q, S, X  
(C) R, T, Z  
(D) S, W, Z  
(E) T, X, Z
21. Which of the following house styles must be on a block that is adjacent to one that has on it only styles S, T, W, X, and Z?
- (A) Q  
(B) R  
(C) S  
(D) W  
(E) X
22. Which of the following can be the complete selection of house styles for a block that is adjacent to exactly one block, if that one block has on it styles S, T, W, and X only?
- (A) S, T, and X  
(B) T, X, and Z  
(C) R, S, X, and Z  
(D) S, T, W, and X  
(E) T, W, X, and Z
23. When an osprey (a fish-eating hawk) returns from fishing to its nesting area with a fish like an alewife, a pollack, or a smelt, other ospreys will retrace its flight path in hopes of good fishing. There is seldom such a response if the first bird brings back a winter flounder. Yet ospreys feed on winter flounder just as readily as on any other fish.
- Which of the following, if true, contributes most to an explanation of the fishing behavior of ospreys as it is described above?
- (A) Ospreys are seldom able to catch alewives, pollack, or smelt.  
(B) Alewives, pollack, and smelt move in schools, but winter flounder do not.  
(C) Winter flounder prefer shallower waters than do alewives, pollack, or smelt.  
(D) Winter flounder and pollack exhibit protective coloration, but alewives and smelt do not.  
(E) Ospreys that live in nesting areas are especially successful fishers.

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