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

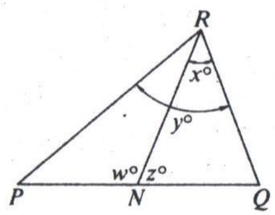
A if the quantity in Column A is greater;
B if the quantity in Column B is greater;
C if the two quantities are equal;
D if the relationship cannot be determined from the information given.

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:	2×6	$2 + 6$	● Ⓑ Ⓒ Ⓓ Ⓔ

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



Example 2:	PN	NQ	Ⓐ Ⓑ Ⓒ ● Ⓔ

(since equal measures cannot be assumed, even though PN and NQ appear equal)

Example 3:	x	y	Ⓐ ● Ⓒ Ⓓ Ⓔ

(since N is between P and Q)

Example 4:	$w + z$	180	Ⓐ Ⓑ ● Ⓓ Ⓔ

(since PQ is a straight line)

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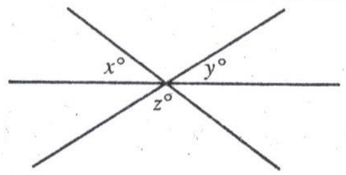
A if the quantity in Column A is greater;
B if the quantity in Column B is greater;
C if the two quantities are equal;
D if the relationship cannot be determined from the information given.

	Column A	Column B
1.	$5[(2 + 2) + 5]$	50
2.	$j - k = 2$ $k - 6 = 4$ j	10

Richard's salary, which is greater than \$10,000, is 75 percent of Sandra's salary. Ted's salary is 80 percent of Richard's salary.

3.	Sandra's salary	Ted's salary
4.	$\frac{5}{3} \times 0.60$	1



5.	$x + y$	$180 - z$

On a trip, Marie drove 200 miles in 5 hours using gasoline that cost her \$1.49 per gallon.

6.	Marie's average speed for the trip in miles per hour	Marie's gas mileage for the trip in miles per gallon
7.	$\sqrt{100 + 36}$	16

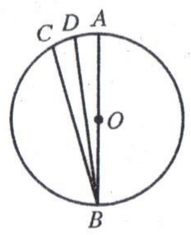
The average (arithmetic mean) of 12 and 20 is equal to the average (arithmetic mean) of 15 and x.

8.	x	16

The total surface area of cube C equals 150.

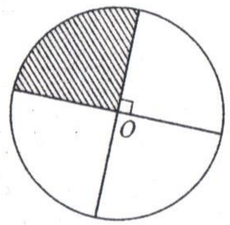
9.	The length of one edge of cube C	4.5
10.	$x + 32y$	$32x + y$

	Column A	Column B



O is the center of the circle.

11.	AB	The average (arithmetic mean) of CB and DB
12.	$(x - 1)(x + 1)$	x^2



The circle has center O and radius 1.

13.	The area of the shaded region	$\frac{\pi}{2}$

The sum of the lengths of two sides of isosceles triangle K is 7. K has a side of length 4.

14.	The perimeter of K	11

S is the set of all fractions of the form $\frac{n}{n+1}$, where n is a positive integer less than 20.

15.	The product of all the fractions that are in S	$\frac{1}{20}$

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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. $\frac{5}{\frac{5}{4}} =$

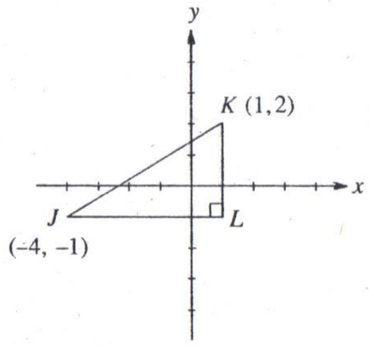
(A) $\frac{1}{5}$
(B) $\frac{1}{4}$
(C) 4
(D) 5
(E) $\frac{25}{4}$

17. A 12-inch ruler is marked off in sixteenths of an inch. What is the distance, in inches, from the zero mark to the 111th mark after the zero mark?

(A) $6\frac{1}{4}$
(B) $6\frac{15}{16}$
(C) $7\frac{3}{4}$
(D) $9\frac{1}{4}$
(E) $11\frac{1}{16}$

18. If $(2x - 1)^2 = 0$, then $x =$

(A) $-\frac{1}{4}$
(B) $-\frac{1}{2}$
(C) 0
(D) $\frac{1}{2}$
(E) $\frac{1}{4}$



19. In the figure above, if JL and KL are parallel to the x and y axes, respectively, what is the area of $\triangle JKL$?

(A) 4.5
(B) 5
(C) 7.5
(D) 8
(E) 15

20. Which of the following is equal to 25,000,000?

(A) 25×10^7
(B) 2.5×10^{-7}
(C) $(2 \times 10^6) + (5 \times 10^5)$
(D) $(20 \times 10^{-7}) + (5 \times 10^{-6})$
(E) $(2 \times 10^7) + (5 \times 10^6)$

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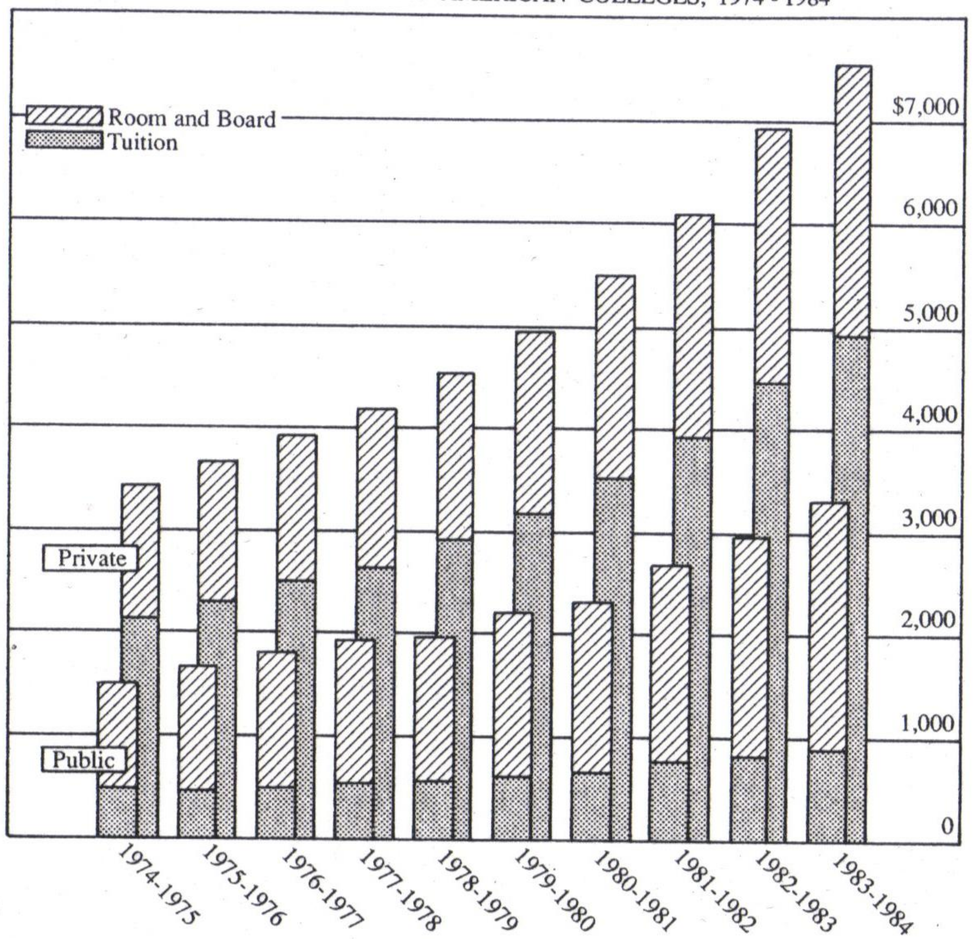
Questions 21-25 refer to the following graph. In these questions, all references to *charges* should be interpreted as the *average annual charges* shown on the graph.

AVERAGE ANNUAL TOTAL CHARGES* FOR UNDERGRADUATE TUITION, ROOM, AND BOARD AT AMERICAN COLLEGES, 1974 - 1984



*The total charge consists of room, board, and tuition.

Note: Drawn to scale.

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21. In which school year shown was the total charge for undergraduate tuition, room, and board at public colleges most nearly equal to $3,000 ?

(A) 1983-1984
(B) 1982-1983
(C) 1981-1982
(D) 1980-1981
(E) 1979-1980

22. Which of the following charges increased by less than $1,000 from the first to the last of the ten years represented on the graph?

(A) Tuition at public colleges
(B) Room and board at public colleges
(C) Total charge at public colleges
(D) Tuition at private colleges
(E) Total charge at private colleges

23. For how many of the school years shown was the total charge at private colleges at least $3,000 more than the total charge at public colleges?

(A) Two
(B) Three
(C) Four
(D) Five
(E) Six

24. In the 1978-1979 school year, the ratio of the total charge at private colleges to the total charge at public colleges was closest to

(A) $\frac{5}{3}$
(B) $\frac{9}{5}$
(C) $\frac{2}{1}$
(D) $\frac{9}{4}$
(E) $\frac{3}{1}$

25. For the school year in which the charge for room and board at public colleges was most nearly equal to $2,000, what was the approximate charge for tuition at private colleges?

(A) $750
(B) $3,500
(C) $3,900
(D) $4,500
(E) $4,900

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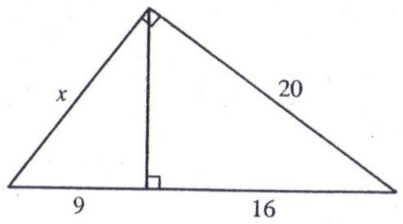


26. What is the value of x in the figure above?

(A) 12
(B) 12.5
(C) 15
(D) $9\sqrt{3}$
(E) 18

27. The number 10^{30} is divisible by all of the following EXCEPT

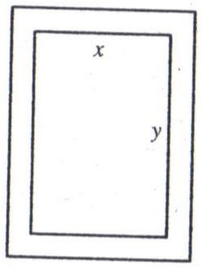
(A) 250
(B) 125
(C) 32
(D) 16
(E) 6

28. If $3x + 1$ represents an odd integer, which of the following represents the next larger odd integer?

(A) $3(x + 1)$
(B) $3(x + 2)$
(C) $3(x + 3)$
(D) $3x + 2$
(E) $3(x + 2) + 1$

29. In the sequence of numbers x_1, x_2, x_3, x_4, x_5, each number after the first is twice the preceding number. If $x_5 - x_1$ is 20, what is the value of x_1?

(A) $\frac{4}{3}$
(B) $\frac{5}{4}$
(C) 2
(D) $\frac{5}{2}$
(E) 4



30. The rectangular garden represented in the figure above, with dimensions x feet by y feet, is surrounded by a walkway 2 feet wide. Which of the following represents the area of the walkway, in square feet?

(A) $2x + 2y + 4$
(B) $2x + 2y + 16$
(C) $4x + 4y + 8$
(D) $4x + 4y + 16$
(E) $4x + 4y + 32$