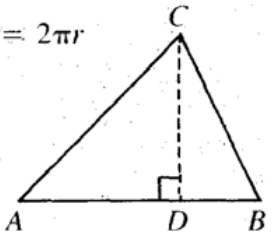
SECTION 2 **Time—50 minutes**
50 Questions

In this section solve each problem, using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding circle on the answer sheet.

The following information is for your reference in solving some of the problems.

Circle of radius r: Area $= \pi r^2$ Circumference $= 2\pi r$
The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.



Triangle: The sum of the measures in degrees of the angles of a triangle is 180.

Definitions of symbols:

$=$ is equal to	$\leqq$ is less than or equal to
$\neq$ is unequal to	$\geqq$ is greater than or equal to
$<$ is less than	$\parallel$ is parallel to
$>$ is greater than	$\perp$ is perpendicular to

If $\angle CDA$ is a right angle, then

(1) area of $\triangle ABC = \dfrac{AB \times CD}{2}$

(2) $AC^2 = AD^2 + DC^2$

Note: Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that its figure is not drawn to scale. All figures lie in a plane unless otherwise indicated. All numbers used are real numbers.

1. How much is $\frac{1}{2}$ of $\frac{x}{2}$?

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

2. $3 + \frac{3}{0.3}$ equals

(A) 10 (B) 13 (C) 33 (D) 40 (E) 44

3. Which of the following is the closest value of $\frac{42.10 \times 0.0003}{0.002}$?

(A) 0.0063 (B) 0.063 (C) 0.63 (D) 6.3 (E) 63

4. What percent of 7.5 is 0.075?

(A) 0.001% (B) 0.01% (C) 0.1% (D) 1% (E) 10%

5. How many 5-gallon cans of milk will be needed to fill 120 pint containers?

(A) 3 (B) 6 (C) 9 (D) 15 (E) 40

6. In a graduating class having the same number of boys and girls, the guidance counselor finds that $\frac{1}{2}$ the boys and $\frac{1}{3}$ of the girls are going to college. What percent of the class is going to college?

(A) 33.3% (B) 41.7% (C) 58.3% (D) 66% (E) 83.3%

7. The first of four afternoon classes begins at 1 P.M. The last class ends at 3:52 P.M. Allowing 4 minutes between classes, how many minutes are there in each class period?

(A) 39 (B) 40 (C) 45 (D) 59 (E) 60

8. All of the following are equal EXCEPT

(A) $1 + \frac{x}{y}$ (B) $\frac{xy + x^2}{x^2}$ (C) $\frac{y^2 + xy}{xy}$

(D) $\frac{y}{x} + 1$ (E) $\frac{x + y}{x}$

9. A group of soldiers forms a solid square with s soldiers on a side. If 56 soldiers are released, the remaining soldiers form a square with $(s - 2)$ soldiers on a side. What is the value of s?

(A) 5 (B) 10 (C) 15 (D) 20 (E) 25

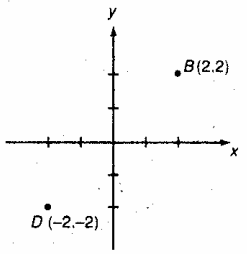
10. $2x + t = 2$
$t =$

(A) x (B) $x - 1$ (C) $2x - 2$ (D) $2 - 2x$ (E) $1 - x$

11. The accompanying figure shows two vertices of square $ABCD$. Which of the following could be the coordinates of vertex C?

I. $(2, -2)$
II. $(4, -4)$
III. $(-2, 2)$

(A) I only (B) II only (C) I and II only (D) I and III only (E) II and III only



12. The base of a rectangle is 20, which is twice its height. What part of the perimeter is the height?

(A) $\frac{1}{12}$ (B) $\frac{1}{6}$ (C) $\frac{1}{4}$ (D) $\frac{1}{3}$ (E) $\frac{5}{6}$

13. By allowing a discount of 30% on an article formerly selling for \$150 a dealer finds he is making a profit of 5% of his cost. His cost was

(A) \$52.50 (B) \$98.50 (C) \$100.00
(D) \$105.00 (E) \$142.50

14. A grocer paid \$2600 for a secondhand delivery truck. At the end of $4\frac{1}{2}$ years he was allowed \$440 for it toward the purchase of a new truck. What was the average yearly amount of depreciation?

(A) \$220 (B) \$450 (C) \$480 (D) \$550
(E) \$2200

15. A diamond ring valued at \$7000 was insured at 80% of its value. What was the premium, if the rate was \$6 per \$1000?

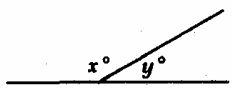
(A) \$3.36 (B) \$4.20 (C) \$33.60
(D) \$42.00 (E) \$336.00

Questions 16-32 each consist of two quantities, one in Column A and one in Column B. You are to compare the two quantities and on the answer sheet fill in circle

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.

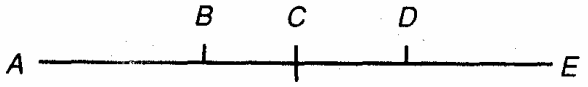
Notes:
1. In certain questions, information concerning one or both of the quantities to be compared is centered above the two columns.
2. In a given question, a symbol that appears in both columns represents the same thing in Column A as it does in Column B.
3. Letters such as x, n, and k stand for real numbers.

EXAMPLES

	Column A	Column B	Answers
E1.	2×6	$2 + 6$	● Ⓑ Ⓒ Ⓓ
E2.	 $180 - x$	y	Ⓐ Ⓑ ● Ⓓ
E3.	$p - q$	$q + p$	Ⓐ Ⓑ Ⓒ ●

	Column A	Column B
	In the state lottery 10% of the 2000 tickets sold won prizes ranging from \$1.00 to \$1000. Florence bought 20 tickets.	
16.	Number of winnning tickets held by Florence	One winning ticket
	$A > B$ $B > C$	
17.	$B + C$	$2A$
	$a = 3$ and $b = 2$	
18.	$\dfrac{\frac{1}{ab}}{\frac{1}{a} + \frac{1}{b}}$	$\dfrac{1}{a + b}$
19.	30%	$\frac{0.9}{2}$
20.	$\dfrac{9x - 13}{8y - 7}$	$\dfrac{13 - 9x}{7 - 8y}$
	$0 < a < b < c$	
21.	$\frac{c}{a}$	$\frac{c}{b}$
22.	The percent increase from 50¢ to 70¢	The percent increase from 70¢ to 90¢

	COLUMN A	COLUMN B
	Mark, Philip, and Michael have a total of \$35. Mark and Philip have the same amount of money.	
23.	The amount of money Michael has.	The amount of money Philip has.
	The diameter of the bicycle wheel is $\frac{7}{\pi}$ feet.	
24.	The number of revolutions made when going 70 feet	10 revolutions



	C is the midpoint of AE. $AB = 90$ and $DE = 85$	
25.	BC	CD
	$x = 2^2$	
26.	x^2	4
	In $\triangle ABC$, the measure of $\angle A$ is 86° and the measure of $\angle C$ is 66°.	
27.	Length of side AC	Length of side AB
	$x > 0$	
28.	$\frac{x+6}{8}$	$\frac{x+3}{4}$
	In $\triangle ABC$ $AB = 4$ and $BC = 9$	
29.	Area of ABC	18
	In $\triangle ABC$ $\angle A° = 48°$ $\angle B° = 72°$	
30.	Length of side AB	Length of side AC
	$\frac{x}{28} = \frac{2}{14}$ $\frac{y}{12} = \frac{1}{3}$	
31.	x	y
32.	$\frac{7}{8}$	$\frac{6}{7}$

Solve each of the remaining problems in this section using any available space for scratchwork. Then decide which is the best of the choices given and fill in the corresponding circle on the answer sheet.

33. In distributing milk at a summer camp it is found that a quart of milk will fill either 3 large glass tumblers or 5 small glass tumblers. How many small glass tumblers can be filled with one large glass tumbler?
(A) $\frac{3}{5}$ (B) $1\frac{2}{3}$ (C) $1\frac{2}{5}$ (D) 2 (E) $2\frac{1}{3}$

34. A can of food feeds 3 kittens or 2 dogs. If I have 8 cans of food and I feed 12 kittens, how many dogs can I feed?
(A) 2 (B) 4 (C) 8 (D) 12 (E) 18

35. At 3:55 P.M. a student begins to do her homework which would take three hours to complete. At 4:15 P.M. she is interrupted by a telephone call and does not resume work. What part of her homework is left uncompleted?
(A) $\frac{1}{9}$ (B) $\frac{2}{9}$ (C) $\frac{1}{3}$ (D) $\frac{2}{3}$ (E) $\frac{8}{9}$

36. How many one-inch cubes can be put in a box 5 inches wide, 5 inches long, and 5 inches deep?
(A) 5 (B) 10 (C) 15 (D) 25 (E) 125

37. How much more is $x - 2$ than 2?
(A) $-x$ (B) $x - 4$ (C) x (D) $2 - x$ (E) 0

38. A broad jumper makes an average standing jump of 8 feet. In how many jumps will he cover y yards?
(A) $\frac{3y}{8}$ (B) $\frac{8}{3y}$ (C) $24y$ (D) $\frac{1}{24y}$ (E) $\frac{24}{y}$

39. James is 30 years old and John is 3 years old. James will be five times as old as John in
(A) $3\frac{3}{4}$ years (B) $6\frac{1}{2}$ years (C) $11\frac{1}{4}$ years
(D) 37 years (E) 38 years

40. A solid block $1' \times 2' \times 3'$ weighs 4 pounds. What is the weight (in pounds) of a solid block of the same material $5' \times 6' \times 7'$?
(A) 8 (B) 35 (C) 70 (D) 140 (E) 315

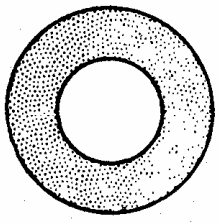
41. Mrs. Lehman finds that her tax bill increased from \$2500 to \$3000. The percent increase is
(A) 5% (B) 10% (C) $16\frac{2}{3}\%$ (D) 20%
(E) 25%

42. Mr. Liebow received 10 crates of fruit for which he paid \$90. He finds that one crate is not suitable for sale because of spoilage. At what price should he sell each of the other crates in order to realize a 20% profit on the total cost?
(A) \$1.80 (B) \$3.00 (C) \$10.80
(D) \$12.00 (E) \$18.00

43. At 10 A.M. water begins to pour into a cylindrical can 14 inches high and 4 inches in diameter at the rate of 8 cubic inches every 10 minutes. At what time will it begin to overflow? $\left(\text{Use } \pi = \frac{22}{7}.\right)$

(A) 10:10 A.M. (B) 11:40 A.M. (C) 12:40 A.M. (D) 1:40 P.M. (E) 2:40 A.M.

44. The width of the ring (shaded portion of the figure) is exactly equal to the radius of the inner circle. What percent of the entire area is the area of the shaded portion?

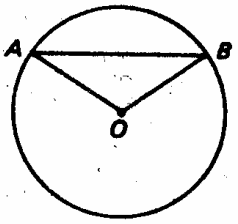


(A) 25% (B) $33\frac{1}{3}\%$ (C) 50% (D) $66\frac{2}{3}\%$ (E) 75%

45. Mr. Adams has a circular flower bed whose diameter is 4 feet. He wishes to increase the size of his bed so that it will have four times as much planting area. What must be the diameter of the new bed?

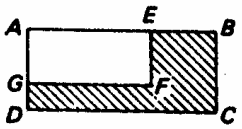
(A) 6 ft. (B) 8 ft. (C) 10 ft. (D) 12 ft. (E) 16 ft.

46. In circle O, $OA = 4$, and $\overset{\frown}{AB} = 112°$. What is the measure of $\angle ABO$?



(A) 22° (B) 34° (C) 44° (D) 45° (E) 68°

47. The length and width of a rectangle are each $\frac{2}{3}$ of the corresponding parts of $ABCD$. $AEB = 12$, $AGD = 6$. The area of the shaded part is



(A) 24 (B) 32 (C) 36 (D) 40 (E) 48

48. An altitude h of a triangle is twice the base to which it is drawn. If the area of the triangle is 225 square inches, then altitude h is

(A) 15 in. (B) 20 in. (C) 25 in. (D) 30 in. (E) 35 in.

49. John's home is 6.3 miles due north of the community center. Dick's home is 5.5 miles due east of it. Find, to the nearest tenth of a mile, the shortest distance between their homes.

(A) 5.9 (B) 8.3 (C) 8.4 (D) 10.8 (E) 11.8

50. If the perimeter of a square is increased by 80%, by what percent is the area increased?

(A) 4% (B) 20% (C) 64% (D) 80% (E) 224%

Mathematical Aptitude Section

Note: Each correct answer to the mathematics questions is keyed by number to the corresponding topic in Chapters 9 and 10. These numerals refer to the topics listed below, with specific page references in parentheses.

1. Basic Fundamental Operations (155–157)
2. Algebraic Operations (157–160)
3. Using Algebra (160–164)
4. Exponents, Roots and Radicals (159–160)
5. Inequalities (164–165)
6. Fractions (176–178)
7. Decimals (176)
8. Percent (178–180)
9. Averages (180–181)
10. Motion (182–183)
11. Ratio and Proportion (183–185)
12. Mixtures and Solutions (177–178)
13. Work (185–186)
14. Coordinate Geometry (172–173)
15. Geometry (165–172, 173–176)
16. Quantitative Comparisons (189–192)

ANSWER KEY

1. **D** (1,6)	*11.* **D** (14)	*21.* **A** (6,16)	*31.* **C** (2,16)	*41.* **D** (8)
2. **B** (1,6,7)	*12.* **B** (15)	*22.* **A** (8,16)	*32.* **A** (6,16)	*42.* **D** (8)
3. **D** (1,7)	*13.* **C** (3,8)	*23.* **D** (3,16)	*33.* **B** (1)	*43.* **D** (15)
4. **D** (8)	*14.* **C** (1)	*24.* **C** (15,16)	*34.* **C** (1)	*44.* **E** (15)
5. **A** (1)	*15.* **C** (8)	*25.* **B** (15,16)	*35.* **E** (6)	*45.* **B** (3,15)
6. **B** (6,8)	*16.* **D** (16)	*26.* **A** (4,16)	*36.* **E** (15)	*46.* **B** (15)
7. **B** (1)	*17.* **B** (2,16)	*27.* **B** (15,16)	*37.* **B** (2)	*47.* **D** (15)
8. **A** (2)	*18.* **C** (2,16)	*28.* **B** (2,16)	*38.* **A** (2)	*48.* **D** (15)
9. **C** (3,15)	*19.* **B** (6,7,8,16)	*29.* **D** (15,16)	*39.* **A** (3)	*49.* **C** (15)
10. **D** (2)	*20.* **C** (2,16)	*30.* **B** (15,16)	*40.* **D** (15)	*50.* **E** (15)