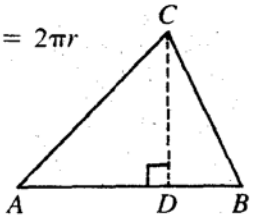
SECTION 2 **Time—50 minutes**
50 Questions

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.

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

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

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

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

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. 32 is $\frac{2}{7}$ of what number?
(A) $9\frac{1}{7}$ (B) 14 (C) 64 (D) 112 (E) 224

2. How much less is $\frac{1}{2}$ of $\frac{4}{7}$ than $\frac{5}{7}$ of $\frac{1}{2}$?
(A) $\frac{1}{7}$ (B) $\frac{2}{7}$ (C) $\frac{3}{7}$ (D) $\frac{1}{14}$ (E) $\frac{3}{14}$

3. $\sqrt{\frac{16}{36} + \frac{1}{4}} =$
(A) $\frac{3}{5}$ (B) $\frac{6}{7}$ (C) $\frac{25}{36}$ (D) $\frac{5}{6}$ (E) $\frac{7}{6}$

4. The equivalent of 0.2% is
(A) 0.002 (B) 0.02 (C) 0.2 (D) 2 (E) 20

5. If $\boxed{K}$ is defined by the equation $\boxed{K} = \frac{\sqrt{K}}{2}$ for all numbers K, which of the following equals 5?
(A) $\boxed{10}$ (B) $\boxed{20}$ (C) $\boxed{25}$
(D) $\boxed{50}$ (E) $\boxed{100}$

6. The number of pupils in a school increased from 2500 to 3000. The percent of increase is
(A) 0.05% (B) 0.5% (C) 5% (D) 20%
(E) 25%

7. A round-trip ticket cost \$54.50 while a one-way ticket cost \$29.00. How much will be saved by buying 3 round-trip tickets instead of buying one-way tickets?
(A) \$10.50 (B) \$10.65 (C) \$11.50
(D) \$31.00 (E) \$35.50

8. Half of the members of a graduating class are going to college. One-fourth of these are going to the local municipal college. What part of the graduating class is going to the municipal college?
(A) $\frac{1}{8}$ (B) $\frac{1}{4}$ (C) $\frac{3}{8}$ (D) $\frac{1}{5}$ (E) $\frac{7}{8}$

9. If books bought at prices ranging from \$2.00 to \$3.50 are sold at prices ranging from \$3.00 to \$4.25, what is the greatest possible profit that might be made by selling 8 books?
(A) \$6 (B) \$8 (C) \$12 (D) \$14 (E) \$18

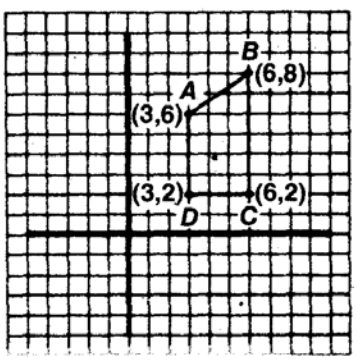
10. There are 10 automobiles waiting to enter a tollgate. If the average length of each car is 16 feet and the average space between each car is 6 inches, what is the length (in feet) of the distance between the front of the first car and the rear of the last vehicle?
(A) 164 (B) $164\frac{1}{2}$ (C) 165 (D) 166 (E) 220

11. If y represents the tens digit and x the units digit of a two-digit number, then the number is represented by
(A) $y + x$ (B) yx (C) $10x + y$
(D) $10y + x$ (E) $10yx$

12. The expression $\sqrt{4 - 3x}$ has a real value for each of the following values of x EXCEPT
(A) -4 (B) 0 (C) $\frac{2}{3}$ (D) 1 (E) 2

13. If $\frac{1}{x} = \frac{a}{b}$ then x equals the
(A) sum of a and b (B) product of a and b
(C) difference of a and b (D) quotient of b and a
(E) quotient of a and b

14. Find the area of $ABCD$.
(A) 13.5
(B) 15
(C) 18
(D) 27
(E) 36



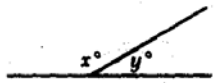
15. A circular pond 40 feet in diameter is surrounded by a patch of grass 2 feet wide. What is the area of the grass?
(A) 4π sq. ft. (B) 84π sq. ft. (C) 164π sq. ft.
(D) 336π sq. ft. (E) 400π sq. ft.

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.

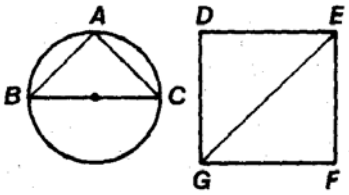
Notes:
1. In certain questions, information concerning one or both of the quantities to be compared is centered above the two columns.
2. In a given question, a symbol that appears in both columns represents the same thing in Column A as it does in Column B.
3. Letters such as x, n, and k stand for real 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
16.	$(2)(4)(6)(8)(10)(12)$	$(24)(40)(8)(6)$
	$x^2 - 25 = 0$	
17.	x	5
	$5y + 15 = 3x + 5y$	
18.	y	0
19.	$\sqrt{\frac{1}{9}} + \sqrt{\frac{1}{16}}$	$\sqrt{\frac{1}{16} + \frac{1}{9}}$
	$x = 0$, $y > 1$, and $z > 1$	
20.	$2x(y + z)$	$y(x + z)$

	Column A	Column B
21.	The largest integer less than $\frac{15}{7}$	The largest integer less than $\frac{41}{14}$
	$a = 5, 10$ $b = 2, 3$	
22.	a^2	b^3

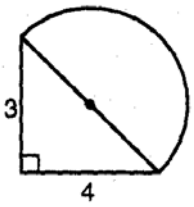


Diameter $BC = 10$
$AB = AC$
Perimeter of square $DEFG = 20$

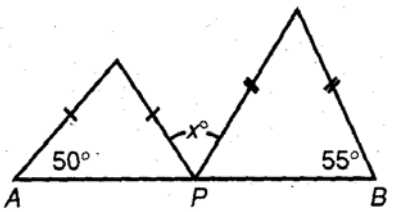
23.	Area of ABC	Area of $DEFG$

In $\triangle KML$, the measure of $\angle L$ equals the measure of $\angle M$.

24.	Measure of $\angle K$	$60°$

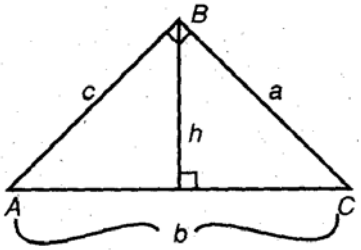


25.	The perimeter of this semicircle	$5 + 2.5\pi$



P is a point on line segment AB.

26.	Value of x	$75°$



27.	$\frac{bh}{2}$	$\frac{ac}{2}$
28.	$(0.2)^3$	$\sqrt{0.64}$

	Column A	Column B
	$x^2 + y^2 = 100$	
29.	x	y
	1 kilometer $= \frac{5}{8}$ mile	
30.	1 mile	$\frac{5}{8}$ kilometer
	The average of the three consecutive numbers a, b, and c is V.	
31.	$a + c$	$2b$
32.	1.2	$\sqrt{14.4}$

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. $\frac{9K^3 - 9m^2K}{3K^2 - 3mK}$ is equivalent to $3K +$

(A) m (B) $3m$ (C) 1 (D) 2 (E) 3

34. The distance s in feet that a body falls in t seconds is given by the formula $s = 16t^2$. If a body has been falling for 5 seconds, how far (in feet) will it fall during the 6th second?

(A) 16 (B) 80 (C) 176 (D) 400 (E) 576

35. In $\triangle CDE$, $CE > CD$. Point A bisects side CD, and point B bisects side CE. Which of the following is (are) true?

I. $CB = AD$
II. $AC = BC$
III. $CB > CA$

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

36. A certain radio costs a merchant \$72, which includes overhead and selling expenses. At what price must he sell it if he is to make a profit of 20% on the selling price?

(A) \$86.40 (B) \$90.00 (C) \$92.00
(D) \$100.00 (E) \$144.00

37. A merchant buys cloth at \$1.60 per yard. At what price per yard should he mark the cloth so that he may sell it at a discount of 20% from the marked price and still make a profit of 20% of the selling price?

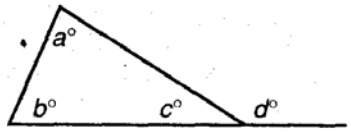
(A) \$2.00 (B) \$2.24 (C) \$2.40 (D) \$2.50
(E) \$2.60

38. A metal cube with an edge of one foot is melted into a rectangular solid one-eighth of a foot in height. What is the area of the top of the new solid?

(A) $\frac{1}{64}$ sq. ft. (B) $\frac{1}{8}$ sq. ft. (C) $\frac{1}{4}$ sq. ft.
(D) 4 sq. ft. (E) 8 sq. ft.

39. In the accompanying diagram (not drawn to scale), which of the following is (are) always true?

I. $d > b$
II. $a > d$
III. $d > c$



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

40. How long is the shadow of a 30-foot tree when a 20-foot pole casts a 14-foot shadow?

(A) 4.7 feet (B) 8.4 feet (C) 9.3 feet
(D) 21 feet (E) 24 feet

41. A cup of oatmeal weighs 3 ounces. A cup of pancake mix weighs 5 ounces. How many cups of oatmeal will have the same weight as 3 cups of pancake mix?

(A) $\frac{3}{5}$ (B) $1\frac{2}{3}$ (C) 3 (D) 5 (E) 15

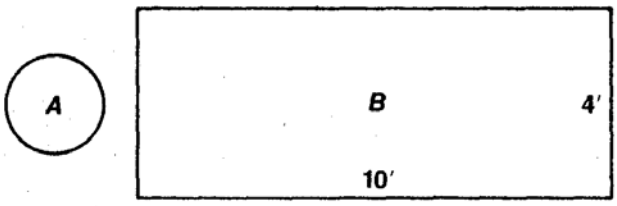
42. The ratio of boys to girls in a senior class is 5:3. If $\frac{9}{10}$ of the boys may graduate and all the girls may or may not graduate, what is the maximum part of the senior class that may graduate?

(A) $\frac{3}{5}$ (B) $\frac{7}{8}$ (C) $\frac{15}{16}$ (D) $\frac{2}{3}$ (E) $\frac{27}{50}$

43. Abe can mow the lawn in 15 minutes. Ben can mow the lawn in 20 minutes. Carl can mow the lawn in 30 minutes. They work together for 5 minutes. What part of the lawn was mowed?

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

44. Given a circle A whose diameter is 2 feet and a rectangular piece of tin B, 10 feet by 4 feet, find, correct to the nearest square foot, the tin that will be left after the greatest possible number of circles of the size of A have been cut from B.



(A) zero (B) 1 sq. ft. (C) 2 sq. ft.
(D) 9 sq. ft. (E) 20 sq. ft.

45. The sum of the base angles of an isosceles triangle is one-half the vertex angle. How many degrees are there in the vertex angle?

(A) 80 (B) 90 (C) 110 (D) 120 (E) 140

46. In $\triangle ABC$, $AB = 2\sqrt{2}$, $BC = 8$, $\angle ABC \stackrel{\circ}{=} 45$. Find area ABC.

(A) $4\sqrt{2}$ (B) 8 (C) $8\sqrt{2}$ (D) 16
(E) $16\sqrt{2}$

47. The sum of three sides of a square equals x. The area of this square, in terms of x, equals

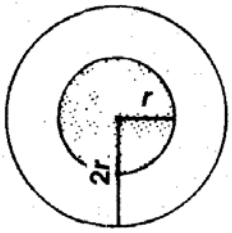
(A) $3x$ (B) $\frac{x}{3}$ (C) $\frac{3}{x}$ (D) $\frac{x^2}{3}$ (E) $\frac{x^2}{9}$

48. The distance between point P (3,0) and point Q is 5. The coordinates of point Q could be any of the following EXCEPT

(A) (−8,0) (B) (3,−5) (C) (3,5) (D) (8,0) (E) (−2,0)

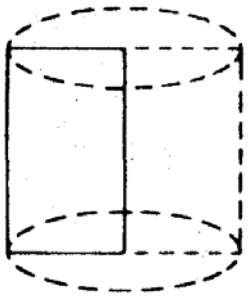
49. What part of the large circle is shaded?

(A) $\frac{1}{5}$ (B) $\frac{1}{4}$ (C) $\frac{1}{3}$ (D) $\frac{1}{2}$ (E) none of these



50. A rectangle is revolved through 360° about its longer side as an axis. If the longer side is a units and the shorter side is b units, the volume of the resulting solid in cubic units is

(A) πab^2 (B) $\pi a^2 b$ (C) $2\pi ab$ (D) $2\pi ab^2$ (E) πab



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