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

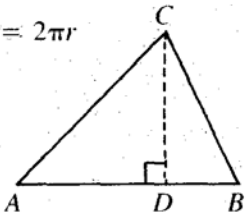
In this section solve each problem, using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding circle on the answer sheet.

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. $0.9\% =$

(A) $\frac{9}{1000}$ (B) $\frac{9}{100}$ (C) $\frac{9}{10}$ (D) 9 (E) 90

2. In the equation $\frac{3}{x} = \frac{x}{27}$, $x > 0$, what is the value of x?

(A) 3 (B) 6 (C) 9 (D) 18 (E) 81

3. If $\frac{1}{2} + \frac{2}{3} + \frac{3}{y} = \frac{23}{12}$, $y =$

(A) 2 (B) 3 (C) 4 (D) 6 (E) 12

4. If a workman receives time and a half for overtime, 25 hours of overtime would be the equivalent of how many regular working hours?

(A) 6 (B) 12 (C) 18 (D) 30 (E) $37\frac{1}{2}$

5. Which of the following could represent the number of units in the lengths of the three sides of a right triangle?

I. 9, 12, and 15
II. 10, 26, and 24
III. $1\frac{1}{2}$, 2, and $2\frac{1}{2}$

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

6. Mr. Benedict left half of his estate to his wife, one-fourth to his son, one-fifth to his daughter and the remainder, $5000, to his college. What is the total amount left by Mr. Benedict?

(A) $9250 (B) $10,000 (C) $16,000
(D) $50,000 (E) $100,000

7. An elevator has a capacity of 20 adults or 24 children. How many children can ride with 15 adults?

(A) 4 (B) 6 (C) 7 (D) 9 (E) 18

8. Joan does $\frac{2}{5}$ of her homework in an hour. How many additional hours will she have to work to complete her homework?

(A) 0.5 (B) 1.5 (C) 2.5 (D) 30 (E) 60

9. A sweater marked $60 has a tag stating TAKE 10% OFF PRICE ON TAG. What must I pay for this sweater, taking advantage of this special price and paying the town 10% sales tax?

(A) $48.60 (B) $54. (C) $57.60
(D) $59.40 (E) $60.

10. One season a baseball team played g games and lost a total of l games. What part of their games did they win?

(A) $\frac{l}{g}$ (B) $\frac{g}{l}$ (C) $\frac{g-l}{l}$ (D) $\frac{l-g}{g}$ (E) $\frac{g-l}{g}$

11. What is the ratio of a 10-inch strip to a strip 2 yards long?

(A) 5:1 (B) 1:5 (C) 20:1 (D) 1:7.2
(E) 1:7.5

12. The following is a report of defective parts reported by inspectors in 3 electronic factories:

Brookline	3 per 10,000
Brookville	5 per 100,000
Brooklyn	13 per 1,000,000

Which of the following best expresses the portion of defective parts in the three factories combined?

(A) 5 per 10,000 (B) 66 per 10,000
(C) 66 per 100,000 (D) 93 per 1,000,000
(E) 363 per 1,000,000

13. Ten years ago Lori was y years old. How old will she be x years from now?

(A) $y - x + 10$ (B) $y + x - 10$ (C) $10 + y$
(D) $x + y$ (E) $x + y + 10$

14. An efficiency expert has calculated that about 9.5% of the articles produced in a manufacturing plant are defective. This is equivalent to expressing the defective articles as

(A) 9 out of 15 (B) 9 out of 50 (C) 10 out of 95
(D) 19 out of 100 (E) 19 out of 200

15. $x - 7 = 0$
$y^2 = 25$
$xy =$

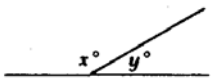
(A) $+35$ (B) ± 35 (C) -35 (D) 5 (E) 0

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

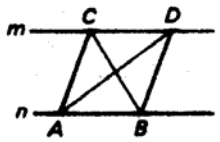
A if the quantity in Column A is greater;
B if the quantity in Column B is greater;
C if the two quantities are equal;
D if the relationship cannot be determined from the information given.

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.

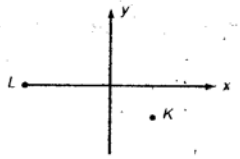
EXAMPLES		
Column A	Column B	Answers
E1. 2×6	$2 + 6$	● Ⓑ Ⓒ Ⓓ
		
E2. $180 - x$	y	Ⓐ Ⓑ ● Ⓓ
E3. $p - q$	$q - p$	Ⓐ Ⓑ Ⓒ ●

	COLUMN A	COLUMN B
16.	$\sqrt{\frac{1}{9}}$	$\left(\frac{1}{3}\right)^2$
17.	The number of integers from -5 to 5 inclusive	The number of integers from 5 to 15 inclusive
	$1 + x < 0$	
18.	x	0
	$-10 < a < -1$	
19.	$\frac{1}{a^4}$	$\frac{1}{a^5}$
20.	$1 - x$	$1 + x$
	$\frac{1}{x} < 0$	
21.	x	0
	$2x = 24$ $2z = x$	
22.	z	12
	1 kilometer $= \frac{5}{8}$ mile	
23.	5 miles	8 kilometers
	Area of circle $= \frac{\pi}{4}$	
24.	Radius of circle	0.5
	Perimeter of square $ABCD = 4b + 4$	
25.	The length of $AB + BC$	$2b$



m is parallel to n.

26.	Area of ABC	Area of ABD
	In $\triangle ABC$, $BC = 12$, $\angle A \cong \angle C$, and the measure of $\angle A \cong 45$.	
27.	Area of ABC	72
28.	$\frac{t + n}{n}$	$\frac{t}{n} + 1$



29.	The x-coordinate of point K	The x-coordinate of point L
	$x^2 = 144$	
30.	x	12
	$2a + 3b > 4$	
31.	a	b
	$x < 0$	
32.	Zero	$x^3 - 1$

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. If k is the average of 10 and -14, then the average of k and -8 is
(A) -24 (B) -12 (C) -11
(D) -5 (E) $+5$

34. A father can do a job as fast as two sons working together. If one son does the job alone in three hours and the other does it alone in six hours, how many hours does it take the father to do the job alone?
(A) 1 (B) 2 (C) 3 (D) 4 (E) $4\frac{1}{2}$

35. $9x - 12y = -21$
$6x + 4y = 34$
$3x - 4y =$
(A) -54 (B) -13 (C) -7 (D) 7 (E) 13

36. A woman went marketing for sugar for canning. In one store sugar was $35\frac{1}{2}¢$ per pound and she found that she lacked $30¢$ of having enough money to buy the number of pounds she needed. She bought the required amount of sugar at another store at $35¢$ per pound and had $45¢$ left. How much money did she have before making the purchase?
(A) \$52.50 (B) \$52.95 (C) \$53.00
(D) \$53.05 (E) more than \$54.00

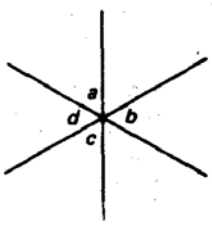
37. What is the maximum number of half-pint containers of cream that can be filled with a 4-gallon can of cream? (2 pts. = 1 qt. and 4 qts. = 1 gal.)
(A) 16 (B) 24 (C) 30 (D) 32 (E) 64

38. Which of the following is (are) true of the value of $(152)^3(783)(281) - (29)^5(0)(374)(2)^8$?
I. The last digit in the answer is 4.
II. The answer is an odd number.
III. The answer is a negative number.
(A) I only (B) II only (C) III only
(D) I and II only (E) I, II, and III

39. How long would it take a car traveling at 30 miles per hour to cover a distance of 44 feet? (1 mi. = 5280 ft.)
(A) 1 sec. (B) 2.64 sec. (C) 5.2 sec.
(D) 1 min. (E) 7.7 min.

40. How many students are there in a class if two students remain after four rows of seats are filled, and nine students remain after three rows of seats are filled?
(A) 21 (B) 22 (C) 28 (D) 30 (E) 32

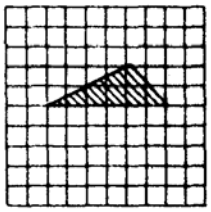
41. $\angle a = \angle b$
$\angle c \stackrel{\circ}{=} 60$
$\angle d \stackrel{\circ}{=}$
(A) 30 (B) 60
(C) 120 (D) 180
(E) none of these



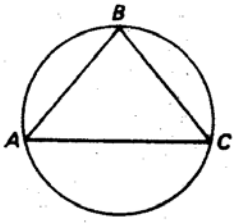
42. How many 2″ squares can be cut from a rectangular paper which is 11″ × 5″?
(A) 10 (B) 11 (C) 12 (D) 13 (E) 14

43. A pulley whose diameter is 9 inches is connected by a belt to another pulley whose diameter is 6 inches. If the larger pulley runs at 1200 revolutions per minute, at how many revolutions per minute does the smaller pulley run?
(A) 800 (B) 1080 (C) 1600 (D) 1800
(E) 2000

44. How many square units are there in the shaded triangle?
(A) 3 (B) 4 (C) 5
(D) 6 (E) 9

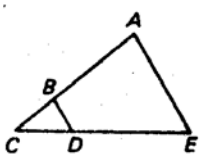


45. $AB = BC$, $\overset{\frown}{AB} = 100°$, $\angle ABC \stackrel{\circ}{=}$
(A) 45 (B) 60 (C) 80
(D) 90 (E) 160



46. In $\angle ABC$, if $\angle A > \angle B$ and $\angle B > \angle C$, then each of the following can be true EXCEPT
(A) $C < 40°$ (B) $A < 170°$ (C) $B > 60°$
(D) $A > 90°$ (E) $C > 60°$

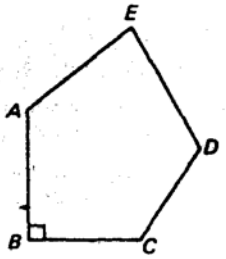
47. Lines ABC and EDC meet at an angle of 40°. m $\angle CBD = 80°$, m $\angle AED = 60°$, $CD = 2$, $DE = 4$, $BD = 1$. What is the length of AE?
(A) 1.5 (B) 2 (C) 3
(D) 4 (E) 8



48. A rectangular piece of cardboard 9″ × 12″ is made into an open box by cutting a $2\frac{1}{2}$″ square from each corner and bending up the sides. What is the volume of the box if no allowance is made for overlapping of the edges?
(A) 70 cu. in. (B) $154\frac{3}{8}$ cu. in. (C) 195 cu. in.
(D) 270 cu. in. (E) 700 cu. in.

49. If the length and width of a rectangle are doubled, by what percent is the area increased?
(A) 30% (B) 75% (C) 100% (D) 300%
(E) 400%

50. In pentagon $ABCDE$, $AB \perp BC$.
$\angle C + \angle D + \angle E + \angle A =$
(A) 450° (B) 540°
(C) 630° (D) 720°
(E) 810°



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