Examination January, 1978 Ninth Year Mathematics

Elementary Algebra

PART ONE *Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Write your answers in the spaces provided.*

1. If $a = 4$, find the value of a^3. 1_____

2. Factor: $x^2 + 2x - 35$ 2_____

3. Express in lowest terms: $\frac{x^2 - 4}{x + 2}$ 3_____

4. Express as a single fraction the sum of $\frac{x + 1}{2}$ and $\frac{x}{3}$. 4_____

5. Express $(4n - 3)(n - 1)$ as a trinomial. 5_____

6. The legs of a right triangle are 6 and 8. Find the hypotenuse. 6_____

7. One side of a square is represented by $3x + 1$. Express the perimeter of the square in terms of x. 7_____

8. Solve for x: $\frac{1}{3}x - 12 = 4$ 8_____

9. Solve for x: $.02x = 15$ 9_____

10. Solve for y: $9y + 10 - 5y = 12$ 10_____

11. Solve the system of equations for y:

$$2y + x = 8$$
$$y + x = 5$$

11_____

12. Solve for x in terms of a and b: $ax - b = 0$ 12_____

13. If $\cos A = .8155$, find angle A to the *nearest degree.* 13_____

14. Solve for the positive value of x: $x^2 - 16 = 0$ 14_____

15. A point on the graph of $y = 2x - 4$ has an x-coordinate of 3. Find the y-coordinate of this point. 15_____

16. A ship sails r miles the first day, s miles the second day, and t miles the third day. Express, in terms of r, s, and t, the average daily mileage of the ship. 16_____

17. A freight train can travel 112 miles in 4 hours. At the same rate, how far can it travel in 6 hours? 17_____

18. A team played 54 games. If the team won 6 more games than it lost, how many games did the team lose? 18_____

19. Find the value of $\sqrt{62}$ to the *nearest tenth.* 19_____

20. What is the numerical value of $|7| - |-3|$? 20_____

21. If 40% of a number is 250, find the number. 21_____

DIRECTIONS **(22-30):** *Write in the space provided the* numeral *preceding the expression that best completes* each *statement or answers* each *question.*

22. The expression $\frac{8x^8}{4x^4}$ is equivalent to

(1) $2x^2$ (2) $4x^2$ (3) $2x^4$ (4) $4x^4$ 22_____

23. Which fraction is equivalent to $-2\frac{1}{4}$?

(1) $\frac{-9}{4}$ (2) $\frac{-7}{4}$ (3) $\frac{-7}{-4}$ (4) $\frac{-9}{-4}$ 23_____

24. Which is true of the graph of $x = -3$?

(1) It has a slope of -3.
(2) It passes through the origin.
(3) It is parallel to the x-axis.
(4) It is parallel to the y-axis. 24_____

25. Which is a member of the solution set of $8x - 4 > 20$?
(1) 1 (2) 2 (3) 3 (4) 4 25____

26. The sum of $\sqrt{27}$ and $\sqrt{12}$ is
(1) $5\sqrt{3}$ (2) $\sqrt{39}$ (3) $13\sqrt{3}$ (4) $5\sqrt{6}$ 26____

27. Which is *not* a member of the solution set of the equation $3x - 2y = 4$?
(1) (3,2½) (2) (−2,−5) (3) (4,4) (4) (−2,0) 27____

28. The set of rational numbers is a subset of the set of
(1) integers (3) real numbers
(2) irrational numbers (4) whole numbers 28____

29. If $\frac{3}{x}$ is subtracted from $\frac{4}{x}$, the result is
(1) 1 (2) $\frac{7}{x}$ (3) $-\frac{1}{x}$ (4) $\frac{1}{x}$ 29____

30. The equation $3(2x + 1) = 6x + 3$ is an illustration of the
(1) associative property of addition
(2) distributive property of multiplication over addition
(3) commutative property of multiplication
(4) commutative property of addition 30____

PART TWO *Answer four questions from this part. Show all work unless otherwise directed.*

31. Answer *either a* or *b* but *not* both.

a Solve graphically and check:

$$\begin{aligned} 2x - y &= 10 \\ x + 2y &= 10 \end{aligned} \qquad [8,2]$$

b Graph the following system of inequalities and label the solution set S:

$$\begin{aligned} y &> -3x + 6 \\ y &\leq 2x - 4 \end{aligned} \qquad [8,2]$$

32. Answer *both a* and *b*.

a Express as a fraction in *lowest terms*:

$$\frac{x+y}{11} - \frac{2x+4y}{22} \qquad [5]$$

b Express as a fraction in *lowest terms*:

$$\frac{y^2-9}{2y+6} \div \frac{y-3}{y+2} \qquad [5]$$

33. An office worker paid \$10.30 for 90 postage stamps. If some were 13¢ stamps and the rest were 9¢ stamps, how many of each kind were purchased? [*Only an algebraic solution will be accepted.*] [5,5]

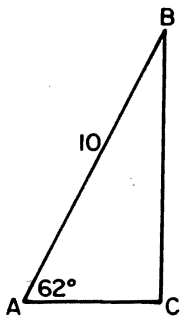
34. Write an equation or system of equations that can be used to solve *each* of the following problems. In *each* case state what the variable or variables represent. [*Solution of the equations is not required.*]

a Two men start from the same place at the same time. One travels due north at a rate of 50 miles per hour and the other travels due south at a rate of 55 miles per hour. In how many hours will they be 315 miles apart? [5]

b One bricklayer takes twice as long as a second bricklayer to build a certain wall. Together they can build the wall in 6 hours. How long would it take each bricklayer to build the wall alone? [5]

35. The sum of a positive number and the square of its additive inverse is 30. What is the number? [*Only an algebraic solution will be accepted.*] [5,5]

36. The right triangle shown in the accompanying figure has hypotenuse $AB = 10$ and angle $A = 62°$.



a Find AC to the *nearest tenth.* [5]

b Find BC to the *nearest integer.* [5]

37. Write the letters *a* through *e* on your answer paper and after *each* letter write the answer to the corresponding question below. [10]

a What is the additive identity element for the set of real numbers?

b If y is an integer, what is the solution set of $|y| = 5$?

c What is the smallest positive integer?

d What is the multiplicative inverse of 7?

e For what value of w is $\frac{7}{8 - w}$ undefined?