Examination January, 1976

Ninth Year Mathematics

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. What is the value of $5x^2y$ if $x = 3$ and $y = 2$? 1____

2. Solve for x: $4x - 3 = 11$ 2____

3. Find the value of $|-4| + |5|$. 3____

4. If $x = \frac{1}{3}y$, what is the value of $\frac{x}{y}$? 4____

5. Solve for x: $2(x + 3) = x$ 5____

6. Find the *positive* square root of 41 to the *nearest tenth*. 6____

7. Express $x^2 - x - 12$ as the product of two binomial factors. 7____

8. If 10% of a number is 8, what is 35% of the number? 8____

9. The point $(k,5)$ is on the graph of the equation $3x + 2y = 22$. What is the value of k? 9____

10. Solve for y: $.5y - 2 = .5$ 10____

11. Express $\frac{5x}{6} - \frac{2x}{3}$ as a single fraction. 11____

12. Express the sum of $3n^2 - n - 2$ and $n^2 + 2n - 1$ as a trinomial. 12____

13. Solve this system of equations for x:

$$x + y = 3$$
$$2x - y = 12$$

13____

14. The tangent of an angle is 0.6500. Find the measure of the angle to the *nearest degree*. 14_____

15. The hypotenuse of a right triangle is 15 and one leg is 12. Find the other leg. 15_____

16. Express in *lowest terms*: $\frac{2x + 4}{6}$ 16_____

17. Using the formula $d = rt$, express r in terms of d and t. 17_____

18. Express the average of $3x + 5$ and $7x - 5$ in terms of x. 18_____

DIRECTIONS **(19-30)**: *Write in the space provided the* numeral *preceeding the expression that best completes* each *statement or answers* each *question.*

19. The solution set of $\frac{x}{2} = 6$ is

(1) $\{12\}$ (2) $\{8\}$ (3) $\{3\}$ (4) $\{4\}$ 19_____

20. Which expression represents the total number of days in x weeks and y days?

(1) $\frac{x}{7} + y$ (3) $7x + 7y$

(2) $7x + y$ (4) $x + 7y$ 20_____

21. The value of $\frac{8 - 20}{-4}$ is

(1) 13 (2) -3 (3) 3 (4) -22 21_____

22. If x is an integer, what is the solution set of $4 < x \leq 5$?

(1) $\{4,5\}$ (2) $\{\ \}$ (3) $\{5\}$ (4) $\{4\}$ 22_____

23. The solution set of $x^2 - 36 = 0$ is

(1) $\{12,-3\}$ (2) $\{6,-6\}$ (3) $\{6\}$ (4) $\{18\}$ 23_____

24. In a class of 30 students, the ratio of the number of boys to the number of girls is 2:3. What is the total number of boys in the class?

(1) 5 (2) 6 (3) 12 (4) 18 24____

25. The expression $(2a^2)^3$ is equivalent to

(1) $2a^5$ (2) $2a^6$ (3) $8a^5$ (4) $8a^6$ 25____

26. The expression $x(x - y)(x + y)$ is equivalent to

(1) $x^2 - y^2$ (3) $x^3 - xy^2$

(2) $x^3 - y^3$ (4) $x^3 - x^2y + y^2$ 26____

27. The prime factors of 30 are

(1) 1,2,15 (2) 2,3,5 (3) 3,10 (4) 6,5 27____

28. The sum of $3\sqrt{2}$ and $\sqrt{98}$ is

(1) $10\sqrt{2}$ (2) $52\sqrt{2}$ (3) 30 (4) 42 28____

29. Which is a finite set?

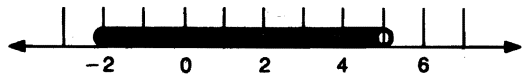
(1) natural numbers between 2 and 5

(2) rational numbers between 2 and 5

(3) integers greater than 5

(4) integers less than 2 29____

30. Which one of the open sentences is shown by the graph?



(1) $-2 \leq x \leq 5$ (3) $-2 < x \leq 5$

(2) $-2 < x < 5$ (4) $-2 \leq x < 5$ 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:

$x + 2y = 7$

$y = 2x + 1$ [8,2]

OR

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

$$x + y < 8$$
$$y \geq x - 4$$

[8,2]

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

a Divide and express in simplest form: [5]

$$\frac{x^2 - 2x - 8}{x} \div \frac{x^2 - 4x}{x}$$

b Solve the following system of equations and check: [3,2]

$$x + 3y = 13$$
$$x + y = 5$$

33. The denominator of a fraction is 5 more than the numerator. If the numerator is decreased by 7 and the denominator is not changed, the new fraction is equal to ⅓. Find the original fraction. [*Only an algebraic solution will be accepted.*] [5,5]

34. Write an equation or a 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 How many pounds of pecans worth 90¢ per pound must be mixed with 50 pounds of walnuts worth 60¢ per pound so that the mixture may be sold at 70¢ per pound? [5]

b The perimeter of a rectangular plot of ground is 38 feet. If the length is 5 feet less than twice the width, find the dimensions. [5]

35. Answer *both a* and *b*.

a In triangle *ABC*, angle *C* is a right angle, *AC* is 12, and angle *A* is 35°. Find *BC* to the *nearest integer*. [6]

b The hypotenuse of a right triangle is 8, and one leg is 4. Find, to the *nearest integer*, the other leg. [4]

36. A person invested $6,500, part at a 7% rate of interest and the rest at 6%. The incomes from the two investments were equal. Find the amount invested at *each* rate. [*Only an algebraic solution will be accepted.*] [5,5]

37. On your answer paper, write the letters *a* through *e* and next to *each* letter write the answer to the corresponding question below. [10]

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

b What is the multiplicative identity for the set of real numbers?

c What is the additive inverse of 3?

d What is the multiplicative inverse of -6?

e What positive number is its own multiplicative inverse?