January 25, 1972

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed.

1. Using x to represent a certain number, write an expression for three less than twice the certain number. 1_____

2. Solve for y: $4(y - 2) = 28$ 2_____

3. Find the solution set of $\frac{6}{x} = \frac{3}{2}$. 3_____

4. Solve for x: $.08x = 1.68$ 4_____

5. Solve for x: $2x - 25 = 20 - 3x$ 5_____

6. Express $(x - 5)(x + 4)$ as a trinomial. 6_____

7. The product of two factors is $2x^2 + x - 6$. One of the factors is $(x + 2)$. What is the other factor? 7_____

8. Express as a single fraction in *simplest form*:

$$\frac{3}{x+2} \div \frac{3}{x}$$ 8_____

9. From $4x + 2y$ subtract $x - 4y$. 9_____

10. Find the positive square root of 28 to the *nearest tenth*. 10_____

11. The length and width of a rectangle are $3x$ and x, respectively. Express in terms of x the perimeter of the rectangle. 11_____

12. The point $(k, 2)$ lies on the graph of $x + 2y = 5$. Find the value of k. 12_____

13. Solve the following system of equations for y:

$$\begin{aligned} x &= 7 \\ 5y + x &= -8 \end{aligned}$$ 13_____

14. If $\tan A = 1.2500$, find the measure of angle A to the *nearest degree*. 14_____

15. Express in terms of x the average of $3x + 1$ and $5x - 3$. 15_____

16. Find the value of $|-6|$. 16_____

17. What is the slope of the line whose equation is $y = \frac{1}{3}x + 2$? 17_____

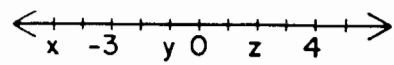
18. Solve for R in terms of E and I: $E = IR$ 18_____

19. On a map a line segment 3 inches long represents a distance of 15 miles. Using the same scale, how many miles long is a road which is 2 inches on the map? 19_____

Directions (20-30): Write in the space provided the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

20. Set A, $\{a, b, c, d\}$, and set B, $\{1, 2, 3, 4\}$, are (1) equal (2) equivalent (3) null sets (4) infinite 20____

21. On the accompanying number line, x, y, and z represent numbers. Which statement is true? (1) $x > -3$ (2) $x < y < z$ (3) $|z| > |x|$ (4) $x > y > z$



21____

22. If $3x - 1 \geq 4$, a member of the solution set is (1) 1 (2) 0 (3) 3 (4) -1 22____

23. The multiplicative inverse of $\frac{1}{3}$ is (1) $-\frac{1}{3}$ (2) 1/9 (3) 3 (4) -3 23____

24. The solution set for the equation $x^2 - 4x - 5 = 0$ is (1) $\{5, -1\}$ (2) $\{-5, 1\}$ (3) $\{5, 1\}$ (4) $\{5, 9\}$ 24____

25. The expression $\sqrt{162}$ is equivalent to (1) $4\sqrt{2}$ (2) $4 + \sqrt{2}$ (3) $9\sqrt{2}$ (4) $3\sqrt{2}$ 25____

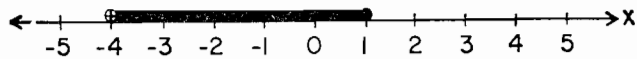
26. Which expression is equivalent to $(-2a^2)^3$? (1) $-8a^6$ (2) $8a^6$ (3) $-8a^5$ (4) $8a^5$ 26____

27. The expression $2 + 3(x + y)$ is equivalent to (1) $5x + 5y$ (2) $3 + 2(x + y)$ (3) $(2 + 3)(x + y)$ (4) $2 + 3x + 3y$ 27____

28. A basketball team won 9 games and lost 3 games. What percent of the games played did the team win? (1) 75 (2) $66\frac{2}{3}$ (3) $33\frac{1}{3}$ (4) 25 28____

29. If the hypotenuse of a right triangle is 7 and one leg is 4, the other leg is (1) $\sqrt{33}$ (2) $\sqrt{65}$ (3) 11 (4) 33 29____

30. The accompanying graph is a representation of the solution set for which of the following?



(1) $1 \leq x < -4$ (2) $-3 \leq x \leq 1$ (3) $-4 < x \leq 1$ (4) $-4 \leq x < 1$ 30____

Part II

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: [8, 2]

$$x + y = 1$$
$$3x + y = 9$$

OR

b (1) Graph the solution set of the following system of inequalities. [8]

$$y \geq -x + 5$$
$$y < 2x + 3$$

(2) Write the coordinates of a point in the solution set of this system. [2]

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

a Express $\frac{y-3}{4y} + \frac{y+6}{y}$ as a single fraction in *simplest form.* [5]

b Express the indicated product as a single fraction in *lowest terms*: [5]

$$\frac{x+2}{3x+3} \cdot \frac{x^2+5x+4}{2x+4}$$

33. A square and a rectangle have the same area. The length of the rectangle is three inches more than the side of the square. The width of the rectangle is two inches less than the side of the square. Find the side of the square. [*Only an algebraic solution will be accepted.*] [6, 4]

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

a If a certain number is decreased by its reciprocal, the result is 8/3. Find the number. [5]

b A man invested a certain sum of money at 7% and twice as much at 5%. If his total income at the end of the first year was $1,700, find how much he had invested at each rate. [5]

35. In right triangle ABC the right angle is at C. The measure of AC is 6 and the measure of BC is 7.

a Find to the *nearest degree* the measure of angle A. [5]

b Find to the *nearest integer* the measure of AB. [5]

36. At 10 a.m. Mr. Arthur and Mr. Murphy start from two towns which are 270 miles apart. They travel toward each other and meet at 1 p.m. If Mr. Murphy's rate is 10 miles per hour faster than Mr. Arthur's rate, find the rate of *each*. [6, 4]

37. On your answer paper write the letters *a* through *e*. After *each* letter write the answer to the correspondingly lettered question below. [10]

a What is the additive inverse of the number represented by n?

b What number is the multiplicative identity?

c What is the largest negative integer?

d What is the set of integers such that $3 < x \leq 6$?

e What value of x will make $\frac{4}{x-2}$ undefined?