August 16, 1972

Part I

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 additive inverse of -7? 1_____

2. Divide $15y^3 - 12y^2 + 6y$ by $3y$. 2_____

3. Find the sum of $x^2 - x + 6$ and $3x^2 - 2x - 8$. 3_____

4. The product of two binomials is $x^2 + 2x - 35$. One of the binomials is $x - 5$. What is the other binomial? 4_____

5. Solve for x: $3(7 - x) = 4x$ 5_____

6. Solve for x: $.03x = 2.4$ 6_____

7. Solve for t: $\frac{2t}{3} = 12$ 7_____

8. Find the solution set for $2x - 3 > 5$ when the replacement set is $\{2, 3, 4, 5, 6, 7\}$. 8_____

9. The width of a box is 8 inches. The ratio of width to length is 2:3. Find the number of inches in the length. 9_____

10. Solve for the *positive* value of x: $3x^2 = 243$ 10_____

11. Find the numerical value of $|-8| - |-2|$. 11_____

12. One of the roots of $x(x - 2) = 0$ is 0. Find the other root. 12_____

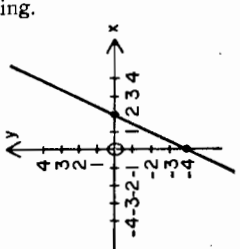
13. Solve for a in terms of b and d: $5a + b = d$ 13_____

14. Find the positive square root of 29 to the *nearest tenth.* 14_____

15. Express $(3x - 2)(3x - 2)$ as a trinomial. 15_____

16. A pole 10 feet high casts a 7-foot shadow at the same time that a nearby building casts a shadow 49 feet long. Find the number of feet in the height of the building. 16_____

17. The accompanying figure shows a line whose equation is $2x - y = 4$. What is the slope of the line? 17_____



18. The perimeter of a square is p. Express the length of one side of the square in terms of p. 18_____

Directions (19-30): Write the ***numeral*** preceding the expression that best completes *each* statement or answers *each question.*

19. The value of $(-2)^3$ is (1) 6 (2) -6 (3) 8 (4) -8 19____

20. The product of $(4a^2b)$ and $(-3a^3b)$ is (1) $-12a^5b$ (2) $-12a^5b^2$ (3) $-12a^6b$ (4) $-12a^6b^2$ 20____

21. If n represents an odd integer, which expression also represents an odd integer? (1) $n + 1$ (2) $n - 3$ (3) $n + 4$ (4) $2n$ 21____

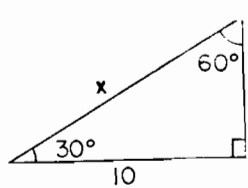
22. Which ordered pair is the solution of the following system of equations? $2x + y = 2$, $-x + y = 8$
(1) (1, 0) (2) (−7, 1) (3) (−2, 6) (4) (2, −6) 22____

23. Given the formula $c^2 = a^2 + b^2$, what is the positive value of a when $b = 6$ and $c = 10$? (1) 64 (2) 2 (3) 8 (4) 4 23____

24. The sum of $\frac{x+2}{3}$ and $\frac{x-2}{4}$ is (1) $\frac{7x+2}{12}$ (2) $\frac{2x}{7}$ (3) $\frac{x^2-4}{12}$ (4) $7x + 2$ 24____

25. The expression $\sqrt{50} - 3\sqrt{2}$ is equivalent to (1) $22\sqrt{2}$ (2) $2\sqrt{2}$ (3) $\sqrt{32}$ (4) 4 25____

26. Which equation represents a correct interpretation of information given in the figure?



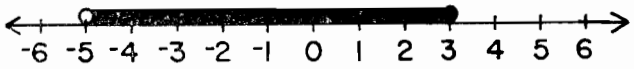
(1) $\cos 60° = \frac{10}{x}$
(2) $\cos 30° = \frac{10}{x}$
(3) $\sin 30° = \frac{10}{x}$
(4) $\tan 30° = \frac{10}{x}$ 26____

27. An equivalent expression for $6a - 5(a + b)$ is (1) $a - 5b$ (2) $a + 5b$ (3) $a - b$ (4) $a + b$ 27____

28. The graph of the equation $2x - 5y = 10$ will pass through the point whose coordinates are (1) (−2, 0) (2) (0, 5) (3) (10, 2) (4) (2, 10) 28____

29. The fact that $5(a + 2) = 5a + 10$ is an illustration of the (1) commutative property of addition (2) associative property of addition (3) distributive property of multiplication over addition (4) commutative property of multiplication 29____

30. Which inequality is represented by the graph below?



(1) $-5 \leq x \leq 3$ (2) $x > -5$ (3) $x \leq 3$
(4) $-5 \leq x < 3$ 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]

$$2x - y = 6$$
$$x + y = 3$$

OR

b Answer *both* 1 *and* 2:

(1) On the same set of coordinate axes graph *each* of the inequalities in the following system: [8]

$$y < 2x + 8$$
$$y \geq -x - 1$$

(2) Name an ordered pair in the solution set of this system. [2]

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

a Express $\frac{5a+1}{3} - \frac{a-1}{6}$ as a single fraction in lowest terms. [6]

b Solve for x: $\frac{x+1}{6} + \frac{x-2}{3} = \frac{1}{2}$ [4]

33. A freight train left a station at 12 noon. At 2:00 p.m. a passenger train, traveling 15 miles per hour faster than the freight train, left the station going in the same direction as the freight. The passenger train overtook the freight train at 6:00 p.m. Find the rate of each train. [*Only an algebraic solution will be accepted.*] [6, 4]

34. Write an equation or system of equations which 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 A man spent \$1.90 for twenty-five stamps. Some were 6¢ stamps and the rest 8¢ stamps. How many of each kind did he buy? [5]

b The lengths of the sides of a right triangle are represented by three consecutive integers. Find the length of each side. [5]

35. An 18-foot ladder leans against the side of a house which stands on level ground. The foot of the ladder is 5 feet from the house.

a Find to the *nearest degree* the number of degrees in the angle which the ladder makes with the ground. [5]

b Find to the *nearest foot* the number of feet in the distance from the top of the ladder to the ground. [5]

36. The length of the side of a square is represented by x. The length of a rectangle is 3 more than the side of the square. The width of the rectangle is 2 less than the side of the square. The area of the rectangle is 24. Find the length of the side of the square. [*Only an algebraic solution will be accepted.*] [4, 6]

37. The replacement set for x for each of the open sentences listed below is $\{-3, -2, -1, 0, 1, 2, 3\}$. On your answer paper, write the letters *a* through *e*, and next to each write the solution set of each open sentence. [Each answer must be a subset of the replacement set.] [10]

a $x + 2 = 2 - x$

b $|x| = 2$

c $x - 4 > -3$

d $4 - \frac{x}{2} = 1$

e $x^2 = 9$

January 25, 1973

Part I

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. Solve for x: $3(x - 2) = 3$ 1_____

2. Solve for x: $4x + 9 = 12$ 2_____

3. Solve for n: $.03n = 6$ 3_____

4. Find the value of y in the proportion $\frac{20}{12} = \frac{5}{y}$. 4_____

5. The sum of the measures of two angles is 90°. If one angle is twice the other, find the number of degrees in the smaller of the two angles. 5_____

6. Express as a trinomial: $(a - 1)(a + 2)$ 6_____

7. Factor: $n^2 - 5n - 14$ 7_____

8. If $a = 1$ and $b = 2$, find the value of $(a^2b)^2$. 8_____

9. Find, to the *nearest tenth*, the positive square root of 18. 9_____

10. Find the value of $|3 - 7|$. 10_____