January 25, 1984

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 on the answer sheet.

1. If $I = \frac{E}{R}$, find R when $I = 5$ and $E = 15$. 1_____

2. If $x = 2$, what is the value of $(2x)^3$? 2_____

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

4. In a math class, 70% of the students who took a test passed. If 14 students passed, how many students took the test? 4_____

5. Find the value of $\sqrt{7}$ to the *nearest tenth*. 5_____

6. Solve for x in terms of a, b, and c: $bx + a = c$ 6_____

7. If a machine can complete a certain job in 5 hours, what part of the job can it complete in x hours? 7_____

8. Factor: $3 - 12y$ 8_____

9. If the vertex angle of an isosceles triangle measures 90°, how many degrees are there in each base angle? 9_____

10. The lengths of the sides of a triangle are 3, 4, and 5. Find the length of the longest side of a similar triangle whose shortest side has length 6. 10_____

11. Solve the following system of equations for x:

$$\begin{aligned} 2x - y &= 6 \\ x + y &= 9 \end{aligned}$$

11_____

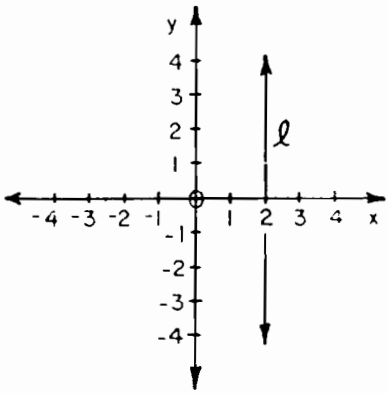
12. Solve for r: $\frac{2r}{3} - \frac{5r}{12} = \frac{5}{4}$ 12_____

13. Solve for x: $3x + 0.6 = 1.4 - 5x$ 13_____

14. From $6x^2 - 8x + 6$ subtract $x^2 - 3x - 6$. 14_____

15. If the replacement set for x is $\{0,1,2,3,4\}$, what is the solution set of $2x - 1 \geq 5$? 15_____

16. What is a equation of line l, as shown in the graph below?



16____

Directions (17-30): Write in the space provided on the answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

17. Which is a rational number? (1) $\sqrt{5}$ (2) $\sqrt{9}$ (3) $\sqrt{12}$ (4) $\sqrt{20}$ 17____

18. The product of $-2a^3$ and $-3a^2$ is (1) $-5a^6$ (2) $-6a^5$ (3) $6a^5$ (4) $6a^6$ 18____

19. Which is an illustration of the associative property?
(1) $a + (b + c) = (a + b) + c$
(2) $a(b + c) = ab + ac$
(3) $a + b = b + a$
(4) $ab + 0 = ab$ 19____

20. If the cosine of an angle is .6750, then the measure of the angle to the *nearest degree* is (1) 47° (2) 42° (3) 43° (4) 48° 20____

21. The multiplicative inverse of $-\frac{1}{5}$ is (1) 1 (2) $\frac{1}{5}$ (3) -5 (4) 5 21____

22. The expression $7 + 2 - \frac{4}{2}(6 - 4)$ is equal to
(1) 5 (2) 7 (3) 14 (4) -14 22____

23. The expression $2\sqrt{20}$ is equivalent to (1) $5\sqrt{2}$ (2) $20\sqrt{2}$ (3) $2\sqrt{5}$ (4) $4\sqrt{5}$ 23____

24. If $(2x + 7)$ and $(x + 2)$ are the factors of $2x^2 + 11x + k$, then the value of k is (1) 11 (2) 9 (3) 3 (4) 14 24____

25. The sum of $\frac{3}{x}$ and $\frac{2}{y}$ is (1) $\frac{2x + 3y}{xy}$ (2) $\frac{2x + 3y}{x + y}$ (3) $\frac{5}{xy}$ (4) $\frac{5}{x + y}$ 25____

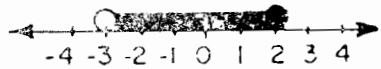
26. If $9x^3 + 3x^2$ is divided by $3x^2$ the quotient is
(1) $3x + 1$ (2) $6x + 1$ (3) $3x$ (4) $6x$ 26____

27. What is the solution set of the equation $x^2 - 5x - 6 = 0$?
(1) $\{2,-3\}$ (2) $\{-2,3\}$ (3) $\{6,-1\}$ (4) $\{-6,1\}$ 27____

28. What is the number of degrees in the supplement of an angle measuring x degrees? (1) $x - 180$ (2) $180 - x$
(3) $x - 90$ (4) $90 - x$ 28____

29. What is the slope of a line whose equation is $y - 2x - 3 = 0$?
(1) -2 (2) 2 (3) 3 (4) -3 29____

30. Which solution set is represented by the graph below?



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

Part II

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

31. *a* On the same set of coordinate axes, graph each of the following inequalities:

$$x \geq -1$$
$$y > x + 2$$ [8]

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

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

a Divide and express the answer in simplest form.

$$\frac{x^2 - 16}{4x} \div \frac{x^2 - 2x - 8}{8x + 16}$$ [6]

b From the product $(x + 3)(2x - 1)$, subtract $3x^2 - x + 2$. [4]

33. 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 The sum of two numbers is 13. If twice the larger number is increased by 2, the result is equal to 5 times the smaller number. Find the numbers. [5]

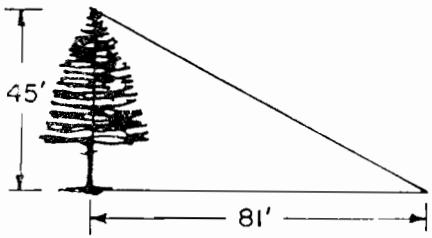
b The ratio of the length of a rectangle to its width is 5:4. If the area of the rectangle is 180 square feet, find the number of feet in the length and the width. [5]

34. At a fast-food restaurant, a family bought 4 hamburgers and 3 bags of french fries for $4.20. At the same time, a family traveling with them bought 5 hamburgers and 2 bags of french fries for $4.55. What was the cost of one hamburger and what was the cost of one bag of french fries? [*Only an algebraic solution will be accepted.*] [5, 5]

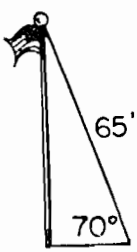
35. Find three consecutive positive integers such that the product of the first and third integers is 15. [*Only an algebraic solution will be accepted.*] [5,5]

36. Answer both *a* and *b*.

a As shown in the accompanying diagram, a tree 45 feet high on level ground casts a shadow 81 feet long. What is the angle of elevation of the Sun, to the *nearest degree*?



b As shown in the accompanying diagram, a wire 65 feet long extends from the top of a vertical pole to level ground and makes an angle of 70° with the ground. Find to the *nearest foot* the height of the pole. [5]



37. The replacement set for x for each of the open sentences below is $\{-4,-3,-2,-1,0,1,2,3,4\}$. *On your answer sheet,* 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 $6x + 7 = 3x + 7$ a_____

b $2x = 5$ b_____

c $|x| = 2$ c_____

d $\frac{2}{3}x \geq 2$ d_____

e $5x < -10$ e_____