June 14, 1985

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 1 centimeter represents 5 kilometers in a scale drawing, how many kilometers are represented by 3 centimeters? 1_____

2. If 4 times a number is increased by 5, the result is 25. What is the number? 2_____

3. Solve for the positive value of x: $x^2 - 49 = 0$ 3_____

4. Solve for x: $0.04x = 0.8$ 4_____

5. Solve for x: $4(2x - 5) = 3x + 15$ 5_____

6. What is the value of $\dfrac{|3 - 5|}{-2}$? 6_____

7. Solve for a: $3a + 4b = 7$
$a - 4b = 1$ 7_____

8. If one side of a square is represented by $3x$, express the perimeter of the square in terms of x. 8_____

9. If $\tan A = 1.2800$, find the measure of angle A to the *nearest degree.* 9_____

10. The point $(3,a)$ is on the graph of the line whose equation is $2x + y = 4$. What is the value of a? 10_____

11. Evaluate $a(b^2 - 5)$ when $a = 4$ and $b = -2$. 11_____

12. Factor: $x^2 + x - 12$ 12_____

13. What is the average of $11x + 3$, $2x - 11$, and $5x + 8$? 13_____

14. A tower casts a shadow of 80 meters at the same time that a nearby tree 4 meters tall casts a shadow of 10 meters. Find the height, in meters, of the tower. 14_____

15. Solve for x: $\frac{2}{3}x - 7 = 9$ 15_____

16. Find the value of $\sqrt{70}$ to the *nearest tenth.* 16_____

17. Solve for d in terms of R and p: $R = p + 2d$ 17_____

18. Find the slope of the line whose equation is $y = \dfrac{-2x}{3} + 2$. 18_____

19. Subtract $2x^2 + 3x - 4$ from $3x^2 - 2x - 1$. 19_____

20. If 35% of a number is 70, what is the number? 20_____

Directions (21-30): Write in the space provided on the answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

21. The product of $3x^2$ and $6x^4$ is (1) $2x^2$ (2) $9x^6$ (3) $18x^6$ (4) $18x^8$ 21____

22. If $n + 2$ represents an odd integer, the next larger odd integer is represented by (1) n (2) $2n + 4$ (3) $n + 3$ (4) $n + 4$ 22____

23. The multiplicative inverse of 5/3 is (1) 1 (2) 3/5 (3) $-3/5$ (4) $-5/3$ 23____

24. An illustration of the distributive property is
(1) $3(x + y) = 3x + 3y$ (2) $3(x + y) = (x + y) \cdot 3$
(3) $3x + 3y = 3y + 3x$ (4) $3(xy) = (3x) \cdot y$ 24____

25. If $2x - 1 > 5$, a member of the solution set is
(1) 0 (2) 2 (4) 3 (4) 4 25____

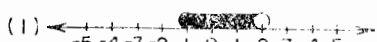
26. The length of a rectangle is represented by $3x$ and its width is represented by $x - 3$. The area of the rectangle is (1) $4x - 3$ (2) $3x^2 - 3$ (4) $3x^2 - 9x$ (4) $4x^2 - 9x$ 26____

27. When $16x^3 - 8x^2 + 4x$ is divided by $4x$, the quotient is
(1) $4x^3 - 2x^2 + x$ (2) $4x^2 - 2x + 1$ (3) $4x^2 - 2x$
(4) $4x^2 - 2x + x$ 27____

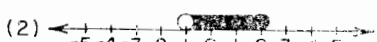
28. What is the sum of $\frac{x-1}{2}$ and $\frac{x-1}{4}$? (1) $\frac{3x-3}{4}$
(2) $\frac{x-1}{6}$ (3) $\frac{3x-2}{4}$ (4) $\frac{3x-3}{8}$ 28____

29. For which value of x is the expression $\frac{x}{x-3}$ undefined?
(1) 1 (2) 0 (3) 3 (4) -1 29____

30. If the replacement set is the set of real numbers, which graph shows the solution set of the inequality $-1 \leq x \leq 2$?

(1) 

(3) 

(2) 

(4) 

30____

Part II

Answer four questions from this part.

Show all work unless otherwise directed.

31. Solve graphically and check:

$$2x - y = 4$$
$$y - x = -2 \qquad [8, 2]$$

32. 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 Find three consecutive positive integers such that the square of the smallest integer exceeds the largest integer by 10. [5]

b Mrs. Stevens invested a certain amount of money at 7% and twice that amount at 10%. If the combined annual income from both investments is $810, how much was invested at each rate? [5]

33. A freight train left a station at 12 noon going north at a rate of 50 miles per hour. At 1 p.m. a passenger train left the same station going south at the rate of 60 miles per hour. At what time were the trains 270 miles apart? [*Only an algebraic solution will be accepted.*] [6, 4]

34. Solve algebraically and check:

$$3x - 2y = -1$$
$$2x + 3y = 8 \qquad [8, 2]$$

35. Bob can paint a room in 3 hours. Dick can paint the same room in 6 hours. How long would it take to paint the room if they both worked together? [*Only an algebraic solution will be accepted.*] [5, 5]

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

a A vertical pole casts a shadow 55 feet long when the angle of elevation of the Sun is 40°. Find the height of the pole to the *nearest foot.* [5]

b In right triangle ABC, C is a right angle, $AB = 20$, $BC = 12$, and $AC = 16$. Find the measure of angle A to the *nearest degree.* [5]

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

a $4x < 2x - 2$

b $|x| = 1$

c $x^2 - 4 = 5$

d $3x - 4 = 3$

e $x(x + 1) = 0$