August 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. [60]

1. The distance between two towns is 50 miles. On a map, these towns are 2 inches apart. Find the distance, in miles, between two other towns that are 3 inches apart on the map. 1_____

2. Solve for a: $6(a - 4) = 12$ 2_____

3. If $3x + 2 \leq 17$, find the *largest* value for x. 3_____

4. If less than twice a number is 21, find the number. 4_____

5. Find the value of $(a^2b)^2$ when $a = 2$ and $b = 3$. 5_____

6. Express as a trinomial: $(2a - 3)(3a + 2)$ 6_____

7. Solve for n: $\frac{3n}{2} - 5 = 10$ 7_____

8. Express as a single fraction in *simplest form*: $\frac{x}{3} - \frac{x}{4}$ 8_____

9. Solve for x in terms of a, b, and c: $ax + b = c$ 9_____

10. Solve the following system of equations for x:

$$2x + y = 7$$
$$x + y = 5$$

10_____

11. Factor: $x^2 - 2x - 3$ 11_____

12. If $\cos x = .5530$, find the measure of angle x to the *nearest degree*. 12_____

13. Find the value of $\sqrt{39}$ to the *nearest tenth*. 13_____

14. Solve for x: $\frac{x}{6} = \frac{x - 2}{5}$ 14_____

15. Solve for x: $0.2x - 1 = 0.8$ 15_____

16. The lengths of the legs of a right triangle are 5 and 12. Find the length of the hypotenuse. 16_____

17. A line segment 28 centimeters in length is divided into two segments which are in the ratio 3 : 1. Find the number of centimeters in the length of the *longer* segment. 17_____

Directions (18-30): Write in the space provided on the answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

18. The product of two binomials is $x^2 - 25$. If one of the binomials is $x - 5$, what is the other binomial?
(1) $x + 5$ (2) $x - 5$ (3) $5 - x$ (4) $5x + 5$ 18____

19. The multiplicative inverse of 5/7 is
(1) 1 (2) $-5/7$ (3) $-7/5$ (4) 7/5 19____

20. The product $5x^3y$ and $6x^3y$ is
(1) $11x^3y$ (2) $30x^3y$ (3) $30x^6y^2$ (4) $30x^9y$ 20____

21. An allustration of the commutative property of addition is
(1) $a + (-a) = 0$ (2) $a + b = b + a$
(3) $a + (b + c) = (a + b) + c$ (4) $a(b + c) = ab + ac$ 21____

22. The value of $|2| + |-2|$ is (1) 0 (2) 2 (3) -4 (4) 4 22____

23. The expression $\dfrac{-18a^6b^4}{6a^2b^2}$ is equivalent to
(1) $-3a^4b^2$ (2) $-3a^3b^2$ (3) $3a^4b^2$ (4) $12a^4b^2$ 23____

24. If $a + 6$ represents an odd integer, the next larger odd integer is represented by (1) $a + 4$ (2) $a + 8$ (3) $2a + 6$ (4) $a + 7$ 24____

25. The solution set of the equation $x^2 + 5x + 6 = 0$ is
(1) $\{-6,1\}$ (2) $\{6,-1\}$ (3) $\{-3,-2\}$ (4) $\{3,2\}$ 25____

26. Which point lies on the graph of $3x - y = 11$?
(1) $(5,-4)$ (2) $(2,5)$ (3) $(6,-7)$ (4) $(4,1)$ 26____

27. The sum of $3\sqrt{2}$ and $\sqrt{18}$ is equivalent to
(1) $9\sqrt{2}$ (2) 18 (3) $6\sqrt{2}$ (4) 36 27____

28. An equation of a line parallel to the y-axis and 3 units to the left of the y-axis is (1) $y = 3$ (2) $y = -3$ (3) $x = 3$ (4) $x = -3$ 28____

29. The area of a square is 25. The perimeter of the square is
(1) 10 (2) 20 (3) 25 (4) 100 29____

30. The result of subtracting $-4x^2 - 2x + 7$ from $-6x^2 + 3x + 4$ is (1) $-2x^2 + 5x - 3$
(2) $10x^2 + x + 11$ (3) $2x^2 - 5x + 3$ (4) $2x^2 + x + 11$ 30____

Part II

Answer four questions from this part.
Show all work unless otherwise directed. [40]

31. Answer *a* or *b* but *not* both.

a On the same set of coordinate axes, graph the following system of inequalities and label the solution set S.

$$3y < 2x + 12$$
$$4x + y < -1 \qquad [8, 2]$$

b Solve graphically and check:

$$2x + y = 2$$
$$x - 2y = 6 \qquad [8, 2]$$

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

a Solve for y: $\dfrac{2y^2 - 3}{y} = 2y + 1$ [4]

b Perform the indicated operation and express the result in *lowest terms*:

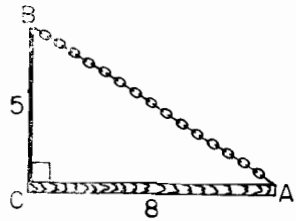
$$\frac{x^2 - 3x}{4x^2} \div \frac{x^2 - 9}{8x} \qquad [6]$$

33. The length of a rectangle is 5 meters greater than its width. If the length and width are each increased by 3 meters, the area of the resulting rectangle is 50 square meters. Find the dimensions, in meters, of the original rectangle. [*Only an algebraic solution will be accepted.*] [5, 5]

34. A runner training for the Olympics ran on a country road at the rate of 8 miles per hour. When he twisted his ankle, he had to turn around and walk back along the same road at a rate of 2 miles per hour. If the entire trip took 5 hours, how far did he run before he twisted his ankle? [*Only an algebraic solution will be accepted.*] [5, 5]

35. Pecans cost 50 cents more per pound than walnuts. If Mr. Martin paid \$7.75 for 3 pounds of walnuts and 2 pounds of pecans, find the price per pound of each. [*Only an algebraic solution will be accepted.*] [5, 5]

36. The accompanying diagram shows a shelf that is 8 inches wide. The shelf is mounted with a perpendicular bracket and supported by a chain. The length of the bracket is 5 inches.



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

b Find the length of support chain AB to the *nearest tenth* of an inch. [5]

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

a $2x = 3x + 1$ *a*.....

b $3x \leq x$ *b*.....

c $|x| = 1$ *c*.....

d $6x - 10 > x$ *d*.....

e $2x^2 = 2$ *e*.....