August 18, 1981

## 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 $y$: $5y - 17 = 4 + 2y$ 1_____

2. If 19 is subtracted from three times a number, the result is 110. Find the number. 2_____

3. Solve for $x$: $5(x + 1) = 6$ 3_____

4. Solve for $x$: $0.9x + 0.4 = 7.6$ 4_____

5. Find the value of $(6a)^2$ when $a = \frac{1}{2}$. 5_____

6. Express as a monomial in radical form: $3\sqrt{7} - \sqrt{7} + 4\sqrt{7}$ 6_____

7. What is the additive inverse of 3? 7_____

8. Express $\frac{x}{2} + \frac{x}{3}$ as a single fraction. 8_____

9. If one acute angle of a right triangle measures 37°, what is the number of degrees in the other acute angle? 9_____

10. The lengths of the sides of a triangle are represented by $(5x + 2)$, $(2x - 7)$, and $(6x - 4)$. Express the perimeter of the triangle as a binomial in terms of $x$. 10_____

11. Carol can mow a lawn in 45 minutes. What part of the lawn can she mow in 15 minutes? 11_____

12. Express the product of $(x + 14)$ and $(x - 3)$ as a trinomial. 12_____

13. Factor: $x^2 - a^2$ 13_____

14. If $\cos A = 0.4796$, find the measure of angle $A$ to the *nearest degree.* 14_____

15. Solve for $x$: $\frac{10}{3x} = \frac{2}{3}$ 15_____

16. Solve for $x$ in terms of $a$ and $b$: $2x + b = a$ 16_____

17. Two numbers are in the ratio 3 : 2 and their sum is 10. Find the *smaller* number. 17_____

18. Solve the following system of equations for $a$: 18_____

$$\begin{aligned} 2a + 5b &= 19 \\ -3a + 5b &= 9 \end{aligned}$$

*Directions* (19-30): Write in the space provided on the answer sheet the *numeral* preceding the expression that best completes *each* statement or answers *each* question.

19. Rounded to the *nearest hundredth*, 87.4566 is (1) 87.00 (2) 87.45 (3) 87.457 (4) 87.46 19____

20. The product of $2x^3$ and $6x^2$ is (1) $12x^6$ $12x^5$ (3) $8x^6$ (4) $8x^5$ 20____

21. If $2a + 5b$ is subtracted from $3a - 4b$, the difference is (1) $a + b$ (2) $5a + b$ (3) $a + 9b$ (4) $a - 9b$ 21____

22. What is the $y$-intercept of the line whose equation is $y - 2x = 5$? (1) $-2$ (2) 2 (3) $-5$ (4) 5 22____

23. The sum of two numbers is 24. If the larger number is represented by $x$, then the smaller number may be represented by (1) $x - 24$ (2) $x + 24$ (3) $24 - x$ (4) $24x$ 23____

24. The value of $|-7| - |3|$ is (1) $-10$ (2) 10 (3) $-4$ (4) 4 24____

25. Which is true of the graph of $x = 3$? (1) It has a slope of 3. (2) It is parallel to the $y$-axis. (3) It has a negative slope. (4) It is parallel to the $x$-axis. 25____

26. If the lengths of the legs of a right triangle are 8 and 3, what is the length of the hypotenuse? (1) $\sqrt{73}$ (2) $\sqrt{55}$ (3) $\sqrt{11}$ (4) $\sqrt{5}$ 26____

27. Which is the solution set of $1 < x \leq 3$, if the replacement set is the set of integers? (1) {1} (2) {1,2} (3) {1,2,3} (4) {2,3} 27____

28. The solution set of $x^2 - 2x = 15$ is (1) {3,5} (2) {3,$-5$} (3) {$-3$,5} (4) {$-3$,$-5$} 28____

29. Which value of $b$ will make the expression $\frac{(b-1)(b+1)}{b-3}$ undefined or meaningless? (1) 1 (2) $-1$ (3) 3 (4) $-3$ 29____

30. Last season, a soccer team won 8 games and lost 2. What percent of the games played did they lose? (1) 20% (2) 25% (3) 80% (4) 400% 30____

## Part II

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

31. Solve graphically and check: $y = 2x - 1$
$3x + 2y = 12$ [8, 2]

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

*a* Multiply and express the answer in *simplest form*:

$$\frac{x^2 - 3x - 40}{x^2 - 25} \cdot \frac{2x - 10}{x - 8}$$ [5]

*b* Express as a single fraction in *simplest form*:

$$\frac{x + y}{3} - \frac{x}{4}$$ [5]

33. Write an equation or 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.*]

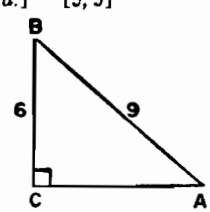
*a* Two cars pass each other going in opposite directions on the interstate highway. One is traveling at 55 miles per hour and the other at 45 miles per hour. If they continue at the same average speeds, in how many hours will they be 250 miles apart? [5]

*b* A merchant wishes to mix peanuts selling for \$2.00 a pound with raisins selling for \$1.50 a pound. How many pounds of each should she mix to obtain a mixture of 120 pounds to sell for \$1.75 a pound? [5]

34. The length of a rectangle is 14 meters longer than the width. Find the dimensions of the rectangle if the area is 51 square meters. [*Only an algebraic solution will be accepted.*] [5, 5]

35. A man invests \$10,000, part of it at 10% and the rest at 5%. The annual income from the two investments is \$700. Find the amount invested at *each* rate. [*Only an algebraic solution will be accepted.*] [5, 5]

36. As shown in the accompanying diagram, $ABC$ is a right triangle, $C$ is a right angle, $BC = 6$, and $AB = 9$.




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

*b* Find the length of $\overline{AC}$ to the *nearest integer*. [5]

37. The questions below refer to set $A = \{-1, 0, 1, 2\}$. On your answer paper, write the letters *a* through *e* and next to each write the set of elements which answers the question. [*Each answer must be a member of set A.*] [10]

*a* What is the additive identity element for the set of real numbers?

*b* What is the multiplicative identity element for the set of real numbers?

*c* What is the additive inverse of $-1$?

*d* What is the multiplicative inverse of $-1$?

*e* Which element of the replacement set is a prime number?