January 23, 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. Solve for y: $5y = -15$ 1_____

2. On a scale drawing, 1 centimeter represents 30 kilometers. How many kilometers are represented by a line segment $2\frac{1}{2}$ centimeters long? 2_____

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

4. Solve the following system of equations for x:
$$2x - 3y = 7$$
$$4x + 3y = 5$$ 4_____

5. Solve for x: $\frac{6}{x - 1} = \frac{3}{4}$ 5_____

6. Factor: $x^2 - 9x + 20$ 6_____

7. Solve for x: $9x + 12 = x - 4$ 7_____

8. Solve for p: $0.3p + 4 = 10$ 8_____

9. If $n + 1$ represents an odd integer, express the next larger odd integer in terms of n. 9_____

10. Find the value of tan 74° to the *nearest tenth.* 10_____

11. Find the sum of $-6x^2 - 4x$ and $6x^2 + 3$. 11_____

12. What value of x will make the expression $\frac{5}{x - 2}$ undefined? 12_____

13. Find the value of $\sqrt{19}$ to the *nearest tenth.* 13_____

14. The point $(k,2)$ lies on the graph of $x + 3y = 5$. Find the value of k. 14_____

15. From $-2x + 3y$, subtract $-x - 5y$. 15_____

16. Factor: $4a^2 - b^2$ 16_____

17. If $I = prt$, find I when $p = 600$, $r = 6\%$, and $t = 2$. 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 a^2b and a^2b^3 is (1) a^4b^3 (2) a^2b^3 (3) a^2b^4 (4) a^4b^4 18_____

19. If a square has a perimeter of 144, what is the length of a side of the square? (1) 12 (2) 36 (3) 48 (4) 72 19____

20. The multiplicative inverse of $-\frac{1}{2x}$ is (1) 1 (2) -1 (3) $-\frac{1}{2x}$ (4) $-2x$ 20____

21. If $4x + a = 4a + x$, then x must equal (1) 0 (2) $5a$ (3) a (4) 4 21____

22. Which is an example of the commutative property of addition?
(1) $2 + 3 = 3 + 2$ (2) $2 + 3 = 1 + 4$
(3) $(2 + 3) + 4 = 2 + (3 + 4)$ (4) $2(3 + 4) = 2 \cdot 3 + 2 \cdot 4$ 22____

23. The expression $(2a + 3b)^2$ is equivalent to
(1) $4a^2 + 9b^2$ (2) $4a^2 + 6ab + 9b^2$ (3) $4a^2 + 12ab + 9b^2$
(4) $4a^2 + 12a^2b^2 + 9b^2$ 23____

24. The value of $|-5| - |6|$ is (1) 1 (2) -1 (3) 11 (4) -11 24____

25. The expression $4\sqrt{2} - \sqrt{32}$ is equivalent to
(1) 0 (2) $8\sqrt{8}$ (3) $-8\sqrt{2}$ (4) $4\sqrt{2}$ 25____

26. The area of a rectangle whose width is w and whose length is $2w$ may be represented by (1) $6w$ (2) $2w^2$ (3) $3w$ (4) $3w^2$ 26____

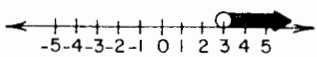
27. When $12x^6 - 4x^2$ is divided by $4x^2$, the quotient is
(1) $3x^4$ (2) $3x^3 - 1$ (3) $3x^4 - 1$ (4) $3x^3$ 27____

28. The solution set of the equation $x^2 - 3x - 4 = 0$ is
(1) $\{-1\}$ (2) $\{-1,4\}$ (3) $\{-4,1\}$ (4) $\{4\}$ 28____

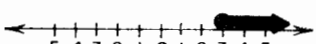
29. The expression $(a^2)^3$ is equivalent to (1) a^5 (2) $2a^5$ (3) $3a^2$ (4) a^6 29____

30. Which graph shows the solution set of $x - 1 < 2$?

(1)


(3)


(2)


(4)


30____

Part II

Answer four questions from this part.

Show all work unless otherwise directed.

31. Solve graphically and check:

$$y - x = -1$$
$$2y + x = 4$$

[8, 2]

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

a Perform the indicated operation and express the result in simplest terms:

$$\frac{x^2 - 4}{x^2 - 5x + 6} \div \frac{x - 2}{3x - 9} \quad [5]$$

b Solve for x: $\dfrac{x - 2}{4} - 6 = \dfrac{x}{12}$ [5]

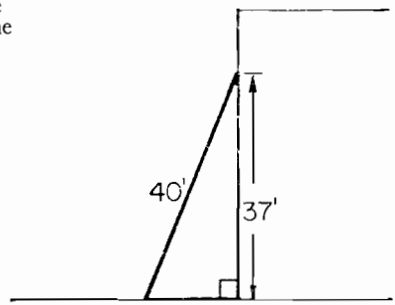
33. The lengths of two sides of a triangle are in the ratio of 1 : 2. The third side is one less than the square of the first side. If the perimeter of the triangle is 9, find the length of the *smallest* side of the triangle. [*Only an algebraic solution will be accepted.*] [5, 5]

34. A freight train and a passenger train start toward each other at the same time from two towns that are 500 miles apart. After three hours the trains are still 80 miles apart. If the rate of the passenger train is 20 miles per hour faster than the rate of the freight train, find the rate of each train. [*Only an algebraic solution will be accepted.*] [6, 4]

35. Mr. Smith invested part of $10,000 in stocks paying 12% interest and the rest in bonds paying 8% interest. If the annual incomes from the investments are equal, how much did he invest at each rate? [*Only an algebraic solution will be accepted.*] [6, 4]

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

In the diagram below, a 40-foot pole leans against a building. The top of the pole reaches a point on the building which is 37 feet above the ground.



a Find to the *nearest degree* the measure of the angle the pole makes with the wall. [5]

b Find to the *nearest foot* the distance from the bottom of the pole to the foot of the building. [5]

37. *On your answer paper,* write the letters *a* through *e*. Next to *each* letter translate the corresponding phrase below into algebraic symbols. [10]

a 3 more than twice x

b 4 less than x

c the product of x and y divided by 3

d the square of the sum of x and y

e one-half the positive square root of x