

January 28, 1982

## Part 1

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  $x$ :  $3x + 2 = -1$  1\_\_\_\_\_
2. Factor:  $a^2 - 5a - 24$  2\_\_\_\_\_
3. On a map, if one inch represents 60 miles, how many miles are represented by  $2\frac{1}{2}$  inches? 3\_\_\_\_\_
4. Solve for  $x$  in terms of  $c$  and  $d$ :  $3c + 2x = d$  4\_\_\_\_\_
5. If the point  $(2, k)$  is on the graph of the equation  $x + 2y = 10$ , find the value of  $k$ . 5\_\_\_\_\_
6. Solve for  $y$ :  $\frac{y}{9} = \frac{y + 1}{12}$  6\_\_\_\_\_
7. The solution set of  $2x^2 + 2 = 52$  contains two members. What is the *larger* member? 7\_\_\_\_\_
8. Find, to the *nearest degree*, the measure of the angle whose cosine is 0.4440. 8\_\_\_\_\_
9. Solve the following system of equations for  $x$ :  

$$\begin{aligned} x + 9y &= -6 \\ 2x - 9y &= 15 \end{aligned}$$
9\_\_\_\_\_
10. A plane travels for 4 hours at an average speed of 250 miles per hour. Returning over the same route, the plane can travel only 200 miles per hour. How many hours will it take for the plane to make the return trip? 10\_\_\_\_\_
11. Solve for  $x$ :  $0.3x - 2 = 4$  11\_\_\_\_\_
12. A person 6 feet tall casts a shadow 15 feet long. At the same time, a nearby tower casts a shadow 100 feet long. Find the number of feet in the height of the tower. 12\_\_\_\_\_
13. What is the numerical value of  $3x^2 - 2y$  when  $x = -1$  and  $y = 0$ ? 13\_\_\_\_\_
14. Find the solution set of  $2(m - 3) = -12$ . 14\_\_\_\_\_
15. Factor:  $2x^2 + x$  15\_\_\_\_\_
16. If the replacement set for  $x$  is  $\{-2, 0, 2, 4, 6\}$ , what is the solution set of  $x + 3 \leq 5$ ? 16\_\_\_\_\_
17. If the measure of the vertex angle of an isosceles triangle is  $80^\circ$ , what is the number of degrees in each base angle? 17\_\_\_\_\_

18. From  $7x + 8y$ , subtract  $2x - 3y$ . 18\_\_\_\_\_

19. The length of a rectangle is 8 and its width is represented by  $w$ . Express the perimeter of the rectangle as a binomial in terms of  $w$ . 19\_\_\_\_\_

20. Express as a trinomial the product of  $x - 5$  and  $x + 3$ . 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. When  $5x^4y^8$  is multiplied by  $2x^2y^3$ , the product is (1)  $10x^8y^9$   
(2)  $10x^6y^6$  (3)  $7x^8y^9$  (4)  $7x^6y^6$  21\_\_\_\_\_

22. The additive inverse of 7 is (1) 1 (2) 0 (3)  $-7$  (4)  $1/7$  22\_\_\_\_\_

23. Which value of  $x$  will make the expression  $\sqrt{29-x}$  a positive integer? (1) 1 (2) 29 (3) 0 (4) 4 23\_\_\_\_\_

24. The sum of  $\frac{x+7}{3}$  and  $\frac{x-2}{4}$  is (1)  $7x + 22$

(2)  $\frac{2x+5}{7}$  (3)  $\frac{7x+22}{12}$  (4)  $\frac{7x+34}{12}$  24\_\_\_\_\_

25. The value of  $|-15| - |-5|$  is (1) 10 (2)  $-10$  (3) 20  
(4)  $-20$  25\_\_\_\_\_

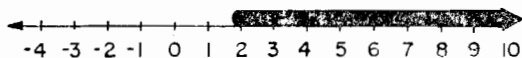
26. The graph of the equation  $3x + 2y = 12$  intersects the  $y$ -axis at the point whose coordinates are (1)  $(0,6)$  (2)  $(6,0)$  (3)  $(0,4)$   
(4)  $(4,0)$  26\_\_\_\_\_

27. A grocer sold  $p$  pounds of butter at  $c$  cents per pound. What was the number of cents the grocer received for the sale, expressed in terms of  $p$  and  $c$ ? (1)  $p + c$  (2)  $pc$  (3)  $\frac{p}{c}$  (4)  $\frac{c}{p}$  27\_\_\_\_\_

28. When  $2\sqrt{5}$  is added to  $\sqrt{45}$ , the sum is (1)  $5\sqrt{5}$  (2)  $5\sqrt{10}$   
(3)  $3\sqrt{50}$  (4)  $6\sqrt{5}$  28\_\_\_\_\_

29. The lengths of the legs of a right triangle are 5 and 7. The length of the hypotenuse is (1) 12 (2)  $2\sqrt{3}$  (3)  $\sqrt{35}$  (4)  $\sqrt{74}$  29\_\_\_\_\_

30. Which inequality is represented by the graph below?



(1)  $x < 2$  (2)  $x \leq 2$  (3)  $x > 2$  (4)  $x \geq 2$  30\_\_\_\_\_

## Part II

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

31. Solve graphically and check:

$$\begin{aligned} y - 2x &= 5 \\ x + 2y &= 0 \end{aligned} \quad [8, 2]$$

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

- a* Solve for  $x$  and check:

$$\frac{x - 2}{3} + \frac{2x - 4}{4} = 5 \quad [4, 1]$$

- b* Divide and express the answer as a fraction in *lowest terms*:

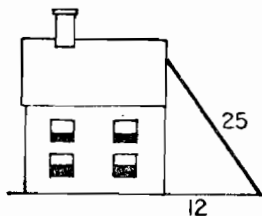
$$\frac{x^2 + 3x - 4}{2x + 2} \div \frac{x + 4}{x + 1} \quad [5]$$

33. The side of a certain square is 3 feet longer than that of another square. The sum of their areas is 117 square feet. Find the length of a side of the *smaller* square. [Only an algebraic solution will be accepted.] [5, 5]

34. Two motorists leave from the same place at the same time and travel in opposite directions. One motorist is traveling 5 miles per hour faster than the other. If they are 315 miles apart after 3 hours, what is the rate of *each* motorist? [Only an algebraic solution will be accepted.] [5, 5]

35. A soda machine contains 20 coins; some of the coins are nickels and the rest are quarters. If the value of the coins is \$4.40, find the number of coins of each kind. [Only an algebraic solution will be accepted.] [5, 5]

36. As shown in the accompanying diagram, a 25-foot ladder leans against the side of a house. The base of the ladder is 12 feet from the house on level ground.



- a* Find, to the *nearest degree*, the measure of the angle which the ladder makes with the ground. [5]
- b* Find, to the *nearest foot*, the distance from the top of the ladder to the ground. [5]

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

$$a \quad -\frac{1}{2}x = 1$$

 $a$ .....

$$b \quad 2 + x = 0$$

 $b$ .....

$$c \quad x^2 = 1$$

 $c$ .....

$$d \quad |x| = 0$$

 $d$ .....

$$e \quad 8 - x = 9$$

 $e$ .....