

August 18, 1982

## 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.

- Solve for  $x$ :  $7 + 2x = 6x - 5$  1 \_\_\_\_\_
- Solve for  $x$ :  $x - (12 - x) = 38$  2 \_\_\_\_\_
- Solve for the positive value of  $x$ :  $x^2 - 169 = 0$  3 \_\_\_\_\_
- Solve for  $x$ :  $\frac{3}{x} = \frac{12}{20}$  4 \_\_\_\_\_
- Solve for  $x$  in terms of  $a$  and  $b$ :  $ax = b$  5 \_\_\_\_\_
- Factor:  $x^2 - 5x - 24$  6 \_\_\_\_\_
- Find the least common multiple of 9, 12, and 18. 7 \_\_\_\_\_
- Mr. Green lives 20 miles from the airport. If he leaves home at 8:15 a.m. and drives at an average speed of 40 miles per hour, what time will he reach the airport? 8 \_\_\_\_\_
- If 15% of a number is 36, find the number. 9 \_\_\_\_\_
- If the length of a side of an equilateral triangle is  $(x + 5)$ , express the perimeter of the triangle in terms of  $x$ . 10 \_\_\_\_\_
- From  $2a^2 - 3$  subtract  $a^2 - 5$ . 11 \_\_\_\_\_
- Express the product of  $(3x - 1)$  and  $(2x + 3)$  as a trinomial. 12 \_\_\_\_\_
- Reduce to lowest terms:  $\frac{x^2 + 5x + 6}{x + 3}$  13 \_\_\_\_\_
- Express the sum of  $\frac{2x - 5}{3}$  and  $\frac{x}{2}$  as a single fraction in simplest form. 14 \_\_\_\_\_
- If  $y^2 + x = 12$ , what is the value of  $x$  when  $y$  equals  $-2$ ? 15 \_\_\_\_\_
- Find the numerical value of  $|5 - 7| + |7 - 5|$ . 16 \_\_\_\_\_
- If  $x$  represents an odd integer, express the next smaller odd integer in terms of  $x$ . 17 \_\_\_\_\_
- Solve the following system of equations for  $y$ :  

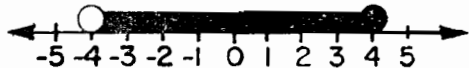
$$\begin{aligned} y - x &= 6 \\ x + y &= 4 \end{aligned}$$
 18 \_\_\_\_\_

*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. 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)  $3w^2$  19\_\_\_\_\_

20. The expression  $(2x)^3(4x^2)$  is equivalent to (1)  $33x^8$   
(2)  $32x^6$  (3)  $128x^8$  (4)  $128x^6$  20\_\_\_\_\_

21. The graph of which inequality is shown in the accompanying diagram?



(1)  $-4 < x < 4$  (2)  $-4 \leq x < 4$  (3)  $-4 < x \leq 4$   
(4)  $-4 \leq x \leq 4$  21\_\_\_\_\_

22. A member of the solution set of the inequality  $4x - 3 < 1$  is  
(1) 1 (2) 2 (3) 3 (4) 0 22\_\_\_\_\_

23. If  $15a^2 - 3a$  is divided by  $3a$ , the quotient is (1)  $5a$   
(2)  $2a$  (3)  $5a - 3$  (4)  $5a - 1$  23\_\_\_\_\_

24. Which is an illustration of the identity property for multiplication?  
(1)  $a \cdot 1 = a$  (2)  $a(b) = b(a)$  (3)  $a(b + c) = ab + ac$   
(4)  $a(bc) = (ab)c$  24\_\_\_\_\_

25. The expression  $5\sqrt{72}$  is equivalent to (1)  $6\sqrt{2}$  (2)  $6\sqrt{10}$   
(3)  $30\sqrt{2}$  (4)  $30\sqrt{5}$  25\_\_\_\_\_

26. The solution set of the equation  $x + 1 = x$  is (1)  $\phi$   
(2)  $\{0\}$  (3)  $\{-1\}$  (4)  $\{\text{all real numbers}\}$  26\_\_\_\_\_

27. The point whose coordinates are  $(-5, 2)$  lies in Quadrant  
(1) I (2) II (3) III (4) IV 27\_\_\_\_\_

28. If  $x = 10(\cos 30^\circ)$ , the value of  $x$  to the nearest tenth is  
(1) 0.9 (2) 5.0 (3) 8.6 (4) 8.7 28\_\_\_\_\_

29. A tree casts a shadow of 48 feet at the same time that a yardstick casts a 4-foot shadow. What is the height of the tree in feet?  
(1) 192 (2) 64 (3) 36 (4) 12 29\_\_\_\_\_

30. What is the slope of the line whose equation is  $2y = 3x - 6$ ?  
(1)  $2/3$  (2)  $3/2$  (3) 3 (4)  $-3$  30\_\_\_\_\_

### Part II

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

31. a On the same set of coordinate axes, graph the solution set of the following pair of inequalities.

$$\begin{aligned} y - 4x &< 0 \\ x + y &> 5 \end{aligned} \quad [8]$$

b Name an ordered pair in the solution set graphed in part a. [2]

32. Solve algebraically and check:

$$\begin{aligned} 5x + 2y &= 9 \\ 2x + 5y &= 12 \end{aligned} \quad [8, 2]$$

33. Two hunters left camp at 4 a.m. and walked in opposite directions. One hunter walked at a rate of 5 miles per hour and the other at a rate of 6 miles per hour. At what time were the hunters 55 miles apart? [Only an algebraic solution will be accepted.] [5, 5]

34. 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.]

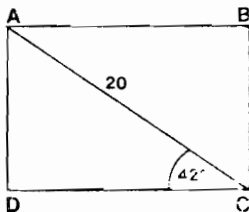
a The measures of two of the angles of a triangle are in the ratio of 3:4 and the third angle is  $40^\circ$  less than the larger of the other two. Find the measure of each of the angles of the triangle. [5]

b Find three consecutive even integers such that four times the first equals three times the third. [5]

35. Solve for
- $x$
- and check:

$$x(x + 3) - 4(x - 2) = 14 \quad [8, 2]$$

36. In the accompanying figure,
- $ABCD$
- is a rectangle, diagonal
- $\overline{AC}$
- is 20 centimeters long and makes an angle of
- $42^\circ$
- with the longer side of the rectangle.



- a Find the measure of  $\overline{DC}$  to the nearest centimeter. [5]
- b Find the measure of  $\overline{AD}$  to the nearest centimeter. [5]
37. On your answer paper, write the letters  $a$  through  $e$  and next to each letter write the answer to the corresponding question below. [10]
- a What is the intersection of the set of odd integers and the set of even integers?
- b What is the sum of the reciprocals of  $\frac{1}{2}$  and  $\frac{1}{3}$ ?
- c What is the additive identity element?
- d For what value of  $x$  is  $\frac{6}{x-8}$  undefined or meaningless?
- e What is the perimeter of a square whose area is 36?