

August 14, 1984

## Part I

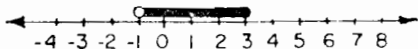
Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Write your answers in the spaces provided on the answer sheet.

- In the proportion  $\frac{c}{d} = \frac{e}{f}$ ,  $c = 4$ ,  $d = 9$ , and  $e = 8$ .  
Find the value of  $f$ . 1 \_\_\_\_\_
- One of the factors of  $x^2 + 5x + 6$  is  $x + 3$ . What is the other factor? 2 \_\_\_\_\_
- If  $\sin A = 0.9801$ , find the measure of angle  $A$  to the nearest degree. 3 \_\_\_\_\_
- Express the number of dollars earned by working for 8 hours at  $d$  dollars per hour, in terms of  $d$ . 4 \_\_\_\_\_
- Solve for  $x$ :  $0.03x + 5 = 11$  5 \_\_\_\_\_
- Solve for  $p$ :  $\frac{2}{3} = \frac{p - 2}{15}$  6 \_\_\_\_\_
- Two numbers are in the ratio of 2:3 and the smaller number is 16. Find the larger number. 7 \_\_\_\_\_
- Solve for  $x$ :  $5 - x = 7$  8 \_\_\_\_\_
- Express the product of  $(3x - 2)$  and  $(2x + 1)$  as a trinomial. 9 \_\_\_\_\_
- Solve the following system of equations for  $x$ :  

$$\begin{aligned} 3x - y &= 10 \\ 2x + y &= 10 \end{aligned}$$
10 \_\_\_\_\_
- If 15% of a number is 6, what is the number? 11 \_\_\_\_\_
- Solve for  $x$  in terms of  $a$  and  $b$ :  $3x - a = b$  12 \_\_\_\_\_
- From  $5x^2 - 6x + 2$  subtract  $3x^2 + 7$ . 13 \_\_\_\_\_
- The side of a square is represented by  $3x - 2$ . Express the perimeter of the square in terms of  $x$ . 14 \_\_\_\_\_
- Find the positive square root of 43 to the nearest tenth. 15 \_\_\_\_\_
- The point  $(2, k)$  lies on the graph of the equation  $y = 3x$ . What is the value of  $k$ ? 16 \_\_\_\_\_
- Solve for the positive value of  $x$ :  $3x^2 - 147 = 0$  17 \_\_\_\_\_
- What is the value of  $|-16| - |9|$ ? 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 fraction  $\frac{x^2 - 16}{x + 4}$  is equivalent to (1)  $x + 4$   
 (2)  $x - 4$  (3)  $x - 12$  (4) 0 19\_\_\_\_\_
20. The expression  $(2x^3y^2)(3x^2y)$  is equivalent to (1)  $5x^5y^3$   
 (2)  $6x^6y^2$  (3)  $5x^6y^2$  (4)  $6x^5y^3$  20\_\_\_\_\_
21. Which is an illustration of the distributive property?  
 (1)  $a(bc) = (ab)c$  (2)  $ab = ba$  (3)  $a(b + c) = ab + ac$   
 (4)  $a + (b + c) = (a + b) + c$  21\_\_\_\_\_
22. The solution set of  $2x - 5 > 7$  is (1)  $\{x|x > 1\}$   
 (2)  $\{x|x < 1\}$  (3)  $\{x|x > 6\}$  (4)  $\{x|x < 6\}$  22\_\_\_\_\_
23. For which value of  $x$  is the expression  $\frac{6}{x - 4}$  undefined?  
 (1) -6 (2) -4 (3) 0 (4) 4 23\_\_\_\_\_
24. The quotient of  $(4x^3 - 3x^2) \div x^2$  is (1) 1 (2)  $2x - 3$   
 (3)  $4x - 3$  (4)  $4 - 3x$  24\_\_\_\_\_
25. The expression  $\sqrt{200}$  is equivalent to (1)  $10\sqrt{2}$  (2)  $2\sqrt{10}$   
 (3)  $8\sqrt{5}$  (4)  $4\sqrt{5}$  25\_\_\_\_\_
26. Which is an equation of the straight line parallel to the  $x$ -axis and 2 units above it? (1)  $y = -2$  (2)  $y = 2$  (3)  $x = -2$   
 (4)  $x = 2$  26\_\_\_\_\_
27. Which is a subset of the set of natural numbers?  
 (1)  $\{1,2,3\}$  (2)  $\{1, \frac{3}{2}, 2\}$  (3)  $\{-1, 0, 1\}$  (4)  $\{0, 1, 2\}$  27\_\_\_\_\_
28. The expression  $(x + 3)^2$  is equivalent to (1)  $x^2 + 6x + 9$   
 (2)  $x^2 + 9$  (3)  $x^2 + 6x - 9$  (4)  $x^2 - 6x + 9$  28\_\_\_\_\_
29. The graph of  $y - 2x = 1$  has a slope of (1) 1 (2) 2  
 (3) -2 (4)  $\frac{1}{2}$  29\_\_\_\_\_
30. The graph below represents the solution set of which inequality?



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

NINTH YEAR MATHEMATICS  
Part II

Answer four questions from this part.

Show all work unless otherwise directed.

31. Solve graphically and check:

$$\begin{aligned} x - 2y &= 4 \\ x &= y + 2 \end{aligned} \quad [8, 2]$$

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

*a* Solve for  $x$ :  $\frac{x-1}{2} - \frac{x-1}{3} = 2$  [4]

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

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

33. 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* Mark and Susan together can paint a room in 3 hours. If Mark works alone, it takes him 9 hours. How many hours would it take Susan to paint the room alone? [5]

- b* The altitude of a triangle exceeds twice the base by 2. The area of the triangle is 20. Find the base of the triangle. [5]

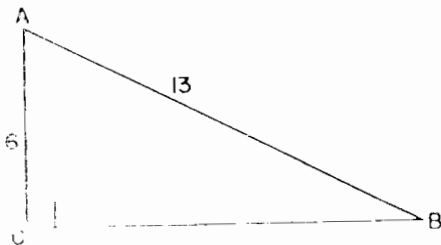
34. Mr. Stevens invested \$8,000 at 10% interest. How much money must he invest at 8% interest so that his total annual interest will equal 9% of his total investment? [Only an algebraic solution will be accepted.] [5, 5]

35. Find three positive consecutive integers such that the square of the first is 10 more than the third. [Only an algebraic solution will be accepted.] [5, 5]

36. In the accompanying diagram of right triangle  $ABC$ , the right angle is at  $C$ ,  $AC = 6$ , and  $AB = 13$ .

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

- b* Find  $BC$  to the nearest integer. [5]



37. On your answer paper, write the letters *a* through *e*. For each algebraic statement listed in *a* through *e*, select the property, *chosen from the list below*, that is illustrated by the statement. Then write its *number* next to the appropriate letter. [10]

## Properties

- (1) Commutative property of multiplication
- (2) Additive identity property
- (3) Multiplicative identity property
- (4) Distributive property
- (5) Associative property of addition
- (6) Multiplicative inverse property
- (7) Additive inverse property
- (8) Associative property of multiplication

<i>a</i> $3 + (-3) = 0$	<i>a</i> _____
<i>b</i> $(3 + 2) + 1 = 3 + (2 + 1)$	<i>b</i> _____
<i>c</i> $3(\frac{1}{3}) = 1$	<i>c</i> _____
<i>d</i> $3 + 0 = 3$	<i>d</i> _____
<i>e</i> $3(2) = 2(3)$	<i>e</i> _____