Examination June, 1978 Ninth Year Mathematics

Elementary Algebra

PART ONE *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: $8x = 2(x + 15)$ 1_____

2. Solve for x: $\frac{18}{12} = \frac{x}{2}$ 2_____

3. If 19 is subtracted from three times a certain number, the difference is 110. What is the number? 3_____

4. On a map, 1 centimeter equals 50 kilometers. If two cities are 175 kilometers apart, how many centimeters apart are they on the map? 4_____

5. Express as a trinomial the product $(x - 5)(x - 3)$. 5_____

6. If $C = \frac{5}{9}(F - 32)$, find C when $F = 41$. 6_____

7. If $\cos B = .6289$, find angle B to the *nearest degree*. 7_____

8. The lengths of the sides of a triangle are represented by $x + 1$, $2x + 3$, and $3x - 5$. Express the perimeter of the triangle as a binomial in terms of x. 8_____

9. Solve for x: $7x - 3 = 3x - 7$ 9_____

10. Solve for x: $1.2x - .35 = .5x + 5.25$ 10_____

11. Solve for a: $\frac{a}{2} + \frac{a}{6} = 2$ 11_____

12. Factor completely: $x^2 - 49$ 12_____

13. Express the product $\frac{(x+y)^2}{4} \cdot \frac{2}{x+y}$ as a single fraction in *simplest form.* 13_____

14. Factor completely: $a^2 + 7a + 12$ 14_____

15. Find the positive square root of 57 to the *nearest tenth.* 15_____

16. If 5% of a number is 30, what is the number? 16_____

17. Subtract $4m - h$ from $4m + h$. 17_____

18. Express $\frac{x^2 + 3x}{2(x+3)}$ as a fraction in *lowest terms.* 18_____

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

19. What is the remainder when $4x^2 - 5x + 7$ is divided by $x - 1$?

(1) 6 (2) -2 (3) 8 (4) 16 19_____

20. If $n + 7$ is an even number, the next larger even number is

(1) $n + 5$
(2) $n + 9$
(3) $10n + 7$
(4) $2n + 14$ 20_____

21. When $12x^4 - 3x^3 + 6x^2$ is divided by $3x^2$, the quotient is

(1) $9x^2 - 3$
(2) $5x^2$
(3) $4x^2 - 3x + 2$
(4) $4x^2 - x + 2$ 21_____

22. The product of $7y^3$ and $4y^5$ is

(1) $11y^8$ (2) $11y^{15}$ (3) $28y^8$ (4) $28y^{15}$ 22_____

23. Which ordered pair is the solution of the following system of equations?

$$3x + 2y = 4$$
$$-2x + 2y = 24$$

(1) $(2,-1)$ (2) $(-4,8)$ (3) $(-4,-8)$ (4) $(2,-5)$ 23_____

24. Which fraction has the *greatest* value?
(1) $\frac{1}{2}$ (2) $\frac{5}{8}$ (3) $\frac{3}{5}$ (4) $\frac{3}{4}$ 24____

25. Which is the solution set for $2x > x + 3$?
(1) $\{x \mid x > 1\}$ (3) $\{x \mid x = 3\}$
(2) $\{x \mid x > \frac{3}{2}\}$ (4) $\{x \mid x > 3\}$ 25____

26. A point on the graph of $x + 3y = 13$ is
(1) (4,4) (2) (−2,3) (3) (−5,6) (4) 4,−3) 26____

27. The solution set of the equation $x^2 - 3x - 10 = 0$ is
(1) {−2,5} (2) {−2,−5} (3) {2,−5} (4) {2,5} 27____

28. If $x + ay = m$, then y equals
(1) $\frac{m - x}{a}$ (2) $\frac{m + x}{a}$ (3) $\frac{m}{a} - x$ (4) $\frac{m}{a} + x$ 28____

29. The expression $\sqrt{27} + \sqrt{12}$ is equivalent to
(1) $\sqrt{39}$ (2) $13\sqrt{3}$ (3) $5\sqrt{6}$ (4) $5\sqrt{3}$ 29____

30. Which statement is *false*?
(1) The set of integers is closed under subtraction.
(2) The set of integers is closed under division.
(3) The set of natural numbers is closed under addition.
(4) The set of natural numbers is closed under multiplication. 30____

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

31. Answer *both a* and *b*.

a On the same set of coordinate axes, graph the following system of inequalities:

$$\begin{aligned} y &> x + 4 \\ x + y &\leq 2 \end{aligned} \qquad [8]$$

b Which of the following points is in the solution set of the graph drawn in answer to *a*?
(1) (2,3) (2) (−5,2) (3) (0,6) (4) (−1,0) [2]

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

a Solve for *c*: $\frac{c+2}{2} - \frac{c-1}{3} = 4$ [5]

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

$$\frac{x-3}{x^2-4x} \cdot \frac{x^2-16}{x^2+x-12}$$ [5]

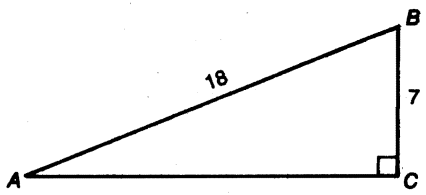
33. The total attendance at a school play was 850. The tickets for senior citizens were \$1.50 each, and the regular tickets were \$2.00 each. If the total receipts were \$1,650, how many tickets of each kind were sold? [*Only an algebraic solution will be accepted.*] [5,5]

34. Find three consecutive odd integers such that twice the sum of the second and third is 43 more than three times the first. [*Only an algebraic solution will be accepted.*] [5,5]

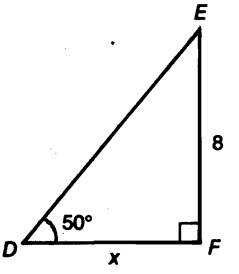
35. The length of a rectangle is 1 centimeter less than twice the width. If the perimeter of the rectangle is 76 centimeters, find the number of centimeters in *each* dimension of the rectangle. [*Only an algebraic solution will be accepted.*] [5,5]

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

a In the accompanying diagram, right triangle ABC has a right angle at C, $AB = 18$, and $BC = 7$. Find angle B to the *nearest degree.* [5]



b In the accompanying diagram, right triangle *DEF* has a right angle at *F*, angle $D = 50°$, and $EF = 8$. Find *DF* to the *nearest integer*. [5]



37. The replacement set for x for each of the open sentences below is $\{-2,-1,0,1,2\}$. On your answer paper write the letters *a* through *e* and next to *each* letter, write the solution set of each open sentence. [*Each answer must be a subset of the replacement set.*] [10]

a $(x - 1)(x + 2) = 0$

b $-1 < x \leq 1$

c $5x + 1 < 3x + 1$

d $x^2 = 1$

e $|x| = -2$