Examination June, 1976  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 \( x \): \( .3x = 1.2 \)  
2. Solve for \( x \): \( 4x + 3 = 2x + 4 \)  
3. If 10 percent of a number is 14, what is the number?  
4. Find the value of \( | -5 | - | 2 | \)  
5. Solve for \( x \): \( 5(x - 2) = 3x + 4 \)  
6. Solve for \( x \): \( \frac{x + 1}{8} = \frac{9}{24} \)  
7. If \( x \) apples cost 25 cents, express in terms of \( x \) the number of apples which can be bought for 75 cents.  
8. If ½ inch represents 3 feet in a scale drawing, then how many inches will represent 24 feet?  
9. Express as a trinomial the product of \( (x + 1) \) and \( (3x + 1) \).  
10. What is the \( y \)-intercept of the line whose equation is \( y = -3x + 4 \)?  
11. Find the positive square root of 18 to the nearest tenth.
12. If \( a = 1 \) and \( b = 2 \), find the value of \( 3a^2b^2 \).  
13. Solve for \( y \) in terms of \( c, d, \) and \( h \): \( dy - c = h \)  
14. From \( 5x^2 - 2x + 3 \) subtract \( 3x^2 + 4x + 3 \).  
15. The lengths of the sides of a triangle are represented by \( x + 4, 2x - 2, \) and \( 3x - 1 \). Express the perimeter of the triangle in terms of \( x \).  
16. Express the sum of \( \sqrt{27} + 5\sqrt{3} \) as a single term in radical form.  
17. Factor: \( 6a - 9 \)  
18. Two numbers are in the ratio of 5:1 and their difference is 28. What is the smaller number?  
19. The length of the hypotenuse of a right triangle is 13. If the length of one leg is 12, find the length of the other leg.  

DIRECTIONS (20-30): Write in the space provided the numeral preceding the expression that best completes each statement or answers each question.

20. Which is equivalent to \( \frac{8}{x} - \frac{3}{x} \)?  
(1) 5  
(2) 5\( x \)  
(3) \( \frac{5}{x} \)  
(4) \( -\frac{5}{x} \)  

21. Which ordered pair is the solution of this system of equations?  
\[
\begin{align*}
x + 2y &= 6 \\
x - y &= 3
\end{align*}
\]
(1) (1,4)  
(2) (2,2)  
(3) (5,2)  
(4) (4,1)  

22. If \( \cos x = .8710 \), what is the measure of angle \( x \) to the nearest degree?  
(1) 29°  
(2) 30°  
(3) 60°  
(4) 61°
23. The multiplicative inverse of $\frac{2}{3}$ is

(1) 1  (2) $\frac{3}{2}$  (3) $-\frac{2}{3}$  (4) 0

24. Which ordered pair is in the solution set of $x + 2y > 7$?

(1) (5,1)  (2) (2,6)  (3) (3,1)  (4) (7,0)

25. The product of $5y^2$ and $4y^3$ is

(1) $9y^5$  (2) $9y^6$  (3) $20y^5$  (4) $20y^6$

26. The equation $x + 4 = 4 + x$ is an illustration of the

(1) associative property of addition  
(2) commutative property of addition  
(3) symmetric property of equality  
(4) reflexive property of equality

27. The result of multiplying $\frac{x^2 - 1}{x}$ by $\frac{4x^2}{x + 1}$ is

(1) $\frac{x - 1}{4x^3}$  
(2) $\frac{(x^2 - 1)(x + 1)}{4x^3}$  
(3) $4x(x + 1)$  
(4) $4x(x - 1)$

28. The solution set of the equation $x^2 - 5x + 6 = 0$ is

(1) {2,3}  (2) {2}  (3) {3}  (4) {-2,-3}

29. Which statement is true about the graph of the equation $y = 3$?

(1) It is parallel to the x-axis.  
(2) It is parallel to the y-axis.  
(3) It has a slope of 3.  
(4) It passes through the origin.

30. Which inequality is represented by the graph below?

(1) $-2 \geq x > 1$  
(2) $-2 \leq x \leq 1$  
(3) $-2 < x \leq 1$  
(4) $-2 \leq x < 1$
PART TWO  Answer four questions from this part. Show all work unless otherwise directed.

31. Solve graphically and check:
   \[ y = 3x + 1 \quad \text{[8,2]} \]
   \[ x = y - 3 \]

32. A side of a square is 7 feet longer than a side of an equilateral triangle. The perimeter of the square is twice the perimeter of the triangle. Find the length of a side of the triangle. [Only an algebraic solution will be accepted.] [5,5]

33. Tickets for a high school dance cost $.50 each if purchased in advance of the dance, but are $.75 each if bought at the door. For the dance, 100 tickets were sold and $60 was collected. How many tickets were sold at the door? [Only an algebraic solution will be accepted.] [5,5]

34. Find algebraically the solution set of the following system of equations and check:
   \[ \frac{x}{y + 1} = \frac{2}{3} \quad \text{[8,2]} \]
   \[ x + y = 9 \]

35. As shown in the accompanying diagram, a 15-foot ladder is leaning against a wall of a building. The bottom of the ladder is 6 feet away from the wall on level ground.
   a Find, to the nearest degree, the acute angle that 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]

36. Find a positive number which is 42 less than its square. [Only an algebraic solution will be accepted.] [5,5]
37. On your answer paper, write the letters \( a \) through \( e \). Next to each letter, write the number of the equality or inequality which is shown by the graph. [10]

\[ a \]

1. \( y \leq 0 \)
2. \( y \geq 0 \)
3. \( x \leq 0 \)
4. \( x \geq 0 \)

\[ b \]

1. \( y < 3 \)
2. \( y < x + 3 \)
3. \( y > x + 3 \)
4. \( y > 3x + 3 \)
c  
(1) $-1 < x \leq 4$
(2) $-1 \leq x < 4$
(3) $-1 < x < 4$
(4) $-1 \leq x \leq 4$

d  
(1) $y > x$
(2) $x > y$
(3) $x > 0$
(4) $y > 0$
e

(1) \( y = x \)
(2) \( y = -x \)
(3) \( y = |x| \)
(4) \( y = -|x| \)