

August 15, 1979

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.

1. Solve for x : $\frac{2x}{3} = \frac{20}{15}$ 1 _____
2. Perform the indicated operation and express the result in lowest terms: $\frac{18}{x-y} \div \frac{9}{x-y}$ 2 _____
3. If 32 meters of wire weighs 8 kilograms, what is the weight in kilograms of 40 meters of the same wire? 3 _____
4. Factor: $x^2 - 25$ 4 _____
5. If $(x + 3)$ is one factor of $2x^2 + 11x + 15$, what is the other factor? 5 _____
6. If a side of a square is 9, what is the area of the square? 6 _____
7. Solve for x : $6x - 3(x - 4) = 18$ 7 _____
8. Solve for x : $.05x - 16 = 9$ 8 _____
9. What is the multiplicative inverse of $\frac{3}{5}$? 9 _____
10. If one pound of peaches costs p cents and one pound of bananas costs b cents, express the total cost in cents of 3 pounds of peaches and 5 pounds of bananas in terms of p and b . 10 _____
11. The legs of a right triangle are 6 feet and 8 feet. Find the number of feet in the hypotenuse. 11 _____
12. If the tangent of an angle is 0.6985, find the measure of the angle to the nearest degree. 12 _____
13. Solve this system of equations for y :
$$\begin{aligned} 3x + 7y &= 10 \\ 3x - 2y &= -8 \end{aligned}$$
 13 _____
14. Find a negative number in the solution set of the equation $(x - 1)(x + 2) = 0$. 14 _____
15. What is the value of $\frac{5}{9}(3x - 6)$ when $x = 8$? 15 _____
16. The profit on a sale of a pair of shoes is 20% of the selling price. What is the profit on a pair of shoes which sells for \$18.00? 16 _____
17. Express as a trinomial: $(2x + 3)(x - 4)$ 17 _____
18. The length of a rectangle is $x + 3$ and the width is $x - 5$. Express in terms of x the perimeter of the rectangle. 18 _____
19. What is 7.2068 rounded to the nearest hundredth? 19 _____

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

20. If $x < y$ and $y < z$, which relationship must also be true?
 (1) $x < z$ (2) $x > z$ (3) $x = y$ (4) $x = z$ 20_____
21. If set $B = \{1, 3, 5, 9\}$, then which is a subset of B ? (1) $\{0\}$
 (2) $\{1, 2, 3\}$ (3) $\{3, 5\}$ (4) $\{1, 3, 5, 7, 9, 11\}$ 21_____
22. The average (arithmetic mean) of 100, -10 , 50, and -40 is
 (1) 20 (2) 25 (3) 40 (4) 50 22_____
23. The solution set of the inequality $3x + 5 \geq 17$ is
 (1) $\{x|x \geq 7\frac{2}{3}\}$ (2) $\{x|x \geq 12\}$ (3) $\{x|x < 4\}$ (4) $\{x|x \geq 4\}$ 23_____
24. The graph of $x + 2y = 4$ intersects the y -axis in the point whose coordinates are (1) $(0, 2)$ (2) $(0, 4)$ (3) $(4, 0)$ (4) $(2, 0)$ 24_____
25. If $12x$ is subtracted from $6x$, the difference is (1) $6x$
 (2) $-6x$ (3) $-18x$ (4) $18x$ 25_____
26. A certain room can be painted in 5 hours. What part of the room can be painted in x hours? (1) $\frac{5}{x}$ (2) $\frac{x}{5}$ (3) $\frac{1}{5x}$ (4) $5x$ 26_____
27. The expression $(3\sqrt{75} - 2\sqrt{27})$ is equivalent to (1) $57\sqrt{3}$
 (2) 9 (3) $9\sqrt{3}$ (4) $\sqrt{48}$ 27_____
28. The expression $(x + 2)^2 - 4x - 4$ is equivalent to (1) x^2
 (2) $x^2 - 4x$ (3) $x^2 + 4x$ (4) $x^2 - 4x + 8$ 28_____
29. If $2W + 2L = P$, then W equals (1) $P - 2L$
 (2) $\frac{P - L}{2}$ (3) $\frac{P - 2L}{2}$ (4) $2P - 2L$ 29_____
30. The product of $\frac{x^8}{6}$ and $\frac{x^8}{6}$ is (1) $\frac{x^8}{36}$ (2) $\frac{x^8}{6}$
 (3) $\frac{x^2}{36}$ (4) $\frac{x^0}{36}$ 30_____

Part II

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

31. Solve the following system of equations graphically and check:

$$\begin{aligned} 3x - 2y &= 4 \\ 3x + 2y &= 8 \end{aligned} \quad [8, 2]$$

32. Answer both a and b.

a Perform the indicated operation and express as a fraction in

lowest terms: $\frac{(x-7)^2}{x^2 - 6x - 7} \cdot \frac{5x+5}{x^2 - 49}$ [5]

b Solve for y . $\frac{5}{3} + \frac{y+1}{9} = 1$ [5]

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.]

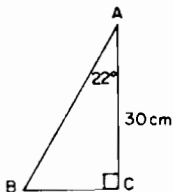
- a The complement of an angle is 15° less than twice the angle. Find the measure of the angle. [5]
- b A passenger train, traveling at an average rate of 65 miles per hour, leaves Boston bound for New York, 200 miles away. At the same time, a freight train leaves New York for Boston, traveling at an average rate of 35 miles per hour. In how many hours will they pass each other? [5]

34. Find three positive consecutive integers such that the product of the first and second is 2 more than 3 times the third. [Only an algebraic solution will be accepted.] [5, 5]

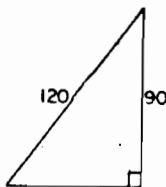
35. A family put \$15,000 in the bank, part in savings certificates at 7% annual interest and the remainder at 5% interest. If the total annual income was \$950, how much was invested at each rate? [Only an algebraic solution will be accepted.] [5, 5]

36. Answer both a and b.

- a In triangle ABC , angle A contains 22° and angle C is a right angle. If the length of AC is 30 centimeters, find, to the nearest centimeter, the length of BC . [5]



- b As shown in the accompanying diagram, a tower 90 feet high is to be supported by a guy wire 120 feet long. Find, to the nearest degree, the angle formed by the guy wire and the ground. [5]



37. On your answer paper write the letters a through e. After each letter, write the answer to each question below. [10]

- a If m represents a number, what is the additive inverse of m ?
- b What is the multiplicative inverse of 2?
- c Which number is the additive identity element?
- d If the replacement set is the set of positive numbers, what is the solution set of $3x + 12 = 0$?
- e What value of x makes the expression $\frac{3}{x-3}$ undefined or meaningless?