


June 21, 1971

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. John can paint a wall in 3 hours. What fractional part of the wall will John be able to paint in one hour? 1 _____
2. Factor: $x^2 + 6x + 9$ 2 _____
3. Express in terms of k , the number of feet in k yards. 3 _____
4. If 16 is 4 more than $3a$, find a . 4 _____
5. Solve for n : $\frac{n + 1}{9} = \frac{5}{3}$ 5 _____
6. Solve for x : $3(x - 3) = 6$ 6 _____
7. Solve for y : $.02y - 3 = 5$ 7 _____
8. From $4y^3 - 6y^2 + 3$, subtract $2y^3 - 4y^2 - 5$. 8 _____
9. Divide $(9x^3 - 6x^2 + 3x)$ by $3x$. 9 _____
10. Solve the following system of equations for x : 

$$\begin{aligned} 2x - y &= 11 \\ x + y &= 1 \end{aligned}$$
 10 _____
11. Solve for y in terms of p and x : $p = 2(x + y)$ 11 _____
12. Find to the nearest tenth the positive square root of 8. 12 _____
13. If the side of a square is $x + 4$, represent its perimeter in terms of x . 13 _____
14. If the replacement set for x is $\{-2, -1, 0, 1, 2\}$, find the solution set of $2x \leq 1$. 14 _____
15. Find the value of ab^2 if $a = 2$ and $b = -3$. 15 _____
16. If the cosine of an angle is .8765, find the angle to the nearest degree. 16 _____
17. For what value of x is $\frac{3}{x}$ undefined? 17 _____
18. Multiply $(2a - b)$ by $(2a + b)$ and express the answer as a binomial. 18 _____
19. The sides of a triangle are 3, 6, and 8. If the longest side of a similar triangle is 16, what is the shortest side of this second triangle? 19 _____

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

20. The product $(-4x^5)(-3x^2)$ is equivalent to (1) $12x^{10}$
 (2) $12x^7$ (3) $-12x^{10}$ (4) $-12x^7$ 20_____

21. Which is an infinite set? (1) $\{x \mid x \text{ is a United States Senator}\}$
 (2) $\{x \mid x \text{ is a human being who was born in 1957}\}$ (3) $\{x \mid x$
 is an odd integer $\}$ (4) $\{x \mid x \text{ is a positive integer less than one million}\}$ 21_____

22. If $x < y$ and $y < z$, which statement about the integers x , y ,
 and z must be true? (1) $x < z$ (2) $x = z$ (3) $x > z$
 (4) $y - x = z$ 22_____

23. If Sharon is now y years old and Nancy is 3 years older than
 Sharon, Nancy's age can be represented by (1) $y - 3$ (2) $y + 3$
 (3) $3y$ (4) $3 - y$ 23_____

24. The value of $|5| + |-3|$ is (1) -8 (2) 2 (3) -2 (4) 8 24_____

25. The graph of $x = -3$ (1) has a slope of -3 (2) passes
 through the origin (3) is parallel to the x -axis (4) is parallel to
 the y -axis 25_____

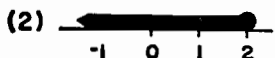
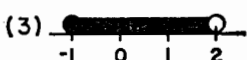
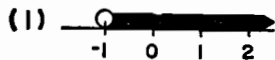
26. Rounded to the nearest tenth, 46.87 is (1) 46.9 (2) 46.8
 (3) 47.0 (4) 46.5 26_____

27. The solution set of the equation $x^2 + 5x + 6 = 0$ is
 (1) $\{-2, -3\}$ (2) $\{2, 3\}$ (3) $\{-2, 3\}$ (4) $\{2, -3\}$ 27_____

28. The sum of $\frac{x+4}{x}$ and $\frac{x-4}{4}$ is (1) $\frac{1}{2}$ (2) $4 + x$
 (3) $\frac{16+x^2}{4x}$ (4) $\frac{2x}{x+4}$ 28_____

29. The sum of $3\sqrt{8}$ and $6\sqrt{2}$ is (1) $9\sqrt{10}$ (2) $12\sqrt{2}$
 (3) 72 (4) $18\sqrt{10}$ 29_____

30. A graph of the solution set of $-1 < x \leq 2$ is



30_____

Part II

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

31. Answer either *a* or *b*, but not both.

a Solve graphically and check: [8, 2]

$$\begin{aligned}x + y &= 1 \\x - y &= -5\end{aligned}$$

OR

b Using a set of coordinate axes, graph the solution set of the following system of inequalities and label the solution set *A*. [8, 2]

$$\begin{aligned}y &\geq -x + 4 \\y &< x + 2\end{aligned}$$

32. Solve the system of equations algebraically and check: [8, 2]

$$\begin{aligned}\frac{x}{5} - \frac{y}{10} &= 1 \\ \frac{x}{3} - \frac{y}{5} &= 1\end{aligned}$$

33. Find *three* consecutive positive integers such that the product of the second integer and the third integer is 30. [Only an algebraic solution will be accepted.] [5, 5]

34. Write an equation or system of equations which 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 Two sides of a triangle are equal. The length of the third side exceeds the length of each of the equal sides by three inches. The perimeter of the triangle is 21 inches. Find the number of inches in the length of each of the equal sides. [5]

b Part of \$3,000 is invested in bonds at 4%, and the remainder in stocks at 6%. The total annual income from both investments is \$150. Find the number of dollars invested at each rate. [5]

35. Answer both *a* and *b*.

a An 18-foot ladder is leaning against the side of a house so that it makes an angle of 70° with the level ground. Find to the nearest foot the distance from the top of the ladder to the ground. [5]

b In right triangle ABC , $\angle C = 90^\circ$, $AC = 30$, and $BC = 21$. Find to the nearest degree the measure of angle A . [5]

36. A jet and a propeller plane leave the same airport at the same time and travel in opposite directions. The average rate of the jet is 550 miles per hour and the average rate of the propeller plane is 300 miles per hour.

a In how many hours will they be 2,550 miles apart? [Only an algebraic solution will be accepted.] [5, 3]

b How many miles from the airport will the jet be at this time? [2]

37. On your answer paper write the letters *a* through *e* and next to each letter write the *number* of the property of the real number system, *chosen from the list below*, which justifies *each* of the statements *a* through *e* below: [10]

Properties

- (1) additive identity property
- (2) multiplicative inverse property
- (3) distributive property of multiplication over addition
- (4) associative property of addition
- (5) associative property of multiplication
- (6) commutative property of addition
- (7) commutative property of multiplication

$$a \quad 2\left(\frac{1}{2}\right) = 1$$

$$b \quad 2(1 + 3) = 2(1) + 2(3)$$

$$c \quad 2 + 1 = 1 + 2$$

$$d \quad (1 + 2) + 3 = 1 + (2 + 3)$$

$$e \quad 2 + 0 = 2$$

August, 1971

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. If $a = 2$ and $b = 3$, find the value of $(2ab)^2$. 1 _____
2. If four more than twice a number is 32, find the number. 2 _____
3. The sum of two numbers is 23. One number is represented by x . Represent the other number in terms of x . 3 _____
4. Solve for t : $8t = 0$ 4 _____
5. Find the solution set: $4(x - 2) = 12 - x$ 5 _____
6. Solve for d : $\frac{d - 4}{d} = \frac{5}{6}$ 6 _____
7. Solve the following system of equations for x :

$$\begin{aligned} x - y &= 3 \\ x + y &= 1 \end{aligned}$$
7 _____
8. Factor completely: $3ax + 6a$ 8 _____
9. One gallon of paint is needed to cover 350 square feet of surface. How many gallons of paint will be needed to cover 1,050 square feet? 9 _____