January 27, 1975

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed.

1. If $x=3$, what is the value of $2x^2$? 1.....

2. Factor: $x^2 - 36$ 2.....

3. Find the value of $|7|-|-4|$. 3.....

4. Solve for w: $\frac{w}{6} = \frac{7}{2}$ 4.....

5. Solve for x: $2(x+5) = 6$ 5.....

6. Solve for x: $.05x-4=6$ 6.....

7. Solve for y: $6y-9=2y+3$ 7.....

8. Find the *positive* root of $3x^2=27$. 8.....

9. Using the formula $A = \frac{h}{2}(b+c)$, find A when $h=7$, $b=11$, and $c=5$. 9.....

10. Express $\frac{n}{3} - \frac{n}{5}$ as a single fraction. 10.....

11. A student 5 feet tall stands next to a flagpole 45 feet tall. If the shadow cast by the student is 8 feet long, how many feet long is the shadow cast by the flagpole? 11.....

12. Solve the following system of equations for x:

$$x + y = 4$$
$$3x - y = 8$$

12.....

13. Express as a binomial in *simplest form*: $(6x^2+4x) \div 2x$ 13.....

14. Express the product of $(x-4)$ and $(x-3)$ as a trinomial. 14.....

15. Two numbers are in the ratio of 1:4 and their sum is 50. What is the *smaller* number? 15.....

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

$$\left(\frac{x^3}{3y}\right)\left(\frac{6y}{x^2}\right)$$

16.....

17. If the point $(4,r)$ is on the graph of $x+3y=10$, what is the value of r? 17.....

18. If $\sin A=.8830$, find angle A to the *nearest degree*. 18.....

Directions (19-30): Write the *number* preceding the expression that best completes *each* statement or answers *each* question.

19. Three times the difference between x and 2 can be expressed as
(1) $3(x-2)$ (2) $3x-2$ (3) $\frac{(x-2)}{3}$ (4) $3x+2$ 19.....

20. The reciprocal of 3 is (1) 0 (2) $\frac{1}{3}$ (3) -3 (4) $-\frac{1}{3}$ 20.....

21. If x is a positive integer, then the solution set of $2x+1<7$ is
(1) {1,2} (2) {1,2,3} (3) {1,2,3,4} (4) {1,2,3,4,5,6} 21.....

22. Which open sentence has a solution set that is infinite?
(1) $x>6$ (2) $x+1=6$ (3) $x^2=4$ (4) $x^2-x-6=0$ 22.....

23. Which is a rational number? (1) $\sqrt{8}$ (2) $\sqrt{12}$ (3) $\sqrt{16}$
(4) $\sqrt{20}$ 23.....

24. The product of $2x^2y^3$ and $3x^3y^4$ is (1) $5x^5y^7$ (2) $6x^5y^7$
(3) $5x^6y^{12}$ (4) $6x^6y^{12}$ 24.....

25. The length of a rectangle is represented by $2x+3$ and its width by $3x$. What is the perimeter of the rectangle? (1) $5x+3$ (2) $6x^2+9x$ (3) $10x+6$ (4) $16x$ 25.....

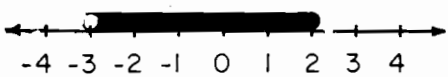
26. If the legs of a right triangle are 3 and 7, what is the hypotenuse of the triangle? (1) $\sqrt{10}$ (2) $\sqrt{58}$ (3) 10 (4) 58 26.....

27. An equation whose graph has the same slope as the graph of the equation $y=5$ is (1) $y=-5$ (2) $y=5x$ (3) $y=x+5$
(4) $y=x-5$ 27.....

28. The expression $\sqrt{18}-2\sqrt{2}$ is equivalent to (1) 1 (2) $\sqrt{2}$
(3) $5\sqrt{2}$ (4) $7\sqrt{2}$ 28.....

29. The sum of $\frac{x+1}{2}$ and $\frac{x-1}{3}$ is (1) $\frac{5x}{6}$ (2) $\frac{2x}{5}$
(3) $\frac{5x+1}{6}$ (4) $5x+1$ 29.....

30. The solution set of which inequality is shown in the graph below?



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

Part II

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

31. Solve graphically and check:

$$x+2y=6$$
$$4x+y=-4$$

[8,2]

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

a From the sum of $3x^2-4x+2$ and x^2+2x-8, subtract $2x^2-4$. [4]

b Perform the indicated division and express your answer in *simplest form*:

$$\frac{3x-12}{2x} \div \frac{x^2-x-12}{2x^3} \qquad [6]$$

33. Two planes started at the same time from the same airport and flew in opposite directions. One flew 60 miles per hour faster than the other. In 5 hours they were 2,800 miles apart. Find the rate of *each* plane. [*Only an algebraic solution will be accepted.*] [5,5]

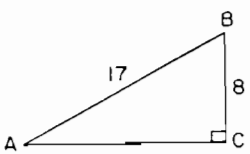
34. A person invested \$3,900, part at 6% and the rest at 5%. If the total annual income from the two investments is \$215, find the amount invested at *each* rate. [*Only an algebraic solution will be accepted.*] [5,5]

35. As shown in the diagram, in triangle *ABC*, angle *C* is a right angle, $AB=17$, $BC=8$.

a Express the value of sin *A* as a common fraction. [2]

b Find the measure of angle *A* to the *nearest degree*. [4]

c Find, to the *nearest integer*, the length of *AC*. [4]



35.....

36. The length of a rectangle is 5 more than its width. The area of the rectangle equals the area of a square whose side is 6. Find the dimensions of the rectangle. [*Only an algebraic solution will be accepted.*] [5,5]

37. Write the *numeral* preceding the expression that best answers the question. [10]

a Which is an example of an infinite set?
(1) $\{x \mid x$ is a positive even number less than 7$\}$
(2) $\{x \mid x$ is a prime number less than 7$\}$
(3) $\{x \mid x$ is a natural number less than 7$\}$
(4) $\{x \mid x$ is a positive rational number less than 7$\}$

a.....

b Given the set $A=\{1, 3\}$. Which is *not* a subset of set *A*? (1) $\{1\}$ (2) $\{2\}$ (3) $\{3\}$ (4) $\{1,3\}$

b.....

c Using the replacement set $R=\{1, 2, 3, 4, 5\}$, what is the solution set of $x-1=5$? (1) $\{\ \}$ (2) $\{1,2,3,4,5\}$ (3) $\{6\}$ **(4) $\{4\}$**

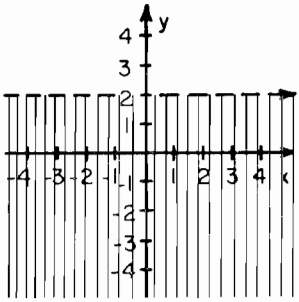
c.....

d Which of the following sets is *not* equivalent to the set $A=\{2, 4, 6\}$? (1) $\{2,4\}$ (2) $\{1,3,5\}$ (3) $\{6,4,2\}$ (4) $\{\frac{1}{2}, \frac{1}{4}, \frac{1}{6}\}$

d.....

e The accompanying graph represents which of the following sets?

(1) $\{(x,y) \mid x < 2\}$
(2) $\{(x,y) \mid x \leqq 2\}$
(3) $\{(x,y) \mid y < 2\}$
(4) $\{(x,y) \mid y \leqq 2\}$



e.....