January 22, 1981

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 c: $3(2 + c) = 12$ 1_____

2. What is the value of $3x^3$ if $x = 2$? 2_____

3. Solve for s: $3s + 9 = 1 - s$ 3_____

4. Express the product of $2\sqrt{3}$ and $4\sqrt{2}$ as a single term in radical form. 4_____

5. Express the product of $(x + 5)$ and $(x + 7)$ as a trinomial. 5_____

6. Solve for x: $0.2x + 6 = 80$ 6_____

7. Solve for x: $\frac{x}{4} - \frac{x}{5} = 2$ 7_____

8. Solve for n: $8n = 0$ 8_____

9. Factor: $x^2 - 16y^2$ 9_____

10. On a map, 1 centimeter represents 4 kilometers. How many centimeters will represent 12 kilometers? 10_____

11. If the sum of two consecutive integers is -15, find one of the integers. 11_____

12. Find $\sqrt{50}$ to the *nearest tenth*. 12_____

13. Express in *lowest terms*: $\frac{x + 3}{x^2 - 2x - 15}$ 13_____

14. The lengths of the sides of a triangle are represented by $a + 2b$, $a + b$, and $2a - b$. Express the perimeter of the triangle as a binomial. 14_____

15. Laura earns $(d + 10)$ dollars per hour. If she worked h hours, express in terms of d and h the amount of money she earned. 15_____

16. During one year, the highest temperature recorded in a certain city was 22°C and the lowest temperature recorded was -41°C. What is the absolute value of the difference between the highest and lowest temperatures? 16_____

17. If $\cos A = 0.7497$, find angle A to the *nearest degree*. 17_____

18. In a right triangle, the acute angles are equal. Find the number of degrees in the measure of one of the acute angles. 18_____

19. What is the *positive* root of the equation $x^2 - 49 = 0$? 19_____

20. Combine and express as a fraction: $\frac{4}{5x} - \frac{1}{10x}$ 20_____

21. Solve the following system of equations for x:

$$x + y = 8$$
$$x - y = 2$$

21_____

22. The lengths of two legs of a right triangle are 5 and 12. Find the length of the hypotenuse. 22_____

Directions (23-30): Write in the space provided the ***numeral*** preceding the word or expression that best completes *each* statement or answers *each* question.

23. If $2x - 3y$ is subtracted from $7x + 8y$, the difference is
(1) $5x + 11y$ (2) $9x + 5y$ (3) $5x + 5y$ (4) $-5x - 11y$ 23____

24. The sum of $\sqrt{18}$ and $15\sqrt{2}$ is (1) $18\sqrt{2}$ (2) $24\sqrt{2}$
(3) $15\sqrt{20}$ (4) $16\sqrt{20}$ 24____

25. If the yearly income from a \$1,000 investment is \$50, the annual interest rate is (1) 0.5% (2) 5% (3) 20% (4) 50% 25____

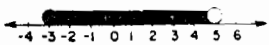
26. What is the slope of the line whose equation is $y = 3x - 7$?
(1) -7 (2) -3 (3) 3 (4) 7 26____

27. The expression $\frac{6}{x} \div \frac{3}{x}$ is equivalent to (1) $\frac{1}{2}$
(2) 2 (3) $\frac{x^2}{18}$ (4) $\frac{18}{x^2}$ 27____

28. If $ax = b$, then x is equal to (1) $b + a$ (2) $b - a$
(3) $\frac{a}{b}$ (4) $\frac{b}{a}$ 28____

29. When $2x^2 - 18$ is factored completely, the result is
(1) $2(x - 3)(x + 3)$ (2) $(2x + 6)(x - 3)$
(3) $(2x - 6)(x + 3)$ (4) $2(x^2 - 9)$ 29____

30. The number line below shows the solution set of which inequality?



(1) $-3 \leq x \leq 5$ (2) $-3 < x \leq 5$ (3) $-3 \leq x < 5$
(4) $-3 \leq x \leq 5$ 30____

Part II

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:

$$y < x - 2$$
$$y \geq -2x + 4 \quad [8]$$

b Write the coordinates of a point which is *not* in the solution set of the system of inequalities graphed in part *a*. [2]

32. Solve algebraically for c and d and check:

$$3c - d = 7$$
$$c + 2d = 7 \qquad [8, 2]$$

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 A bus leaves New York headed for Boston traveling at an average rate of 45 miles per hour. At the same time a bus leaves Boston bound for New York at an average rate of 50 miles per hour and traveling on the same road. If the two bus terminals are 190 miles apart, in how many hours will the buses pass each other? [5]

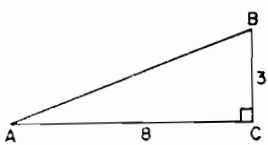
b One machine can polish a gym floor in 10 hours. A smaller polisher can do the job in 15 hours. How many hours will it take to do the job if both machines are used together? [5]

34. A man invests \$8,500, part at 6% and the remainder at 7%. How much does he invest at each rate if his total annual income is \$535? [*Only an algebraic solution will be accepted.*] [5, 5]

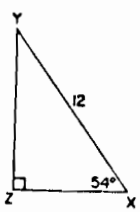
35. Find three consecutive positive integers such that the square of the first is equal to the third. [*Only an algebraic solution will be accepted.*] [5, 5]

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

a As shown in the accompanying diagram, ABC is a right triangle with right angle at C. If $AC = 8$ and $BC = 3$, find the measure of angle A to the *nearest degree*. [5]



b As shown in the accompanying diagram, XYZ is a right triangle with right angle at Z. If $XY = 12$ and the measure of angle X is 54°, find YZ to the *nearest integer*. [5]



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

a What is the number of significant digits in the numeral 1.02?

b What is the solution set of $|x| - 2 = 5$?

c What is the reciprocal of 3?

d For what value of x is $\dfrac{3}{2 - x}$ undefined or meaningless?

e What are the prime numbers between 6 and 12?