NINTH YEAR MATHEMATICS—JUNE 1958 (1)

Course 1—Algebra

(Sample Examination)

Instructions

It is wise to divide your time so that you may complete the entire examination in *three hours*. Part I probably can be done within a period of one and one-half hours and parts II and III within the time remaining. Excess time may be used in reviewing your paper for errors.

Part I

Directions (1-25): Answer all questions in this part. Write the answer to each question in the space provided at the right. No work need be shown for this part. Each correct answer will receive 2 credits. [50]

1. Find the factors of $x^2 + 2x - 15$.
2. How many inches are there in a feet and b inches?
3. Find the average of the numbers represented by $x - 8$ and $3x + 2$.
4. Reduce the fraction $\frac{x^2 - 4y^2}{2x + 4y}$ to its lowest terms.
5. Given the formula: $C = \frac{5}{9}(F - 32)$. Find C when $F = 5$.
6. Remove parentheses and combine similar terms: $(a + 2)^2 - 2(a - 2)$
7. Solve for y: $2y + 3.4 = 6.8$
8. Solve for m: $2m - (m - 5) = 4$
9. Solve for x: $8 - 5x = x + 5$
10. Which has the larger value: $5\sqrt{2}$ or $2\sqrt{5}$?
11. Find the square root of 159 to the *nearest tenth.*
12. A man purchased a building lot for \$3,000 and built a \$12,000 house on it. What percent of the total cost was the cost of the lot?
13. Solve for n: $\frac{n}{4} + \frac{n}{5} = 36$

14. Solve for x: $\frac{a}{b} = \frac{c}{x}$

15. Solve for the *positive* value of x: $5x^2 = 320$

16. During a community chest campaign $26,250 was raised. This amounted to 105% of the established quota. What was that quota?

17. Express the sum of $\frac{x+y}{2}$ and $\frac{y-x}{3}$ as a fraction in its lowest terms.

18. If $h = 100 \tan 55°$, find h to the *nearest integer*.

19. The scale on a map is 1 inch = 50 miles. If two cities are 175 miles apart, how many inches apart will they be on this map?

20. An airplane traveled 900 miles in 3 hours and 20 minutes. What was the average rate of speed in miles per hour for this trip?

Directions (21-24): Indicate the correct completion to *each* question by writing on the line at the right the letter *a*, *b*, *c* or *d*.

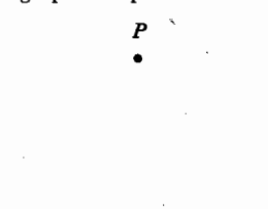
21. The trinomial $x^2 - 3x - 18$ is exactly divisible by (*a*) $x + 2$ (*b*) $x + 3$ (*c*) $x + 6$ (*d*) $x - 9$

22. A right triangle may be (*a*) acute (*b*) obtuse (*c*) equilateral (*d*) isosceles

23. The graph of the straight line $x + 2y = 6$ intersects the x-axis at the point whose abscissa is (*a*) -3 (*b*) 0 (*c*) 3 (*d*) 6

24. In order that the expression $x^2 - 6x + k$ shall be a perfect square, k must have the value (*a*) -9 (*b*) 9 (*c*) 12 (*d*) 36

25. Construct a line through point P parallel to line m.



Part II

Answer three questions from this part. Only algebraic solutions will be accepted. Show all work.

26. Tickets for a high school football game cost 50¢ each if purchased at the advance sale before the day of the game and 75¢ each if bought at the gate on the day of the game. For a particular game, 1,200 tickets were sold and the receipts were $712.50. How many tickets were bought at the gate on the day of this game? [6, 4]

27. A certain fraction is equivalent to $\frac{2}{5}$. If the numerator of this fraction is decreased by 2 and its denominator is increased by 1, the resulting fraction is equivalent to $\frac{1}{3}$. Find the numerator and denominator of the original fraction. Check. [6, 3, 1]

28. The sum of two angles of a triangle is 75° and their difference is 9°. Find the number of degrees in each of the *three* angles of the triangle. Check. [5, 4, 1]

29. How many cubic centimeters of pure acid must be added to 1,000 cubic centimeters of a solution which is 75% acid to make a solution which is 90% acid? [6, 4]

30. Write the equation or equations that may be used in solving any *two* of the following problems. In each case state what the letter or letters represent. Solution of the equations is *not* required.

a. A train travels between two cities at an average rate of 42 miles per hour. An express train traveling at an average rate of 70 miles per hour makes the trip between these cities in two hours less time. What is the distance between the two cities? [5]

b. An investment of $2,700, part at 3% and the remainder at 4%, earns a yearly income of $93. Find the amount invested at *each* rate. [5]

c. A number increased by its reciprocal is equal to $2\frac{1}{6}$. Find the number. [5]

Part III

Answer two questions from this part. Show all work.

31. Solve *graphically* and check: [6, 2, 2]

$$2x - y = 5$$

$$2x + 3y = 1$$

32. When a yardstick held vertically casts a shadow 5 feet long on level ground, a flagpole nearby casts a shadow 195 feet long. Find:
   a. the height of the flagpole [6]
   b. the angle of elevation of the sun correct to the *nearest degree* [4]

33. Solve for n and check: $\frac{n-1}{2} + \frac{n-2}{3} - \frac{n-3}{4} = 6$ [8, 2]

34. Square $ABCD$ is inscribed in a circle as shown in the diagram. If the radius of the circle is 6, find
   a. the length of a diagonal of the square [2]
   b. the length of a side of the square (Answer *may* be left in radical form.) [5]
   c. the area of the square [3]