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. In questions 1, 2 and 3 each correct answer will receive 1 credit. In questions 4 through 25 each correct answer will receive 2 credits.   [50]

1. *a.* Multiply 5.03 by 2.38
   b. Subtract $\frac{1}{8}$ from $\frac{3}{4}$.

2. *a.* Divide 54.72 by 1.6
   b. What is $3\frac{1}{3} \div \frac{5}{6}$?

3. *a.* What per cent of 80 is 60?
   b. Change $12\frac{1}{2}\%$ to an equivalent fraction.

4. Find the square root of 113 to the *nearest tenth*.

5. From $2x^2 - 3x - 1$ subtract $x^2 + 6x - 2$.

6. Factor completely: $4ab^2 + 20ab$.

7. Factor: $x^2 + 3x - 28$.

8. Solve for a: $\dfrac{2a + 3}{3} - \dfrac{a - 3}{5} = 3$.

9. Multiply $4a - 1$ by $2a + 3$.

10. If p pounds of oranges can be bought for c cents, how many pounds can be bought for 98 cents?

11. Using the formula $C = \dfrac{5}{9}(F - 32°)$, find C when $F = 68°$.

12. The sides of a triangle are represented by $x + 2$, $x - 3$ and $2x + 1$. Express the perimeter of this triangle in terms of x.

13. Solve for y: $7y - 2 = 8y - 13$.

14. Solve the following pair of equations for x:
$$3x - 4y = 8$$
$$x + 2y = 1$$

15. Find the value of m in the proportion $\dfrac{27}{m} = \dfrac{3}{4}$.

16. Combine $\sqrt{50} + \sqrt{2}$. [Leave answer in simplest radical form.]

17. The area of a rectangle is $2a^2 + a$. If the length is $2a + 1$, what is the width?

18. If $\tan A = .6320$, find angle A to the *nearest degree*.

19. If a boy can mow an entire lawn in h hours, what fractional part can he mow in 2 hours?

20. Combine in a single fraction: $\dfrac{5a}{4} - \dfrac{a}{3}$.

21. A basketball player in three games scored r, s and t points. Represent this player's average score for these games.

22. Solve for x: $3x - (5 - x) = 5$.

23. Solve for m: $6m + b = 3$.

24. A man drove a car for 3 hours at the rate of x miles per hour. For the next 2 hours his rate of speed was 5 miles per hour slower. Express in terms of x the total distance he traveled.

25. Write a linear equation expressing the relationship between x and y as shown in the following table:

x	0	1	2	3
y	-1	2	5	8

Part II

Answer three questions from this part. A purely arithmetical solution in this part will not be accepted. Show all work.

26. Find three consecutive odd numbers such that the sum of the first and third is 37 more than the second. Check.   [6, 3, 1]

27. The denominator of a fraction is 1 more than twice the numerator. If 2 is added to both the numerator and the denominator, the value of the fraction is $\frac{3}{5}$. Find the original fraction. Check.   [6, 3, 1]

28. The area of a square exceeds the area of a rectangle by 4 square inches. The width of the rectangle is 3 inches less and its length is 4 inches more than the length of a side of the square. Find a side of the square. Check.   [6, 3, 1]

29. A man invests $6500, part at 4% interest and the remainder at 5%. How much does he invest at *each* rate if his annual income from the two investments is $300?   [6, 4]

30. Write the equations that would be used to solve the following problems. In *each* case state what the letter or letters represent. [Solution of the equations is *not* required.]

    a. A boy has $3.75 in nickels and dimes. If he has 6 more dimes than nickels, how many dimes has he?   [4]

    b. City A is 36 miles from city B. A boy riding a bicycle started from A toward B at the same time that a second boy started from B toward A. The first boy, while traveling, averaged 9 miles per hour but stopped one hour to rest on the way. The second boy traveled steadily at an average rate of 6 miles per hour. How far from city A were the boys when they met?   [6]

Part III

Answer two questions from this part. Show all work.

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

$$x + y = 3$$
$$2x - y = 9$$

32. *a.* A boy flying a kite lets out 250 feet of string that makes an angle of 54° with level ground. Assuming that the string is straight, find, to the *nearest foot*, how high the kite is above the ground. [7]

    b. Find the hypotenuse of a right triangle whose sides are 7 feet and 24 feet.   [3]

33. *a.* A salesman receives a commission of 5% on his total sales. If he wishes to make $80 in commissions each week, how large must his total weekly sales be?   [6]

    b. Multiply $\frac{3a^2b}{2}$ by $\frac{8}{ab^2}$ [2]

    c. Simplify: $\sqrt{\frac{1}{3}}$ [2]

*34. Show by substitution in the equation $x^2 - 4x + 1 = 0$ whether or not $2 + \sqrt{3}$ is a root.   [10]

* This question is based on one of the optional topics in the syllabus, and may be substituted for any other question in part III.

Note to teacher: These questions may be used in conjunction with the examination in elementary algebra by those pupils who have followed the outline in the ninth year syllabus. A copy of this sheet should be distributed to each pupil qualified, together with a copy of the regular examination paper in elementary algebra.
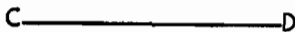
Part I

Directions: Substitute the following questions for *both* question 24 *and* question 25 on part I of the algebra examination.

24. Construct a triangle congruent to triangle *ABC*.
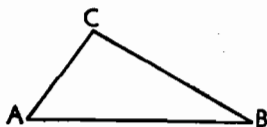
25. Through point *P* construct a line parallel to line segment *CD*.

Part III

Directions: Substitute *one* of the following questions for *any one* of the questions on part III of the examination in elementary algebra.

35. *a.* Construct a rectangle 2 inches long and 1½ inches wide. [6]
    b. Draw a diagonal. [2]
    c. Construct the perpendicular bisector of the diagonal. [2]

36. A boy usually spends his day of 24 hours as represented in the circle graph below. Using this graph, answer the following questions:

    a. How many hours does he spend *each* day
        (1) in sleep?   [2]
        (2) at school?   [2]
        (3) at work?   [2]

    b. At what activity does he spend *three* times the number of hours that he spends at meals?   [2]

    c. How many degrees on the circle represent the amount of time spent in sleeping?   [2]