The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

ELEMENTARY ALGEBRA

Monday, September 12, 1927 — 9.15 a. m. to 12.15 p. m., only

Fill in the following lines:

Name of candidate.. .... Number ....

Address (city, street and number)... ....

Instructions

Do not open this sheet until the signal is given.

Answer all questions in part I and five questions from part II. Papers entitled to less than 75 credits will not be accepted.

Part I is to be done first and the maximum time to be allowed for this part is one and one half hours. Merely write the answer to each question in the space at the right; no work need be shown.

If you finish part I before the signal to stop is given you may begin part II. However, it is advisable to look your work over carefully before proceeding to part II, since *no credit will be given any answer in part I which is not correct and reduced to its simplest form.*

When the signal to stop is given at the close of the one and one half hour period, work on part I must cease and this sheet of the question paper must be detached. The sheets will then be collected and you should continue with the remainder of the examination.

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Part 1

Answer all questions in this part. Each question has 2½ credits assigned to it. Each answer must be reduced to its simplest form.

1 Factor $3ax - 6aby^2 + 15 az$ Ans................

2 Factor $12x^2 + xy - 6y^2$ Ans................

3 Factor $a^2 + 9b^2 - 6ab$ Ans................

4 Simplify $x + 2(a - b) - (x + 3b)$ Ans................

5 Find the number which, if divided by 7, gives a quotient of 9 and a remainder of 3.   Ans................

6 Change the fraction $\dfrac{3}{x+9}$ to one having $2x^2 + 13x - 45$ for its denominator.   Ans................

7 Find the value of $3\sqrt{12}$ correct to the *nearest tenth*.   Ans................

8 Simplify $2\sqrt{\frac{1}{4}}$ Ans................

9 Simplify $2\sqrt{6} \times 5\sqrt{2}$ Ans................

10 Solve for x the equation $4:9 = 3:x$ Ans................

11 A has x dollars and B has \$5 less than 3 times as much as A; express B's money in terms of x.   Ans................

12 What number placed in the parenthesis will make the expression $4x^2 + (\ \ )xy + 9y^2$ a perfect square?   Ans................

13 Simplify $\left(x - \dfrac{16}{x}\right) \div \left(\dfrac{4+x}{x}\right)$ Ans................

14 Solve the following set of equations:
$$2x - y = 11$$
$$x + y = 10$$
       Ans................

15 Solve for h the formula $V = \dfrac{\pi R^2 h}{3}$ Ans................

16 Using the formula given in question 15, find the value of V if $\pi = 3.14$, $R = 4$ and $h = 6$.   Ans................

17 If it takes m minutes for a man to walk to his work, what part of the distance can he cover in 5 minutes?   Ans................

18 Express as a single radical $7\sqrt{3} - 2a\sqrt{3} + (3 - a)\sqrt{3}$ Ans................

19 Solve the following equation for x:
$$x^2 - 5x - 24 = 0$$
       Ans................

20 A pupil's standings in algebra for four months were a, b, c and d; what was his average standing for these four months?   Ans................

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Part II

Answer five questions from this part. Full credit will not be granted unless all operations (except mental ones) necessary to find results are given; simply indicating the operations is not sufficient. Each answer should be reduced to its simplest form.

21 Solve the following set of equations and check *one* pair of answers:

$$4x^2 + y^2 = 40$$
$$2x + y = 8 \qquad [8, 2]$$

22 A man wishes to divide $500 among A, B and C so that A gets $20 more than B, and C one half as much as B; how much will each receive? [6, 4]

23 Two trains travel at rates that are in the ratio 2:3. They start at the same time from two cities 350 miles apart and travel toward each other. If they meet after traveling 5 hours, what is the rate of each? [6, 4]

24 Find each root of the following equation correct to the *nearest tenth*:

$$3x^2 - 5x - 4 = 0 \qquad [10]$$

25 Express *each* of the following statements as an equation in x, stating in each case what x represents: [Do not solve the equations.]

  a The length of a rectangle is 7 feet more than its width; if the area is 44 square feet, find the dimensions. [3]

  b In order to find the height of a tree, a man notes that at a certain hour the tree casts a shadow of 27 feet. At the same time a pole 8 feet high casts a shadow of 5 feet. Find the height of the tree. [4]

  c A boy was given a dollar bill with which to purchase oranges. He bought 3 dozen and received 28 cents in change. What was the price of the oranges a dozen? [3]

26 Extract the square root of

$$9x^4 - 42x^3 + 50\tfrac{1}{4}x^2 - \tfrac{7}{2}x + \tfrac{1}{16} \qquad [10]$$

27 How many pounds of coffee selling at 28 cents a pound and how many pounds selling at 40 cents a pound must be combined to make a mixture of 60 pounds that can be sold for 35 cents a pound? [6, 4]

28 The following table shows the number of quarts of strawberries that a fruit dealer sold a day at the prices indicated:

Number of quarts	Price per quart
12	65 cents
16	55 cents
22	45 cents
40	35 cents
72	25 cents

  a Make a *broken line* graph of the data given in the table. [8]

  b Estimate from the graph the number of quarts the fruit dealer would sell at 28 cents a quart. [2]

[3]