The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

ELEMENTARY ALGEBRA

Monday, September 13, 1926 — 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 I

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

1 Inclose the last three terms of the following expression in a parenthesis preceded by a minus sign:

$2x^3 - 5x^2 - 4x + 2$ *Ans.*.....

2 An exact divisor of $3x^3 + 8x^2 - 5x - 6$ is $x + 3$; what is the quotient? *Ans.*.....

3 Find the value of $b^3 - 5b^2 + 10b - 12$ when $b = 3$. *Ans.*.....

4 The length of a rectangle is $x + 5$ and its width is $x - 3$; what is its area? *Ans.*.....

5 Factor $az^2 - 16ay^2$ *Ans.*.....

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

7 Factor $x^2 + 14a^2x + 49a^4$ *Ans.*.....

8 Reduce to a single fraction in its lowest terms

$$\frac{4}{a-b} - \frac{3}{a+b}$$ *Ans.*.....

9 Reduce to a single fraction in its lowest terms

$$\frac{2x^3}{(x+2y)^2} \cdot \frac{2xy^2}{x^2-y^2} \div \frac{x^2-y^2}{2x+4y}$$ *Ans.*.....

10 Find the square root of 79 to the *nearest tenth*. *Ans.*.....

11 Solve the following set of equations for x and y:

$$2x + 4y = 14$$
$$3x - 4y = 1$$ *Ans.*.....

12 Solve the following equation for x:

$\frac{2}{3}(x + 1) - \frac{3}{4}(2x + 1) = 0$ *Ans.*.....

13 Simplify $3\sqrt{50}$ *Ans.*.....

14 Simplify $40\sqrt{\frac{1}{20}}$ *Ans.*.....

15 Simplify $4\sqrt{3} + 2\sqrt{6} - a\sqrt{6} - 5\sqrt{3}$ *Ans.*.....

16 A man now has d dollars. How many dollars will he have after he has doubled his money and then lost 10% of the original amount? *Ans.*.....

17 $d = vt + 16t^2$. Find the value of d when $v = 2.9$ and $t = 0.2$ *Ans.*.....

18 Solve the following formula for R:

$$C = \frac{EN}{RN + R}$$ *Ans.*.....

19 Solve the following equation for x:

$x^2 + x - 72 = 0$ *Ans.*.....

20 From the following set of equations form a quadratic equation in y, one of whose members is 0:

$$x - 2y = 3$$
$$x^2 + y^2 = 26$$ *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 If three times a boy's age 10 years ago is subtracted from twice his present age, the result will be his present age; how old is the boy? [10]

22 Find to the *nearest tenth* the values of x in the following equation:

$$x^2 + 4x - 9 = 0 \qquad [10]$$

23 Solve the following set of equations for x and y and check *one* pair of values:

$$x + 2y = 6$$
$$x^2 + xy = 8 \qquad [8, 2]$$

24 A certain building is 222 feet longer than it is wide. The distance around the building (perimeter) is 1500 feet. Find the length and the width of the building. [10]

25 Two bicyclists start at the same time from two places 57 miles apart and travel toward each other. After 3 hours of traveling they meet. If one of them travels 3 miles an hour faster than the other, what is the rate of each? [10]

26 A trolley company collects a certain fare from each adult passenger and a smaller fare from each child. On one trip there were 14 adult passengers and 5 children and fares amounting to $1.18 were collected. On another trip there were 7 adults and 30 children and fares amounting to $1.69 were collected. Find the fare for an adult and for a child. [10]

27 The sum of the squares of two consecutive whole numbers increased by 3 times the smaller number is 53; what are the numbers? [10]

28 The pressure per square inch on a submerged body increases with the depth of the water and is expressed approximately by the formula $P = 0.4\ D$, in which P is the pressure in pounds per square inch and D the depth in feet.

a Make a table showing the pressure per square inch at a depth of 10 feet, 20 feet, 30 feet, 40 feet and 50 feet respectively. [4]

b Plot the graph of the table made in answer to *a*, using graph paper for the purpose. [4]

c From your graph determine the depth at which the pressure is 15 pounds per square inch. [2]