The University of the State of New York

INTERMEDIATE ALGEBRA

Friday, August 21, 1942 — 8.30 to 11.30 a. m., only

Instructions

Do not open this sheet until the signal is given.

Part I

This part is to be done first and the maximum time allowed for it 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, since *no credit will be given any answer in part I which is not correct and in 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.

Parts II, III and IV

Write at top of first page of answer paper to parts II, III and IV, (*a*) names of schools where you have studied, (*b*) number of weeks and recitations a week in intermediate algebra previous to entering summer high school, (*c*) number of recitations in this subject attended in summer high school of 1942.

The minimum time requirement is five recitations a week for half a school year after the completion of elementary algebra. The summer school session will be considered the equivalent of one semester's work during the regular session or five recitations a week for half a school year.

For admission to this examination attendance on at least 30 recitations in this subject in a registered summer high in 1942 is required.

The use of the slide rule will be allowed for checking but all computations with tables must be shown on the answer paper.

See instructions for parts II, III and IV on page 1.

Part II

Answer three questions from this part.

26 Find, correct to the *nearest tenth,* the roots of the equation $x^2 + 9x - 12 = 0$ [10]

27 Solve the following set of equations, group your answers and check *one* set:

$$x^2 = 2y + 6$$
$$5x - y = 15 \qquad [7, 2, 1]$$

28 The formula $H.\ P. = \dfrac{3.142\ dfs}{33,000}$ is used in determining the horsepower of certain small engines. By means of logarithms, find $H.\ P.$ when $d = .5$, $f = 3.5$ and $s = 1355$ [10]

29 *a* Draw the graph of the equation $x^2 + y^2 = 9$ [3]
   b On the axes used in answer to *a*, draw the graph of the equation $x = y^2 - 5$ [5]
   c From the graphs, estimate the values of x and y common to the two equations.   [2]

*30 Solve: $2x + y = 43$
           $x + 3z = 47$
           $y - z = 14$ [10]

Part III

Answer one question from this part.

31 How much water must be added to 100 cubic centimeters of an 80% solution of boric acid to reduce it to a 50% solution? [7, 3]

32 Write the equations that would be used in solving the following problems. In each case state what the unknown letter or letters represent. [Solution of the equations is not required.]
   a A woman was told that it would take 1440 small square tiles to cover the floor of her bathroom but that if she bought tiles 4 inches longer on each side, it would take only 160. Find the length of a side of *each* tile. [5]
   b A man walked from A to B at the rate of $3\frac{1}{3}$ miles per hour and returned by a different route at the rate of 4 miles per hour. The route by which he returned was one mile shorter than the route by which he went and it was made in 45 minutes less time. Find the distance between A and B by the shorter route. [5]

Part IV

Answer one question from this part.

33 Each of the following statements is sometimes true and sometimes false. In *each* case write (*a*) a value for c which will make the statement true, (*b*) a value for c which will make the statement false. [10]
   (1) $m + n$ is a factor of $m^c + n^c$
   (2) The roots of the equation $x^2 = c$ are imaginary.
   (3) $4x^2 + 4x + c$ is a square.
   (4) The graph of the line whose equation is $y = mx + c$ passes through the origin.
   (5) $\dfrac{1}{c}$ is less than 1.

34 A fruit dealer paid $93 for peaches and pears. He sold the peaches for $40 and the pears for $44. If his percentage of loss on the peaches was the same as his percentage of gain on the pears, the gain and loss being computed on the cost, how much did he pay for *each* kind of fruit? [10]

* This question is based on one of the optional topics in the syllabus.

Fill in the following lines:

Name of school..Name of pupil..

Detach this sheet and hand it in at the close of the one and one half hour period.

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Each answer must be reduced to its simplest form.

1 Solve for k: $n = \dfrac{a-k}{5k}$

1................

2 Write the linear equation expressing the relationship between x and t shown in the following table:

t	2	6	9	11
x	12	36	54	66

2................

3 If the area of a rectangle is represented by $\dfrac{1}{a^2} - 1$ and the length by $\dfrac{1}{a} + 1$, what expression represents the width?

3................

4 Solve $x - 8 = \dfrac{9(x-6)}{2}$

4................

5 Solve $\sqrt{x-2} = 5$

5................

6 Factor $x^{2n} - 3x^n + 2$

6................

7 One root of the equation $9x^2 - 9x + 2 = 0$ is $\frac{2}{3}$. What is the other root?

7................

8 In the formula $x = 2n^2$, does x increase or decrease as n decreases from 0 to —2?

8................

9 Write the equation which shows that x is the arithmetic mean between a and b.

9................

10 Express in simplest form $4x^0 \div 2^{-4}$.

10................

11 Find, correct to the *nearest degree,* the angle of elevation of the sun when a vertical pole casts a shadow twice the length of the part of the pole which is above ground.

11................

12 What is the number whose logarithm is 3.9060?

12................

13 Find the logarithm of $\sqrt[3]{0.838}$.

13................

14 What is the name of the graph of the equation $s = 45t$?

14................

15 What name is given to a number whose square is a negative number?

15................

16 Express the following statement as an equation:
The velocity, v, of sound in air varies directly as the square root of the absolute temperature, k, of the air.

16................

17 Which term of the series 7, 13, 19, ... is 133?

17................

18 If the roots of the equation $x^2 + 4x + q = 0$ are equal, what is the value of q?

18................

19 Write the first *three* terms of the expansion $(1 - 2a)^4$

19................

20 What is the slope of the line whose equation is $2x - 3y = 6$?

20................

[3]

[OVER]

Directions (questions 21–25) — Indicate the correct answer to each question by writing on the dotted line at the right the letter *a, b* or *c.*

21 $\dfrac{\sqrt{6}-\sqrt{3}}{\sqrt{6}}$ is equal to (*a*) $1-\sqrt{3}$, (*b*) $\frac{1}{2}(2-\sqrt{2})$ or (*c*) $-\sqrt{3}$ 21. . . . .

22 $\dfrac{x-y}{x+y} - \dfrac{x+y}{x-y}$ is equal to (*a*) $-4xy$, (*b*) $\dfrac{2y^2}{x^2-y^2}$

or (*c*) $\dfrac{4xy}{y^2-x^2}$ 22. . . . .

23 $4^{3n} \div 2^n$ is equal to (*a*) 2^{5n}, (*b*) 2^{2n} or (*c*) 8   23. . . . .

24 Log 2.366 is equal to (*a*) 374.0, (*b*) 0.3740 or (*c*) 0.3739   24. . . . .

25 If a man can do a piece of work in *m* days and a boy can do it in *n* days, the number of days it would take both working together is (*a*) $\dfrac{m+n}{mn}$, (*b*) $\dfrac{mn}{m+n}$ or (*c*) $\dfrac{m+n}{2}$ 25. . . . .