INTERMEDIATE ALGEBRA

Thursday, June 18, 1931 — 9.15 a. m. to 12.15 p. m., only

Instructions

Do not open this sheet until the signal is given.

Answer all questions in part I and five questions from part II.

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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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 question has 2½ credits assigned to it; no partial credit should be allowed. Each answer must be reduced to its simplest form.

1 Solve for L the formula $M = W + \frac{1}{3} L^2$ *Ans.*.............

2 Simplify $-\frac{1}{1-a} \div \frac{a}{a-1}$ *Ans.*.............

3 Write an equation with integral coefficients the sum of whose roots is $\frac{1}{3}$ and the product $\frac{2}{3}$.   *Ans.*.............

4 Simplify $\sqrt[2]{m^4} \times m^{-\frac{1}{2}}$ *Ans.*.............

5 If $b^x = 64$, as b assumes in succession the values $2, 4, 8 \dots$, does x increase or decrease?   *Ans.*.............

6 Factor $x^{2a} - 9x^a$ *Ans.*.............

7 Find the roots of $2x^2 - 4\frac{1}{2} = 0$ *Ans.*.............

8 Find the *fourth* term of the series $\frac{1}{2}, \frac{3}{4}, \frac{9}{8}, \dots$ *Ans.*.............

9 Find the sum of the first 20 terms of the series whose first three terms are $-8, -6, -4$.   *Ans.*.............

10 Write an equation to express the fact that the square root of two less than a number is equal to one third the number.   *Ans.*.............

11 What is the form of the graph of the equation $4x^2 + 9y^2 = 15$?   *Ans.*.............

12 The graph of the equation $x^2 + y^2 = 7$ is a circle; what are the coordinates of its center?   *Ans.*.............

13 If $\log x = 3.9358$, find x.   *Ans.*.............

14 Using $\log 3 = .4771$, find $\log \frac{1}{3}$.   *Ans.*.............

15 Solve for x: $\sqrt{22 - x} = 3\sqrt{2}$ *Ans.*.............

16 Is $5 - \sqrt{2}$ a root of the equation $x^2 - 10x + 23 = 0$? [Answer *yes or no.*]   *Ans.*.............

17 What must be the value of the discriminant of a quadratic equation in order that its roots may be equal?   *Ans.*.............

18 What is the product of the roots of the equation $x^2 + 7x = 6$?   *Ans.*.............

19 Express as a single term $3\sqrt{-8} - \sqrt{-18}$ *Ans.*.............

20 If $5^0 + x = 2$, find x.   *Ans.*.............

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Write at top of first page of answer paper to part II (*a*) name of school where you have studied, (*b*) number of weeks and recitations a week in (1) elementary algebra, (2) intermediate algebra.

The minimum time requirement is five recitations a week for half a school year, or the equivalent, after the completion of elementary algebra.

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.

In the examination in intermediate algebra the use of the slide rule will be allowed for checking, provided all computations with tables are shown on the answer paper.

21 The edges of two cubical boxes are in the ratio $2:3$. Their combined capacity is 280 cubic feet. Find an edge of *each* box. [7, 3]

22 A woman 35 years old inherits some money; how much must she put in a savings bank at $4\frac{1}{2}\%$ interest, compounded annually, to have it amount to \$10,000 when she is 50 years old? [10] [Use the formula: $A = P(1 + r)^n$]

23 A dealer wishes to make a mixture of 50 pounds of assorted nuts as a " holiday special " worth 98 cents a pound. He decides to put in equal amounts of almonds and pecans, the rest to be walnuts. If almonds are worth \$1.25 a pound, pecans \$1.15 a pound and walnuts \$.65 a pound, how many pounds of each must the mixture contain? [7, 3]

24 Find the roots of $2x^2 - 3x = 3$ to the *nearest tenth*. [10]

25 The sum of three numbers in geometric progression is 14. The two-digit number formed by using the first of these numbers as the tens' digit and the second as the units' digit is three times the third of these numbers.

    a Represent the three numbers. [1]
    b Write the equations that would follow from the facts given. [4]
    c Solve these equations and write the two-digit number. [5]

26 Solve the following set of equations and correctly group your answers:

$$y = 2x - 5$$
$$x^2 + y^2 = 25 \qquad [8, 2]$$

27 A rectangular pasture, one of whose sides borders on a stream, is to be fenced in on the other three sides.

    a Using 80 rods of fencing for the three sides and letting x stand for the number of rods in the side that is at right angles to the stream, represent the number of rods in the other dimension of the field. [1]
    b Using the dimensions expressed in answer to *a*, write an equation for the area y of the field. [1]
    c Plot the graph of the equation made in answer to *b* for $x = 0, 10, 20, 30, 40$ [5]
    d On the graph made in answer to *c*, indicate the point where the area y has its greatest value. What is the corresponding value of x? [2]
    e For the greatest value of the area, how do the dimensions of the field compare with each other? [1]