

INTERMEDIATE ALGEBRA

Thursday, June 9, 1910—9.15 a. m. to 12.15 p. m., only

Write at the top of the first page of your answer paper (a) the name of the school where you have studied, (b) the number of weeks and recitations a week that you have had in algebra.

Two recitations a week for a school year (or four recitations a week for half a school year), in addition to the five recitations a week for a school year required for elementary algebra, in a recognized academic school, is the regular requirement, and any statement showing less or other than this should be accompanied by a satisfactory claim or explanation made by the candidate and certified by the principal; otherwise such paper will be returned.

Answer eight questions, selecting two from each group. No credit will be allowed unless all operations (except mental ones) necessary to find results are given; simply indicating the operations is not sufficient.

Group I 1 Extract the cube root of

$$x^3 - 6x + 15x^{\frac{1}{2}} - 20 + 15x^{-\frac{1}{2}} - 6x^{-1} + x^{-\frac{3}{2}}$$

2 Simplify $\frac{3\sqrt{-5} - \sqrt{-2}}{2\sqrt{-5} - 3\sqrt{-2}}$

Find the square root of $60 - 5\sqrt{108}$

3 Simplify $\sqrt{50} + \sqrt[3]{9} - 4\sqrt{\frac{1}{2}} + \sqrt[3]{24} + \sqrt[3]{27} - \sqrt[4]{64}$

Group II 4 Using the binomial theorem write the first five terms of $(m^2 - n^3)^6$

5 Solve $\sqrt{x+a} + 2\sqrt{x+6a} = \frac{16a}{\sqrt{x+a}}$

6 Solve $\begin{cases} x^2 + y^2 + 2x + 2y = 23 \\ xy = 6 \end{cases}$

Group III 7 A man travels 445.5 miles; he goes 10 miles the first day and increases his speed $\frac{1}{2}$ mile each succeeding day. How many days does he travel?

8 The denominator of a certain fraction exceeds the numerator by 2; if a certain number is added to both numerator and denominator the value of the fraction thus formed is $\frac{2}{3}$, while if this same number is subtracted from both numerator and denominator the value of the fraction formed is $\frac{1}{3}$. Find the original fraction.

9 Without solving, determine the character of the roots of the equation $3x^2 + 9x - 12 = 0$. Give the reason for each statement concerning these roots.

Group IV 10 The difference of the cubes of two numbers is 342; if the product of the numbers is multiplied by their difference the result is 42. Find the numbers.

11 The sum of three numbers in the ratio of 5:6:8 is 57; find the numbers.

12 Factor the following: $49a^2 + 4 - 36b^2 - 28a$; $a^4 + 4b^4$; $m^8 - m^6 + 32m^3 - 32$; $(1+x^3) + (1+x)^3$; $8x^2 - 14bx + 3b^2$