The University of the State of New York

220TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Monday, January 20, 1919—9.15 a. m. to 12.15 p. m., only

Write at top of first page of answer paper (*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 four recitations a week for half a school year, after the completion of elementary algebra.

Answer eight questions. Each answer should be reduced to its simplest form.

1 Solve by formula and by factoring $2x^2-5x=3$

2 Simplify $\left(\frac{3a^4-75a^2}{3a-7}\right)\left(6a-\frac{7}{a}-11\right)\div-\left(2+\frac{5}{a^2}+\frac{11}{a}\right)$

3 Solve for f the formula $\frac{1}{f}=\frac{1}{r}+\frac{1}{rt}$

4 *a* Write the discriminant of *each* of the following equations and from it determine the nature of the roots:

$x^2-5x+6=0$

$4x^2=9-9x$

$x^2-5x+7=0$

$x(x-5)=x-16$

b Form the equation whose roots are

$-3+\sqrt{7}$ and $-3-\sqrt{7}$

5 *a* Find to *three* decimal places the value of $\frac{\sqrt{5}-\sqrt{2}}{\sqrt{5}+\sqrt{2}}$

b Find the value of $\frac{a^3-ab+b^3}{a^3+b^3}$ if

$a=\sqrt{2}+1$ and $b=\sqrt{2}-1$

6 *a* Simplify the following expression:

$$\sqrt[2n]{\frac{64^n}{4^{2n}}}$$

b Find the value of $8^{\frac{2}{3}}$, 8^0, 8^{-1}, 3.72×10^{-4}

7 Solve $\begin{cases}\frac{1}{x}-\frac{1}{y}=\frac{1}{3}\\ \frac{1}{x^2}+\frac{1}{y^2}=\frac{5}{9}\end{cases}$

8 The dimensions of a rectangular solid are e, $2e+1$ and $3e-2$. Denote its total surface by s and its volume by v. Find s in terms of e; v in terms of e; e in terms of s.

9 A 5% solution of salt, weighing 160 lb, is to be reduced to a 4% solution. How many pounds of water must be added? How many gallons of water must be added, if one gallon weighs 8.35 lb?

10 The two sides of a right triangle are 3 and 4 inches long respectively. How much must the longer leg be extended in order that the hypotenuse may become 2 inches longer?

11 Find the 11th term and the sum of the first 11 terms of the progression 1, $\frac{3}{4}$, 2, $\frac{5}{4}$.

12 The cost of a certain article is 4¢ a pound; if p is the price paid for n pounds, what is the equation connecting n and p? Draw the graph of that equation.

13 A projectile weighing w pounds, whose diameter is d inches, strikes a wrought iron plate when moving at the rate of v feet per second. The depth of penetration p (in inches) is given by the formula

$$p=\frac{v}{608.3}\sqrt{\frac{w}{d}}-0.14d$$

Find p when $d=12.5$, $w=1250$ and $v=2016$

14 An automobile, after traveling at the rate of 30 miles an hour for 3 hours, has an accident which delays it $\frac{1}{2}$ hour; it then continues its journey at the rate of 20 miles an hour. At what rate must another car, which started from the same place 2 hours later, travel in order to overtake the first car in 5 hours? [Solve *either* algebraically *or* graphically.]

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DIRECTIONS FOR RATING

The direction, "Less than 60% of the credit should be granted when an error in computation occurs," should be followed in rating all incorrect answers to questions which fall under the topics mentioned in "Suggestions on the Rating of Regents Examination Papers in Mathematics" under "General 3."

In rating all problems, see "Suggestion 12."

No credit should be allowed for checks unless made in original statements.

Except in schools where the "committee system" is used, teachers are urged to mark papers cumulatively, that is, to add the credits earned by each answer to the total credits earned by preceding answers so that the mark given to the last answer is the per cent to which the paper is entitled, e. g. consecutive answers earning 5, 7, 4 etc. respectively should be marked 5, 12, 16 etc. respectively.

1 12½ credits
Allow 7½ credits for correct solution by formula.
Allow 5 credits for correct solution by factoring.

2 12½ credits
Allow 2 credits for factoring the first expression.
Allow 6 credits for factoring the other expressions (3 each).
Allow 4½ credits for correct inversion and cancelation.

3 12½ credits
Allow no partial credit.

4 12½ credits
a Allow 10 credits (2½ each).
b Allow 2½ credits.

5 12½ credits
a Allow 7½ credits.
b Allow 5 credits.

6 12½ credits
a 6½ credits
b 6 credits
Allow 4 credits for the correct values of the first and last expressions (2 each).

Allow 2 credits for the correct values of the second and third expressions (1 each).

7 12½ credits
Allow 7½ credits for finding the first pair of roots.
Allow 5 credits for finding the other pair of roots.

8 12½ credits
Allow 4½ credits for expressing s in terms of e.
Allow 2 credits for expressing v in terms of e.
Allow 6 credits for expressing e in terms of s.

9 12½ credits
Allow 7½ credits for correct equation.
Allow 3 credits for finding the number of pounds of water.
Allow 2 credits for finding the number of gallons of water.

10 12½ credits
Allow 7½ credits for correct equation.
Allow 5 credits for correct result.

11 12½ credits
Allow 6 credits for finding the 11th term.
Allow 6½ credits for finding the sum of the first 11 terms.

12 12½ credits
Allow 6 credits for correct equation.
Allow 6½ credits for correct graph.

13 12½ credits
See "General Suggestion 3."

14 12½ credits
If solved algebraically, allow 7½ credits for correct equation and 5 credits for finding the rate.
If solved graphically, allow 7½ credits for correct graph and 5 credits for finding the rate.