INTERMEDIATE ALGEBRA

Monday, June 18, 1917—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, including the eleventh. Each answer should be reduced to its simplest form.

Assign 16 credits to the eleventh question and 12 credits to each of the others.

1 Perform the indicated operations and simplify the result:

$$\left(2+\frac{m}{m-3}\right)\times\left(\frac{9-m^2}{4-m^2}\right)\times\left(\frac{m+2}{m^2+m-6}\right)-\left(\frac{2}{m+2}\right)$$

Check by substituting a numerical value for m.

2 Factor the following:

$12a^2-5ab-2b^2$

$x^3-6x^2+11x-6$

$16a^2b^2-(a-b)^4$

$16m^4-9m^2n^2+25n^4$

3 *a* Simplify the following and express the result with positive exponents:

$$\sqrt{(a^{-1}c^{-1}p^2qr^{-3})(a^{-1}b^3p^{-3}q^2r)\div(bc^{-3}p^{-1}q^3r^{-2})}$$

b Simplify $\dfrac{4\sqrt{7}}{\sqrt{7}-\sqrt{5}}$ and find its value correct to *two* decimal places.

4 Solve and check:
$$\begin{cases}\dfrac{1}{x^2}+\dfrac{1}{y^2}=61\\[2mm]\dfrac{1}{x}-\dfrac{1}{y}=1\end{cases}$$

5 Solve and check: $m^2-8m+40-2\sqrt{m^2-8m+40}=35$

6 *a* Solve the formula for the value of L:

$$C=\frac{E}{\sqrt{R^2+(2\pi nL)^2}}$$

b Determine which of the following surds is the greater:

$\sqrt[3]{3},\ \sqrt[6]{6}$

7 The sum of the areas of two square pieces of tin is 25 square feet and a side of the larger is 1 foot longer than a side of the smaller; state the equations in two unknown quantities and find graphically the length of a side of each square.

8 An automobile is driven at the rate of 20 miles an hour for 4 hours. After a stop of 2 hours the run is resumed for 3 hours at the same rate, when an hour's stop is made. After another run of an hour and a half at the same rate the automobile reaches its destination. Construct a graph to represent the journey and from it determine how far the automobile is from its starting point at the end of the eighth hour.

9 A stone dropped from a floating balloon takes 10 seconds to reach the surface of a lake below; if the numbers in the series 16, 48, 80 . . . represent the number of feet the stone falls in successive seconds, how high is the balloon above the lake?

10 There are two alloys of silver and copper, one of which contains twice as much copper as silver, the other three times as much silver as copper; how much of each alloy is required to make an alloy of equal parts of silver and copper which will weigh $2\frac{1}{2}$ ℔ avoirdupois?

11 *a* Solve $2x^2+4=5x$ and check by obtaining the coefficient of x and the constant term from the roots obtained.

b By using the discriminant b^2-4ac, determine which of the following have rational factors [The work must be shown in each case]:

$20x^2-9x-20$

$13x^2+x-12$

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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 all problems solved with two unknowns, no credit should be given for one equation correctly formed if the other is not given or is inaccurate.

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 12 credits

Allow 6 credits for simplifying the first three expressions (2 each).
Allow 1 credit for correct cancelation.
Allow 2 credits for correct addition.
Allow 3 credits for correct check.

2 12 credits

Allow 3 credits each. Apply suggestion 17 under "Suggestions on Elementary Algebra" for factors not prime.

3 12 credits

a 5 credits. Allow 4 credits if $\sqrt{\frac{b^2c^2}{a^2}}$ is found, but allow no partial credit.
Allow 1 credit for correct simplification.

b 7 credits
Allow 4 credits for correct simplification.
Allow 3 credits for result correct to *two* decimal places.

4 12 credits

Allow 6 credits for finding one pair of correct values.
Allow 2 credits for finding other pair of correct values.

Allow 4 credits for checks (2 each). If second pair of values is found by substitution, allow no credit for check unless made in original equation other than the one used to find these values.

5 12 credits

Allow 5 credits for finding two correct values.
Allow 3 credits for finding the other two correct values.
Allow 4 credits for checks (1 each).

6 12 credits

a 8 credits
b 4 credits. No partial credit.

7 12 credits

Allow 4 credits for correct statement of equations.
Allow 6 credits for correct graphs, 4 for circle and 2 for straight line.
Allow 2 credits for correct lengths (1 each).

8 12 credits

Allow 9 credits for correct graph.
Allow 3 credits for determining distance.

9 12 credits

Allow 2 credits for correct formula.
Allow 6 credits for correct substitution.
Allow 4 credits for correct result.

10 12 credits

Allow 8 credits for correct equations.
Allow 4 credits for correct results (2 each).

11 16 credits

a 10 credits.
Allow 4 credits for correct solution.
Allow 6 credits for correct check (3 for each part).
b Allow 6 credits (3 each).