

INTERMEDIATE ALGEBRA

Monday, January 21, 1918—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 five questions from group I, question eleven and two other questions from group II. Each answer should be reduced to its simplest form.

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

Group I

Answer five questions from this group.

- 1 Find the prime factors of *each* of the following:

$$18a^2 + 27a - 5$$

$$x^2 - 6x + 9 - y^2$$

$$a^4 + 4a^2 + 16$$

$$x^3 - 7x - 6$$

- 2 Extract the square root of

$$4x^{2m} + 4x^m - 3 - 2x^{-m} + x^{-2m}$$

Check.

- 3 Solve for x and check:

$$\sqrt{7x+1} = 1 + \sqrt{3x+10}$$

- 4 a Solve for d in terms of l , H and V :

$$V = \sqrt{\frac{H \times 2500}{l \times \frac{13.9}{d}}}$$

- b What is the total surface of a rectangular block if its length is l'' , its width is w'' and its height is h'' ?
[Make a drawing.]

- 5 Solve $\frac{x-5}{x+3} - \frac{x-8}{3-x} = \frac{80}{x^2-9} + \frac{1}{2}$

- 6 Solve for x and y either graphically or algebraically:

$$x^2 + y^2 = 25$$

$$xy = 12$$

Group II

Answer question eleven and two other questions from this group.

7 Graph the equation $v = 32t$, letting the abscissa distances represent the values of t and the ordinate distances represent the values of v . If t represents time in seconds and v velocity in feet, read from the graph the velocity of a falling body at the end of 4 seconds; at the end of 6 seconds. Read from the graph the time required to give the body a velocity of 16 feet.

- 8 a A toboggan slide of uniform grade is to be built on a perfectly level surface and is to have 10 supports, the distances between them being equal; the length of the longest support is to be 42 feet 6 inches and the length of the shortest is to be 2 feet. How long must each of the supports be?

b Derive the formula used in the solution of a.

- 9 a Change the repeating decimal .7272 . . . to a common fraction.

b Derive the formula used in the solution of a.

10 A rectangular wheat field is 80 rods long by 60 rods wide; a strip of uniform width is cut around the field, so that half the grain is left standing in the form of a rectangular plot. How wide is the strip that is cut?

- 11 a Solve $3x^2 - 5x + 4 = 0$ and check by deriving the entire equation from the roots obtained.

b Determine the nature of the roots of the following equations:

$$4x = 9 - x^2$$

$$4x = 12 - x^2$$

$$-4x = 12 + x^2$$

$$-4x = 1 + 4x^2$$

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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 3 credits each.

2 12 credits

Allow 4 credits for finding first two terms of root correctly.

Allow 4 credits for finding third term of root if work is finished correctly.

Allow 4 credits for correct check.

3 12 credits

Allow 5 credits for first correct value.

Allow 4 credits for second correct value.

Allow 3 credits for correct checks, 1 for root, 2 for extraneous root.

4 12 credits

a 8 credits.

b 4 credits. Allow no partial credit.

5 12 credits

Allow 4 credits for clearing fractions correctly.

Allow 5 credits for first correct result.

Allow 3 credits for second correct result.

DIRECTIONS FOR RATING—concluded

6 12 credits

If solved graphically, allow 4 credits for graphs (2 each).

Allow 8 credits for finding roots (2 for each pair).

If solved algebraically, allow 6 credits for finding first pair of roots correctly and 6 credits for finding the other pairs (2 each).

7 12 credits

Allow 6 credits for correct graph.

Allow 6 credits for reading correct values (2 each).

8 12 credits

a 8 credits

Allow 1 credit for correct formula.

Allow 3 credits for correct substitution.

Allow 2 credits for correct value of *d*.

Allow 2 credits for correct lengths of supports.

b Allow 4 credits.

9 12 credits

a 8 credits.

Allow 1 credit for correct formula.

Allow 3 credits for correct substitution.

Allow 4 credits for correct result.

b Allow 4 credits.

10 12 credits

Allow 7 credits for correct equation.

Allow 5 credits for correct solution.

11 16 credits

a 8 credits.

Allow 4 credits for correct solution.

Allow 4 credits for correct check.

b Allow 8 credits (2 each).