

ELEMENTARY ALGEBRA

Tuesday, June 18, 1918—1.15 to 4.15 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 elementary algebra. The minimum time requirement is five recitations a week for a school year.

Answer 10 questions, including seven from group I and three from group II. 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.

Group I

Answer seven questions from this group.

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

$$x^4 - x^2$$

$$m^2 - 11m + 18$$

$$6p^2 - pq - q^2$$

$$a^2 + 2ab + b^2 - c^2$$

$$a^3 + a^2b + a + b$$

- 2 Factor the right hand member of the formula

$$A = \frac{1}{2}bh + \frac{1}{2}b'h$$

thus rendering it simpler for computation. Then compute the value of A when $b = 4\frac{1}{4}$, $b' = 2\frac{3}{4}$ and $h = 6$

- 3 Perform the indicated operations and check your work by substituting appropriate values for
- a
- and
- b
- :

$$\frac{a^2 + 4ab + 3b^2}{a^2 - b^2} \times \frac{(a-b)^2}{a+3b} \div \frac{a-b}{a+b}$$

- 4 Divide
- $15t^4 - 19t^3 + 8t^2 - t - 1$
- by
- $5t^2 - 3t - 1$
- and perform the arithmetical division when
- $t = 10$
- .

- 5 Find the value of

$$-\frac{b}{2a} \pm \frac{1}{2a} \sqrt{b^2 - 4ac}$$

when $a = 1$, $b = -7$, $c = 12$

$a = 6$, $b = 1$, $c = -1$

$a = 3$, $b = -6$, $c = 10$

- 6 Solve the equations

$$4x + 5y = 6$$

$$xy = -2$$

Check the solutions.

- 7 Find the square root of

$$4x^4 + 20x^2 - 3 - \frac{70}{x^2} + \frac{49}{x^4}$$

- 8 Find to two decimal places the value of
- k
- in the equation
- $k(14 - k) = 47$

Group II

Answer three questions from this group.

- 9 The frame for a square picture is 2 inches wide and the area for the opening for the picture is 54 square inches; find the outside dimensions of the frame and state whether or not both results obtained are admissible.

- 10
- a
- How many ounces are there in
- p
- pounds?

- b
- How many pounds are there in
- z
- ounces?

- c
- A merchant pays
- d
- dollars for
- n
- yards of velvet; what is the average price per yard?

- d
- If an automobile goes
- m
- miles per hour, what is its rate in feet per minute?

- 11 A rectangular building lot is known to contain 2700 square feet; one side is 15 feet longer than the other. Find the dimensions of the lot.

- 12 A number of boys go camping, agreeing to divide the expenses among themselves. If the number had been two more, each would have paid \$12 less; if the number had been three less, each would have paid \$24 more. How many boys were there and how much did each boy pay?

- 13 When the values of
- x
- and
- y
- are very small
- $\frac{1+x}{1+y}$
- may be taken as nearly equal to
- $1+x-y$
- . Find to five decimal places the error in this statement when
- $x = 0.02$
- and
- $y = 0.03$
- .

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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 "Elem. Alg. 12."

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.

1 10 credits

Allow 2 credits each.

2 10 credits

Allow 5 credits for complete simplification.

Allow 5 credits for correct value of A .

Allow no partial credit on either part.

3 10 credits

Allow 4 credits for correct factoring (2 each).

Allow 4 credits for correct inversion and cancellation.

Allow 2 credits for correct check.

4 10 credits

Allow 5 credits for correct division.

Allow 5 credits for correct arithmetical division.

Allow no partial credit on either part.

5 10 credits

Allow 1 credit for first correct substitution.

Allow 2 credits for first correct addition and simplification.

Allow 1 credit for second correct substitution.

Allow 2 credits for second correct addition and simplification.

Allow 1 credit for third correct substitution.

Allow 3 credits for third correct addition and simplification.

DIRECTIONS FOR RATING—concluded

6 10 credits

Allow 4 credits for finding first pair of roots correctly.

Allow 2 credits for finding second pair of roots correctly.

Allow 4 credits for correct 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.

7 10 credits

Allow 5 credits for first two correct terms of the root.

Allow 5 credits for third term of root if work is finished correctly.

8 10 credits

Allow 6 credits for finding $k=7 \pm \sqrt{2}$

Allow 4 credits for finding correct decimal values (2 each).

9 10 credits

Allow 5 credits for correct equation.

Allow 3 credits for correct solution.

Allow 2 credits for stating whether or not both results are admissible.

10 10 credits

a 2 credits

c 2 credits

b 2 credits

d 4 credits

Allow no partial credit on a, b, c or d .

11 10 credits

Allow 5 credits for correct equation.

Allow 3 credits for first correct dimension.

Allow 2 credits for second correct dimension.

12 10 credits

Allow 5 credits for correct equations.

Allow 3 credits for first correct result.

Allow 2 credits for second correct result.

13 10 credits

Allow 2 credits for correct substitution.

Allow 8 credits for finding the error.