EXAMINATION FOR QUALIFYING CERTIFICATES

INTERMEDIATE ALGEBRA

Tuesday, September 13, 1921—9.15 a. m. to 12.15 p. m., only

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Answer eight questions. 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. Papers entitled to less than 75 credits will not be accepted.

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

$$x^{10}-1$$
$$6-2y-4y^2$$
$$x^{4a}+3x^{3a}-10x^{2a}$$
$$x^3-7x-6$$
$$(c+d)^2-6c-6d+9$$

[No partial credit allowed on any part.]

2 Find to the *nearest hundredth* the roots of the equation $t^2=12t-16.5$

3 *a* Rationalize the denominator in $\dfrac{\sqrt{(x-3)}+\sqrt{3}}{\sqrt{(x-3)}-\sqrt{3}}$

b Find the numeric value of $8^{-\frac{2}{3}}\times 2^0-(8^{-\frac{2}{3}}\times 2)^0$

4 A bag weighing 18 ounces contains two sizes of steel balls, one size weighing 1 ounce and the other $\frac{2}{3}$ of an ounce; there are 23 balls in all. Find the number of balls of each size.

5 The dimensions of a rectangular box are expressed by three consecutive numbers; if its entire surface, including the cover, is 214 square inches, find its dimensions.

6 *a* Knowing the log of $43=1.6335$, write the log of 4.3, .043, 4300, $\sqrt{.43}$

b What would be the characteristic in 43^9? $.43^5$?

c Find by the use of logarithms the value of $\dfrac{\sqrt[3]{4.063}}{.324^2}$

7 A ball rolling down an inclined plane goes 4 feet in the first second, three times as far in the next second, five times as far in the third second, etc.; find by formula the distance it will have rolled in 9 seconds.

8 Solve for x and y: $\begin{cases} x+y=25 \\ \sqrt{x}+\sqrt{y}=7 \end{cases}$

9 Determine by *two* different methods whether $3-\sqrt{2}$ and $3+\sqrt{2}$ are roots of the equation $x^2+7=6x$. [Leave all work on the paper.]

10 Solve for y and check:

$$\frac{3y\sqrt{2}-1}{y\sqrt{3}-1}=\sqrt{6}+1$$

11 In the formula $S=\dfrac{a-ar^n}{1-r}$

a Solve for a in terms of the other letters.

b Find S when $a=\frac{2}{3}$, $r=\frac{2}{3}$ and $n=3$.

12 Make a graph of $2x^2-5x=y$ for values of x from $+4$ to -2. From this graph determine the roots of the equation $2x^2-5x-3=0$. [Leave all work on the paper to show how these roots are determined from the graph.]