SECONDARY MATHEMATICS, I

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SECONDARY MATHEMATICS

I.

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Introduction

THE growth of this series of Mathematics for Secondary Schools, has covered a period of seven years, and has been simultaneous with the growth and development of the shop, laboratory, and drawing courses in Cass Technical High day school, as well as in the evening and continuation classes.

The authors have had clearly in mind the necessity of first developing a sequence of mathematics that would enable the student to recognize fundamental principles and apply them in the shop, drawing room, and laboratory; and, second to so develop the course that each year's work would be a unit and not depend upon subsequent development for intelligent application.

It has been assumed that the school work-shop, drawing room, and laboratory would furnish opportunity to apply mathematics and that it was not necessary to exhaust every possible application in the mathematics class.

The authors have been aware of the popular demand for a closer union of algebra and geometry, but have recognized that demand only when the union came about naturally and would assist the mathematical sequence desired.

Instructors in the wood shop, pattern shops, machine shop, drawing rooms, chemistry, physics, and electrical laboratories, etc., have furnished examples of mathematical application incident to the respective subjects. Hundreds of problems arising in the industries, have been brought in by the machinists, sheet metal workers, carpenters, electrical workers, pattern makers, draughtsmen, etc., etc., coming to the evening and continuation classes. Complete charts of machine shop work and electrical distribution requirements have been made, including a statement of the required sequence of mathematics. All of this material has been classified, with a view to the mathematical sequence.

The net result is a series of Mathematics so organized that a mastery of the text makes it possible for a student to use mathematics intelligently in the various departments of the school, in the industries, and at the same time prepare for college mathematics.

E. G. ALLEN,
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CHAPTER I

THE EQUATION

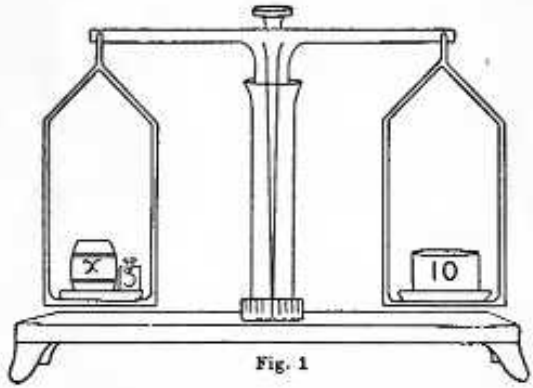

Fig. 1

1 In order to find the weight of an object, it was placed on one pan of perfectly balanced scales (Fig. 1). It, together with a 3-lb. weight, balanced a 10-lb. weight on the other pan. If 3 lbs. could be taken from each pan, the object would be balanced by 7 lbs. This may be expressed by the *equation*, $x+3=10$, in which the expressions $x+3$ and 10 denote the weights in the pans, the sign $(=)$ of equality denotes the perfect balance of the scales, and x is to be found.

2 Equation: An *equation* is a statement that two expressions are equal. The two expressions are the *members* of the equation, the one at the left of the equality sign being called the *first member*, and the one at the right, the *second member*.

3 From the explanatory problem, it will be seen that *the same number may be subtracted from both members of an equation.*

Oral Problems:

Solve for x:

1. $x+7=21$
2. $x+2=3$
3. $x+1.1=3.5$
4. $x+2\frac{5}{6}=7\frac{1}{2}$
5. $x+\frac{5}{7}=\frac{1}{1}\frac{1}{2}$

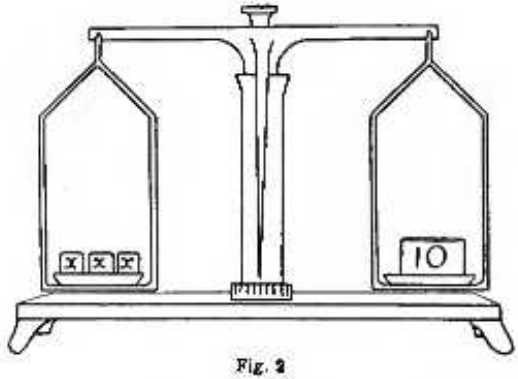

Fig. 2

4 It is required to find the weight of a casting. It is found that 3 of them exactly balance a 10-lb. weight (Fig. 2). If the weight in each pan could be divided by 3, one casting would be balanced by $3\frac{1}{3}$ lbs. This may be expressed by the equation,

$$3x = 10,$$

$$x = 3\tfrac{1}{3},$$ (dividing both members by 3)

5 From this explanatory problem, it will be seen that *both members of an equation may be divided by the same number.*

Oral Problems:

Solve for x:

1. $4x = 12$
2. $2x = 16$
3. $5x = 9$
4. $11x = 33$
5. $1.1x = 12.1$

Example: Solve for x: $5x + 12 = 37$

$5x = 25$ Why?

$x = 5$ Why?