$$s_1 = abcdefgh \cdot ijlmnop, \quad s_2 = aiem \cdot cogk.$$

When s_1 is of order 8, s_2 must be of order 4 since s_2^2 is not commutative with s_1. When s_1 is of order 4, the order of s_2 is either 4, 2, or 1, as may be readily seen from the following substitutions:

$$s_1 = aecg, \quad s_2 = abcd \cdot efgh\,; \quad s_1 = abcd, \quad s_2 = ac.$$

Finally, when s_1 is of order 2, the order of s_2 is evidently 2 or 1. Hence the theorem: *If two non-commutative operators satisfy the relations* $s_1^{-2}s_2s_1^2 = s_2^3$, $s_2^{-2}s_1s_2^2 = s_1^5$, *their orders are one of the following pairs of numbers:* 8, 4; 4, 4; 4, 2; 2, 2.

When s_1 is of order 8, H is abelian and of order 8. From the following equations it results that s_1^2 is transformed into its inverse by $(s_1s_2)^2$:

$$(s_1s_2)^{-1}s_1^2s_1s_2 = s_2^{-1}s_1^2s_2 = s_1^2 \cdot s_1^{-2}s_2^{-1}s_1^2 \cdot s_2 = s_1^2s^2,$$

$$(s_1s_2)^{-2}s_1^2(s_1s_2)^2 = s_2^{-1}s_1s_2^2s_1s_2 = s_2 \cdot s_2^{-2}s_1s_2^2 \cdot s_1s_2 = s_2s_1^{-2}s_2 = s_1^{-2}.$$

Hence the order of G is a multiple of $8 \cdot 4 \cdot 2 = 64$ whenever s_1 is of order 8. That the order of G may be exactly 64 results directly from the given substitutions, as they generate an imprimitive group of degree 16 and order 64. From the properties of the dihedral group it results that s_1, s_2 may be so selected that the order of G is an arbitrary multiple of 64 and that the third derived of each one of these groups is identity. The categories of groups which result when the orders of s_1, s_2 have the other possible sets of values are still more elementary and their fundamental properties are easily derived from the general theorems of the preceding section.

THE SOLUTION OF AN INTEGRAL EQUATION OCCURRING IN THE THEORY OF RADIATION.

BY PROFESSOR W. H. JACKSON.

(Read before the American Mathematical Society, December 30, 1909.)

PROFESSOR Arthur Schuster * has discussed the propagation of heat by radiation when the isothermal surfaces are

* "The influence of radiation on the transmission of heat." *Phil. Magazine*, Feb., 1903.