one must be an odd number while that of the other is twice
this odd number when \( s_1 s_2 = s_3^2 \); but when \( s_1 s_2 = s_3^2 s_1^{-2} \) it is
only necessary that the order of one is three times that of the
other.

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THE TEACHING OF MECHANICS.


There are few topics in elementary mathematics that are
more generally mishandled by the writers of our text books than
Newton's three laws of motion. Perhaps it would be more
accurate to say that the applications of the laws are generally
misunderstood and that consequently the exponents of axioms
which form the foundation of the mathematical science of me­
chanics rarely fail to make some fundamental error which des­
troys at the outset any hope of a logical development of the
subject. The worst cases generally occur in the books which
are published under the title "Physics." It frequently happens
that the authors have not mastered the meaning of the laws;
more frequently they show a want of care in their statements
and explanations. In either case the effect on the student must
be the same — a nebulous conception of the whole subject and
a general impression that one can get along perfectly well in
physics or engineering without bothering to understand what
facts are directly observed and which can be deduced from the
laws of motion. A man who wishes to rise to the higher levels
of these professions must know such matters.

Perhaps it will not be altogether out of place to insist here
on some points in the teaching in this country of applied ma­
thematics or mathematical physics, whatever be the name we
like to give to the science which concerns itself with the appli­
cation of mathematics to problems in which space, time, and
matter are supposed to be related by certain definitely stated
laws. At the outset, the subject is a "pure" science in exactly
the same way that pure mathematics is so, in that it rests solely
on definitions and axioms which have no necessary relation to
the phenomena of nature. Every problem attacked is an ideal,
not an actual problem. The statement of the ideal problem
must conform to the laws laid down if it is to fall within the