

The examples are chosen with great skill.

We should all welcome such a well thought out endeavor to make the theory of groups more teachable. But as long as mathematicians remain as happily diversified as at present some will think that such a book as that under consideration has made too great sacrifices of rigor and generality, while others would condemn the books the reviewer would like to see written as too abstract and their authors as too visionary. Nothing is more disputable than taste.

M. H. INGRAHAM

The Universe in the Light of Modern Physics. By Max Planck. Translated by W. H. Johnston. New York, Norton, 1931. 118 pp. \$2.00.

Planck (p. 8) insists that we are compelled to assume the existence of a world of reality behind the usual world of the senses and that progress in physics has been made only on this assumption. "But (p. 10) besides the world of sense and the real world, there is also a third world which must be carefully distinguished from these:—this is the world of Physics." The most far-reaching results of investigation (p. 15) can be obtained only by following a road leading to a goal which is theoretically unobtainable; and that goal is the apprehension of true reality: as the view of the physical world is perfected, it recedes from the world of sense and approaches the world of reality. The principal intellectual tool for such progress is (p. 65) the hypothesis whose implications are drawn and subjected to the test of experimental verification.

In relativity and quantum theory (p. 18) we have two completely new ideas, but their advent means (p. 23) reconstruction, not destruction. The revolutionary consequences of these ideas are treated at some length, especially in their bearing (p. 28) on the meaning of a particle, on the nature (pp. 39–41) of the principle of uncertainty and (p. 45) the character of waves of probability, and finally on causality, determinism, indeterminism and free will. Whatever doubt (p. 59) these new ideas may have thrown on the question whether physics is really on the right path, Planck meets with the proposition (p. 60) that theory and experience were never before so closely linked in physics and with the confident prediction (p. 112) that the parts of classical theory which have had to be discarded will be supplanted by what is sounder and more adequate.

The new physics (p. 113) will give us an insight into the secrets of the theory of knowledge. A new need has arisen for ideas from philosophy. "For this reason (p. 113) a careful study of the views and ideas of our great philosophers might prove extremely valuable." "Modern Physics (pp. 113–4) impresses us particularly with the truth of the old doctrine which teaches that there are realities existing apart from our sense-perceptions, and that there are problems and conflicts where these realities are of greater value for us than the richest treasures of the world of experience."

These and similar propositions are urged with supporting reasons. The translation appears to be well done. The typography reaches a high order of excellence.

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