action, but also serve to emphasize fundamentals in both classical and modern physics. An especially notable example is the approach to Heisenberg's uncertainty principle through the problem of the bandwidth required to resolve pulses of short duration. Perhaps the most stimulating chapter is the last, in which the author concludes that "Certain apparently sensible questions, such as the question of weather conditions . . . several days ahead, are in principle unanswerable and the most we can hope to do is to determine the relative probabilities of different outcomes."

There may be some question as to whether the non-mathematical layman will be able to follow all of the development of the last five chapters, and the author is occasionally guilty of extravagance. (Few aerodynamicists, even in the United Kingdom, would be willing to admit that F. W. Lanchester's esoteric volumes *Aerodynamics* and *Aerodonetics* "played a part in aerodynamics not unlike that exercised by Newton's *Principia* in astronomy.") These things notwithstanding, the reviewer believes that the author has succeeded admirably in reaching the goal described in the opening quotation of this review. Indeed, he goes beyond this goal, and the book (especially the individual essays) is warmly recommended to practicing applied mathematicians, as well as to laymen and students.

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16[K, S, W].—C. WEST CHURCHMAN & PHILBURN RATOOSH, Editors, *Measurement: Definitions and Theories*, John Wiley & Sons, Inc., New York, 1959, vii + 274 p., 24 cm. Price $7.95.

The December 1958 meetings of the American Association for the Advancement of Science included a two-day symposium on Measurement. The dozen papers of this symposium are included in this volume, together with a related paper separately invited but not delivered.

The book is divided into four parts. Part I, "Some Meanings of Measurement," consists of four papers concerned primarily with defining and characterizing the concept of measurement. Part II, "Some Theories of Measurement," contains three papers that approach the definition and characterization of measurement in more formal language—mathematical and logical symbols are more in evidence here—and thus warrant grouping together in a separate class. Part III, "Some Problems in the Physical Sciences," contains three papers that deal with theoretical and practical aspects of measurement in classical and modern physics, plus a paper on "rare events" that is out of place in this volume. Part IV, "Some Problems in Social Science," contains only two papers, one on inconsistency of judgments as a measure of psychological distance and one having to do with experimental tests of a probabilistic theory of economic behavior.

There are in all fourteen contributors, one paper being co-authored. The disciplines they represent are: philosophy (5), psychology (3), psychophysics (1), physics (2), mathematics (1), statistics (1), economics (1), and accounting (1). Philosophy is thus somewhat over-represented; astronomy, the biological and earth sciences, not at all.

In the Preface it is stated that the Symposium "was designed to present contrasts in approaches to the problems of measurement." To this end, "the partici-

pants were chosen from different disciplines" and selected particularly "because it was known that they had different viewpoints on the meaning and significance of measurement." Consequently, this volume "is a book of contrasts," not a unified collection of interrelated essays on measurement, and definitely not a textbook on measurement. At best it presents a broad picture of current thinking on the definition, nature, and functions of measurement, against a background of measurement needs and practices in various disciplines at the middle of the twentieth century. But the "picture" is not all in sharp focus. This is due not so much to differences in expository skill of the authors, as to differences in their objectives. Some seek sharpness of definition at the price of a narrow field of applicability; others demand a broad field of applicability at the sacrifice, if necessary, of sharpness of definition. Furthermore, much of the discussion is at a level of abstraction so far removed from the day-to-day practice of measurement in scientific and industrial laboratories that many who have devoted their lives to measurement of the properties of animate and inanimate things will find a large fraction of the volume very foreign to them, if not entirely unintelligible. Nevertheless, it is a volume that one will expect to find in the library of a university or college where research is conducted at the postgraduate level.

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17[K, Z].—JAPANESE STANDARDS ASSOCIATION, *Random Number Generating Icosahedral Dice (20-face Dice)*, 6-1 Ginza-higashi, Chuo-ku, Tokyo. Price $2.50 per set of 3 dice + postage $.70 (up to 9 sets).

This device is a set of three icosahedral dice made of plastic material. The dice are different colors, red, yellow and blue, so that ordered triplets of digits may be generated. Each decimal digit appears on two faces of each die.

The dice were presumably intended to measure 15 millimeters between parallel faces. However, the casting was not particularly good and the measurements listed below were recorded between the ten pairs of faces on the new dice tested. This review was unaccountably lost for several months, and in the intervening period there has been considerable flow of the plastic material so that the measurements are currently considerably worse and actually meaningless, for the faces are clearly no longer plane.

Red	Yellow	Blue
14.74	14.90	15.09
14.97	14.96	14.71
14.82	14.95	14.93
14.88	14.97	14.93
14.94	15.05	14.93
14.76	14.95	14.83
14.85	15.07	15.09
14.96	14.97	14.74
14.83	14.93	14.87
14.79	14.90	15.03

When the dice were new they were tested by 800 rolls each on a level felt surface conforming to the specification of ordinary dice tables. Standard tests [1, 2] applied