equation (14) and unroll the cone which projects this curve from the origin, on the xz-plane, the curve into which (c) goes will satisfy (10) and hence will rotate into a surface of constant positive curvature.   Hence *the curves of 4-space which rotate by (7) into surfaces of constant positive curvature are obtained by tracing on the xz-plane curves (c) which rotate by (7) into surfaces of constant positive curvature, and then rolling the xz-plane into a cone with vertex at the origin.   The curves into which the curves (c) go are those sought.*   Of course to obtain curves which cut the path curves orthogonally the above cones must be such that each of their tangent planes cuts a pair of completely perpendicular planes in lines.   Curves which generate surfaces of constant negative curvature are obtained in a similar manner.

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SHORTER NOTICES.

The Mystery of Space.   A study of the hyperspace movement in the light of the evolution of new psychic faculties, and an inquiry into the genesis and essential nature of space. By ROBERT T. BROWNE.   New York, E. P. Dutton and Company, 1919.   8vo.   395 pp. $4.00.

THIS book is a mixture of cosmogony, psychology, and geometry; heralded in a recent flyer as "an epoch-making work."

With the cosmogony and psychology we can have little to do.   Anyone obviously has a perfect right to philosophize about the universe and the true nature of space as much as he pleases and to dress his philosophy in Greek nomenclature to give it a scientific aspect if he chooses.   But the reader may be pardoned if he is tempted to compare the periodic wanderings of Mr. Browne's "monopyknon," from chaos through seven stages of "pyknosis" before emerging into physical being, and thence through sentient, mental, and spiritual stages back to chaos again, with Goethe's story of the Homunculus; and to assert that the one is as mediaeval in character as the other was intended to be.   Nor can one deny to the author the right to hold and to defend, if he can, the theory that humanity will one day develop to the point where,

through the agency of the pineal gland and the pituitary
body, intuition will supersede intellect and mathematics will
cease to be useful or, if needed, will be known intuitively to
the infants of that millennium. If a common mortal finds
difficulty in following the arguments in support of this theory,
it is probably because he has regarded his pineal gland and
pituitary body, if conscious of them at all, as rudimentary
rather than embryonic, and so has failed to cultivate their
latent powers, as Mr. Browne would have us believe clair-
voyants, and their like, do.

But with geometry the case is somewhat different. The
author's profound apology to mathematicians for his temerity
in entering this field indicates that he was conscious of his lack
of training for the work he essayed to do.   That he attempted
to prepare for it by reading about non-euclidean geometry
and hyperspace, is shown by a more or less detailed repro-
duction of the history of non-euclidean geometry from the
earliest attempts to prove Euclid's parallel postulate to the
present time; by numerous quotations from various writers
on non-euclidean geometry and hyperspace; and by an appen-
dix containing a bibliography of over one hundred articles
and books.   That he failed to digest this material is shown by
the persistent confusion of non-euclidean geometry with
hyperspace, and by his supposition that these subjects were
invented by mathematicians for the purpose of explaining the
real nature of space.   Of course he must refute these spurious
explanations in order to introduce his own idea of space.
Naturally he can offer no proof that real space is not non-
euclidean in character or that it has exactly three dimensions,
for he scorns basic axioms and takes mathematicians to task
for deifying the definition.   One wonders why he did not
seize upon hyperbolic geometry as a coup de maître in support
of his theory that real space is finite, limited, and surrounded
by chaos, or "spacelessness."   The best he can do, however, is
to assert the absurdity of all geometrical conceptions, other
than the classical euclidean, styling them "superfœtated
hypotheses" or "mathetic divertisements."   It is apparently
an easy and interesting game for Mr. Browne to tilt rhetorical
lances at non-euclidean geometry and the fourth dimension
and he indulges frequently in this sport throughout the book.
But this is a dangerous game for one who apologizes upon
entering it and exhibits throughout a lack of knowledge of

the objects at which he aims his lances, and our author must
not expect to fare better at it than did his prototype who
mistook the windmills for something other than they were.

L. WAYLAND DOWLING.

Junior High School Mathematics, Books 1 and 2. By E. H.
TAYLOR and FISKE ALLEN. New York, Henry Holt and
Company, 1919.

To one who has followed the trend of mathematical educa-
tion during the last ten or fifteen years, it is apparent that
the voluminous discussion on coordination of elementary
mathematics is beginning to bear fruit. Recent elementary
texts like the one under discussion show very clearly that
teachers and authors now have a definite aim in view. The
two most notable features of these modern texts are, first, the
early introduction of geometric ideas and constructions without
formal demonstrations, and second, the socializing of ele-
mentary mathematics by interesting the pupil in everyday
activities which require computations and geometric construc-
tions.

The text under review is a modern coordinated treatment of
arithmetic, algebra and geometry for use in the seventh and
eighth grades. Book 1 contains first a review of the funda-
mental operations of arithmetic with numerous problems in
keeping accounts and simple business transactions. This is
followed by a study of the formula as an introduction to
literal arithmetic and algebra; percentage and its simpler
practical applications; measurement of lines and angles;
triangles and other constructions with ruler and compasses;
parallel lines, quadrilaterals and polygons; and the mensur-
ation of areas. The arrangement of subject matter is excellent,
and the problem material covers a very extensive range of
useful applications.

Book 2 continues the three lines of work begun in the first
volume, viz., arithmetic, algebra and geometry. Algebra is
approached through the formula and the use of letters to
shorten statements in words; the square root of numbers is
found arithmetically and also graphically by using the Pytha-
gorean theorem; ratio and proportion are also treated both
arithmetically and geometrically; this is followed by the
mensuration of simple solids with numerous concrete prob-
lems; explanation of the negative; problems involving simple