

Multicultural Mathematics Bibliography

Prepared by Karl Schaffer for De Anza College students, also made available on the web.
First draft April, 2001, revised summer 2007, emphasis on recently published work.
Catalogue numbers in brackets are for those held by the De Anza College Library.

Ethnomathematics, Multiculturalism, and Equity

Changing Faces of Mathematics, Perspectives on Gender, ed. by Judith E. Jacobs, Joanne Rossi-Becker, and Gloria F. Gilmer, 2001, publ. by NCTM (National Council of Teachers of Mathematics).

Changing Faces of Mathematics, Perspectives on Multiculturalism and Gender Equity, ed. by Walter G. Secada, 2000, publ. by NCTM.

Changing Faces of Mathematics, Perspectives on African Americans, ed. by Marilyn E. Strutchens, Martin L. Johnson, William F. Tate, 2000, publ. by NCTM.

Changing Faces of Mathematics, Perspectives on Latinos, ed. by Luis Ortiz-Franco, Norma G. Hernandez, Yolanda De La Cruz, 2000, publ. by NCTM.

Changing Faces of Mathematics, Perspectives on Asian Americans and Pacific Islanders, 2000, publ. by NCTM.

Each of these is a full length volume composed of articles on math education issues relating to each group or to multiculturalism and gender in general. One of the editors of the volume on gender, Joanne Rossi-Becker, is at SJ State.

Radical Equations, Math Literacy and Civil Rights, by Robert P. Moses and Charles E. Cobb, Jr., 2001, publ. by Beacon Press. Robert Moses traces his journey from the civil rights struggles of the 60's to the struggle for math literacy today. Moses spoke at De Anza in 2000 as part of the Distinguished Speakers Series. [E184 .A1 M7 2001]

The Multicultural Math Classroom, by Claudia Zaslavsky, 1996. Ideas on how to introduce multicultural perspectives in elementary and middle school, with analyses of the issues. (Relevant to our Math 100,101, and 105 classes.) Publ. by Heinemann. [QA135.5 .Z367 1996]

Equity in Mathematics Education, Influences of Feminism and Culture, ed. by Pat Rogers and Gabriele Kaiser, 1995, publ. by The Falmer Press.

Algebra Activities from Many Cultures, by Beatrice Lumpkin, 1997. Enrichment activities from a variety of cultures. Publ. by J. Weston Walch, 321 Valley St., P.O. Box 658, Portland, Maine 04104.

Multicultural and Gender Equity in the Math Classroom: the Gift of Diversity, the 1997 yearbook of the National Council of Teachers of Mathematics. Addresses all sorts of historical and pedagogical issues in gender and multiculturalism. The NCTM is having their national conference in Las Vegas in April of 2002, and they will have a "miniconference" on ethnomathematics and related issues as part of that event. Publ. by NCTM.

Ethnomathematics, the Art or Technique of Explaining and Knowing, by Ubiratan D'Ambrosio, 1998, publ. by the International Study Group on Ethnomathematics, \$10 to ISGEM, sent to Rick Scott, International Study Group on Ethnomathematics, Box 30001 MSC 3CUR, Las Cruces, NM 88003.

Ethnomathematics: Challenging Eurocentrism in Mathematics Education, by Arthur Powell and Marilyn Frankenstein, 1997. Discusses practical mathematical knowledge in contrast to the more abstract theoretical mathematics typically valued in the mathematical community. Frankenstein spoke at De Anza in April of 1999 as part of the Distinguished Speakers Series. Publ. by State Univ. of New York Press. [GN476.15 .E85 1997]

Ethnomathematics: A Multicultural View of Mathematical Ideas, by Marcia Ascher, 1991. Explores mathematical ideas involving space, logic, number, probability, networks, and more, found in the cultures of many peoples. Publ. by Brooks/Cole. [GN476.15 .A83 1998]

The Crest of the Peacock: Non-European Roots of Mathematics, by George Gheverghese Joseph, 1991, revised in 2000. Shows that advanced mathematics has been done by human beings everywhere. Very detailed descriptions of mathematics from non-European cultures. Publ. by Penguin Books. [QA22 .J67 2000]

Multicultural Mathematics, Teaching Mathematics from a Global Perspective, by David Nelson, George Gheverghese Joseph, and Julian Williams, 1993. Examples of mathematics from around the world. Publ. by Oxford Univ. Press. [QA11 .N43 1993]

Cross Cultural Studies in Cognition and Mathematics, by DF Lance, 1983, Academic Press.

The Racial Economy of Science, Toward a Democratic Future, ed. by Sandra Harding, 1993, Indiana Univ. Press. Bloomington and Indianapolis. Articles on science, racism, and associated issues. [Q175.55 .R3 1993]

Cognition in Practice: Mind, Mathematics, and Culture in Everyday Life, by J Lave, 1988, Cambridge Univ. Press.

The Anthropology of Space, by R. Pinxten et al, 1983, Univ. of Pennsylvania Press.

Mathematical Enculturation, by AJ Bishop, 1988, Dordrecht: Reidel.

Curriculum Development For A Multicultural Society, by Feu, 1985, pub. by Feu, London.

New Directions for Equity in Mathematics Education, ed. by Walter G. Secada, Elizabeth Fennema, and Lisa Byrd Adajian, 1995, Cambridge Univ. Press. A compilation of articles on this subject. [QA13 .N49 1995]

Multicultural Math, Hands-On Activities from Around the World, by Claudia Zaslavsky, 1994, publ. by Scholastic Professional Books.

Handbook of Regular Patterns, An Introduction to Symmetry in Two Dimensions, by Peter S. Stevens, 1981, The MIT Press. Cambridge, Mass., and London, England. A handbook of symmetrical designs found in textiles, mosaics, pottery, and natural forms, from around the world, and how to classify them by analyzing their symmetries. [NC745 .S73 1981]

Mathematics in Archaeology, by Clive Orton, 1980. Collins, London. How archaeology uses mathematics to answer questions about age, identity, and function.

The Power of Limits, Proportional Harmonies in Nature, Art, and Architecture, by Gyorgy Doczi, 1981, 1994. Shambala, Boston and London. An investigation of patterns in nature and culture.

Mathematics across cultures : the history of non-western mathematics, by Helaine Selin, 2000, Kluwer Academic. [QA21 .M3612 2000]

Specific Cultures

Native American Mathematics, ed. by Michael P. Closs, 1986, University of Texas Press, Austin. Mathematical development indigenous to the Americas, including essays on the Ojibway, Inuti, Chumash, Aztec, Maya, Inca, and Jibaro. [E59 .M34 N37 1986]

We, the Navigators, The Ancient Art of Landfinding in the Pacific, by David Lewis, 1972, 1994, 2nd edition. Univ. of Hawaii Press, Honolulu. How the Micronesians and Polynesians navigated without instruments.

Space-Time of the Bororo of Brazil, by Stephen Michael Fabian, 1992, University Press of Florida. "... how the Bororo Indians of Brazil integrate the social, natural, and cosmic dimensions of time and space into their environment."

The Sea Island Mathematical Manual: Surveying and Mathematics in Ancient China, by Frank J. Swetz, 1992, The Pennsylvania State Univ. Press. [TA527 .C6 S94 1992]

Africa Counts, Number and Pattern in African Culture, by Claudia Zaslavsky, 1973, publ. by Prindle, Weber, and Schmidt. One of the first and best books on African mathematics that has been republished recently.

Mathematics of the Incas, Code of the Quipu, by Marcia Ascher and Robert Ascher, 1981, Publ. by Dover Publications. All about the quipu, the code used to store information on population and other data, based on string designs. [F3429.3 .Q6 A82 1997]

Challenges in the Mathematics Education of African American Children, Proceedings of the Benjamin Banneker Association Leadership Conference, ed. by Carol Malloy and Laura Brader-Araje, 1998, publ. by NCTM.

African Fractals, Modern Computing and Indigenous Design, by Ron Eglash, 1999, publ. by Rutgers Univ. Press. A thorough analysis of the occurrence of fractal designs in African cultures. "...In Europe and America we often see cities laid out in a grid pattern of straight streets and right-angle corners. In contrast, traditional African settlements tend to use fractal structures – circles of circles of circular dwellings, rectangular walls, enclosing ever-smaller rectangles, and streets in which broad avenues branch down to tiny footpaths with striking geometric repetition...." [GN650 .E35 1999]

Women, Art and Geometry In Southern Africa, by Paulus Gerdes. Africa World Press, 1998, ppb, 244 pages. \$21.95 ISBN 0-86543-601-0 (hardcover) 0-86543-602-9 (ppb), from Africa World Press, P.O. Box 1892, Trenton NJ 08607. [TT119 .S64 G47 1998]

Geometry from Africa, Mathematical and Educational Explorations, by Paulus Gerdes, 224 pp, ppb. list price 39.95, publ. by MAA. Mathematical ideas and constructions in African cultures. Paulus Gerdes has published much in languages other than English, and his writings are starting to be translated. [QA461 .G52 1999]

Mathematics in the Time of the Pharaohs, by Richard J. Gillings, 1972. Dover Publications, Inc., New York. "The first book-length study of ancient Egyptian mathematics." [QA27 .E3 G52 1982]

The Muslim Contribution to Mathematics, by A. AL-Daffa', 1977, Humanities Press.

History of Hindu Mathematics, by B. Datta and A.N. Singh, 1962, Asia Publishing House. [Q124.97 .E57 2003 eb]

Chinese Mathematics in the Thirteenth Century, by U. Leggrecht, 1973, MIT Press.

The Development of Mathematics in China and Japan, by Y. Mikami, 1961, Chelsea. [QA27 .C5 M5 1961]

Science and Civilization in China, by J. Needham and L. Wang, 1959, Cambridge Univ. Press. (Our library may have this one). The opus on science and technology in China. [DS721 .N39 v.2]

A History of Japanese Mathematics, by D.E. Smith, and Y. Mikami, 1914, pub. by Open Court.

The History of Ancient Indian Mathematics, by C. N. Srinivasiengar, 1967, The World Press Private.

Was Pythagoras Chinese?: An examination of right triangle theory in ancient China, by F. Swetz and T.I. Kao, 1977, The Pennsylvania Univ. Press. Traces early Chinese knowledge of the theorem known now as that of Pythagoras. [QA27 .C5 S95]

The Abacus, a Pocket Computer, by Jesse Dilson, 1968. St. Martin's Press, New York. How to use the abacus. [QA75 .D5]

The Japanese Abacus, Its Use and Theory, by Takashi Kojima, 1954. A text on the abacus.

Chinese Brain Twisters and More Chinese Brain Twisters, by Baifand, ___ and 1999. John Wiley and Sons, Inc., New York. Traditional Chinese mathematical puzzles.

Chinese mathematics: a concise history, Yan Li, Clarendon Press, 1987. [QA27 .C5 L4713 1987]

Legacy of the Luoshu: The 4,000 Year Search for the Meaning of the Magic Square of Order Three, by Frank J. Swetz, 2002, Open Court. A new and entertaining history of the magic square. [QA165 .S84 2002]

Women and Mathematics

Hypatia's Heritage: a history of women in science from antiquity through the nineteenth century, by M. Alic, 1986, Beacon Press. Hypatia was the most well-known woman mathematician of antiquity, who lived and taught in Alexandria, and whose murder by a mob coincides with the decline of Alexandria as the center of learning during the "Greek period." [Q130 .A48 1986b]

Women in Mathematics, Scaling the Heights, 1997. Ed. By Deborah Nolan. Course materials from the Mills College Summer Math Institutes designed to increase the numbers of women math graduate students. Publ. by the Mathematical Assoc. of America. Contains scholarly articles on mathematics.

Women in Mathematics, by Lynn M. Osen, 1974. The MIT Press, Cambridge, Mass., and London. Eight biographies of women mathematicians [throughout history. [QA28 .O83 1974]

Women and the Mathematical Mystique, ed. by Lynn H. Fox, Linda Brody, and Dianne Tobin, 1980. The Johns Hopkins Univ. Press, Baltimore and London. Reviews the questions of sex difference in mathematical abilities.

She Does Math, Real-Life Problems from Women on the Job, ed. By Marla Parker, 1995. Careers of 38 women who use mathematics professionally, and math problems they have written to show how they use mathematics on the job. Publ. by the Mathematical Association of America. [QA27.5 .S53 1995]

Women Becoming Mathematicians, Creating a Professional Identity in Post -World War II America, by Margaret A.M. Murray, 2000. The MIT Press, Cambridge, Mass., and London. A study of 36 of the American women who earned Ph.D. s from 1940 to 1959. [QA27.5 .M88 2000]

How to Encourage Girls in Math and Science, by Joan Skolnick, Carol Langbort, and Lucille Day, 1982, publ. by Dale Seymour Publications. A discussion of the issues, followed by classroom activities.

Pythagoras' Trousers: God, Physics and the Gender Wars, by Margaret Wertheim, 1995. Traces male-domination in physics, and has interesting biographical information on women physicists. Publ. by Times Books (Random House). [QC19.6 .W47 1997]

Common Threads: Women, Mathematics and Work, by Mary Harris, 1997. Looks at occupations such as needlework, which involve significant geometry, and yet which often go uncredited as mathematics, at least partly because it is traditionally done by women. Publ. by Trentham Books. [QA27.5 .H375 1997]

Little Sparrow: A Portrait of Sophia Kowalesky, by Don. H. Kennedy, 1983, Ohio Univ. Press. Kowalesky was an important – and fascinating - figure in late 19th century mathematics and physics.

The Gender and Science Reader, ed. by Muriel Lederman and Ingrid Bartsch, 2001. Routledge, London and New York. Feminist analyses of science. [Q130 .G43 2001]

Celebrating Women in Mathematics and Science, ed. by Miriam P. Cooney, 1996, publ. by NCTM. Biographies of 22 women scientists and mathematicians.

Women in Mathematics, the Addition of Difference, by Claudia Henrion, 1997, publ. by Indiana Univ. Press. Contains many biographies of contemporary women mathematicians, as well as analyses of the problems of women in this field. [QA27.5 .H46 1997]

Gender Equity, Sources and Resources for Education Students, by Jo Sanders, Janice Koch, Josephine Urso, 1997, publ. by Lawrence Erlbaum Associates. Contains source materials on the issue of gender equity. [LC213.2 .S251 1997]

Gender Equity Right From the Start, Instructional Activities for Teacher Educators in Mathematics, Science, and Technology, by Jo Sanders, Janice Koch, Josephine Urso, 1997, publ. by Lawrence Erlbaum Associates. A companion volume to the one above, this one contains classroom materials and activities. [LC213.2 .S25 1997 v.1]

Notable Women in Mathematics, A Biographical Dictionary, ed. by Charlene Morrow and Teri Perl, 1998, Greenwood Press, 88 Post Road West, Westport, Connecticut 06881. 59 biographies of women in mathematics. [QA28 .N68 1998]

Girls into Mathematics, by C. Adams and H. Neill, 1985, Centre for Mathematics and Education, Ilea. [QA28 .N68 1998]

Change is possible: stories of women and minorities in mathematics, by Patricia C. Kenschaft, American Mathematical Society, 2005. "This work tells of the long slow struggle of women and minorities to achieve parity in the field of mathematics through the stories of representative women and minority mathematicians from the past couple of centuries."-AMS. [QA10.5 .K46 2005]

Women in mathematics: the addition of difference, by Claudia Henrion, Claudia, Indiana University Press, 1997. [QA27.5 .H46 1997]

Mathematics and gender, ed. By Elizabeth Fennema,. "Contributors report on various American and Australian research studies that have increased understanding of why females and males learn different kinds and amounts of mathematics". Book News, Inc., Portland, OR Teachers College, Columbia University, 1990. [QA27.5 .M38 1990]

History of Mathematics

Vita Mathematica, Historical Research and Integration with Teaching, ed. by Ronald Calinger, 1996, publ. by Math Assoc. of Amer. Recent compendium of articles integrating history and mathematics. [QA21 .V57 1996]

Using History to Teach Mathematics, an International Perspective, ed. by Victor Katz, 2000, pub. by MAA. Articles on teaching mathematics through history. [QA12 .U85 2000]

From One to Zero, A Universal History of Numbers, by Georges Ifrah, 1985, publ. Penguin Books. [QA141.2 .I3613 1985]

The Universal History of Numbers, From Prehistory to the Invention of the Computer, by Georges Ifrah, 2000. John Wiley & Sons, New York. A mammoth 600 page investigation of the story of mathematics. [QA141 .I3713 2000 v.1]

Archimedes, What Did He Do Besides Cry Eureka?., by Sherman Stein, 1999. MAA, Wash. D.C. The discoveries and mathematical methods of Archimedes.

The Story of Mathematics, by Richard Mankiewicz, 2000, Princeton Univ. Press. Princeton, NJ. A beautifully illustrated book on the origins of mathematical ideas, from counting to the contemporary subjects of fractals, game theory, and the infinite.

An Imaginary Tale, The Story of $\sqrt{-1}$, by Paul J. Nahin, 1998, publ. by Princeton Univ. Press. The history of the imaginary and complex numbers. [QA255 .N34 1998]

The Joy of Pi, by David Blatner, 1997, publ. by Walker and Company. A delightful romp through the history of pi.

A History of Pi, by Peter Beckmann, 1970. Golem, Boulder, Co. [pb FRAZ 3]

The Historical Roots of Elementary Mathematics, by Lucas N.H. Bunt, Phillip S. Jones, and Jack D. Bedient, 1976. Dover Publications, Inc., New York. A text on the history of mathematics, from ancient Egypt to the late 19th century. [QA21 .B95 1988]

Number, the History of Numbers and How They Shape Our Lives, by John McLeish, 1991, publ. by Fawcett Columbine.

Mathematics in Civilization, by H.L. Resnikoff and R. O. Wells, Jr., 1973, publ. by Dover Publications. [QA21 .R43 1984]

A Peek into Math of the Past, Mathematical and Historical Investigations for Middle School and Pre-Algebra Students, by Erica Dakin Voolich, 2001, by Dale Seymour Publications. Reproducible blackline masters for the classroom, along with background materials. [QA22 .V66 2001]

Historical Topics for the Mathematics Classroom, 1969, by the NCTM. An older compilation of articles on how to integrate history and mathematics. [QA21 .H559 1989]

The Rainbow of Mathematics, A History of the Mathematical Sciences, by Ivor Grattan-Guinness, 1997. W.W. Norton and Co., New York and London. The evolution of mathematics in all aspects, from the simple to the more complex. [QA21 .G695 1998]

The Mystery of Numbers, by Annemarie Schimmel, 1993, publ. by Oxford Univ. Press. The mystery and meaning of numbers. [BF1623 .P9 E55 1994]

A Concise History of Mathematics, by Dirk J. Struik, 4th revised ed., 1948, 1967, 1987. Dover Publications, Inc., New York. Covers history of mathematics with attention paid to non-European roots, by the inimitable activist who died recently at the age of 106. [QA21 .S87 1987]

The Anthropology of Numbers, by Thomas Crump, 1990, publ. by Cambridge Univ. Press. The historical and cultural dimensions of number systems, and how they relate to ethnohistory, politics, measurement, time, money, music, games, and architecture. [GR933 .C78 1992]

Number Words and Number Symbols, A Cultural History of Numbers, by Karl Menninger, 1969, MIT Press. [QA141.2 .M4513]

Great Moments in Mathematics Before 1650, by Howard Eves, 1983. MAA, Wash. D.C. Twenty historical episodes in mathematics.

The History of the Calculus and Its Conceptual Development, by Carl B. Boyer, 1949, Dover Publications, Inc., New York. The historical development of the calculus. [QA303 .B67 1959]

The History of Mathematics, An Introduction, by David M. Burton, 1983. Wm. C. Brown Publishers, Dubuque, Iowa.

Mathematical Thought From Ancient to Modern Times, Vol 1-3, by Morris Kline, 1972. Oxford Univ. Press, New York and Oxford. From the origins of mathematics to the developments of the twentieth century. [QA21 .K516 1990 v.2, QA21 .K516 1990 v.3]

Capitalism and Arithmetic: The New Math of the Fifteenth Century, by F.J. Swetz, 1987, Pub. by Open Court. [QA23 .S94 1987]

Mathematics From the Birth of Numbers, by Jan Gullberg, 1997. W. W. Norton and Co., New York and London. An encyclopedia of mathematical history as well as mathematics.

The Exact Sciences in Antiquity, by O. Neugebauer, 1962, Harper and Row. [QA22 .N36 1957]

A History of Mathematical Notations, by Florian Cajori, 1929, publ. by Dover Press. The classic study of mathematical notation, in two volumes and over 800 pages.

A History of Mathematics, by Carl B. Boyer, 1968, publ. by Princeton Univ. Press. From the beginnings of numeration to the twentieth century. [QA21 .B767 1991]

Leonard of Pisa and the New Mathematics of the Middle Ages, by Joseph and Frances Gies, 1969, publ. by New Classics Library. Known today as Fibonacci, he was best known in his time for bringing the Hindu-Arabic number system to Europe from Arab North Africa. [QA29 .F5 G5 1980]

Geometry Civilized, History, Culture, and Technique, by J. L. Heilbron, 1998. Clarendon Press, Oxford. Geometry and its problems, with a focus on plane geometry and trigonometry.

Unknown quantity: a real and imaginary history of algebra, by John Derbyshire. [QA151 .D47 2006]

The History of mathematics: a reader, by John Fauvel. Macmillan Press in association with the Open University, 1990, [QA21 .H57 1990]

Mathematics as a cultural system, by Raymond Louis Wilder, Pergamon Press, 1981. [QA21 .W368 1981]

A Contextual History of Mathematics to Euler, by Ronald Calinger, 1999, Prentice Hall. An interweaving of mathematical history with political and social history.

Alternative Teaching Strategies

Just a few of the many, many books published in this area recently.

Assesment Practices in Undergraduate Mathematics, ed. by Bonnie Gold et al, \$29.95, 350 pp, ppb., 1999. MAA. (MAA can be reached at 800-331-1622 or www.maa.org)

Writing in the Teaching and Learning of Mathematics, by John Meier and Thomas Rishel, ppb, 128 pp, 1998, \$18.95. MAA. [QA11 .M4817 1998]

Exemplary Programs in Introductory College Mathematics, ed. by Susan Lenker, 140 pp, ppb., 1998 \$28.95. MAA

For the Learning of Mathematics, a journal which publishes many articles on mathematics and culture and related subjects. MSTE group/Faculty of Education/ A 234 Mcarthur Hall/ Queen's University / Kingston, ON Canada K7L 3N6

Multicultural Mathematics Posters and Activities, by the Mathematics Office of the Seattle Public Schools, 1984, republished by the NCTM, tho it may be out of print,

Overcoming Math Anxiety, by Sheila Tobias, 1980, Houghton-Mifflin. [QA11 .T67 1995]

A Practical Guide to Cooperative Learning in Collegiate Mathematics, ed. by Barbara E. Reynolds, et al, 1995, publ. by Math. Assoc. of America. [QA11 .P633 1995]

Games and Recreations

Board and Table Games from Many Civilizations, by R.C. Bell, 1979, Dover Publications.

Mathematical Games and Activities from Around the World, by Claudia Zaslavsky, 1998. Games, puzzles, and projects from around the world. Publ. by Chicago Review Press. [QA95 .Z37 1998]

The Multicultural Game Book, by Louise Orlando, 1993, publ. by Scholastic Professional Books.

Number From Ahmes to Cantor, by Midrat Gazale, Princeton Univ. Press, Princeton, NJ. Mathematical recreations derived from historical sources.

Bulletin of the International String Figure Association (annual), and *String Figure Magazine* (quarterly), published by the ISFA, see www.isfa.org. String figures are found worldwide, are closely tied to culture, employ complex geometric reasoning, yet have resisted mathematical analysis.

Calendars

Mapping Time, The calendar and its History, by E. G. Richards, 1998, Oxford Univ. Press. History of many calendars, plus mathematical procedures for doing calendar calculations. [CE11 .R5 1999]

Empires of Time, Calendars, Clocks, and Cultures, by Anthony Aveni, 1989, Basic Books. Historical and cultural background of various calendars, with chapters on Mayan, Aztec, Inca, and Chinese calendars.

Echoes of the Ancient Skies, the Astronomy of Lost Civilizations, by E.C. Krupp. 1983, Oxford Univ. Press. "Archaeoastronomy – the study of ancient peioples' observation of the skies and its role in their cultural evolution." [QB16 .K78 1983]

Time's Pendulum, From Sundials to Atomic Clocks, the Fascinating History of Timekeeping and How Our Discoveries Changed the World, by Jo Ellen Barnett, 1998, Harcourt Brace & Co. Timekeeping, with an

emphasis on clocks and timekeeping devices.

Sundials, History, Theory, and Practice, by Rene R. J. Rohr, 1965, publ. by Dover Press. The history of the sundial, and practical methods for building one.

Sundials, Their Theory and Construction, by Albert Waugh, 1973, Dover Publications, New York.
How to build and understand a sundial.