

Using Trigonometric Identities **18.57**

The following are collections of identities that are true for all values of the variables in the identities. Functions are defined.

Trigonometric Identities

$$\sin(-\theta) = -\sin \theta$$

$$\cos(-\theta) = \cos \theta$$

$$\tan(-\theta) = -\tan \theta$$

$$\csc(-\theta) = -\csc \theta$$

$$\sec(-\theta) = \sec \theta$$

$$\cot(-\theta) = -\cot \theta$$

Quotient Identities

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

Pythagorean Identities **These are known to be properties of Pythagoras and identity to follow:** **Remember these identities:**

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$\tan^2 \theta + 1 = \sec^2 \theta$$

$$\cot^2 \theta + 1 = \csc^2 \theta$$

These identities are used in evaluating trigonometric functions, simplifying trigonometric expressions, and solving trigonometric equations.

Evaluating Trigonometric Functions

Ex. Find all six trigonometric angle function values of θ if θ is $\frac{\pi}{6}$ that are $\sin \theta$ and $\cos \theta$.

Sol. Assume that Pythagorean identity to solve for $\sin \theta$:

$$\sin^2 \theta + \cos^2 \theta = 1 \Rightarrow \sin^2 \left(\frac{\pi}{6} \right) + \left(\frac{1}{2} \right)^2 = 1$$

$$\sin^2 \left(\frac{\pi}{6} \right) = 1 - \left(\frac{1}{2} \right)^2 = \frac{3}{4}$$

$$\sin \left(\frac{\pi}{6} \right) = \pm \sqrt{\frac{3}{4}} = \pm \frac{\sqrt{3}}{2} \quad \text{Since } \sin \theta > 0, \quad \sin \left(\frac{\pi}{6} \right) = \frac{\sqrt{3}}{2}$$

Ex. There are two answers to this equation. Explain how you determined the negative solution. For which angle between 0 and 2π is $\sin \theta = -\frac{1}{2}$?

Sol. Assume identity to find $\sin \theta$:

$$\sin^2 \theta = \left(-\frac{1}{2} \right)^2 = \frac{1}{4} \Rightarrow \sin \theta = \pm \frac{1}{2}$$

Precalculus Hs Mathematics Unit 05

JA Banks



Precalculus Hs Mathematics Unit 05:

Teaching and Learning High School Mathematics Charlene E. Beckmann, Denisse R. Thompson, Rheta N. Rubenstein, 2009-11-02 Too many high school students faced with mathematics in courses at the level of algebra and beyond find themselves struggling with abstract concepts and unwilling to pursue further study of mathematics When students curtail their course taking in mathematics they may be impacting their college and career options Thus high school mathematics teachers have the responsibility to help students recognize the value and importance of mathematics while also designing instruction that makes mathematics accessible to all students Ball and Bass 2000 as well as other mathematics educators have recognized that mathematics teachers not only need to know mathematics content and mathematics pedagogy i e teaching strategies but they also need to know how these ideas are integrated This mathematical knowledge for teaching is the knowledge that teachers of mathematics need and it differs from the knowledge that research or applied mathematicians must know This text is designed to provide teachers with insights into this mathematical knowledge for teaching Teaching and Learning High School Mathematics is likely different from many other texts that you have used It integrates both content and pedagogy to help you develop and build your own understanding of teaching The text is designed to help you develop deep conceptual understanding of fundamental mathematics Ma 1999 so that you are able to approach mathematics from multiple perspectives with many tools Such flexibility in teaching is essential if teachers are to help all students become mathematically proficient Throughout this book you are encouraged to work in cooperative teams This strategy is designed to help you develop a mathematics learning community and build a professional network that will be a valuable resource during your professional career Hopefully you will experience the benefits of engaging in rich mathematical discussions with peers and consider how to encourage such learning environments in your own classrooms Lesson planning is another element pervasive throughout this text To help teachers plan for effective student centered lessons the Question Response Support QRS Guide is introduced in Lesson 1 1 and used throughout the remainder of the lessons The QRS Guide is a tool on which teachers may record tasks or questions Q for students expected and observed student responses R and teacher support S in the form of additional just enough questions to support students in their progress on the task In each unit teachers expand their repertoire of teaching and learning elements and strategies and incorporate these elements as they plan additional lesson segments In Unit 4 lesson planning is formally introduced as teachers put together elements from previous units into complete cohesive lesson plans **Workshop Precalculus** Nancy Baxter-Hastings, 2002-02-22 The Workshop Precalculus text is part of the successful Workshop Mathematics Project based at Dickinson College Pennsylvania It combines interactive teaching and collaborative learning such that students become active participants in the learning process In this new text this proven pedagogy is used to cover topics in precalculus linear and quadratic functions and trig functions for example *Precalculus: A Functional Approach to Graphing and Problem Solving*

Karl Smith, 2013 *Precalculus A Functional Approach to Graphing and Problem Solving* prepares students for the concepts and applications they will encounter in future calculus courses. In far too many texts, process is stressed over insight and understanding and students move on to calculus ill equipped to think conceptually about its essential ideas. This text provides sound development of the important mathematical underpinnings of calculus, stimulating problems and exercises, and a well developed, engaging pedagogy. Students will leave with a clear understanding of what lies ahead in their future calculus courses. Instructors will find that Smith's straightforward, student friendly presentation provides exactly what they have been looking for in a text. **Precalculus** Gregory Butts, 2020 *The University of Michigan-Dearborn*

University of Michigan--Dearborn, 1973 *University of Michigan Official Publication* University of Michigan, 1973 Each number is the catalogue of a specific school or college of the University **Mathematics for High School Teachers**

Zalman Usiskin, 2003 For algebra or geometry courses for teachers, courses in topics of mathematics, capstone courses for teachers or other students of mathematics, graduate courses for practicing teachers or students who want a better understanding of mathematics. Filling a wide gap in the market, this text provides current and prospective high school teachers with an advanced treatment of mathematics that will help them understand the connections between the mathematics they will be teaching and the mathematics learned in college. It presents in depth coverage of the most important concepts in high school mathematics: real numbers, functions, congruence, similarity, and more. **Announcement**

University of Michigan--Dearborn, 1975 Pedagogy and Content in Middle and High School Mathematics G. Donald Allen, Amanda Ross, 2017-11-10 The book provides an accumulation of articles included in *Focus on Mathematics Pedagogy and Content*, a newsletter for teachers published by Texas A M University. Each article presents a discussion of a middle or high school mathematics topic. Many of the articles are written by professors at Texas A M University. The book is broken into three parts with the first part focusing on content and pedagogy related to the NCTM content strands of Number, Algebra, Geometry, Measurement, and Statistics, and Probability. Articles include an in depth presentation of mathematical content as well as suggested instructional strategies. Thus, the integration of content knowledge and pedagogical knowledge is emphasized. The second and third parts apply to assessments, mathematical games, teaching tips, and technological applications. While other pedagogical reference books may provide an in depth look at how to teach a topic, this book includes articles that also explain a topic in great length. Thus, teachers may develop content knowledge first and then re-read each article in order to learn appropriate instructional strategies to use. Many articles include technological applications which are interspersed throughout the book. In addition, a special section which includes helpful information, available tools, training sessions, and other references for using technology in mathematics is also presented. Resources in Education, 2001-10

Digest of Education Statistics 2012 Thomas D. Snyder, Sally A. Dillow, 2014-04 *Digest of Education Statistics 2012* is the 48th in a series of publications initiated in 1962. Its primary purpose is to provide a compilation of statistical information.

covering the broad field of American education from pre kindergarten through graduate school drawn from government and private sources but especially from surveys and other activities led by NCES National Center for Education Statistics part of the Institute for Education Sciences IES The digest contains data on the number of schools students and teachers as well as statistics on educational attainment finances libraries technology and international comparisons Details on population trends education attitudes labor force characteristics and federal aid supplies helpful background for evaluating the education data This statistical reference could be helpful to parents choosing schools for their children as well as for teachers librarians and public administrators as it tracks enrollment population trends and key areas of studies with student progress It also tracks the post secondary college level detailing undergraduate tuition and room board ESTIMATE costs at private nonprofit institutions private for profit institutions and public institutions It also tallies the number of postsecondary degrees and provides some gender demographics in this area The Digest contains seven chapters All Levels of Education Elementary and Secondary Education Postsecondary Education Federal Programs for Education and Related Activities Outcomes of Education International Comparisons of Education and Libraries and Adult Education Preceding these chapters is an Introduction that provides a brief overview of current trends in American education which supplements the tabular materials in chapters 1 through 7 The Digest concludes with three appendixes The first appendix Guide to Sources provides a brief synopsis of the surveys used to generate the Digest tables the second Definitions is included to help readers understand terms used in the Digest and the third Index of Table Numbers allows readers to quickly locate tables on specific topics In addition to updating many of the statistics that have appeared in previous years this edition contains new material including Percentage distribution of 6 to 18 year olds by parent s highest level of educational attainment household type either two parent or single parent and child s race ethnicity table 12 Enrollment and percentage distribution of enrollment in public elementary and secondary schools by race ethnicity and region table 44 Number and percentage of public school students participating in programs for English language learners by state table 47 Children 3 to 21 years old served under Individuals with Disabilities Education Act Part B by age group and race ethnicity table 49 Percentage of 3 4 and 5 year old children enrolled in preprimary programs by attendance status level of program and selected child and family characteristics table 57 Number and enrollment of public elementary and secondary schools that have closed by school level and type table 109 Number and percentage distribution of public school students eligible for free or reduced price lunch by school level locale and student race ethnicity table 112 Public elementary and secondary charter schools and enrollment by state table 117 First time kindergartners reading mathematics science cognitive flexibility and approaches to learning scale scores in fall and spring of the kindergarten year by selected child family and school characteristics table 135 Number and percentage distribution of kindergartners by kindergarten entry status i e early entrant on time entrant delayed entrant or kindergarten repeater and selected child family and school characteristics table 136 Kindergartners reading mathematics science

cognitive flexibility and approaches to learning scale scores in fall and spring of the kindergarten year by kindergarten entry status table 137 Percentage of 9th grade students participating in various school sponsored and non school sponsored activities by sex and race ethnicity table 183 Percentage of 4th 8th and 12th graders absent from school in the last month by selected student and school characteristics and number of days absent table 187 Total and current expenditures per pupil in fall enrollment in public elementary and secondary schools by function and subfunction table 214 Total fall enrollment in all postsecondary institutions participating in Title IV programs by degree granting status and control of institution table 222 Percentage of recent high school completers enrolled in 2 year and 4 year colleges by income level table 236 Number of postsecondary students who entered the student loan repayment phase number of students who defaulted and 2 year student loan cohort default rates by level and control of institution table 400 Number and percentage of persons 16 to 24 years old who were neither enrolled in school nor working by educational attainment age group family poverty status and race ethnicity table 429 Employment to population ratios of all persons males and females 16 to 64 years old by age group and educational attainment tables 431 432 and 433 Unemployment rates of all persons males and females 16 to 64 years old by age group and educational attainment tables 434 435 and 436 Percentage of high school students age 16 over who were employed by age group sex race ethnicity family income nativity and hours worked per week table 441 and Average reading literacy scale scores of fourth graders and percentage whose schools emphasize reading skills and strategies at or before second grade or at third grade by sex and country or other education system table 462 **Who Gets In?** Rebecca

Zwick, 2017-05-15 On the disputed topic of U S college admissions everyone agrees that this high stakes competition is unfair But few agree on what a fair process would be Stressing transparency in evaluating applicants Rebecca Zwick assesses the goals and criteria of different admissions policies and shows how they can fail to produce the desired results *It Pays to be an Engineer*, 1993

Resources for Teaching Discrete Mathematics Brian Hopkins, 2009 Hopkins collects the work of 35 instructors who share their innovations and insights about teaching discrete mathematics at the high school and college level The book s 9 classroom tested projects including building a geodesic dome come with student handouts solutions and notes for the instructor The 11 history modules presented draw on original sources such as Pascal s Treatise on the Arithmetical Triangle allowing students to explore topics in their original contexts Three articles address extensions of standard discrete mathematics content Two other articles explore pedagogy specifically related to discrete mathematics courses adapting a group discovery method to larger classes and using logic in encouraging students to construct proofs

Directory of Distance Learning Opportunities Modoc Press, Inc., 2003-02-28 This book provides an overview of current K 12 courses and programs offered in the United States as correspondence study or via such electronic delivery systems as satellite cable or the Internet The Directory includes over 6 000 courses offered by 154 institutions or distance learning consortium members Following an introduction that describes existing practices and delivery methods the Directory

offers three indexes Subject Index of Courses Offered by Level Course Level Index Geographic Index All information was supplied by the institutions Entries include current contact information a description of the institution and the courses offered grade level and admission information tuition and fee information enrollment periods delivery information equipment requirements credit and grading information library services and accreditation Colorado Chapter 1 Beacon ,1994

Mathematics Assessment and Evaluation Thomas A. Romberg,1992-07-01 This books contains papers written on issues related to externally mandated mathematics tests and their influence on school mathematics Chapter 1 presents an overview of the book including brief abstracts of each chapter Chapter 2 presents a summary of the overall problems associated with the need for valid information Remaining chapters include 3 Implications of the National Council of Teachers of Mathematics NCTM Standards for Mathematics Assessment Norman Webb 4 Curriculum and Test Alignment Thomas A Romberg and others 5 State Assessment Test Development Procedures James Braswell 6 Test Development Profile of a State Mandated Large Scale Assessment Instrument in Mathematics Tej Pandey 7 Assessing Students Learning in Courses Using Graphics Tools A Preliminary Research Agenda Sharon L Senk 8 Mathematics Testing with Calculators Ransoming the Hostages John G Harvey 9 Gender Differences in Test Taking A Review Margaret R Meyer 10 Communication and the Learning of Mathematics David Clarke and others 11 Measuring Levels of Mathematical Understanding Mark Wilson 12 A Framework for the California Assessment Program to Report Students Achievement in Mathematics E Anne Zarinnia 13 Evaluation Some Other Perspectives Phillip C Clarkson A reference list organized by chapter contains 300 citations Appendices include the NCTM Evaluation Standards a classification matrix illustrative questions history and rationale for student mathematics journals SMP Project student log sample pages and the report of Vermont s Mathematics Portfolio Assessment Program MKR ENC Focus ,2001 *On Evaluating Curricular Effectiveness* National Research Council,Division of Behavioral and Social Sciences and Education,Center for Education,Mathematical Sciences Education Board,Committee for a Review of the Evaluation Data on the Effectiveness of NSF-Supported and Commercially Generated Mathematics Curriculum Materials,2004-11-12 This book reviews the evaluation research literature that has accumulated around 19 K 12 mathematics curricula and breaks new ground in framing an ambitious and rigorous approach to curriculum evaluation that has relevance beyond mathematics The committee that produced this book consisted of mathematicians mathematics educators and methodologists who began with the following charge Evaluate the quality of the evaluations of the thirteen National Science Foundation NSF supported and six commercially generated mathematics curriculum materials Determine whether the available data are sufficient for evaluating the efficacy of these materials and if not Develop recommendations about the design of a project that could result in the generation of more reliable and valid data for evaluating such materials The committee collected reviewed and classified almost 700 studies solicited expert testimony during two workshops developed an evaluation framework established dimensions criteria for three methodologies content

analyses comparative studies and case studies drew conclusions on the corpus of studies and made recommendations for future research

Elements of Mathematics Gabor Toth, 2021-09-23 This textbook offers a rigorous presentation of mathematics before the advent of calculus Fundamental concepts in algebra geometry and number theory are developed from the foundations of set theory along an elementary inquiry driven path Thought provoking examples and challenging problems inspired by mathematical contests motivate the theory while frequent historical asides reveal the story of how the ideas were originally developed Beginning with a thorough treatment of the natural numbers via Peano's axioms the opening chapters focus on establishing the natural integral rational and real number systems Plane geometry is introduced via Birkhoff's axioms of metric geometry and chapters on polynomials traverse arithmetical operations roots and factoring multivariate expressions An elementary classification of conics is given followed by an in depth study of rational expressions Exponential logarithmic and trigonometric functions complete the picture driven by inequalities that compare them with polynomial and rational functions Axioms and limits underpin the treatment throughout offering not only powerful tools but insights into non trivial connections between topics Elements of Mathematics is ideal for students seeking a deep and engaging mathematical challenge based on elementary tools Whether enhancing the early undergraduate curriculum for high achievers or constructing a reflective senior capstone instructors will find ample material for enquiring mathematics majors No formal prerequisites are assumed beyond high school algebra making the book ideal for mathematics circles and competition preparation Readers who are more advanced in their mathematical studies will appreciate the interleaving of ideas and illuminating historical details

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