



CONNECTING COMMUNITIES COALITION (CCC)
CULTURAL FRAMEWORK OF THE MATH CURRICULUM
AFFECTIVE COMPONENT: ACHIEVEMENT VALUES TRAINING

CULTURAL THEME	TOPICS & CURRICULAR MATERIALS	LESSONS	LEARNING OUTCOME(S)
<p>WEEK ONE: Critical-mathematical Literacy Goal #1: Understanding Culture and Mathematics</p> <p>African Legacy in Math and Science</p> <p><i>Journey into African Heritage</i></p>	<ol style="list-style-type: none"> 1. <i>Who am I?</i> 2. <i>African Roots of Mathematics</i> 3. Introducing Imhotep: The World's First Multi-Genius <p>* <i>An extraordinary man called: Imhotep</i></p> <p>* IMHOTEP: The FIRST Pyramid Builder</p>	<p><i>Timechart</i> Exercise identifying key historical periods of math innovation & lifetimes of Imhotep, Hypatia, Euclid, etc.</p> <p><i>Internet Math Exercises #1a:</i> <i>African Contributions to Math</i> http://www.saxakali.com/COLOR_ASP/ or http://www.saxakali.com/coloru</p> <p>Internet Activities #1b: Mathematicians of the African Diaspora http://www.math.buffalo.edu/mad/index.html</p>	<p>Students communicate their thoughts about African heritage and maintain a log of their journey into African legacy in math/science.</p>
<p>WEEK TWO: Critical-mathematical Literacy Goal #2: Understanding the Mathematics of Socio-political Knowledge-</p> <p>African-Americans Continuing the Legacy in Math and Science</p> <p><i>African-American Trailblazers in the Western Hemisphere</i></p>	<p><i>Science & Mathematics: Knowledge That Will Open Doors</i></p> <ol style="list-style-type: none"> 1. <i>Nile Valley Presence in America: Pyramid-Building in the Americas</i> 2. <i>Mathematicians of the African Diaspora: Benjamin Banneker</i> 3. <i>Mathematicians of the African Diaspora: Martha Haynes</i> 	<ol style="list-style-type: none"> 1. Group presentation of Nile Valley contributions to the Americas 2. <i>Mathematicians of the African Diaspora: Benjamin Banneker (biographical analysis)</i> 3. <i>Using a Grid: (Famous African Americans with key included)</i> 	<p>Students acquire knowledge of how African-Americans have built on the math/science foundations of their ancestors in the Western Hemisphere.</p>
<p>WEEK THREE: Critical-mathematical Literacy Goal #3: Understanding the Politics of Mathematical Knowledge</p> <p><i>Discerning the Politics Behind Curricular Omissions of African Foundations of Algebra</i></p> <p><i>Deciphering African Number Patterns & the Origins of Algebra</i></p>	<ol style="list-style-type: none"> 1. Hypatia, Mother of Algebra 2. <i>Hypatia—Martyred Genius</i> 3. <i>Hypatia: One of Algebra's Parents</i> 4. Diophantus, Father of Algebra 	<ol style="list-style-type: none"> 1. Critical thinking questions about Hypatia's contributions 2. Hypatia's Triangular, Square, & Polygonal Numbers 3. Diophantus' Figurate Numbers (creating polygon dot patterns) 4. Hypatia's- <i>One Problem With Many Solutions</i> 	<p>Students read and analyze Hypatia's contribution to Algebra, as well as study her personal sacrifice and socio-political commitment to African epistemology.</p> <p>Students learn that Algebra originated in Africa and is connected to African heritage.</p>



CULTURAL THEME	TOPICS & CURRICULAR MATERIALS	LESSONS	LEARNING OUTCOME(S)
<p>WEEK FOUR-</p> <p>Critical-mathematical Literacy Goal #4: Understanding the Politics of Knowledge-</p> <p>African Roots of Geometry</p> <p><i>African Fractals & the Mathematics of the African Aesthetic</i></p>	<p>1. African Fractals: Modern Computing & Indigenous Design</p> <p>2. African Fractals & African-American Hairstyles</p> <p>3. Euclid: The African Roots of Geometry</p> <p>4. Kemetic Theorem of the Right Triangle</p>	<p>1. African Fractals website <i>Mathematicians of the African Diaspora</i> website</p> <p>(Also Ron Eglash at http://www.rpi.edu/~eglash/csdt/African.html)</p> <p>2. The African Roots of Geometry</p> <p>* Overview of Euclid's <i>The Elements</i></p> <p>* Review of "Kemetic" (vs. Pythagorean) Theorem</p> <p>*Apply the Kemetic Theorem to geometric problems</p>	<p>1. African Fractals</p> <p>a. Students discern the fractal shapes that underlie African functional and artistic structures.</p> <p>b. Students learn that the fractals indicate the complex mathematical processes in African culture.</p> <p>2. African Roots of Geometry</p> <p>a. Students discover the African origins of geometry</p> <p>b. Students learn that math principles underlying the Kemetic (vs. Pythagorean) Theorem) of the right-angled triangle were used before Pythagoras was born.</p> <p>c. Students learn that, Euclid, considered the greatest mathematician, was African, wrote <i>The Elements</i> (of Geometry).</p>
<p>WEEK FIVE-</p> <p>Putting it all Together: Apply Mathematical Reasoning through Creative Expressions</p> <p><i>Building for Your Future: College Preparation & Career Planning</i></p> <hr/> <p><i>Building For Our Collective Destiny</i></p>	<p>1. <i>Assertiveness: Taking Charge of Your Life: The Importance of Math</i></p> <p>2. <i>Personal Success: What I Expect Ten Years From Now</i></p> <p>-----</p> <p>Framing African/African-American Contributions to Mathematics</p> <p>-----</p> <p>Message to the Black Community of Lessons Learned</p>	<p>1. Identify a career role model from the timeline chart for one's career choice</p> <p>2. <i>Personal Success: What I Expect Ten Years From Now: Developing an action plan for college</i></p> <p>-----</p> <p>3. Finalize timeline charts depicting historical & contemporary African/ African-American contributions to mathematics.</p> <p>* Summarize lessons learned to present in a culminating event for the community.</p> <p>* Create a powerpoint presentation on lessons learned about the African legacy in math/science.</p>	<p>1. Students reflect on their career choices, and college requirements for their selected majors.</p> <p>2. Students gain experience in developing a career plan.</p> <p>* Students gain experience in developing personal problem solving and developing achievement strategies.</p> <hr/> <p>3. Students re-present an accurate picture of the contributions of African people to the development of mathematical knowledge.</p>

THE ANCIENTS



Most histories of mathematics devote only a few pages to Ancient Egypt and to northern Africa during the 'Middle Ages'. Generally they ignore the history of mathematics in Africa south of the Sahara and give the impression that this history either did not exist or, at least, is not knowable, traceable, or, stronger still, that there was no mathematics at all south of the Sahara. In history, to Europeans, even the Africinity of Egyptian mathematics is often denied or suffers eurocentric views of conceptions of both "history" and of "mathematics" from the bias of such views. Contrary to the popular view, one can neither racially or geographically separate Egyptian civilization from its black African roots.

Myths and Lies	Truths	Lechombo bone in Swaziland, the oldest mathematical object	Ishango bone Zaire-Uganda 8000 years ago
Zimbabwe	Egypt before the Greeks who borrowed the numbers	pre-Colonial Nigeria	Angola-Zambia Tanzania
AMUCHMA - African Mathematical Union Commission on the History of Mathematics in Africa, an important resource for the topics below			
North Africa (since the 9th century)	Below the Sahara (an overview)	The Canary Islands	Number systems and Calendars of the Beber references

don't forget **MODERN AFRICAN MATH** and **AFRICAN AMERICAN MATH**



Connecting Communities Coalition Cultural Framework of the Mathematics Curriculum Mathematics Training Schedule

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Session 1 Overview of Week One- African Mathematics

The purpose of the first session is to give the participants an introduction to African Mathematics as a way to describe an “African Way of Doing Mathematics.” Topics covered will be:

- The Ishango Bone/Tally Instrument
- Ancient Egyptian Mathematics
- The Yoruba Number System
- Muslim Mathematics

Participants will see the themes that permeate through African Mathematics. In addition, participants will engage in a variety of activities to gain a greater understanding of Ancient Egyptian mathematicians and the African roots of advanced mathematics.

Session 2 Overview of Week Two- Mathematicians of the African Diaspora

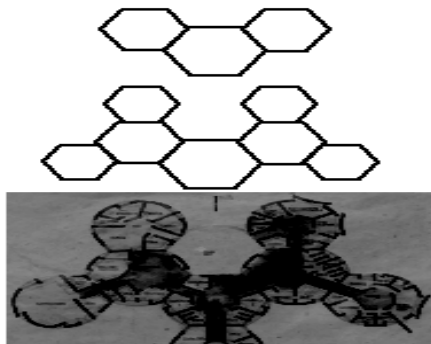
The purpose of this session is to provide participants with information about African and African-American Mathematicians. The participants will leave this session with the biographies of mathematicians as well as activities to use with students to familiarize them with the works of African-American Mathematicians.

Session 3 Overview of Week Three- Polygonal Numbers

The purpose of this session is to provide participants with the mathematical background to teach about Hypatia and Polygonal Numbers. The participants will do activities to familiarize them with polygonal numbers and learn how to use finite differences to determine the generalized form for determining the rule for any pattern of polygonal numbers.

Session 4 Overview of Week Four- Fractals and Geometry

The purpose of this session is to provide the participants with the mathematical background to teach about African Fractals and Geometry. Participants will do activities to learn about Fractal Patterns and The Right Triangle Theorem.



Kitwe community clinic in Zambia -- design by David Hughes and Alex Nyangula using the fractal structure of traditional African architecture.

