MATH WORLD

the world of mathematics and

some of its citizens.

NCAT March 2006

Math is used everywhere

- One *public* view of math is numbers- counting, adding, multiplying...
- OR figures of geometry like triangles and circles
- MATH is much more than Algebra, Trigonometry and Geometry.
- Mathematicians study patterns.

people/companies using math

professional sports teams, phone companies,

classical composers, rap composers,

fast food chains, chain grocery stores.

Salaries for mathematicians AVERAGE around $120,000.

1. J. Ernest Wilkins, jr.

PhD University of Chicago

graduated *High School* at **13**, *College* at **17**,

- *Doctorate* at **19** (1942).
- worked as a Mathematician for the American Optical Company.
- Past President of the American Nuclear Society.
- 2nd Black member of the exclusive National Academy of Engineering.

2. **Fern Hunt,** PhD. CUNY

the greatest Black woman mathematician

- She works for the National Institute of Standards and Technology.
- She is the world expert at using mathematics to understand how people migrate - move from one part of the world to another, say from New Delhi to Atlanta.
- She characterized the ferro-magnetic materials used in disk drives and ATM cards.

3. **William Massey,** Ph. D. Stanford

•Uses mathematics to make efficient call centers for companies like AT&T and Lucent Technologies.
•He is the first Black Mathematical Scientist to be a Full Professor at the ivy league school Princeton University (2001).
•No one has worked so hard to produce mathematics researchers.

4. **Jonathan Farley**,

PhD Oxford University (England)

- graduated 2nd in his class from Harvard University in Boston.
- Farley studies mathematics related to patterns of terrorists. Currently he spends half the year as a professor at Stanford U, and half as a professor in Jamaica, West Indies
- He is also a consultant on mathematics to movies and TV shows.

5. **Kate Okikiolu**, PhD UCLA

- In 1997, she won the $500,000 Presidential Early Career Award for Scientists and Engineers for her mathematical study of the *sound of drums*.
- She is a professor at the University of California and has also developed math courses for inner-city children in San Diego.

6. Trachette Jackson,

PhD. U. Washington (Seattle)

- She studies the way cancer tumors grow, and how they may be halted through chemotherapy.
- Does she use a microscope?
- No, she is a Professor of Mathematics at the University of Michigan

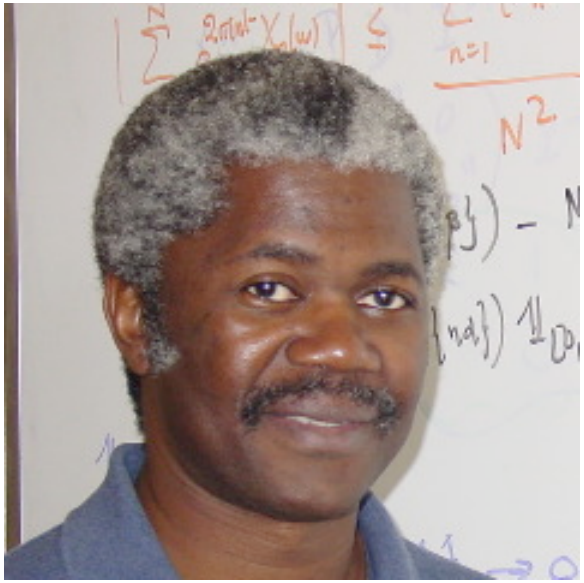
7. Arlie Petters, PhD MIT, in Mathematics & Physics

- He is a Professor of Mathematics and of Physics at Duke University.
- He invented the Theory of Mathematical Astronomy, to discover how gravity of giant stars and Black holes affects light.
- Has just received a special award from the exclusive National Academy of Sciences.

8. **Idris Assani**, **PhD**. University Pierre and Marie Curie - Paris

1996: He became the first Black mathematician to receive tenure at the University of North Carolina at Chapel Hill.

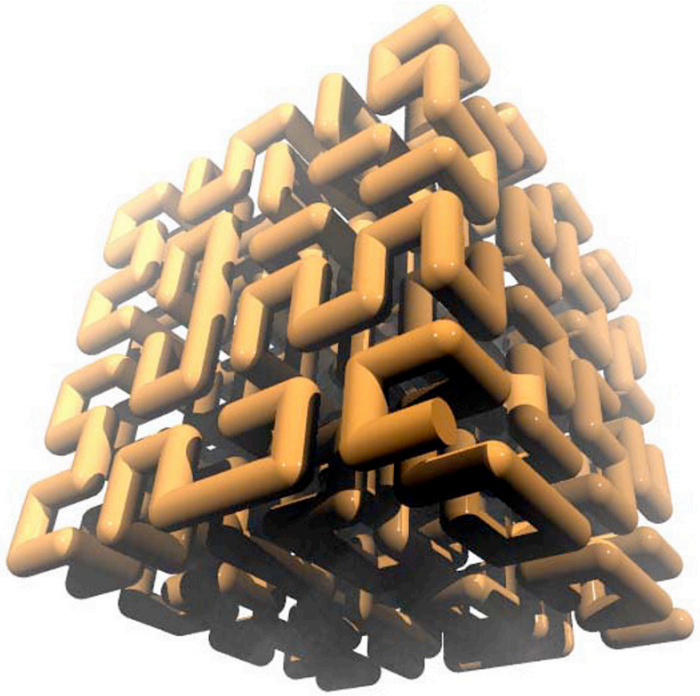
His area of work is called Ergodic Theory and he studies how multiple objects can move about in a way each one approximates its original position in the same time.



9. **Edray Goins**, **PhD**. Stanford University

- Raised in rough South Central Los Angeles. His mother always said, “Do *better* than the challenges you meet.”
- One of the few Blacks to ever graduate from the stellar Mathematics Department of the California Institute of Technology. Now studies Elliptical Curves.

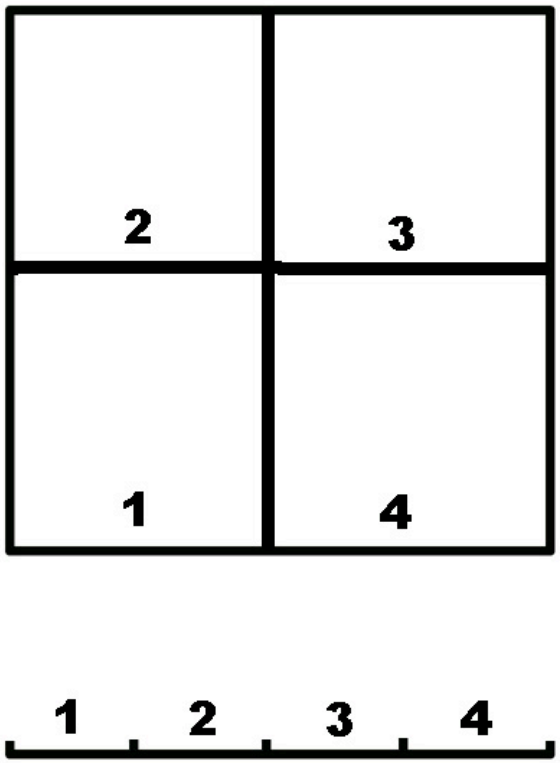
Space Filling Curve

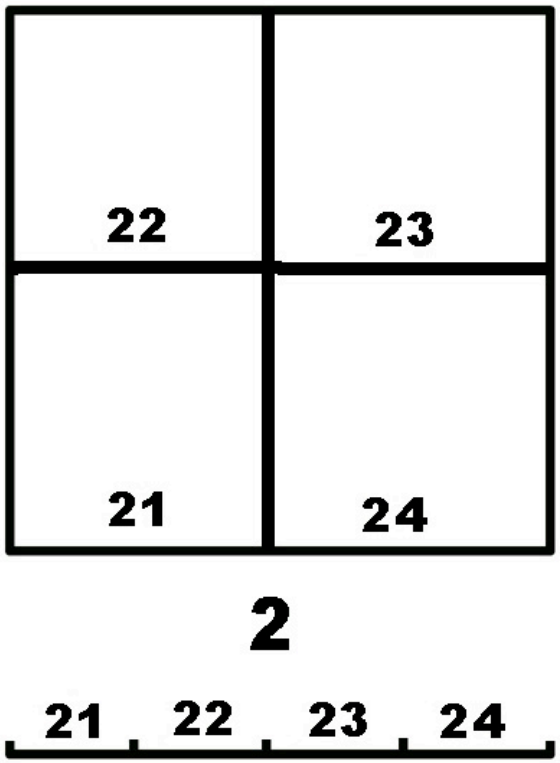


To the left is a representation of a mathematical object called a Space Filling Curve.

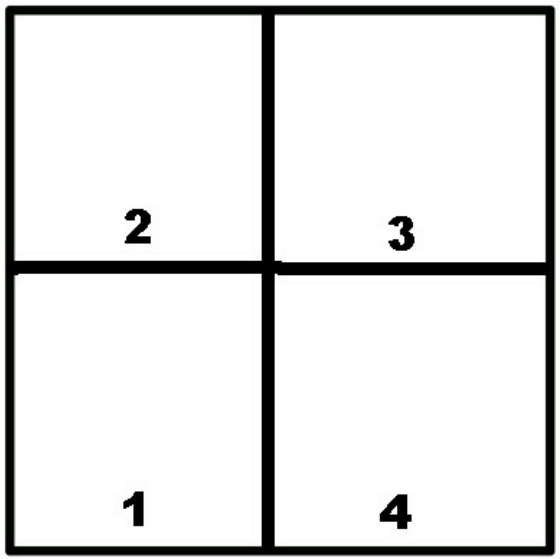
Digital cameras use **space filling curves** to turn **pictures** into **numbers** and back again.

Here's how you do it.



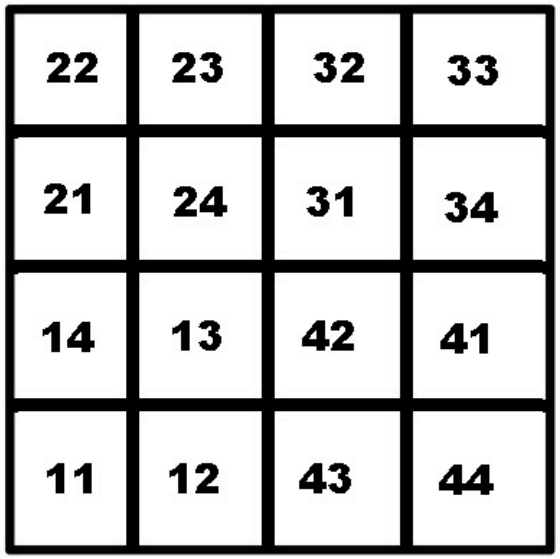


again

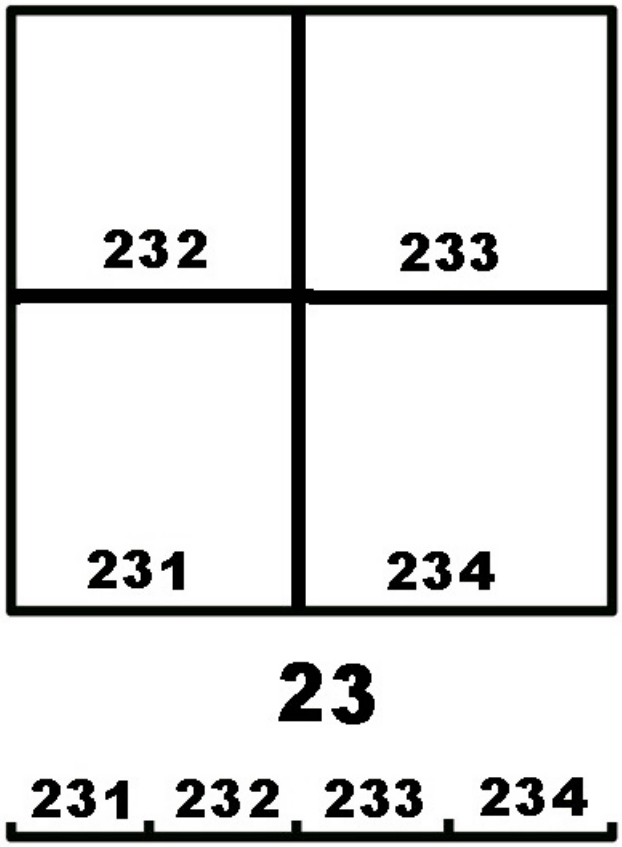


22	23	32	33
21	24	31	34
14	13	42	41
11	12	43	44

again

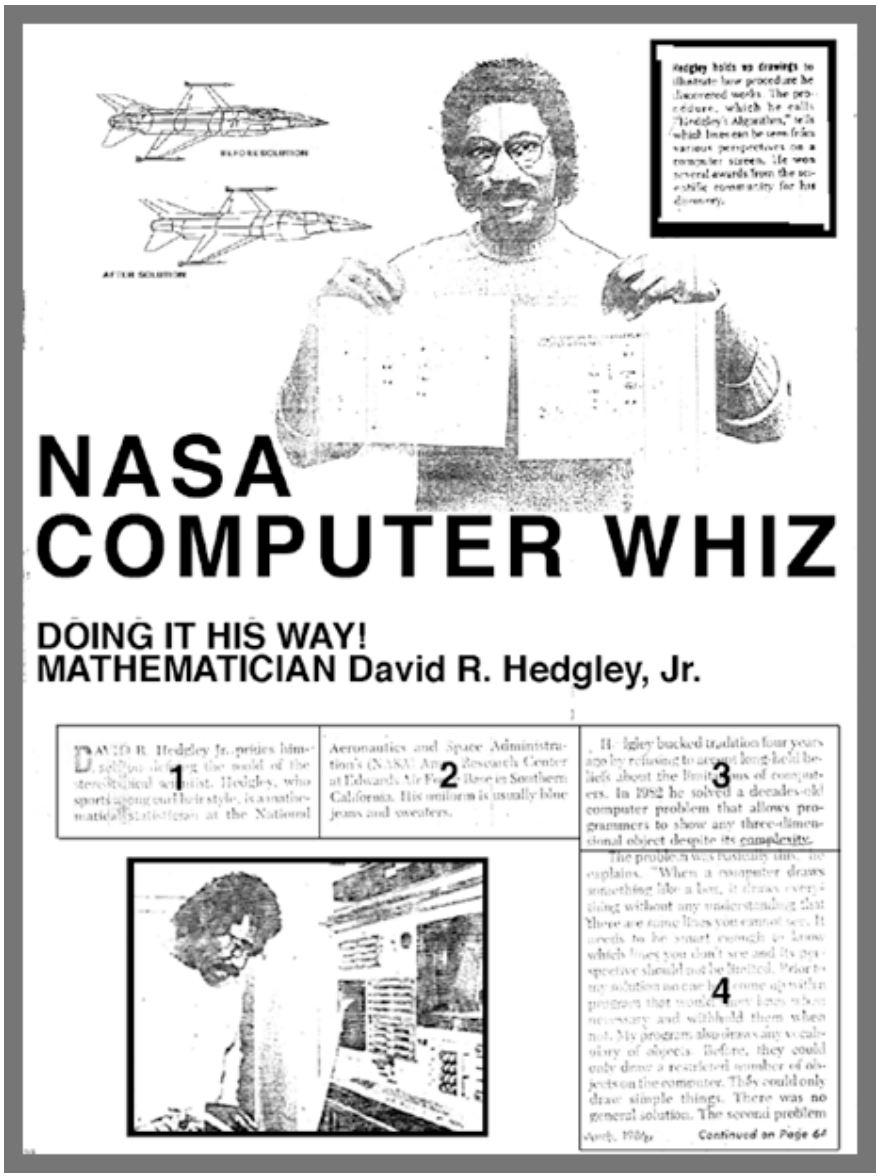


|11.12.13.14|21.22.23.24|31.32.33.34|41.42.43.44|



David Hedgley’

The Father of 3D Graphics



NASA COMPUTER WHIZ

DOING IT HIS WAY!
MATHEMATICIAN David R. Hedgley, Jr.

1

2

3

4

- First used space filling curves to represent computer graphics.
- works for the Space Agency.

Mathematicians can be teachers and/or researchers.

- During the old wars, the languages known by few people would be used as codes to pass secrets. Our country used the language of the Navajo Indians.
- These days they use mathematics to create and beak codes.
- The largest employer of mathematicians in the world works with codes the world. This is the US **N**ational **S**ecurity **A**gency.

Peasant numbers

- Integers n and their reciprocals $^1/_n$, say $^1/_2$, $^1/_5$, $^1/_8$.
- The Egyptians knew these 5,000 years ago.
- Each fraction was written as a sum of peasant numbers - say instead of $^{33}/_{18}$, they would write $1 + {}^1/_2 + {}^1/_3$.
  This expression is called an Egyptian number.
- The Egyptian number $3 + {}^1/_{13} + {}^1/_{17} + {}^1/_{173}$ approximates π to four decimal places.
- Write $^5/_{22}$ as an Egyptian number.

Continued Fractions

$$2 + \cfrac{1}{3 + \cfrac{1}{5}}$$ instead of $\frac{37}{16}$

$$3 + \cfrac{1}{7 + \cfrac{1}{16}}$$ approximates π to five decimal places.

Solving $x = \dfrac{1}{2 + x}$ proves

$$\sqrt{2} - 1 = \cfrac{1}{2 + \cfrac{1}{2 + \cfrac{1}{2 + \cfrac{1}{2 + \cfrac{1}{2 + \cdots}}}}}$$

PUZZLE

- A man must cross a river with three items: a wolf, a goat, and a cabbage.
- He has only a small boat to cross and only take one item at a time.
- But if left alone, the wolf will eat the goat, and the goat will eat the cabbage.
- **How does he do it?**

Tower of Hanoi

1,**2**,1,**3**,1,2,1,**4**,1,2,1,3,1,2,1,**5**,
1,2,1,3,1,2,1,4,1,2,1,3,1,2,1,**6**,
1,2,1,3,1,2,1,4,1,2,1,3,1,2,1,5,
1,2,1,3,1,2,1,4,1,2,1,3,1,2,1,**7**,
1,2,1,3,1,2,1,4,1,2,1,3,1,2,1,5,
1,2,1,3,1,2,1,4,1,2,1,3,1,2,1,6,
1,2,1,3,1,2,1,4,1,2,1,3,1,2,1,5,
1,2,1,3,1,2,1,4,1,2,1,3,1,2,1,**8**,..

REFERENCES

Scott Williams

Mathematicians of the African Diaspora

- http://www.math.buffalo.edu/mad/index.html