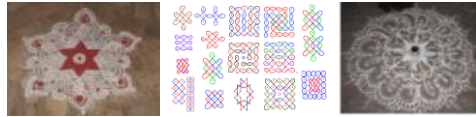


ODE TO HOLI – FESTIVAL OF COLORS – 2011



Petersen graph

Smallest bridgeless cubic graph with no 3-edge-coloring



Hindu Art Sand in Color

Annual celebration *Holi* truly Hindu on day full moon

Rightly christened a *Festival of colors with colors in colors*

Express joy marking end of harsh winter a reason soon

Community join live act of playing with hues valors



Hindu Art Color Sand in Fill

Age old ancient Hindu traditions spawn

Begin routine sweep and clean day's dawn

Level ground with dung mixed waters cozy

Complex drawings entrance choice in dozens hazy

Every house front door decorated in reception

With Rangoli a color sand art rich in collection



The Hubble Space Telescope snapshots

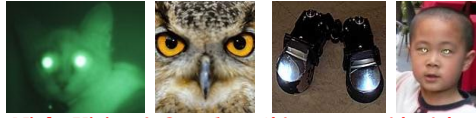
Colors exist and existed since creation

Color means singular to life forms diverse consult

Touch feelers primitive a guide in simulation

Served purpose saved from savage assault

Universe colorful captured in spectrum bright
Color blind nonetheless in Black & White sight
Gray tone- a parameter in extra makes plenty
Enabling shades several to distinguish bounty



Night Vision & Goggles Chinese Boy with Night Vision

Seeing sensors beginning unknown origins carnival
Deprived life forms thrived in competition tight
Vision under evolution instinct sustain survival
Sight during day demand even through dusk to night
Eyes in design studded with multitude lenses in special
Enhance beam meager from starry night sky sheen crucial

On hang around stealthy Eurasian eagle owl
Cats in variety evolved apt to ambience fit for survival
Pallas, Black-footed, fishing cats, sandcat, bearcat and Caracal
Fennec fox, clouded-leopard, aardvark, ocelot, vampire bat in parallel

Color vision weak in variety wilder beast or zebra in migration
Misses detection of lion or leopard presence in camflouge aberration
Unaware an easy target prey, a predator on prowl aggravation
Hierarchy well set in evolution a result significant combination

Human made device camera for capture
Thermal one twilight vision in rupture
Infra red enabling sight at dusk or night image
Fit for purpose fix on tree or stick on skin enabling gauge
Record animal life or activity in waters, on land, during flight shy or stealthy
All through day or night in jungle, rural or suburb wealthy



Road & Traffic Signals

Meaning of Color at variance in context singular

Man's choice wavelength on weight brighter regular

Red shade in signal *warns and stops* strict diet

Orange tinge signs *system share* in transit

Green sign signals *clear path* move in quiet

Parties pursue rules of safety for right exit

Implied none above or below, lasts or firsts

Follow secure path safety for all count tests



Francis Guthrie (1831-1899)
Guthrie's dilemma

Daily routine a Combinatorist profession in no exception

Plays with a dye on diagram, map or graph at reception

Guide to chemical waste combination - safety from blast

Be it a network in service or a timetable schedule cast

In coloring a graph assign a dye to every node

No two neighbouring in colours same convince code

Number in painting with colours least launch chromatic

Three hues in ample for simpler or most maps mundane dramatic

An additional fourth in demand for some exceptional

A region bordered by an odd number present conditional

As said in *Theory of Graphs* a true translation
 Four-colors in plenty painting a map on a plane partition
 Regions sharing boundary in common accept colors unlike
 Guthrie's problem emerges first to conjecture in 1852 on bike
 Augustus de Morgan an honest vital instrument to popularise
 Cayley in 1878 accredited first document in publication vitalise
 False proofs and fake examples instances many gave rise
 "Every planar graph is four-colorable" prove or disprove voice in raise

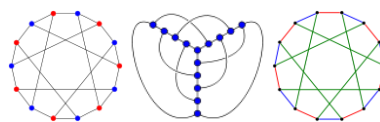


Alfred Kempe (1849-1922)
 Regions and Chains

Coloring trait tops test in trade traditional
 Passed on from generation to generation occupational
 But realization recognition and demonstration
 Coloring map regions just with four shades in production
 Not an easy task an ordeal over time hope fades
 Kempe in 1879 first to presenting a proof in public
 Came to be known '*method of Kempe chains*' symbolic



Percy John Heawood (1861-1955)



The Heawood graph:
chromatic number 2. crossing number 3. chromatic index 3

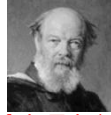
Kempe's proof in agreement lives on for a year and a decade
 An announcement in 1890 from Heawood not for good made
 News rather destructive than constructive instead

A defect in detect in testimony recognised stood

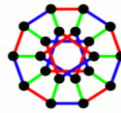
A map with 18 or 9 faces in evidence survived

An alternate declaration for sure *five colors suffice* to credit

Marks a beginning of Color romance pairs coming close to split



Peter Guthrie Tait (1831-1901)



No two edges coming from
The same vertex share the same color

Tait in 1880 inspired makes in faith second attempt

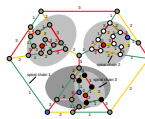
With bright ideas but again a proof in error prone built

Petersen in 1891 again after a year and a decade later

Detected a gap in Tait's proof endorsed to alter



Julius Petersen (1839-1910)



W.T. Tutte (1917-2002)

Tutte's graph and spiral three edge coloring

Tait found formulation the 4CT equivalence bearing

Every cubic plane graph with no cut-edge has an edge 3-coloring

Tait in 1884 amongst related works proposed the speculation

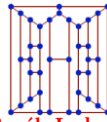
Every 3-connected planar cubic graph is Hamiltonian

Tutte (1946) disproved ingenious construct with a counterexample

A graph with 25 faces, 69 edges and 46 vertices only a sample

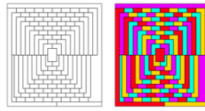
Using three copies of Walther graph now known Tutte's graph best

Barnette-Bosák-Lederberg in 1965 found graph of order 38 the smallest



Barnette-Bosák-Lederberg Graph

JFerro debunked for alleged short proofs contempt
Opens up unsettled 4-CC fresh again for bright cult
A challenge to GT World to all Mathematicians in bait
Physicists pride plan plunge in pond public provoke
Identified and branded a notorious *graph theory disease invoke*



Scientific American, April, 1975 Martin Gardner

April Fool's cruel joke by Martin Gardner shook GT grounds
A map manufactured with regions 110 claiming five colors a must
Tight sittings hours passed by result in no answer sounds
SWagon 1998 in offer a four coloring hit using Mathematica trust
Colours six suffice for zero genus an improvement to five viable
But trim this number all the way to four proved knotty gamble
If the 4-CC were false a map requiring five colors constructible
Crux of proof makes obvious nonexistence a counterexample minimal



Kenneth Appel and Wolfgang Haken
<http://rjlipton.wordpress.com/2009/04/24/the-four-color-theorem/>

In 1976 Appel & Haken hoist a proof settling 4-CC at last

Assistance algorithmic from JAKoch computer-assisted proof cast

An exhaustive analysis scores of discrete cases to verify with caution

The first major theorem using computers in celebrations

Infinitude of possible maps reducible to 1936 configurations

Further shortened to 1476 to be checked all by supercomputers

Each not part of a smallest counterexample generations

Any map must have a portion that looks like one of these matters

Verification involving pages of laborious hand calculations



Errera's incomplete four coloring

No smallest counterexamples existed or in construct

Any must contain, yet not contain, one of these might obstruct

A contradiction meaning no counterexamples exist right

Demonstrating the 4-CC truth without doubt insight

Consumed over a thousand CPU hours indebt

Celebration achievement by University of Illinois

Release of postmark Four Colours Suffice!

Mark and mind for grand success entice



Heinrich Heesch (1906-1995)
Main ingredients: reducibility and discharging

Part proof computer verified gained wider acceptance and fears

A simpler proof similar ideas and still relying on computers

Algorithm quadratic configurations 633 reduced set unavoidable

In 1997 by Robertson, Sanders, Seymour, and Thomas

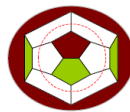
Yet another proof in 2005 by Georges Gonthier pops

Use of general purpose theorem proving software hops

Independent proof by Robertson et al. to signify

A formulation in the equational logic program *Coq*

Confirming validity clarity in steps clear folly fog



The Birkhoff's diamond
A maximal dichromatic coloring

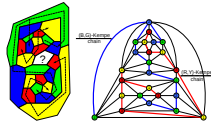
Rumours in 1980s a flaw in the Appel-Haken proof

Ulrich Schmidt at RWTH Aachen examined safe roof

Obliged in a detailed article- magnum opus in print

A book in 1989 claiming complete and detailed evidence

Attempts continue for alternate proofs worldwide confidence



Heawood map and double-spiral coloring

Spiral or double spiral chain ITait's Victorian approach

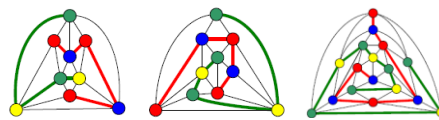
Birkoff's diamond an inspirational starting point encroach

Isolate bad example graphs for Kempe's argument for insight fill gaps

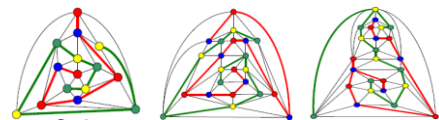
Maximal mono- and di-chromatic colourings of high and low land maps

Twin graphs in make for troubles in inner and outer faces convenience

Enhanced visual abstraction and non-computer proof a consequence



Fritsch, Soifer, Errera



Poussin, Kittell, Heawood

Known counterexamples to Kempe's proof
With double-spiral chain decompositions



Thomas L. Saaty

Presented 29 equivalent formulations of the 4CT

A proof by ADharwadkar yet another new approach

Topological and Algebraic in qualification coach

Using Steiner systems and Tit's inequality threshold four

Eilenberg modules Hall matchings and Riemann surfaces tour

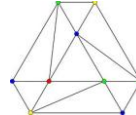
Color romance continues across minds in capture world over
Nature on nerves reveals facts in earthly processes turn over
More in treasure unknown manifest secrets hidden unveil
Survival top priority taste in test world extraterrestrial



Klein bottle

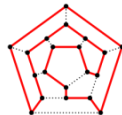


Percy Heawood (1861-1955)



Heawood Four-Color Graph

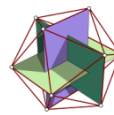
SURYAPRAKASH RAO



Dodecahedron



William Rowan Hamilton (1805-1865)



Icosahedron-golden-rectangles

Related Web Links

http://en.wikipedia.org/wiki/Heawood_graph

<http://toextremhost.com/>

<http://www.lycos.com/info/four-color-theorem--problems.html>

<http://www.sciencephoto.com/media/329724/enlarge>

<http://www.foxnews.com/story/0,2933,480059,00.html>

<http://www.ibtimes.com/articles/181419/20110716/stars-and-their-fates-white-dwarfs-supernovae-and-black-holes.htm>

Due Respects & Acknowledgements

Attempts many approaches different

From comers of the vast world concurrent

A few in mention ACayley, LCarroll, PMayer

Howard Levi for Algebraic Approach dear

List incomplete and unending utterance

To all those contributors not in reference

Mission Accomplished

Time hath tied terse reasons various unknown

Focus on connoisseur Combinatorists well known

Remember recall esteem extraordinary activities in lead

Salutes to great souls share deeds noble abide guide plead

Graph Theory and *Block Designs* in fusion repercussion

Constructs and clarifications from one for problems in other discussion

Solutions sought easily otherwise intricate burdensome

GT evolving encompassing with fast dispersal in domains alien

Be it worldwide web, Networks of Electronics or Transportation

An attest a Universal language in the background an assertion

Theories of Sciences Physical, Chemical or Social bearing

Applications in Computer, Civil, Mechanical Engineering

Name one or any GT term certain has its footprint uncanny

An easy tool GT a mirror a glance at one's own image shiny