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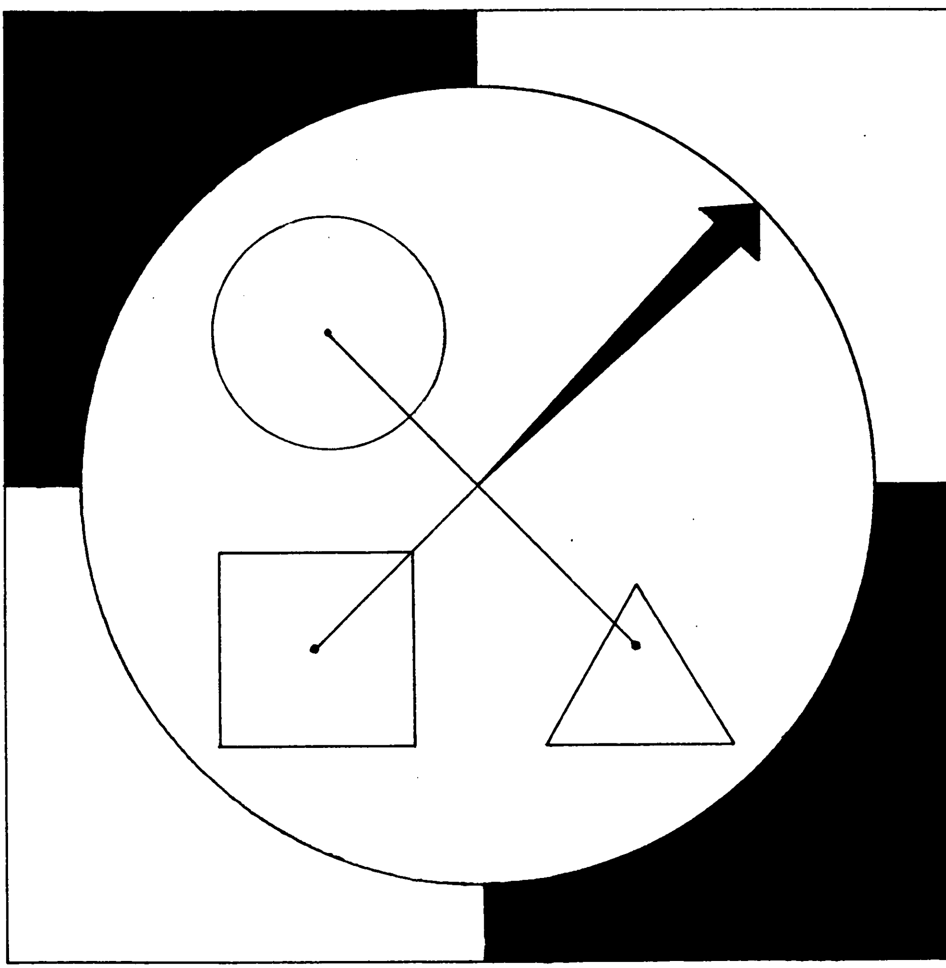
James Vance

Vector

BRITISH COLUMBIA ASSOCIATION OF MATHEMATICS TEACHERS

NEWSLETTER



VOLUME 11, NUMBER 2 JANUARY 1970

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The B. C. Association of Mathematics Teachers publishes *Vector* (newsletter) and *Teaching Mathematics* (journal). Membership in the association is $4.00 a year. Any person interested in mathematics education in British Columbia is eligible for membership in the BCAMT. Journals may be purchased at a single copy rate of $1.50. Please direct enquiries to the Publications Chairman.

CHANGES IN THE CONSTITUTION

At the last Annual General Meeting, the constitution was amended in the following locations:

Article 6 - sections c, d.
Article 7 - sections a, b, c, f.
Article 14 - section c.

Read through your copy of the constitution and see what we are made of.

ELECTIONS

Two executive positions are open for nomination:

Vice-president and Treasurer.

According to the constitution:

1. nominations may be submitted by any two members.
2. term of office shall be from July 1, 1970 to June 30, 1971.
3. nominations shall close at midnight January 31.
4. members will receive a ballot on/or before February 15.
5. ballots must be returned to the Director of Professional Development (BCTF) postmarked not later than midnight, March 1.

NCTM MATERIALS

In June 1969, Jim Clark resigned the position of NCTM representative. At that time, he was asked to continue in the position to tidy up the details. Len Gamble has now been appointed the NCTM representative on the executive.

The executive has decided to enter upon a one-year experiment in the selling of NCTM materials. Jim Clark will sell the materials, the work being done by the students of mathematics and commerce at Jim's school. The profits realized during the experiment are to be assigned to the school for service rendered. Orders for NCTM materials may still be sent to Jim Clark, 21054 Clark Avenue, R. R. #3, Langley.

ACTION – REACTION

What do you think? -- Let us know.

1. What is the present situation in your school or district regarding Ac. Ma. 10? Is your treatment different? Are there desirable changes which should be made in the course?

2. The executive is interested in starting publication of monographs or topics in mathematics. The idea is to try to follow the example of the Science PSA, and to achieve the same success. If you have some materials that would be of interest to others, or if you know of some teacher who is talented in this way, please get in touch with the executive.

CANADIAN ASSOCIATION OF MATHEMATICS TEACHERS

A conference on Educational TV in Mathematics is to be held in Toronto on April 17 and 18. Attempts have been made to contact provinces to obtain information on past, present and future plans, on films and tapes, etc. The Department of Education will not take an active part in the conference, but will make certain tapes available (see 'School Broadcasts' in this issue). The annual meeting of CAMT will be held at the time of the conference. Roy Craven will attend as the representative of the BCAMT.

PARADOX

1. 'This sentence is false.' *Is it?*
2. Mr. Jones of Vancouver said, 'All residents of Vancouver are liars.' *Did Mr. Jones lie?*
3. Mr. Smith of Richmond said, 'I shave all the people of Richmond who do not shave themselves.' *Who shaves Mr. Smith?*
4. Mr. Brown was caught poaching. He was given a choice of the manner of his death as follows: if he made a true statement, he would be hanged; if he made a false statement, he would be beheaded. Mr. Brown made the statement, 'I shall be beheaded.' *How did Mr. Brown die?*

JUNIOR MATHEMATICS CONTEST
UNIVERSITY OF WATERLOO, ONTARIO

You have probably already received details of this contest, to be held on Wednesday, April 1, 1970. The contest is open to Grade 9, 10 and 11 students from Ontario to British Columbia. The main aims of the contest are to stimulate students interested in mathematics and to provide an opportunity for schools and students to test their mathematical prowess against that of others. Registration deadline is January 31, 1970. Further details are available from:

Mrs. D. E. Kennedy,
Department of Mathematics,
University of Victoria,
Victoria.

MATHEMATICAL ASSOCIATION OF AMERICA CONTEST

You have probably already received details of the 1970 MAA contest to be held on March 10, 1970. The aim of the contest is to create and to sustain interest in mathematics among the students of our secondary schools (primarily in Grades 11 and 12). Registration is to be sent in on/or before January 15, 1970. Further details are available from:

Dr. Brian Alspach,
MAA Contest Chairman,
Mathematics Department,
Simon Fraser University,
Burnaby 2.

RESOURCE PERSONNEL

Requests have come recently from the Professional Development Division (BCTF), the Manitoba Teachers of Mathematics Association, and the committee planning the 9th Northwest Mathematics Conference (Victoria, October 1970) for names of people who were willing and qualified to lead workshops or to give talks. Have you heard or seen someone worth-while? Do you know someone in whom you think others would be interested? If you can recommend someone, please let the executive know and it will forward the names. This will, of course, in no way commit the person to any activity. Please help us to identify others who may be willing to serve in this way.

INDEPENDENT STUDY CONFERENCE

On February 20 and 21, the Division of Professional Development (BCTF) and Education Co-ordinates, Canada will present a conference 'Independent Study at the Secondary School Level.' The conference will deal with the philosophic basis for independent study programs and also with techniques of operation. Feature speakers have been associated with the 'Stanford Group' in developing a unique and successful computer program for flexible module scheduling. Further informational bulletins will be sent to all secondary schools. Look for them if you are interested.

A PROBABILITY PROBLEM

A continuous flow of vehicular traffic was experienced along a highway at a street-level railroad crossing. The crossing was guarded by an attendant charged with the task of activating a warning system whenever a train approached the crossing.

One can, then, attach probabilities to the system:

P(A) = the probability that the attendant will close the warning switch = a
P(S) = the probability that the switch and circuit will function = s.
P(B) = the probability that the warning signals will function = b.

The insurance underwriters will allow only a certain probability of failure P(F) = f.

One can then ask (1) if the system meets the specification of failure, and (2) what could be done to minimize the probability of failure.

(from an idea by A.M. Glass, *New Jersey Mathematics Teacher*, October 1969)

SCHOOL BROADCASTS

Check your listing of school broadcasts for TV. Two series should be of particular interest to mathematics classes:

1. Symmetry in Mathematics
Four ½-hour programs in January, non-graded.

2. Men and Calculating Machines
Four ½-hour programs in April, leads to computers in 4th program, non-graded.

BCAMT MATH CONTEST

It was the intention of the BCAMT to sponsor a math contest for students in Grades 8, 9 and 10. Unfortunately, as of December 6, we have been unable to get someone to manage the contest. If you are interested in running the contest (making up, distributing, collecting, and marking the test; and making the presentations) or any part of it this year or next, please contact the executive. This year's contest will probably not be held; we need response if B. C. is to have its own contest.

PYTHAGOREAN THEOREM

Many people are aware of the result of the Pythagorean theorem, namely, $a^2 + b^2 = c^2$ where a, b, c are the sides of a right triangle. Some know the more general relation for any triangle, namely, $a^2 + b^2 - 2ab \cos c = c^2$. But how many of you know the relationship for right triangles in non-Euclidian geometry?

Elliptic Plane

- if ABC is a triangle in the elliptic plane, and angle C is a right angle, the relationship becomes:

$$\cos \frac{C}{R} = \cos \frac{A}{R} \cdot \cos \frac{B}{R}$$

where R is the radius of the sphere whose points, taken either singly or in diametrically opposite pairs, are points of the elliptic plane.

Hyperbolic Plane

- if ABC is a triangle in the hyperbolic plane, with C the right angle, the relationship becomes:

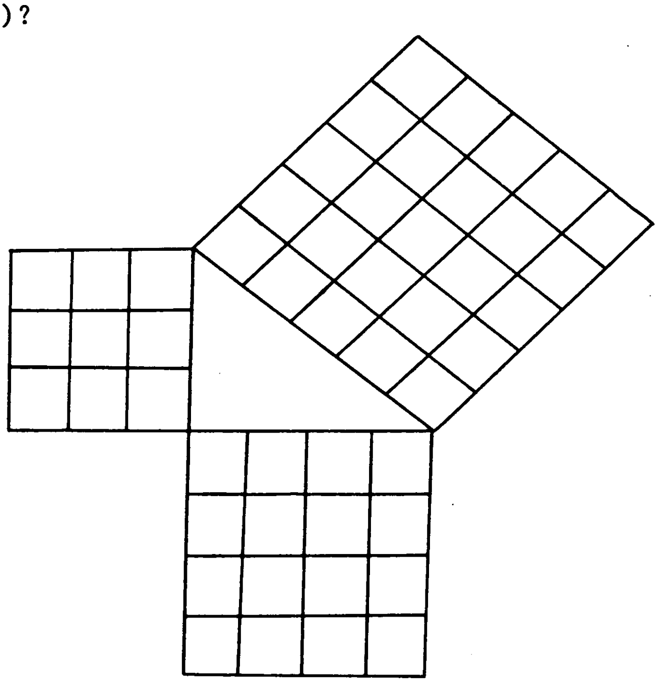
$$\cosh \frac{C}{K} = \cosh \frac{A}{K} \cdot \cosh \frac{B}{K}$$

where cosh = hyperbolic cosine
K = constant characteristic of the hyperbolic plane.

Reference: *A New Look at Geometry*, by I. Adler. (Signet Science Library, 1966)

PYTHAGOREAN MAGIC SQUARES

You have probably worked with ordinary Magic Squares, but have you ever seen them combined in the following manner where the sum of the legs (or squares) equals the hypotenuse (or square)?



Reference: *The Pythagorean Proposition*, by L. S. Loomis (NCTM, 1968)

A persistent young student named Lee
Said, 'An angle I'll trisect -- you'll see!?
He shouted, 'Eureka!'
And handed his teacher
A right angle cut into three.

Janet Glaze, La Sierra High School, California.

A bewildering figure, the square
When the top and the side I compare
I can never decide
If it's tall or it's wide
Whether which, I can't seem to declare.

Janet Glaze, La Sierra High School, California.

EXERCISE

Draw a rectangle on a paper napkin, maybe 3 by 5 inches. Then hold a small purse mirror in front of you, nose high, with the mirror tilted enough to see the rectangle on the napkin. Now, looking into the mirror, attempt to draw the diagonal of the rectangle. It's not exactly easy!!!!

PROBLEMS

1. Why is it that a positive integer of two or more digits, all of whose digits are the same, cannot be a perfect square?

2. For any number x, there is a number y, such that, if added to x, or multiplied by x, the result is the same. Describe all such numbers y.

GEOMETRIC DAFFYNITIONS

(taken from the January 1969 issue of *Mathematics in Michigan*). Match each of the following daffynitions with the term it best describes. Each word is used, at most, one time.

1. An ill insect
2. The man in charge
3. A place where criminals are sent
4. A highway divider
5. A figure that isn't hep
6. A flattering remark
7. A delicious desert
8. A sharp weapon
9. What a person should do when it rains
10. A group of notes
11. A sunburned man
12. A jungle animal
13. The son of Mr. and Mrs. Kole, who became a knight
14. How to track a woman criminal
15. A person who places stress
16. How the poet wrote his love
17. The amount of food one of the Detroit Lions eats at one meal
18. A gauge that won't take nickels
19. Latin American dances
20. A dog kept in the freezer
21. A hotel bookkeeper
22. Two cisterns
23. Where escaped prisoners hide out
24. To be in favor of farm machinery
25. A tall kettle on the fire
26. A program of light beams
27. A dog that is no more
28. When the sun is blocked by the moon
29. A prisoner's poem
30. What the little child said when his parrot flew away
31. What the prison inmate did to while away his time by raising insects
32. A rather attractive bit of confusion
33. How the French revolutionist would get rid of his enemy
34. A bent line that's been in an accident
35. What the little acorn said when it grew up
36. How the Southern farmer greeted his friend Cyrus
37. A place where sales are made
38. What the prisoner magician did on his wife's birthday
39. A sultan's act

Area
Acute Angle
Altitude
Angle
Arc
Axiom
Base
Bisector
Center
Centroid
Chord
Circle
Coincide
Complement
Concave
Concentric
Cone
Congruence
Converse
Cube
Cylinder
Degree
Diameter
Ellipse
Exterior
Excenter
Geometry
Hypotenuse
Inscribe
Intersect
Isosceles
Inverse
Line
Loci
Median
Obtuse
Origin
Parallels
Perpendicular
Pi
Polygon
Postulate
Prism
Proportion
Protractor
Pyramid
Radius
Ray

40. Fear of height
41. What the student did when asked from what continent is U Thant?
42. The middle wharf
43. Whey the greeting card came after your birthday
44. What the student said after seeing a bunch of laughing people
45. For listening but not watching
46. A song in an opera
47. A window finisher
48. Icecream container
49. A young seal

Ratio
Rectangle
Reflection
Region
Rotation
Ruler
Rhombus
Secant
Sector
Similar
Sphere
Square
Tangent
Theorem
Translation
Trapezoid
Vertical

GEOMETRIC DAFFYNITIONS ANSWERS (from Oct. 1969 V.E.A. *Math News)*

1. Secant
2. Ruler
3. Prism
4. Median
5. Square
6. Complement
7. Pi
8. Sphere
9. Coincide
10. Chord
11. Tangent
12. Line
13. Circle
14. Center
15. Excenter
16. Inverse
17. Proportion
18. Diameter
19. Rhombus
20. Perpendicular
21. Inscribe
22. Parallels
23. Concave
24. Protractor
25. Hypotenuse
26. Ratio
27. Exterior
28. Ellipse
29. Converse
30. Polygon
31. Congruence
32. Acute Angle
33. Axiom
34. Rectangle
35. Geometry
36. Loci
37. Bisector
38. Concentric
39. Degree
40. Vertical
41. Translation
42. Pyramid
43. Postulate
44. Isosceles
45. Origin
46. Area
47. Cylinder
48. Cone
49. Cube

THE STORY OF JOE SINE

One day Joe *Sine* went to call on his new neighbors who lived in the *adjacent* house. He was a handsome *tangent*, a confirmed bachelor.

Joe was met at the door by two sisters who had anything but *congruent* figures. The first, *Deca Gon*, had real *construction* problems. Her *discontinuous* curves were *intersected* at various *angles* by *parallel* lines. The second sister, *Polly Gon*, was dressed in a pretty *co-ordinate* set and it was obvious that her *natural* curves ran into *imaginary* numbers. Just looking from the *first* to the *second*, Joe found his interest *compounding* rapidly. What poor Joe did not know was that Polly know all the *angles* and was an expert at taking *squares*.

Joe was invited to come in and sit down. Deca proved to be as *square* as she looked and just sat there like a *log*. Polly, at a given *sine*, sent Deca out to find some *roots* to make tea. While she was gone, Polly served Joe *pi*. Then she used the *complementary* angle and Joe was soon reduced to *zero* power. Next she introduced an 'if ... then' *proposition*. That is, if Joe would marry her, then ... Joe said yes, then began to consider the possibility of spending the rest of his life *adjacent* to her side. He suddenly became very nervous and began crossing and uncrossing his legs for *joint* variation. What would be a hero's *formula* for getting out of this mess? Joe was so scared he nearly had a *corollary* coronary.

But the tension was suddenly borken when Deca came bursting through the door with a tremendous discovery. Against all *probability*, she had dug up a freak of nature, a *square* root!

'Chips from the Mathematical Log' published by NCTM from *Washington Mathematics*.

The above story could be made into an interesting problem by leaving out the italicized words and supplying them in a list at the bottom.

DO-DECA-BALL

Do-deca-ball is a word invented to describe a ball made from six strips of paper and a bit of paste. The Greek word 'dodeka' means 12, and the do-deca-ball has 12 holes in its surface, each in the shape of a pentagon.

THE STRIPS:
Cut six strips (from construction paper of six colors, if desired). The paper should be stiffer than wrapping paper, but lighter than the cardboard of which boxes are made. The larger the ball desired, the heavier the paper should be. The strips should be just 18 times as long as they are wide; strips 12" long (plus overlap) by 5/8" wide make a very nice size of ball, about 3½" in diameter. Cut strips exactly.

LAYING OUT THE STRIPS:
Lay out five strips in the form of a five-pointed star, as in Figure 1. Note that each strip goes over or under each of the other four strips, as in ordinary flat weaving. There is just one simple rule to remember: where three strips come together and cross each other, as in Figure 2, *the left hand strip will always go over the right hand strip.* That occurs five times in your five-pointed star, and it is a good idea to check each set of three, to make sure it obeys this rule.

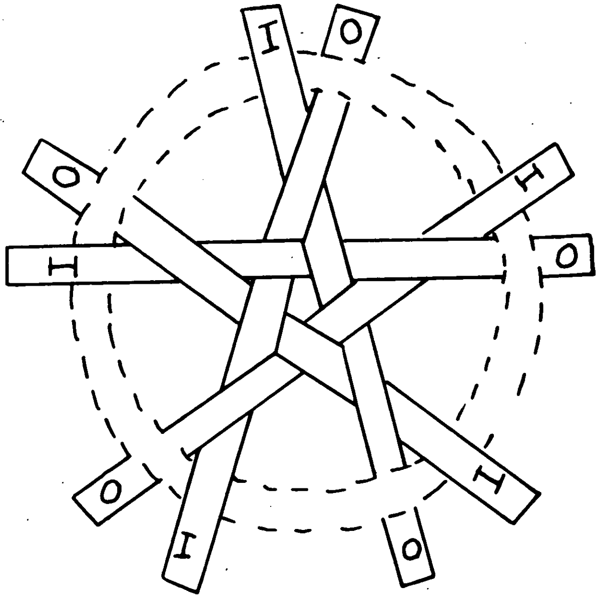


Figure 1

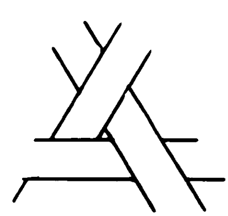


Figure 2

PUTTING ON THE EQUATOR

The one strip left over is the equator, because it is going to go right around the middle of the ball, like the equator of a globe. First, glue or paste the ends of this last strip together to form a circle. For this size of ball, the overlap for gluing is ¼". For smaller balls, it is proportionately smaller. A few paper clips will come in handy for holding the ends together while the glue or paste is drying. Now look at Figure 1 and you will see a big circle around the outside (drawn with dotted lines). It represents the position of the equator-except that, instead of flattening out the equator to fit the flat five-pointed star, it is necessary to curve the points of the star upward so that they will fit onto the smaller equator.

There are now 10 loose ends to your five-pointed star. Five of these will go *inside* the equator and five *outside*. In Fig. 1, the ones that go inside are marked 'I' and those that go outside are marked 'O'. Copy these markings, if desired. Look at Fig. 3. Note that the strips cross in pairs just above the equator and each pair is paper-clipped. The center of the five-pointed star is now at the south pole of your ball.

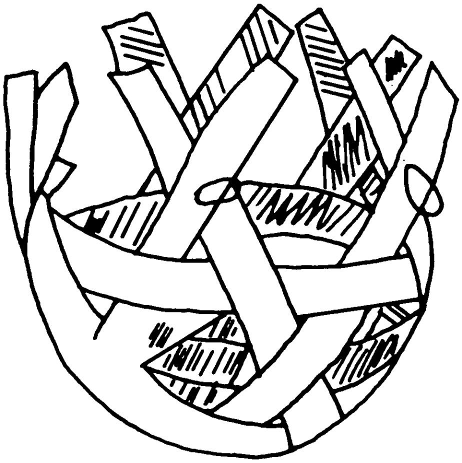


Figure 3

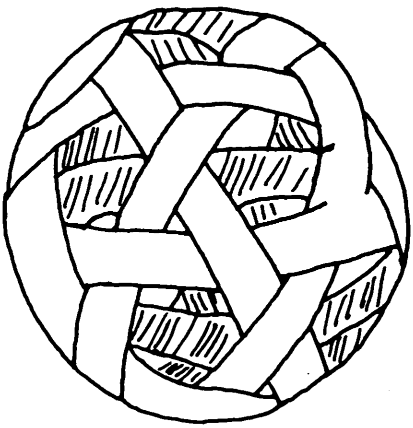


Figure 4

FINISHING THE NORTH POLE:

To finish the ball, glue the ends of any one of the five unglued strips together, using the overlap as marked. A paper clip again will be useful while the glue is drying. Find one pair of the clipped-together strips that is ready to criss-cross with the strip already glued, one end goes over and the other under the glued strip. After criss-crossing this pair, match each of these strips with its other end, and glue them. Three strips are now complete, besides the equator. Glue the two remaining strips, making sure that any one strip passes alternately over and under the other strips. Remove the clips, and the do-deca-ball is complete. (Figure 4)