Vector

BRITISH COLUMBIA ASSOCIATION OF MATHEMATICS TEACHERS

NEWSLETTER

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Don't Delay Join Your Math PSA NOW!

In return you will receive:

1. Newsletters
   - this one is short for early distribution -- later issues will be packed with as many items of interest as I can find.
2. Journals
   - one is ready now, for distribution in November -- one more by June (two, if finances will permit).
3. Dialog
   - contact with mathematics teachers throughout British Columbia, Canada, and even the U.S.A.

Make sure YOUR application is in before November 15!

PSA MEMBERSHIP

Membership is now open to any person wishing to join. You need not be a member of the BCTF; you need simply agree in principle with the aims and objectives of the BCTF. If you are not a member of the BCTF and wish to join the BCAMT, NOW is your chance.

Join before November 15 (please). You really don't have to enroll by that date because people who join after it may become members, BUT no grant will be given. If you join before November 15, the BCAMT gains from $2.00 to $3.00 extra revenue, which we may spend for our membership. You are worth more before November 15!

Please pass this newsletter around. Show it to other people in your school. Show it to friends who are not members of the BCTF. Remember, the more members we have, the more money we have available and the more we can spend directly on you.

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ACTION - REACTION

1. You may be interested in the July-August 1969 issue of The Journal of Educational Research, Vol. 62, No. 10, which focuses on mathematics research. Articles include: 'Success in Calculus,' 'Geometry Achievement,' 'Mathematics Attitude.' The journal is available on loan from the BCTF Resources Center.

2. What was your reaction to the survey test of last May in Academic Math 10? Have you seen the results and the report? I should like to receive some opinions on the value of the survey so that they may be printed in the next newsletter.

3. Your executive has decided to abandon the math contest it has been sponsoring during the last few years. It feels that the MAA is a good contest for a Grade 12 maximum level, and that the Ontario Math Contest is good for a Grade 11 maximum level, but that there is a real need for a contest which is designed for the more restricted junior secondary school population. The executive is now in the process of organizing a math contest which will be open only to students of Math 8, 9 and 10. Anyone interested in helping to organize it? Let us know!

4. Jim Clark has resigned as NCTM representative (Len Gamble is the new representative). However, Jim has a fairly large stock of NCTM materials. So, if you wish any information on NCTM materials, Jim Clark (21054 Clark Avenue, R.R. 3, Langley) is still a nearer source than Washington, D.C.

5. We have available a film and tape-recording on the NCTM. If you are interested, it may be borrowed from our secretary, Isobel Leask.

6. This newsletter probably won't reach you in time, but here is a last reminder of the 8th Northwest Mathematics Conference to be held in Eugene, Oregon on October 10-11, 1969. We mailed brochures to all BCAMT members and to all secondary schools in the province. Why not take advantage of the Monday holiday (October 13) and take a trip to the U.S.A.?

7. There are obviously great differences between Grade 9 and Grade 11 students. I've felt for some time that either the Math 11 course or some Math 11 teachers are out of touch with the Math 9 course. I have the promise of an article by a teacher who has just returned to a junior secondary school after spending a year in a senior secondary school. Are some Math 11 teachers or is the Math 11 course out of touch with reality, or am I misinformed? Any reaction?

8. Your school principal should have received a Teacher's Manual for General Mathematics 9, 10, 11 prepared by a group of teachers in Victoria. Are we heading into an era in which the general mathematics curriculum is to be 'practical' and comprising of 'basic skills,' or can we offer something more interesting? What is your reaction to the manual? Let me know!

LEARNING CONDITIONS

- are you interested?

Last January, the Curriculum Committee made several recommendations:

1. that PSAs should involve themselves directly in the formation of the BCTF's position on effective teaching and learning conditions.
2. that interested PSAs prepare briefs outlining their

position on desirable and undesirable teaching and learning conditions as they pertain to their particular area of specialization, such briefs to be submitted before November 15, 1969.

You are being asked for recommendations on desirable (and/or undesirable) conditions with respect to the physical environment, learning materials, class size or composition, supportive staff and professional training that should apply in your particular area.

A four-page outline (Learning Conditions Committee -- Policies and Procedures adopted by the 1969 AGM), which may provide some direction, is available from the BCTF.

If you are interested in learning conditions, get involved and let your opinions be known by writing to Menno Wiebe (Vice-president, BCAMT). He will collect all opinions and present them to the Learning Conditions Committee.

Division by Zero and Logical Rigor

Do they bother you or your students? We divide by zero all the time in calculus -- or do we? Do you agree or disagree with the concern expressed in the following article?

CALCULUS FOR THE CANTANKEROUS

- by Bruce Ewen,
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A typical development of a derivative proceeds by finding the slope of a secant for $y = x^3$ (choose your own function; the development will be the same) that is, $\frac{\Delta y}{\Delta x} = \frac{x_2^3 - x_1^3}{x_2 - x_1}$, which can be simplified and have meaning only if $x_2 \neq x_1$. When we use this valid expression for the slope of a secant to produce the slope of a tangent, the logical gymnastics are questionable, to say the least, since in the early part of the exercise $\Delta x \neq 0$ (read: must not be) and in the latter part $\Delta x = 0$. It matters little what devious language we use, it remains a fact that in the exercise we have accepted the 'meaningless' $\frac{0}{0}$ as equal to a real number.

Now, if you will not agree with me that the language which is used to justify logically this operation is devious, I invite you to read the definition of a limit, which appears in any calculus textbook, into a tape-recorder and then listen to your own voice. See if you can follow it yourself! Jennings' Introduction to Calculus, used in British Columbia, avoids the language of limits with a profusion of sybolism. If we expect

today's teenagers to be enthralled by mathematics, indeed if we expect them not to be turned away from it, our language must come down to earth a little.

Our predecessors have been concerned with avoiding, or explaining away, the appearance of $\frac{0}{0}$ in an expression. Now, if $\frac{0}{5} = 0$ and $\frac{5}{0}$ does not exist, is it unreasonable to write $\frac{0}{5} < \frac{0}{0} < \frac{5}{0}$? Then $\frac{0}{0}$ is a real number, whose value depends upon the context in which it appears. You say you don't like that? I guess we'll have to get along without zero over zero.

For the example $y = x^3$ above, the expression for the slope of the secant from $x = a$ to $x = b$ is $b^2 + ba + a^2$, and for the slope of the secant from $x = b$ to $x = c$ is $b^2 + bc + c^2$. Now, if $0 < a < b < c$, the following is true:

$$b^2 + ba + a^2 < b^2 + b^2 + b^2 < b^2 + bc + c^2$$

the three quantities mentioned having the same structure and, hence, describing the same kind of thing could not be compared in this way if they did not describe the same kind of thing. Note that the expression does not depend on the sizes of the intervals $a - b$ or $b - c$. Our transitive expression must then read: 'the slope of the secant from $x = b$ to $x = b$ is between the slope of the secant from $x = a$ to $x = b$ and the slope of the secant from $x = b$ to $x = c$.'

Now, the slope of a secant from $x = b$ to $x = b$ is obviously the slope of the tangent at $x = b$. We can therefore say that $3b^2$ gives the slope of the tangent at $x = b$ for $y = x^3$.

But wait! Let's see what happens to our transitive expression if we make zero of its smallest member by subtracting from each member the value of the slope of secant $a - b$: we have $m_{\text{sec } a-b} < m_{\text{tan at } b} < m_{\text{sec } b-c}$; subtracting, we have $0 < m_{\text{tan at } b} - m_{\text{sec } a-b} < \text{sec } b - c - m_{\text{sec } a-b}$. This means that, for the foregoing discussion to have validity, the change of slope must be different from zero in all the intervals used in the development.

It seems about time the formulation of mathematical expression, most of which is relatively unchanged since its origination, was reduced to match the difficulty of the ideas involved, otherwise, we shall continue to drive many capable persons away from the subject.