Credit Humber Association for Mathematics Promotion

CHAMP News

Volume # 1 Issue #2
Spring 1997

Jeff Irvine
Brampton Centennial S.S.
Peel Board of Education

CHAMP is an association for Mathematics Teachers of Halton, Peel , Etobicoke and Dufferin Peel.

Franklin's Math - An Interview With Grade One Teacher, Tami Moase

CHAMP News: Tami, what is ***Franklin's Math?***

Tami Moase: ***Franklin's Math*** is a CD Rom Program which has been a resounding success when I've used it with my Grade One class at Ridgeview PS.

CN: Why do your Grade One students enjoy ***Franklin's Math?***

TM: There are three levels of difficulty. Level One is concrete - for example, equating pictures of three frogs with pictures of three elephants. Level Two begins abstraction by equating pictures of three frogs to the numeral 3. Level Three is the most abstract, progressing to simple equations like 3 + 4 = 7.

CN: What do you as a teacher like about these levels?

TM: The different levels allow me to individualize programs for each of my students depending on what level of reasoning they are at. More advanced students can be challenged and don't get bored. Students at earlier levels of reasoning have activities at their level and don't get frustrated.

CN: Is there any variety in the activities?

TM: There are many sections in ***Franklin's Math.*** Among the sections are Patterning Activities, Time, Money, Counting by 2's, 5's, 10's, Number Concepts, basic Number Facts, and a Matching Game which is similar to the

game Concentration. The Patterning activities are the children's favourites. They enjoy patterning, and even the least advanced kids can be successful at basic patterns.

CN: Do the children get bored once they have seen an activity before?

TM: No, not all. The activities are never the same twice in a row. The basic structure may be the same, but the questions are always different.

CN: Can you describe the students with whom you have used ***Franklin's Math***?

TM: I've used this CD with all my students, from ESL students, who have very limited English skills, through very advanced students, who have already mastered the Grade One Math curriculum.

CN: What's your opinion of the graphics quality of ***Franklin's Math?***

TM: The graphics are excellent. They provide bright, eye-catching colour and good detail to maintain students' attention.

CN: How much does it cost?

TM: The ***Franklin's Math*** CD price is approximately $40 to $50. It's well worth the price.

CN: Please give us your overall rating of ***Franklin's Math.***

TM: ***Franklin's Math*** allows every one of my students to realize success. The wide variety of levels and activities and the high quality graphics make it a grabber for every student. I highly recommend ***Franklin's Math*** for your Grade One classroom.

In This Issue

EDITOR'S MESSAGE

Welcome to the second issue of CHAMP News, exclusively for members of CHAMP. As members you have a voice in Mathematics Education in Ontario. You also receive significant tangible benefits including the newsletter, reduced conference rates, social events and an exclusive CHAMP Hospitality Suite at OAME 97.

Be sure to renew your CHAMP membership, and encourage your colleagues to join us.

Jeff Irvine
President, CHAMP

A Special Note to Our Halton Members:

Recently you may have received a letter from Grand Valley Mathematics Association indicating that GVMA is your local OAME regional chapter. This is not correct. CHAMP is your Regional Chapter of OAME and has been since its founding. Please inform your friends, colleagues and acquaintances that CHAMP is the OAME affiliation they should check off when joining or renewing OAME memberships.

Request For Submissions

CHAMP, your local Regional Chapter of OAME (Ontario Association For Mathematics Education), publishes a newsletter three times per school year. We are especially interested in publishing articles from Elementary Mathematics teachers.

Producing an acceptable article for the newsletter need not be time consuming. Every teacher has done something in their classroom on Mathematics which "works" well and benefits success. Just tell us what it was and how it worked. If there is a particularly good worksheet, include a copy. If the activity involved computer software, tell us which programs and where to get them (if this information is available).

An article should be approximately 250 words (equivalent to one page typed, double spaced). It may be submitted typed or written. Be sure to include your name and school. Samples of student work may also be included and will be printed in the newsletter if space permits.

Copy deadline for the next issue is May 15, 1997. Please consider making a submission.

Send articles to: JEFF IRVINE
Brampton Centennial Secondary School
251 McMurchy Ave. South
Brampton, ON
L6Y 1Z4

Please feel free to call me at 451-2860 ext 230 if you have questions.

CHAMP NEWS

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Brampton Centennial Secondary School: BPC 4AG
Production: Dufferin Peel-Print Shop

O.A.M.E Conference 1997

Approximate
Conference Fees:

<u>OAME Current Members Only</u>

Full Conference	$150.00
Thursday May 8 Only	$ 90.00
Friday May 9 Only	$ 90.00
Saturday May 10 Only	$ 40.00

<u>Non-Members Only</u>

Full Conference	$180.00
Thursday May 8 Only	$105.00
Friday May 9 Only	$105.00
Saturday May 10 Only	$ 50.00

BE SURE TO APPLY FOR FUNDING EARLY!

Be sure to visit the CHAMP Hospitality Suite at OAME 97. Exclusive to CHAMP members. Check at the desk for room location. Tickets for two free beverages are enclosed with this newsletter (CHAMP members only).

School Wide Arithmetic Testing

by Kyra Kristensen-Irvine

Vice-Principal, Ridgeview PS

Assessment, accountability and evaluation are all words we hear a lot lately. Parents want to know where their children stand in core subject knowledge. Teachers need to know that they are making a difference.

One way we have attacked this situation at Ridgeview PS, is through standardized testing of all of our students in arithmetic skills. We are currently using the Peel Arithmetic Survey as the instrument. In September, we test all our students (Kindergarten through Grade Five). Each teacher keeps their own individual student results, and a comprehensive summary for each Grade Level is then compiled and illustrated graphically. September Grade Level Medians are reported. All the results are presented at a staff meeting. If there are any concerns, grade level meetings are set up to identify possible causes and devise strategies to improve the results. The focus is not on pointing fingers but providing support where the data shows a need.

The test is repeated school wide in February. We compare the results from September and set up intervention programmes to help students experiencing difficulties. During those years which included testing we were very happy to see the progress made by our students. The test is administered a final time in June. The teachers receiving these students at the next grade level are better able to organize program and purchase resources for the coming year. We also share the results with our School Council.

Benefits

1. When a parent asks for information on their child's progress, the teacher can respond with comparison to the entire grade level. Our school is very large, so there may be up to five classes at a particular grade level.
2. Teachers take ownership in student growth which is a direct result of their teaching.
3. School programming and resources are better matched to the needs of the students.
4. Communication among teachers at the same grade level has increased.
5. Teachers receiving students at the next grade level are better prepared and can individualize program much more efficiently since they already have some data to work with.
6. Student progress from year to year and over several years can be monitored.
7. Information on student achievement can be passed along to our local senior public school when students move on to Grade Six.
8. The comparative graphs from September, February and June provide hard data to celebrating student progress.

My Viewpoint

Teachers have been quite excited to share the growth of their students. Granted, at first some were leery. However, growth was evident and support via the intervention programme was welcomed by teachers, parents and staff. While the instrument may not be perfect, it does provide a standardized method of evaluating on aspect of student learning. In a nutshell, this programme has been a celebration of teachers' efforts to increase the knowledge of their students.

Rockwell International Tours

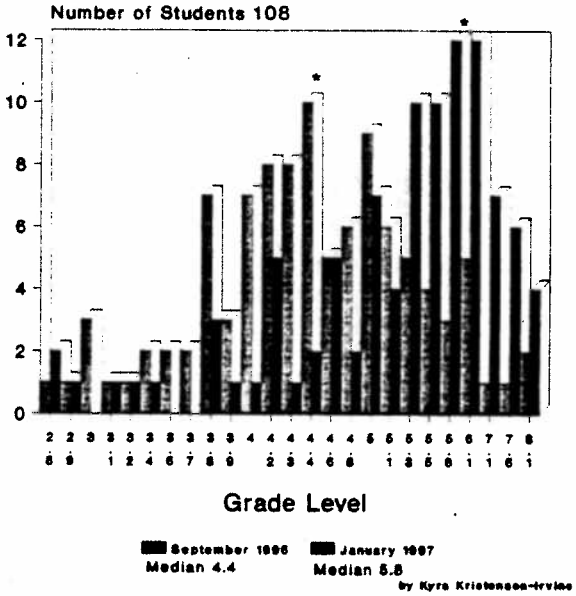
Rockwell International (Milton Plant) has generously offered to provide guided tours of its state-of-the-art high tech production facility. Plant personnel will also outline educational requirements and Rockwell initiatives for potential hires. Groups of teachers (maximum 8-10) are invited to contact :

Contact Jeff Irvine Brampton Centennial S.S.

Jeff Irvine,
Brampton Centennial S.S.
(905) 451 - 2860
EXT. 230
or fax:
(905) 451 - 4756
to arrange a tour. Please do not call Rockwell directly. Individual teachers should call Jeff and a tour will be arranged when a group fills.

Ridgeview P.S. 1996-97
Grade 5 Arithmetic Results
School-Wide Test

January: Median 5.8



Just Published!!

LINKING ASSESSMENT AND INSTRUCTION IN MATHEMATICS - JUNIOR YEARS

A companion publication to Linking Assessments and Instructions in Mathematics - Transition years

A cooperative effort of

Ontario Association for Mathematics Education
Ontario Association of Junior Educators
Ontario Mathematics Coordinators Association

This document is on sale at the following rates:

1 - 9 copies	$11.00 each
(OAME members $7.00 one copy per member)	
10 - 39 copies	$9.00 each
40 - 79 copies	$8.00 each
Over 80 copies	$7.00 each

MAILING AND DELIVERY COSTS EXTRA

ORDER FORM

Please send:
_____ Copies of Linking Assessment and Instruction in Mathematics -

Junior Years @ $_____

TOTAL AMOUNT $_____

Do not send cash or cheque. You will be invoiced with mailing costs added.

Ordered by:
NAME_____

ADDRESS_____

_____

_____

Phone number ( )

OAME
Membership # _____

PLEASE SEND THIS FORM TO OAME, PO BOX 96, ROSSEAU ON, P0C 1J0
Phone/fax (705) 732 - 1990

A CHAMP EVENT TO MARK ON YOUR CALENDAR!

Announcing...

SPRING MATHFEST

Place: St. Francis Xavier CSS
50 Bristol Rd., Mississauga

Date: APRIL 10th 1997

Time: 4:00 pm

- **Wine and Cheese**
- **CHAMP student awards presentation**
- **Interesting and useful workshops on a variety of topics**

Program/registration form is on page 7.

Workshops will feature Assessment/Evaluation, Math Portfolios, Math Connections, Problem-solving with Calculators and Computer software, Technology in the Workplace and much more. No matter what grade you teach (K-OAC), there will be topics of interest and use to you.

Be sure to keep April 10th free for Spring Mathfest!

Spring Mathfest '97

PROGRAM

4:00 - 5:15	Wine and Cheese/Registration
4:30 - 5:00	Student Awards
5:15 - 6:15	Workshops

Current
Helpful
Accessible
Mathematics
Professional Development

Workshops

1. Standards-based Assessment in Junior Mathematics (Anne Maller and Kim Meldram - J)

Anne and Kim will present the OAMEIOAJE Junior Assessment Document.

2. Using "Virtual Tiles" (Irene McIlvoy - I)

See how to use this software in Transition Years classes.

3. "Technology in the Workplace" (Harold Mackinnon (Rockwell) - any grade)

Just what are the mathematics, science and technology skills and requirements employers look for in the employees? Come and see what the people at Rockwell are looking for and what they can offer you as a teacher of Mathematics.

4. Mathematics software (Dave Chamberlin & Cathy Perry - J/I)

Dave and Cathy will demonstrate software designed for the Junior International Grades.

Workshops

5. Using the TI-92 in Intermediate/Senior classes (Fred Ferneyhough - I/S)

Fred will demonstrate how he uses this Graphics Calculator/Symbolic Manipulator in grade 10 and grade 11 algebra instruction.

6. The Geometers' Sketchpad (Paal Cox - I/S)

A hands-on introduction to this exciting and popular software.

7. Mathworks (Marion Gadsby and Sherry Singer - I/S)

For 10 years Turner Fenton SS has been successfully using a worksheet-based program to teach the Grade 10 General Level Mathematics course. The authors will discuss the pro's and con's of the program which will soon be published.

8. Portfolios in Transition Years Mathematics (Vito Calella and Brandan Johnson - I)

Using portfolio assessment in Grade 7/8 Mathematics

9. Hands-on with Corel Draw (Tom Caswell - I/S)

See how easy it is to make perfect diagrams using Corel Draw.

SEND REGISTRATION TO:

Peel
Anne Muller **Lisgar P.S.**
Phone: 785 - 0105
FAX: 785 - 0108

Dufferin-Peel
Sue Trew **C.E.C.**
Phone: 890 - 0708
Ext 4356
FAX: 890 - 6076

Halton
c/o Susan Klassen, J.W. Singleton Centre
Phone: (905) 335 - 3663
FAX: (905) 335 - 9802

Etobicoke
Mike Wierzbe **Board Office**
Civic Centre Court
Phone: (416) 394 - 7289
FAX: (416) 394 - 6420

Registration

Name: _____

School: _____

Phone: _____

Workshop Selection

☐ **First Choice**

☐ **Second**

CHAMP ☐ **MEMBER** *(no charge)*

☐ **NON-MEMBER** *($10*)*

** Make cheque payable to CHAMP*

The Famous Moving Particle Analysis: A Graphical Approach

A Topic From MCA 0A0
by
Jeff Irvine

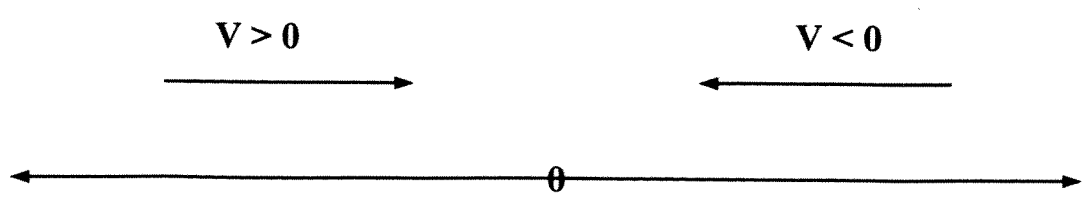
"A particle moves on a straight line with position function $p(t) = t^3 + t^2 - 4t - 4$.
Determine

(a) When the particle is speeding up
(b) When the particle is slowing down
(c) When is the particle is moving towards the origin"

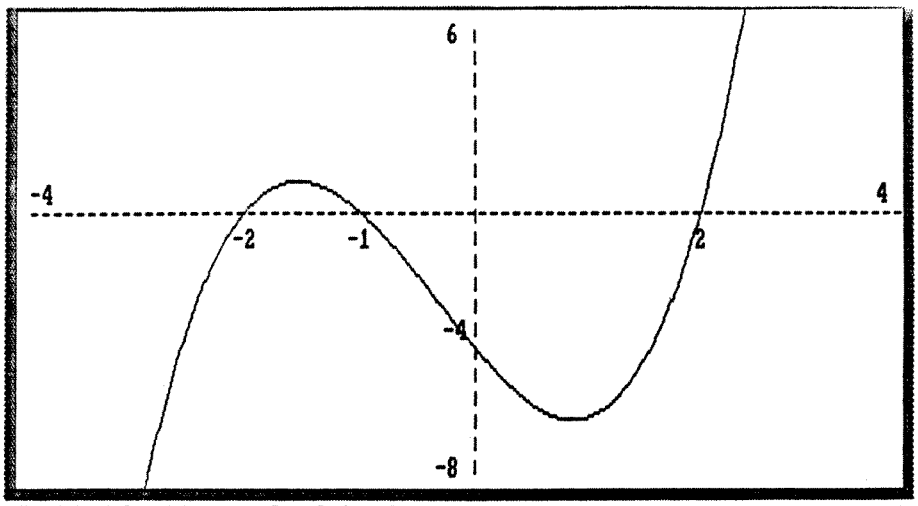
This is a standard Calculus question, requiring the student to find first and second derivatives (velocity and acceleration) and then determine when certain conditions are met by the three functions. For example, to answer (a) above, "*When is the particle speeding up*", students must determine for which intervals of time both **velocity** and **acceleration** are in the same direction (either both positive or both negative). This may involve solving a quadratic (or higher degree) inequality. One approach to this is to construct a table after factoring the polynomials. Besides running into problems if the polynomials don't factor nicely, students often have trouble visualizing the required intervals. Of course, with current calculators or computers, the factoring problem can be eliminated. However, the visualization problem remains.

An approach which I have used very successfully is to have students sketch graphs of the three functions p(t), p'(t) and p"(t) vertically above one another, using the same horizontal scale... With the aid of these graphs the questions posed above can be answered quite easily, since the required regions can be located simply on the graphs. For example, to answer (a) above (intervals during which the particle is speeding up), look at the velocity and acceleration graphs. Locate the region where both graphs are positive (above the horizontal axis): This gives $t > 0.87$. The other possibility is both functions negative (below the horizontal axis), giving $-1.54 < t < -0.33$. For (b) (slowing down), locate regions in which the two functions have opposite signs, giving $t<-1.54$ and $-0.33<t<0.87$. Question (c) (moving toward the origin) requires the particle to be on the negative side of the origin and moving to the right, or the particle to be on the positive side of the origin and moving left. By comparing regions on the graphs of position and velocity the results are $t<-2$; $0.87<t<2$; $-1.54 <t<-1$.

The graphical approach enables the student to visualize and analyze the situation more easily, while reinforcing the use of derivatives and graph sketching as problem solving tools.

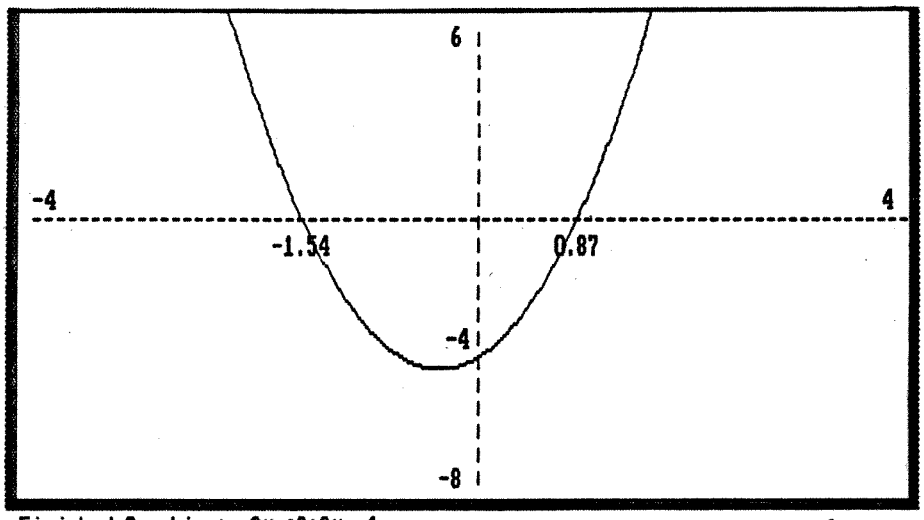


Conditions for "Moving Toward the Origin" $p < 0$ and $v > 0$ OR $p > 0$ and $v < 0$



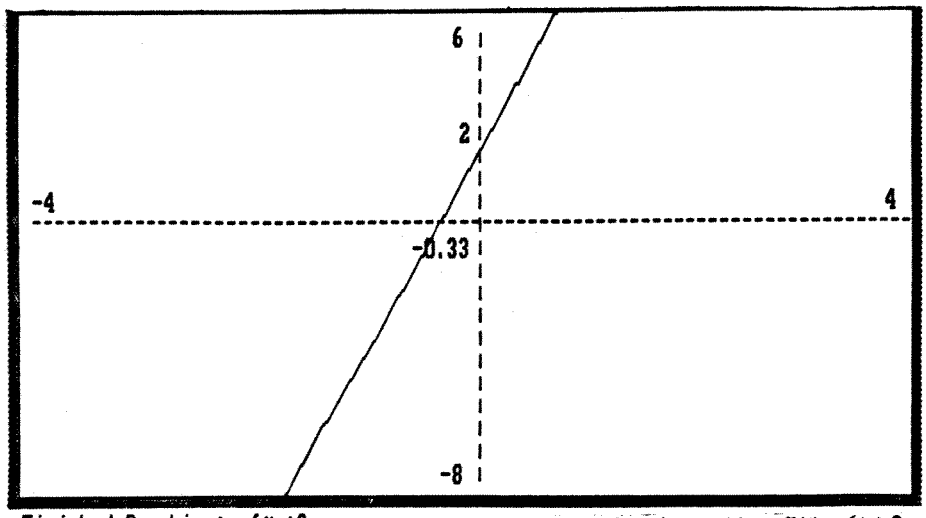
Finished Graphing: x^3+x^2-4*x-4.

Position : $p(t) = t^3 + t^2 - 4t - 4$



Finished Graphing: 3*x^2+2*x-4.

Velocity : $v(t) = p'(t) = 3t^2 + 2t - 4$



Finished Graphing: 6*x+2.

Acceleration: $a(t) = p''(t) = 6t + 2$

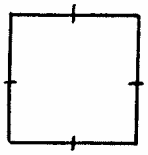
ACCORDIAN BOOKS

By Marlene Dewey
Clarkson S.S.

When we showed our π - thons (Math Club) this paper-folding construction, they loved it. Many students made them again in larger sizes for assignments in non-math subjects. These books are not only interesting but are lovely too if decorated inside with colour and/or patterns.

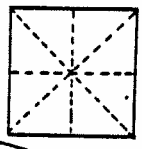
STEP 1

Start with 5 identical SQUARE sheets of paper.... white is best!



STEP 2

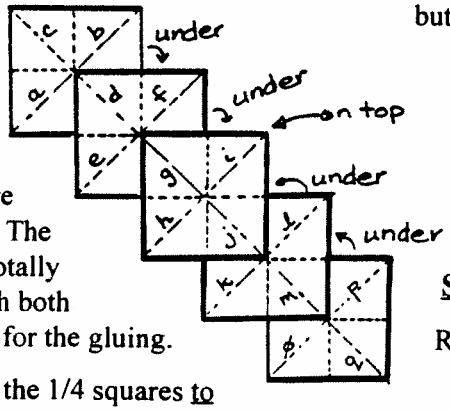
Fold EACH of the 5 squares as shown. Make <u>every</u> fold a <u>2-way fold</u>



<u>A 2-way fold</u> :
Fold and crease firmly.
Open.
Fold again along the crease but in the other direction.
Every fold done this way will fold forwards or backwards.

STEP 3

Glue the 5 squares together as shown...each square overlaps the previous square in 1/4 of the area. The middle square is totally visible on top, with both sides symmetrical for the gluing.



<u>NOTE</u> Overlap the 1/4 squares <u>to the fold lines but</u> <u>NOT</u> <u>ON THEM</u>... all folds must still be able to fold flat over overlaps

STEP 4

Pinch and push folds <u>a</u> and <u>b</u> in towards each other to make 1/4-square c match with 1/4-square d. Press flat you will have 4 BIG SQUARES with the top left 1/4-square at d very thick now with 1/4-square <u>c</u> on top.

STEP 5

Pinch and push folds <u>e</u> and <u>f BACK</u>, away from you, towards each other to make 1/4-squares c and d match with 1/4-square g but <u>underneath</u> <u>g</u>. You will now have 3 BIG SQUARES only now with extra thickness under 1/4-square <u>g</u>.

STEP 6

Repeat <u>step 4</u> with <u>j</u> and h so that the thick 1/4-square at <u>g</u> matches the 1/4-square at <u>j</u> but on <u>top</u> of <u>j</u>.

STEP 7

Repeat <u>Step 5</u> with <u>k</u> and <u>l</u>. The thickness will be below 1/4-square <u>m</u>.

STEP 8

Repeat step 4 with <u>o</u> and <u>p</u>. You will end up with one very thick 1/4-square only, under 1/4-square <u>q</u>.

STEP 9

Press Flat.

STEP 10

Cut out two cardboard squares which are about 1 cm longer on each side than mini square q.

STEP 11

Glue the surface of mini square q, centered onto one cardboard square. In the same way, glue the back of the thick mini-square onto the second square of cardboard, centering also. The two cardboard squares are the covers of your accordian book. Open and shut your book a few times for practice.

STEP 12

Write on or colour these pages as you wish. When the book is opened flat, a whole panorama appears. If the original squares have geometric line patterns on them, colouring them creates a work of art!

Puzzles to Ponder

by Richard Dewey

The following is a variation of questions posed by John T. Gordon of Georgia State University.

1. A regional gas company of Ontario sent out a notice with one of their fall gas bills notifying their customers of the advantages in using a programmable thermostat for their home. The company did a study which indicated that for every 1° C reduction in temperature, there would be an approximate savings of 4.5% in the heating cost. Assuming that your home is usually kept at a constant temperature of 22°C, by what percent will your heating bill be reduced if you reduced the temperature to 17°C from 9AM to 3:30Pm and to 20°C from 1AM to 5:30AM, keeping it at 22°C for the remainder of the time?

I came across a variation of the following problem in the reader reflections section of a recent edition of *The Mathematical Teacher*. I copied the equation down on a business card and put it into my wallet. Unfortunately I made no record of where I got it from. It's too good a question to pass up, so here is my version:

2. In answering the question: "If $x^2-3x+5=0$, find the value of the polynomial $x^4-6x^3+9x^2-7$", John solved the first equation for the value of x. This was no simple task since the solution required the use of complex numbers. He then substituted these values into the polynomial and evaluated. Jane, on the other hand, divided the polynomial by the expression x^2-3x+5 and used the remainder as her answer. Was Jane just lucky to get the correct answer? Explain. What answer did John and Jane get for the value of $x^4-6x^3+9x^2-7$?

Here is a variation of a neat problem by Eugene McGovern of Continental Reinsurance Corporation of New York City.

3. In discussing the batting averages of two Toronto Blue Jays' catchers, the following conversation might have taken place:

Team Statistician: I've been doing the statistics on Charlie O'Brien and Sandy Martinez for the past season. I've found that Martinez had a higher batting average than O'Brien in both the first and second half of the season.

Cito Gaston: I thought that O'Brien had the higher batting average for the season.

Team Statistician: He did.

Cito Gaston: You mean that Sandy's batting average for each half of the season was higher than Charlie's but Charlie's batting average was higher for the season?

Team Statistician: That's exactly what I mean!

Cito Gaston: How is that possible?

See if you can come up with an example to describe how that is possible. Here are some hints: The batting average is determined by dividing the number of hits by the number of times at bat. Assume that O'Brien was injured during the first half of the season and Marinez was injured during the second half.

Answers on Pg 15

Article Continued on Pg 12

4. A painting on a wall of an art gallery is 2 metres in height. An observer notes that the bottom of the painting is exactly one half metre above his eye level. How far from the wall should the observer stand to maximize the apparent size of the painting? Would it make any difference to the solution if the observer's eye level falls within the painting?

Those of you who have been around as long as I have might remember an article called Mathematical Misteaks by Robert Carman written in 1971. Here are some delightful tidbits from that article:

Freak Arithmetic Cancellations:

$$\frac{1\cancel{6}}{\cancel{6}4} = \frac{1}{4} \qquad \frac{2\cancel{6}}{\cancel{6}5} = \frac{2}{5} \qquad \frac{1\cancel{9}}{\cancel{9}5} = \frac{1}{5} \qquad \frac{4\cancel{9}}{\cancel{9}8} = \frac{4}{8}$$

Here are some more:

$$\frac{1\cancel{0}5}{6\cancel{0}0} = \frac{15}{60} \qquad \frac{3\cancel{8}5}{8\cancel{8}0} = \frac{35}{80} \qquad \frac{4\cancel{0}5}{9\cancel{0}0} = \frac{45}{90} \qquad \frac{3\cancel{3}44}{7\cancel{3}31} = \frac{344}{371}$$

Some very radical radicals:

$$\sqrt{4\frac{4}{3}} = 2\sqrt{\frac{4}{3}} \qquad \sqrt{9\frac{9}{8}} = 3\sqrt{\frac{9}{8}} \qquad \sqrt{6\frac{6}{35}} = 6\sqrt{\frac{6}{35}} \qquad \sqrt{7\frac{7}{48}} = 7\sqrt{\frac{7}{48}}$$

Note: You may wish to search for some interesting patterns here and come up with some new misteaks of your own.

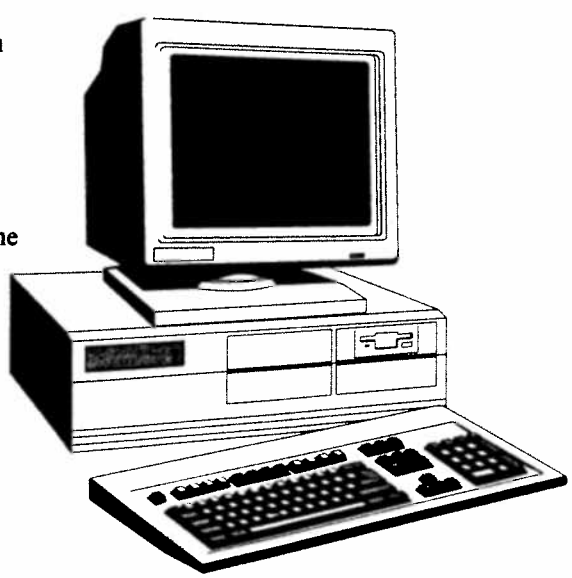
Software Books and Resources.

By Peter Cox

Many in Peel are in the process of replacing our old ICON, IBM, or what ever labs with more modern equipment. Those who teach Computer Studies finally might have an opportunity to upgrade their software base. It was with this in mind that I began to investigate what an appropriate upgrade path might be for North Park S.S.

We have been using Pascal as our programming language for a long time, and when the original IBM lab (286) came to our school, we opted to spend the cash for TurboPascal 5.0. It has provided a powerful, structured programming environment that is safe (no scary system calls), that is extensively supported by resource material and that supports the development of Units (libraries of routines), a tool that greatly facilitates the creation of stand alone programs. Time marches on.

A friend gave me a printout from Borland's webpage (WWW.BORLAND.COM). While browsing through the site it occurred to me that others might be interested in their products and in the software licence costs for educational institutions. A one time cost of 25 dollars U.S. per machine is the most expensive it gets for many of their packages.



TurboPascal for Windows 1.5, looks like it will run on our new networks. It promises a Windows development environment, allows the development of Windows (using and look-alike) stand -alone applications and is fully OOPs enabled. I find the idea of being able to teach 11, 12 , and OAC, using the same language base but with increasingly more professional results very attractive. One learning curve for staff and students at a price that is not to hard to take. The fact that over a thousand High Schools and Universities teach programming using TurboPascal seems significant.

Check out Borland's Web site. It's worth a look.

UNIVERSITY of GUELPH

UPdate '97

Professional Development Program for Secondary School Teachers, Guidance Counsellors and School Administrators

Friday, April 25, 1997

Engineering for the rest of us

Engineering's more than asphalt, circuit b... ds, and girders. This ... different types ... ious session ...

Preparing students to make the change from high school to university

of en... This session will consider a rang... of issues which face studen... they leave high school ... university. Particul... be given to the ...

The World Wide Web and worthwhile wonderings

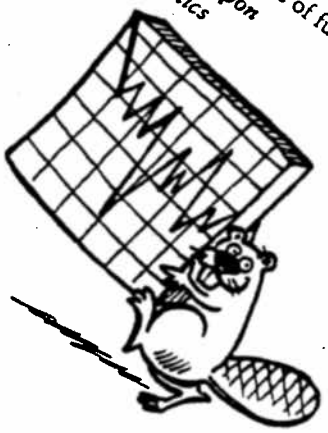
"World of Work Skills" - Better preparing students for the world of work

This session will inform participants of the innovative approach ...ted by the Bachelor of Scienc...re) program Commi... acquire the ski... empl... 199... Ar... C...

The stock market, the new Canadian economy and the education of business managers

This will be a discussion of the evolution of the Canadian economy, the stock market and the education needs of future managers.

Francis Tapon
Economics



Finding science in ice cream

Demonstra... scientific principles in ice cre... ical lab for ... late ... hope.

Campus Tour

...e University of Guelph with a student guide. Visit ...es, the library, and our facilities.

Innovations in the mortgage market

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Mathematics and Statistics

Jim Potvin

Human Biology and Nutritional Sciences

muscl... the effects ... act on the bod... outline the applica... to the design of sports ... the development of injuries, optimization of athletic performance, and the ergonomic design of occupational tasks.

PROGRAM SCHEDULE

8:30 - 9:00 a.m.	Arrival, Registration, Coffee
9:00 - 9:15 a.m.	Welcome
9:30 - 12:00 p.m.	Morning Sessions
12:00 - 1:00 p.m.	Lunch - Peter Clark Hall
1:00 - 1:45 p.m.	George Chuvalo
2:00 - 3:00 p.m.	Afternoon Session

Conference Fee $50 includes lunch and all sessions.

For a registration form please call:
(519) 824-4120 x 6716 or 8713
Fax (519) 766-9481

CHAMP Math Contest 1996

This year 7749 students wrote the contests. 32 senior public and 37 high schools from across the region participated. The Dufferin-Peel school board was on work-to-rule at the time the contests were written and so the number of participants appears lower than it was last year. In reality, the number of students writing the contests from the other three boards increased over that of last year. While it is possible to write the grade 7 contest in pairs, it appears that most students prefer to write it individually.

The published results this year combined all the schools writing and were not board-specific. For the first time, we had two schools tie for the team championship at the grade 7 level and at the grade 11 level. In Peel there were two elementary school students who wrote the grade 9 and 11 contests! Both young men did very well and should be very proud of their efforts.

The awards will be presented at the annual Spring Event to be held at St. Francis Xavier on April 10, 1997. All teachers, students and parents are welcome to attend this ceremony.

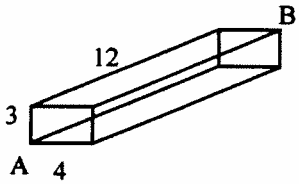
This contest is a year-round undertaking. We start writing it in May and finish the next April! The amount of work involved is vast and it wouldn't get done without a lot of people volunteering their time. Classroom teachers, writers, editors, publishers, markers, and secretaries all must be thanked for their contributions.

The Halton Board of Education will assume responsibility for the contest next year and best wishes are extended to them in this most important CHAMP endeavour.

Norm Wilkie
Erindale S.S.

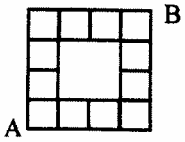
SAMPLE PROBLEMS FROM THIS YEAR'S CONTEST

1) A room is 4m wide, 12m long and 3m high. A fly in one corner at A wants to fly to the opposite corner of the room at B. The shortest distance he can fly is:



(a) 13 (b) 19 (c) 5 (d)17 (e) 18

2) Determine the number of difference paths that can be traced from A to B if you are allowed to move only upwards and to the right.



(a) 12 (b) 13 (c) 23 (d) 34 (e) 35

3) A stairway is being built by stacking blocks. The first stair contains 1 block, the second stair contains three blocks, the third stair contains five blocks and each subsequent stair contains two more blocks than the preceding stair. If 1996 blocks are available for the construction, how many more blocks are required to complete the last step?

(a) 29 (b) 59 (c) 44 (d) 45 (e) 49

4) In a class of 22 students, 15 are boys. If five boys and 3 girls join the class, the percent of the class which is now female is:

(a) 40% (b) 60% (c) 35% (d) 50% (e) 48%

5) The largest four-digit number to be found the in the sequence 1, 4, 7, 10, 13, 16,..., is:

(a) 9995 (b) 9996 (c) 9997 (d) 9998 (e) 9999

Problems Corner:

Answers to 2nd set of problems:

1. 9:00AM to 3:30PM = 6.5h 1:00AM to 5:30AM = 4.5h
   $22° - 17° = 5°$ $22° - 20° = 2°$

   $\left(\frac{6.5 \times 5}{24} + \frac{4.5 \times 2}{24}\right) \times 4.5\%$ = a savings of 7.78125%

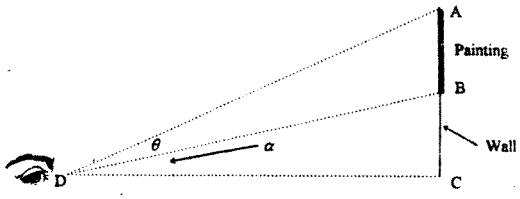
2. let $x^2 - 3x + 5 = f(x)$ and $x^4 - 6x^3 + 9x^2 - 7 = g(x)$
   when dividing $g(x)$ by $f(x)$ let $q(x)$ represent the quotient and $R(x)$ represent the remainder. Therefore, $g(x) = f(x) \times q(x) + R(x)$.
   But $f(x) = 0$, so $g(x)$ = the remainder $R(x)$.

   So: $x^4 - 6x^3 + 9x^2 - 7 \div x^2 - 3x + 5 = x^2 - 3x - 5$ with a remainder of 18
   and $\therefore x^4 - 6x^3 + 9x^2 - 7 = 18$.

3. Here is one example:

		Number of times at bat	Number of hits	Batting Average
First half season	Martinez	250	75	.300
	O'Brien	100	29	.290
Second half season	Martinez	50	18	.360
	O'Brien	300	99	.330
Whole season	Martinez	300	93	.310
	O'Brien	400	128	.320

4.

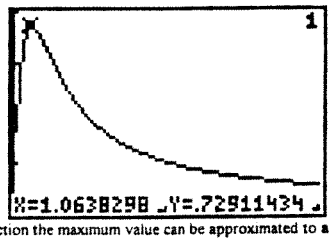


AB = 2 BC = .5 CD = x $\beta = \alpha + \theta$
or $\theta = \beta - \alpha$

$\beta = \tan^{-1}\left(\frac{2.5}{x}\right)$ and $\alpha = \tan^{-1}\left(\frac{5}{x}\right)$

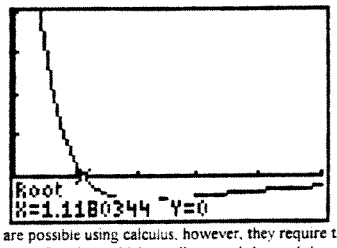
$$\therefore \theta(x) = \tan^{-1}\left(\frac{5}{2x}\right) - \tan^{-1}\left(\frac{1}{2x}\right)$$

If we put this function into a graphic calculator of a computer program like Theorist the graph will look like the following. (Note: set the domain to $0 \le x \le 20$ and the range to $0 \le y \le \frac{\pi}{4}$)



Using a tracing function the maximum value can be approximated to a value of x = 1.06m

Graphing the derivative and solving for the x-intercept will refine this answer to x = 1.1180344.



Algebraic solutions are possible using calculus, however, they require taking the derivatives of inverse trig functions which usually extends beyond the scope of the high school calculus course.

If the observer's eye falls within the boundaries of the painting, the maximum angle will occur when x = 0, which is not possible.

Answers to last edition:

1.
```
      1 1 7
    - 3 1 9
    -------
    1 0 5 3
  1 1 7
3 5 1
-------
3 7 3 2 3
```

2. 7774 pilches

3. This is a harmonic progression where $\frac{1}{30} + \frac{1}{45} = \frac{1}{n}$
   the problem can also be done geometrically by drawing two perpendiculars to a horizontal line of any length. Measure up one of the vertical lines 30 units from the horizontal and up 45 units from the other. Now, draw lines from these points to the opposite corners. These two lines will intersect somewhere in the middle. The vertical distance from this intersection point to the horizontal line will also give you the answer. By the way, the answer is 18 seconds.

4. What is the highest power of 2 in 1000!
   (Please note that there was a typographic error in the Volume 1 Issue 1 publication)
   $1000! = 1000 \times 999 \times 998 \times 997 \times \ldots$

Of these numbers			
	500	are divisable by	2^1
	250	are divisable by	2^2
	125	are divisable by	2^3
	62	are divisable by	2^4
	31	are divisable by	2^5
	15	are divisable by	2^6
	7	are divisable by	2^7
	3	are divisable by	2^8
	1	is divisable by	2^9
	994		

5. If $\sqrt{4 + 2\sqrt{3}} - \sqrt{28 + a\sqrt{3}} = -4$ solve for a.
   Traditional methods only make the problem worse, however, let
   $(c + d)^2 = 4 + 2\sqrt{3}$
   $c^2 + 2cd + d^2 = 4 + 2\sqrt{3}$
   $\therefore c^2 + d^2 = 4$ *and* $2cd = 2\sqrt{3}$
   $c^2 + \frac{3}{c^2} = 4$ and $c^4 + 3 = 4c^2$
   $\therefore c^4 - 4c^2 + 3 = 0$ and $(c^2 - 3)(c^2 - 1) = 0$
   $\therefore c = \pm\sqrt{3}, or \pm 1$

   Cases 1 and 2
   and $\sqrt{2 + 2\sqrt{3}} = 1 \pm \sqrt{3}$
   so the original expression $\sqrt{4 + 2\sqrt{3}} - \sqrt{28 + a\sqrt{3}} = -4$
   becomes $1 \pm \sqrt{3} - \sqrt{28 + a\sqrt{3}} = -4$
   $\therefore \sqrt{28 + a\sqrt{3}} = 5 \pm \sqrt{3}$
   squaring both sides we get: $28 + a\sqrt{3} = 25 \pm 10\sqrt{3} + 3$
   or $a\sqrt{3} = \pm 10\sqrt{3}$
   therefore $a = \pm 10$

   Cases 3 and 4
   and $\sqrt{2 + 2\sqrt{3}} = -1 \pm \sqrt{3}$
   so the original expression $\sqrt{4 + 2\sqrt{3}} - \sqrt{28 + a\sqrt{3}} = -4$
   becomes $-1 \pm \sqrt{3} - \sqrt{28 + a\sqrt{3}} = -4$
   $\therefore \sqrt{28 + a\sqrt{3}} = 3 \pm \sqrt{3}$
   squaring both sides we get: $28 + a\sqrt{3} = 9 \pm 6\sqrt{3} + 3$
   so $28 + a\sqrt{3} = 12 \pm 6\sqrt{3}$
   or $a\sqrt{3} = -16 \pm 6\sqrt{3}$
   and $3a = -16\sqrt{3} \pm 18$
   therefore $a = \frac{-16\sqrt{3}}{3} \pm 6$

Math Internet Sites

Surf the Net to an exciting Math site. Here are some possibilities. If you know a good Math site, share it. Send the Internet address to Jeff Irvine at Brampton Centennial Secondary School for publication in the next CHAMP News.

Organization	World Wide Web site URL
AMS	http://www.ams.org/
ASCD	http://www.ascd.org/
BBC	http://www.bbcnc.org.uk/education
Calculus Labs	http://www.calculus.net/labs/
Camel	http://www.camel.math.ca/home.html
CBC classroom site	http://www.cbc.ca
Chance	http://www.geom.umn.edu/docs/snell/chance/
Chess club/games	http://www.compulink.gr/chess (free sign-up)
Colourful Math	http://www.math.ucalgary.ca/~laf/colorful.html/
ECOS	http://www.schoolnet.ca/up/ECOS/
ENO	http://www.village.ca
Erdos for Kids	http://csr.uvic.ca/~e4k
Exercises in Math Readiness	http://math.usask.ca/readin/
Family Math	http://theory.lcs.mit.edu/~emjordan
Fractals	http://www.cnam.fr/fractals.html
Frequently Asked Math Questions	http://daisy.uwaterloo.ca/~alopez-o/math-faq/
History of Math	http://www-groups.dos.st-and.ac.uk/~history/index.html
History of Math	http://nunic.nu.edu/~jchao/math/math.html
K-12 Resource	http://www.yahoo.com
Kids Links	http://www.crc.ricoh.com/people/steve/kids.html
Lego News	http://legowww.homepages.com/
Math Central	http://fermat.math.uregina.ca/mathcentral/
Math History	http://aleph0.clarku.edu/~djoyce/mathhist/
Math Hots	http://www.abc.se/~m9847/calculus.html
Math Information	http://www.cm.cf.ac.uk
Math Magic	http://www.scri.fsu.edu/~dennis/topics/math_magic.html
Math Pages	http://www.seanet.com/~ksbrown/
Math Resources Catalog	http://mthwww.uwc.edu/wwwmahes
Math Sources	http://www.cwru.edu/CWRU/UL/SCIENCES/MathematicsInternet.html
Mathematician Biogs	http://www-groups.dcs.st-and.ac.uk/history-mathematics
MEGA Math	http://www.c3.lanl.gov/mega_math/
NASA Shuttle Web	http://shuttle.nasa.gov/
NCTM (Standards)	http://www.enc.org/cd/NCTM/280dtoc1.html
Pacific Rim	http://www.pacificrim.net/~mckenzie
Planet Earth	http://www.educ.queensu.ca/rcol/tbleconb.html
Portfolios	http://www-tep.ucsd.edu/TResource/portfolionews
School Home Pages	http://calvin.stemnet.nf
SchoolNET	gopher://gopher.schoolnet.carleton.ca
SchoolNET	http://www.schoolnet.ca
Schools in Nfld	http://calvin.stemnet.nf
Schools on the Internet	http://hillside.coled.umn.edu
Science/Math Resources	http://wwwhpcc.astro.washington.edu/scied/science.html
Search Engines	http://www.yahoo.com
Shell Centre	http://acorn.educ.nottingham.ac.uk
Shining Time Station	http://www.catt.ncsu.edu/users/gkeeper/
Solar Eclipse Paths	http://umbra.nascom.nasa.gov/eclipse/predictions/eclipse-paths.html
Sources in Statistics	http://www.cwru.edu/CWRU/UL/SCIENCES/MathematicsInternet.html
TERC	http://hub.terc.edu/terc.html
Texas Instruments	http://www.ti.com/calc/docs/calchome.html
The Geometry Forum	http://forum.swarthmore.edu/k12
Theodore Tugboat	http://www.cochran.com
Web home page	http://www.w3.org
Wild Geometry	http://www.geom.umn.edu/pps/gallery.html
Word Problems for Kids	http://juliet.stfx.ca/people/fac/pwang/mathpage/math.html
World Factbook '94	http://www.odci.gov/cia/publications/94fact