Credit Humber Association for Mathematics Promotion

CHAMP NEWS

Volume #2 Issue #2
Winter 1998

CHAMP is an association for Mathematics Teachers of Halton, Halton Separate, Peel and Dufferin Peel Separate Boards

"TAN Q" VERY MUCH!

Despite a shortage of articles by February 1st, teachers proved themselves to be CHAMPS! What an interesting collection we have received over the past few weeks. We say a sincere "**TAN Q**" to all of the contributors to this issue. We appreciate your time, effort and kindness in sharing with your colleagues in math teaching across the four boards. CHAMP invites and encourages others to follow this example of professional "careware" and "shareware".

In the coming months changes in education will challange our time, our energy, our patience and our confidence. It will be practical and almost essential for us to share to an even greater degree! Please consider making a contribution ... any length, any topic and any level of mathematics teaching is welcome!

Please send contributions to:
Marlene Dewey
Clarkson Secondary School
2524 Bromsgrove Rd.
Mississauga, ON L5J 1L8
or fax to (905) 822-6896

Please include your name, school, board, grade level and your school telephone and fax numbers.

We hope you enjoy this issue and find something in it which you can use in your classroom. And we hope to see your name listed as the author of one of our future articles.

Marlene Dewey

Happy "redN" !

In This Issue

Created by a team of students from Brampton Centennial Secondary School.
BPA-4AG-B: Aaron Walker (Team Leader), Amit Bodalia, Paul Boom, Krista Carberry, Paul Du, Becky Hall, Jill Kavanagh, Jason Mak, Stephanie Milne, Glenford Murray, Omar Patan, Saloni Purohit.
BPC-3AG-B: Jennifer Au, Tony Bacchus, Mark Chapman, Navdeep Sarao, and Harjinder Singh.

Math Class

Hangnails
Lower Back Pain
Other Fun Things

Taking Up Homework

By: Jeff Irvine (Brampton Centennial S.S.)

Is there anything most classroom teachers like less than taking up Math homework? [...the old "poke in the eye with a sharp stick" comes to mind, but not much else!]. Homework take-up is generally described as "boring", "a time waster","mind-numbing","eye-glazing" and other entertaining terms. Active, engaging and efficient methods of homework take-up seem to be few and far between. Here are some of the methods I've tried over my teaching career, not necessarily in order of preference:

- **Post solutions on the bulletin board.** Advantages include little lost time in class and relatively little boredom. Disadvantages —teacher must do presentable solutions for all questions; students must have the initiative to check the bulletin board and correct mistakes on their own; students unsure of their abilities may not approach the teacher for clarification.

- **Solutions in a "Solution Book" to which students can refer.** Advantages similar to the above. Disadvantages also similar, and enterprising/lazy students may simply remove (steal) pages of solutions.

- **Solutions shown on teacher-made overheads:** Advantages—students see correct Mathematical form; students can ask questions and clarifications; (virtually) all students will end up with correct solutions in their notes. Disadvantages—takes a lot of class time; teacher must prepare overheads for every question; BORING; students who don't have questions about homework are forced to move at the pace of the weakest student; some students have great difficulty copying notes from the overhead.

- **Teacher writes solutions to all questions on the blackboard.** Not even worth discussing!

- **Students write solutions to all questions on the blackboard.** This is a method I used to use quite a bit. By placing the question numbers in order on the blackboard prior to class, and by pre-selecting a student for each question, organizational time can be limited. Advantages—allows for discussion of problems; if no one requires discussion of a particular problem it can be skipped; students get a chance to show off their work; provides some incentive for students to actually try all the homework problems; teacher can select student writers from a wide variety of behavioral types (the quiet ones, the chronic no-homework ones, etc.). Disadvantages—big time commitment; often solutions will be skipped (and so just occupied valuable blackboard space); pace of class geared to weakest student; time must be allocated for students to correct their work using the blackboard solutions. I sometimes modified this method by allowing students to volunteer (rather than be volunteered), or by allowing a conscript to take a student helper with them to the board.

- **When students enter class, they write on the blackboard the numbers of questions to which they wish to see solutions. Student volunteers then write solutions on the blackboard, with the teacher handling any question for which no one volunteers.** Advantages—only those questions for which students have questions will get taken up; much less time spent than if every question is written on the blackboard; can focus on more difficult problems, or areas which were not clearly taught the previous day; strong students less likely to get bored. Disadvantages—still takes significant class time; what happens if no one volunteers? Does the teacher then do every selected question? Students may request every question from the homework; students still need to copy solutions from the blackboard, thus requiring time allocated

- **Check answers in the back of the book, in pairs:** Advantages—fairly efficient with respect to class time; allows discussion between pairs regarding correct solutions and alternate solutions; less threatening than whole-class discussion for weaker students. Disadvantages—focuses on answers rather than solutions; product not process is valued; some pairs may be incompatible or too social; some pairs may finish well before others, requiring useful tasks to keep them busy; pairs may be dominated by stronger student.

Continued on page 5

A ReCREATION Area

By: Renee Krajewski (Teacher Candinate - Queen's University)

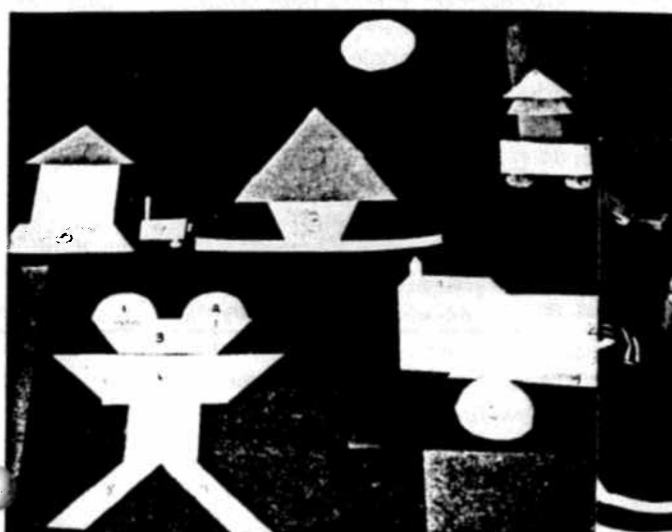
I have just finished a 14-week placement at Brampton Centennial S.S. in the Math and French Departments. This is the first year of the new program at the Education Faculty of Queen's University. One of the new elements of this program is the implementation of an Action Research project. The project has each teacher candidate answering the following question (depending on their personal interests): "How can I help my students improve the quality of education?" My response to this is that if we wish to improve the quality of learning, we first need to improve students' attitudes towards learning. For this reason, I chose to focus my Action Research on Mathematical Assessment. This has always been a topic which has concerned me, primarily because of the negative attitudes that most students have towards Math. It is difficult to foster a positive atmosphere towards the subject when the "traditional" Math test punishes students for human mistakes. Students may be interested in a particular Math unit, but the typical test at the end of the unit seems to invoke stress, as well as result in a hatred for the topic that was once so interesting. Tests do not need to be seen by students as evil means by which a teacher can punish his/her students. The purpose of my research is to find alternative means of testing which still evaluate students but in a more relaxed fashion.

> One crucial thing I learned: Do Not Stifle a creative genius.

One chapter that I had the opportunity to evaluate before my practicum ended dealt with the area of geometric figures. Rather than give a series of shapes to the students and have them calculate their respective areas, I handled the evaluation in a more informal manner. The test appeared more like an art lesson. I asked the students, armed with construction paper, glue and scissors, to construct a picture using rectangles, squares, triangles, trapezoids and circles. The students were not informed that this was for evaluating purposes. The requirement for these pictures was that they include a minimum of 8 of the figures studied in class and that none of them overlap. Once all of the pictures were completed, I had the students get into pairs and calculate the area of each of their creations. After this activity was completed, the students switched their pictures and calculated the area on their own. At this point they were informed that their work would be assessed. They would be graded on their accuracy, and their group working skills, as well as on their organization and creativity. One crucial thing that I learned: Do not stifle a creative genius. Some of the students who are typically uninterested in Math were taking a lot of time and effort to create these masterpieces. I had expected them to finish the construction in twenty minutes but this did not happen. This was one activity that I really did not mind giving extra time to.

As for the marks on this unit, they were incredible. (And they deserved to be.) The students produced better creations than I could ever have hoped. They had a great time and I heard many groups discussing how they calculated the areas of their figures. The marks ranged from 7 to 10 out of 10, with the majority perfect. Many of the students, who do not usually excel in this subject, really did a terrific job and I think it was a boost to their confidence level.

There are many advantages to this method of evaluation. The students were actually part of the test-writing process. Their constructions were the questions. A number of aspects were evaluated: originality, creativity, organization and group work. There are not many math tests that incorporate all of these areas. The students were also given a chance to see the work of their peers. Sharing ideas is a crucial part for the students: that's what life is.



Taking the Stairs

by Carol Danbrook
(W.G. Davis SR. P.S.)

It seems to go something like this- - - - - I can categorize my teaching into three methods, each for a different purpose. Usually when I begin a new topic, I study the curriculum documents available, make notes about what should have been learned in the formative grades, what should be taught in the "transition" years and then see what concepts are studied in the secondary years.

I follow a procedure of a brief review, discussion, or pretest, then a series of interesting (I hope) activities focussed on the particular expectation. This method of learning I call "riding the escalator".

Something quite different happens when I am trying to prepare my students for such challenging problem-solving contests as CHAMP or Gauss. At such times we have to "take the elevator", preferably the "express". By this I mean that I often teach concepts very quickly and intensely, hoping that they will be remembered for a little while. I always do this with a great deal of guilt and constantly assure my students that someday all will become clear. This type of teaching is not without its benefits because if students want to do well, they will be active learners. When the topic is explored later students can be more involved in exploring and proving the veracity of the concept.

But sometimes I like to "TAKE THE STAIRS". We take the stairs in our lives because we know it's good exercise. We discover muscles that are weak from little use. We know it is difficult but we have accomplished more when we have arrived. We certainly do not need to do it all the time, but sometimes we need to know that we can do it.

What does this have to do with the teaching of mathematics? I believe that many bright students are weak math students because they have been taught math by someone saying that- - -it is so.

You don't understand? Here's what you do. Memorize these formulas by this trick.

Unless students have faith that the system of thinking in mathematics is always logical and dependable they will avoid trying to understand complex concepts. Instead they should be thinking "maybe I didn't get it today, but I'll work on it tonight and tomorrow I will understand a little more".

A few times during the year we stop and TAKE THE STAIRS with a topic. Sometimes we "take the stairs" when we explore Multiplication of Mixed Numbers. The quick "elevator" method of course is to rename the mixed numbers to improper fractions. But what an opportunity to use many related math concepts and skills, all to reach the same correct answer.

Intermediate students themselves do not know many ways to restate the question, but they are fascinated and bemused by my great excitement at being able to prove it in yet another way! And of course they know that this does not happen for every lesson. But it could!

Consider the example 2 1/2 x 1 1/4. If we explore the question using the Distributive Property of Multiplication over Addition, we are also reaffirming that 2 1/2 means

2 + 1/2

So we follow the procedure of multiplying all parts of the term 2 1/2 with all parts of 1 1/4, and then adding the products. ie:

2 x 1 = 2
2 x 1/4=1/2
1/2 x 1=1/2
1/2 x 1/4=1/8
3 1/8

We can reverse the procedure because multiplicaton is Commutative. ie:

1 x 2=2
1 x 1/2=1/2
1/4 x 2=1/2
1/4 x 1/2=1/8
3 1/8

Using a calculator we can use the fraction function or rename the mixed number to decimals. ie: 2.5 x 1.25=3.125

If we considered the fractions in a metric problem-solving context it could look like this: The Varsity cross-country course was about 2 1/2 km or 2500 m. I ran one and a quarter times around the track. How many metres did I run? We can calculate 1.25 x 2500=3125 m or 3 1/8 km. This is an opportunity to notice that we do not multiply 2 1/2 km x 1 1/4 km or 2500 m x 1250 m. Also answer is in m or km, depending on which unit we used in the calculation.

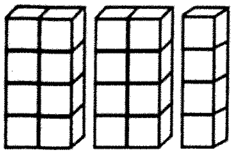
If we considered that 2 1/2 meant 2 1/2 hours, we would calculate 1 /1/4 periods of 150 minutes; 1.25 x 150 = 187.50. How can this be 3 1/8? 187.50 ÷ 60= 3.125 = 3 1/8!

Perhaps 2 1/2 means 2 1/2 dozen or 30. If 30 doughnuts can be glazed with one tub of icing, how many could be glazed with 1 1/4 tubs? 30 x 1.25=37.5. ie: 36 + 1.5 or 3 dozen plus 1 1/2 doughnuts is 1/8 of a dozen. ie:

1.5 x 8 = 12! We would also discuss that of course, you wouldn't glaze an eighth of a doughnut, only spread it thinly or open another tub of icing.

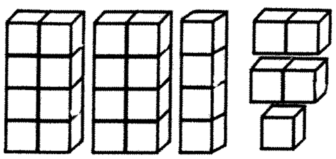
The best concrete material to use for this example is interlocking cubes. In this case, the "whole" would be made with 8 cubes.

The example would look like this-

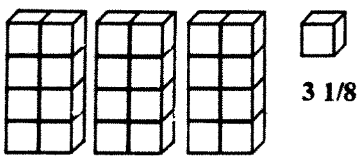


We would want one and one quarter of this 2 1/2

so we would have



or



3 1/8

All of these examples can be reversed to show that $3\ 1/8 \div 1\ 1/4 = 2\ 1/2$ and

$3\ 1/8 \div 2\ 1/2 = 1\ 1/4$

ie: $25/8 \times 4/5 = 5/2$ or $2\ 1/2$ or

$25/8 \times 2/5 = 5/4$ or $1\ 1/4$

By a thorough investigation of a single example, we can explore many math concepts. We can explore risk-taking by trying to reach the same result.

Our math power can be strengthened by sometimes "Taking the Stairs"!

...Taking Up Homework

- **Homework Groups:** This is an idea I got from Geoff Roulet at Queen's University. I really like it, although it's not perfect. Early in the school term, students are formed in groups of four. Homework is then discussed in these groups, for a specified time each class (time will vary depending on assignment and student responses). Advantages—group is less likely to be dominated by one student; focus is on solutions and alternate solutions rather than just answers; less threatening than whole-class disussion; incentive for students to try all assigned questions; teacher available as a resource if a group gets stuck; any questions which are revealed as problems for all the groups can be referred to the teacher for full class discussion; time is actively used by virtually all students; personalized teacher comments (for a group, or a particular student); groups can be varied at different times throughout the term; students take ownership of problems. Disadvantages—teacher will often discuss the same question multiple times (hopefully with different groups); sometimes personality problems within groups; may take more time than originally allotted, if groups have multiple questions.

Over the last several semesters, the Homework Group has been my dominant method. Of course, I have used many of the other methods as well, depending on the topic, focus and sometimes depending on the class dynamic. A very chatty class will make less efficient use of their time in homework groups. So will a highly non-verbal/anti-social class.

If you have a homework take-up method you'd be willing to share, I'd like to hear about it. You could call or fax me at Brampton Centennial Secondary School, 451-2860, fax 451-4756.

Calculator Corner

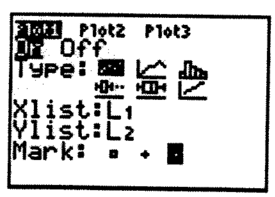
Data Analysis, Curve Fitting & Residuals

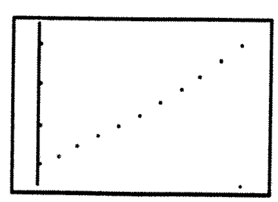
Richard Dewey, IndEC South

Data can be organized into lists and graphed using a scatter diagram. The analysis of this data requires a description of the pattern which relates the dependent and independent variables. Ideally, this description can be characterized by a mathematical function. Often, this function demonstrates a direct variation between the variables and will result in a linear function. Not long ago, the best way for a student to produce this function was to use graphical methods such as the median, median line. Further analysis requires advanced statistical methods such as the method of least squares. A grade 9 or 10 student, however, can easily produce the equation of a line of best fit using the statistical capabilities of the TI-83 graphic calculator. At the grade 10 level, a student can use the calculator to analyze data that fits more sophisticated patterns, like a quadratic, cubic, quartic, exponential, etc. pattern. This type of analysis produces a much richer mathematical environment. This capability also introduces a new and interesting question. How do we know which pattern is appropriate for a given data set?
The first step in the answer to this question leads us to a discussion of the significance of the correlation coefficient or "r value". This discussion should involve the concept of the residuals of the data.

Unfortunately, the correlation coefficient, used in isolation can be misleading. A correlation coefficient close to 1 or −1 provides information about the data, however, any data within an appropriately short interval or within certain ranges can take on the appearance of being linear. The following example will produce data that has this characteristic. The unit is designed to demonstrate how to identify nonlinear data which produces an r value close to 1 with a linear regression that is actually quadratic in nature.

1. Make sure all functions and lists have been cleared and all stat plots are turned off.
2. Press 2nd CATALOG and scroll down to DiagnosticOn and press enter.
3. Press Stat, Edit and move the cursor to the very top of list L1 (above the L1 name).
4. Press 2nd, List, OPS then move down to 5 Seq(
5. Type X,X,0,1,.1) This will produce a sequential list in L1, starting with 0, ending with 1, with a differential interval of .1.
6. Cursor to the very top of list L2.
7. Enter $(L1+1)^2$
8. Press 2nd Stat Plot, Plot 1, Enter
9. Set screen to look like this:
10. Press Zoom 9 for ZoomStat
11. This should produce a scatter diagram that looks like the one to the right.
12. We will now check the r value.

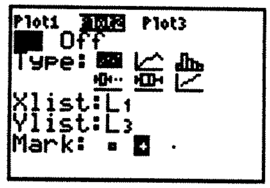




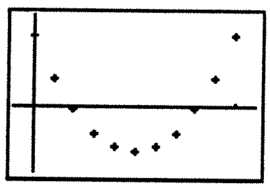
13. Press Stat, Calc, LinReg(ax+b), then enter L1, L2, then Y1 by going to Vars, Y-Vars, Function, Y1, enter, enter.
14. The screen should now look like this:

```
LinReg
 y=ax+b
 a=3
 b=.85
 r²=.9914077991
 r=.9956946314
```

15. Notice that the r value is very close to 1 and that the graph of the data looks very straight **even though it was created by a quadratic function.**
16. Press Y=, what should appear under Y1 is the equation $Y1 = 3x + .85$.
17. Pressing Graph should graph a line through most of the points.
18. To see the error in our choice of models we will now look at the graph of the residuals.
19. Press Stat, Edit and cursor up to the very top of list 3, L3
20. Press 2nd, List and enter RESID and enter for the residuals.
21. Press 2nd, Stat Plot, enter and turn Plot1 off.
22. Move the cursor up to Plot2 and press enter to set up Plot2.



23. Change the entries to screen to match the screen to the right.
24. To see the graph of the residuals, press Zoom, 9 for ZoomStat.
25. The resulting graph should look like the graph to the right:



26. Notice how the residuals form a definite pattern. This parabolic pattern indicates that the linear function used to model the data was a poor choice of a model. To correct this we will now find an equation which models the residuals.
27. Press Stat, Calc, 5 for QuadReg then L1, L3 and then enter
28. This should produce the regression analysis to the right:

```
QuadReg
 y=ax²+bx+c
 a=1
 b=-1
 c=.15
 R²=1
```

29. This function has the equation $y = x^2 - x + .15$
30. Press Y= and move the cursor to Y2.
31. Press Vars, Statistics, EQ, RegEQ to enter the equation into Y2.
32. Move the cursor to Y3. Press Vars, Y-Vars, Function, Y1. Press + for add. Press Vars, Y-Vars, Function, Y2 to enter Y1 + Y2 as Y3.
33. Place the cursor over the = sign for the functions Y1 and Y2 and press enter to turn the Y1 and Y2 graphs off.
34. Go to Stat Plot and turn Plot2 off and Plot1 on.
35. Using Windows, set Xmin = -.1, Xmax = 1.1, Xscl = .1, Ymin = 0, Ymax = 5, Yscl = 1 and press graph to see how this new function fits the data.
36. Notice that the sum of the linear equation produced in step 16. ($y = 3x + .85$) and the equation in line 29 results in the equation $y = x^2 + 2x + 1$ or $y = (x+1)^2$.
37. For your next investigation, you might try defining L2 by the equation $2(L1) + .001Sin(L1)$.

CALCULATOR CORNER
Graphing Rational Functions

by Fred Ferneyhough, Bramalea Secondary School

Today in Calculus, we were introducing the concept of a limit as x approaches a value which determines a vertical asymptote. What follows is my approach to the topic today as well as a few ideas where a similar approach can be useful in MAT 3A0 and MAT 4A0, an(can be done equally well on either the TI-83 or the TI-92.

The function which we had started with was $y=\frac{1}{x-2}$. Although the students had seen similar functions in MAT 4A0, their understanding of the behaviour of y for values of x close to 2 was not good. We have been doing limits for about a week now, and they have a firm grasp of the idea that the limit should be interpreted as "what happens to the value of y as x gets closer to the given value".

TABLE SETUP
TblStart=1.9
△Tbl=.1
Indpnt: Auto Ask
Depend: Auto Ask

The first thing we did was call up the "y=" editor and enter the function in y_1. Then we entered the "TBLSET" function and entered the values shown in the diagram to the right. Note throughout this article that the tables presented reflect what we would understand to be the limit as x approaches 2 from the left. I found it easier to begin with this and then switch over to the limit from the right.

X	Y1
1.4	-1.667
1.5	-2
1.6	-2.5
1.7	-3.333
1.8	-5
1.9	-10
[illegible]	ERROR

X=2

After everyone had this table ready, we displayed the table and scrolled down so that the screen showed the values in the second diagram. The students were then asked to make a sketch of the function using these co-ordinates. On the TI-92, the word "UNDEFINED" appears in place of the word "ERROR", which I like a bit better. Either way, the students can see that there is a problem when x=2 even if they don't understand it from looking at the defining equation of the function. I borrowed this idea from Anne Solomon in our department after watching her teaching domain and range using a tabular approach.

X	Y1
1.94	-16.67
1.95	-20
1.96	-25
1.97	-33.33
1.98	-50
1.99	-100
[illegible]	ERROR

X=2

But, I was afraid that some students might think that the -10 is the limit for this problem, so we changed the "TBLSET" window again using TBLSTART=1.99 and △ TABLE=0.01. This produced the table in the next diagram. At this point, a few more students caught on and they suggested that we should do this once again and see if the value of y gets even larger as x gets closer. So, we adjusted the "TBLSET" window again using TBLSTART=1.999 and △TABLE=0.001, to get the final table. Now, virtually all of the class had caught on to the idea that as x gets closer to 2, y gets infinitely large. We were then able to carry out the same type of analysis as x approaches 2 from the right and then produces a graph of the function which would be accurate about x=2. Finally, we proceeded to look at similar problems and predict what would happen without producing all of the tables.

X	Y1
1.994	-166.7
1.995	-200
1.996	-250
1.997	-333.3
1.998	-500
1.999	-1000
[illegible]	ERROR

X=2

In MAT 3A0, most schools introduce a set of functions which include y=1/x, identified as the reciprocal function. Far too often we just plot a couple of points and say "this is what the function looks like". Using the tables, students can grasp the ideas behind vertical and horizontal asymptotes without a great deal of explanation from us. In MAT 4A0, we formally introduce the concepts of asymptotes and I have often stumbled around trying to describe what happens to y without using the term "limit". Using the graphical calculator would help in this area as well.

Natural Numbers Naturally Have Natural Patterns

By: Richard Dewey (IndEC South)

I'm not sure where I first saw, or read about, this property of the natural numbers, but it was one of those things that is hard to forget. I always feel a special sense of excitement when I see a pattern that just doesn't seem possible. For example, the Law of Sines. I know its true since the proof is quite simple but isn't it amazing that if you take any given triangle and divide the sine of an angle by the length of the side opposite it you will always get the same number?

Here is another property of numbers that I find amazing.

Consider the sequence of natural numbers:
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, ...

If we cancel every 2nd number we are left with the odd numbers:
1, 3, 5, 7, 9, 11, 13, 15, 17, 19, ...

Now, if we take partial sums 1, 1+3, (1+3)+5, (1+3+5)+9, ... we get:
1, 4, 9, 16, 25, 36, 49, 64, 81, 100, ...

I think we all knew this would produce successive squares, however ... let's continue with the pattern:

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, ...

We begin this time by canceling out every 3rd number:
1, 2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 17, 19, 20, ...

Now we take partial sums getting:
1, 3, 7, 12, 19, 27, 37, 48, 61, 75, 91, 108, 133, ...

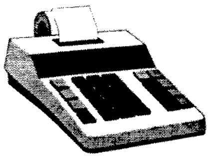
Now we cancel out every 2nd number:
1, 7, 19, 37, 61, 91, 127, ...

Once again we take partial sums getting:
1, 8, 27, 64, 125, 216, 343, ...

Which, interestingly enough, are the successive cubes!

Wouldn't be totally amazing if this worked for fourth powers by cancelling every fourth number, taking partial sums; cancelling every third number, taking partial sums; cancelling every second number and taking partial sums? Try it and see!!!

In fact, it always works!!! Now, wouldn't these make interesting induction proofs? For a real challenge, what about proving it for all possible levels.



INTERMEDIATE ALGEBRA

An Activity Approach

by Betty Lehman
(Fletcher's Creek Senior School)

I am a grade eight teacher of Math and Science at Fletcher's Creek Senior School in Brampton and my principal regularly gives me the CHAMP publication. This newsletter along with my involvement in NCTM have over the years proven to be very worthwhile professional development tools.

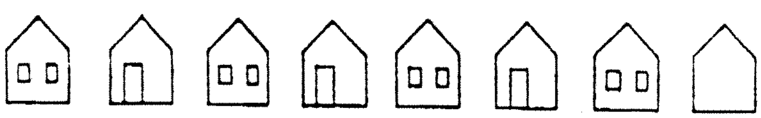
Last summer I went to Boston and attended a three day seminar called Algebra for All. It was a wonderful experience and, although it was expensive, I gained a tremendous amount from attending. In truth my students actually were the winners because from the conference I returned home to build a workshop titled **Algebra: An Activity Approach to Intermediate Algebra.** This experience in Boston gave me the additional knowledge, tools and confidence to teach intermediate Algebra enthusiastically and effectively.

I studied the new Ontario Curriculum, the NCTM Standards, old issues of the NCTM Mathematics Teacher, book publications such as Algebra Experiments 1, Thinking Mathematically, The Write Tool to Teacher Algebra and some of Marilyn Burns' ideas. From the research I have constructed numerous activities which I successfully piloted with my grade eights this year.

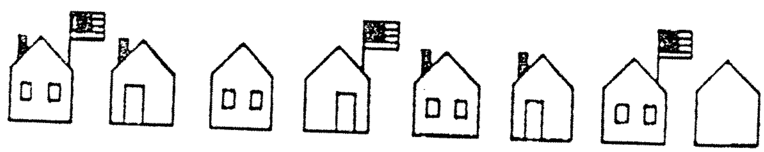
I am sincerely excited about making Algebra more understandable for students and offering teachers tools that will lower their anxiety about teaching Algebra and make it easier for them to be turned on to this topic which is often perceived as a mystery.

What follows is an Activity which helps an intermediate math student grasp algebra.

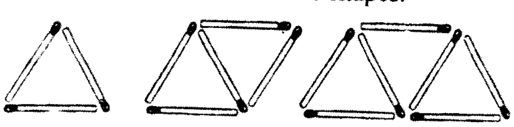
Pupils complete the pattern by finishing the drawing of the next house.

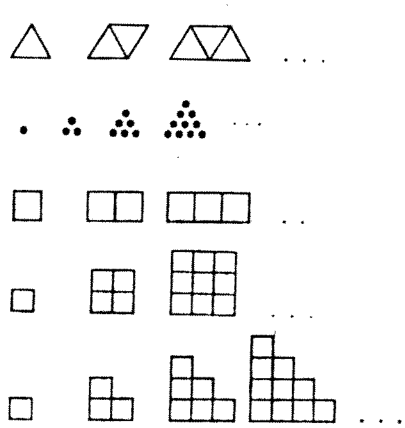


A more complex example

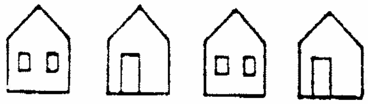


Students make the next three shapes.





QUESTIONS AND/OR ANSWERS

1. 

2. 

3. How many matches do we need to construct t (number of △s) ?

Number of Matches = $2t + 1$

4. What is the perimeter of a chain of triangles that has 63 △s ?

Perimeter = $t + 2$

5. How many dots will be in the 12th image of this series?

1	2	3	4	5	(number of dots in the base line)
1 +2	3 +3	6 +4	10 +5	15 +6	

$$\frac{n(n+1)}{2}$$

6. What is the perimeter of a chain of 18 squares?

1	2	3	4
4	6	8	10

$P = 2n + 2$ n is the number of squares in the chain.

7. Number of Squares in the Base Area

1	2^2	3^2	4^2	5^2
1	4	9	16	25

Area = n^2 n is the number of squares in the base.

Perimeter

1	2	3	4	5
4	8	12	16	20

$P = 4n$ n is the number of squares in the base.

8. Step Building

How many blocks are needed to build n steps ?

Steps	1	2	3	4
Blocks	1	3	6	10

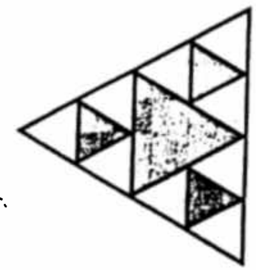
Area = $\frac{n(n+1)}{2}$

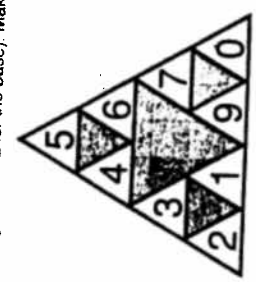
Perimeter = $4n$

n is the number of blocks in the base.

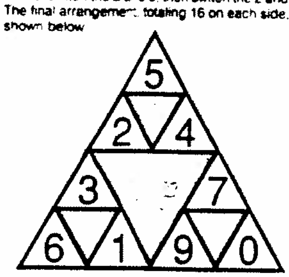
BUILD A PERFECT PYRAMID

If you add up the four numbers on each side of the numbered triangle below, you'll get three different totals (14 for the left side, 18 for the right, and 12 for the base). Make just two transpositions of numbers so that every side adds up the same. (A transposition consists of interchanging two numbers.)





ANSWER 1. First switch the 2 and 6, then switch the 2 and 4. The final arrangement, totaling 16 on each side, is shown below.



References:

Questions 1,2,3 - Arithmetic Teacher
May 1991
Teaching Informal Algebra

Questions 4 - 8 - NCTM Addenda Series
Grade 5 - 8 Pages 48 - 54

Performance Assessment: ESTIMATION

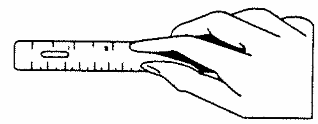
By: Gale Taylor (Applewood Heights S.S.)

After reading the Grade Three EQAO 1997 test and various articles on Performance Assessment I decided that as a personal objective this year I would attempt a performance assessment evaluation in each of the grades that I teach. The following is a summary of my first attempt at a destreamed Grade Nine Level.

TEACHING UNIT

A unit on estimation was developed (copy available). The topics included: exact or approximate answer; calculation method (different estimation methods) and appropriate tools (mentally, paper and pencil, calculator/computer); reasonableness of answers; and development of personal anchors in all types of measurement - including linear, area (Pick's Formula, Monte Carlo Method), volume, capacity, time, weight. Class activities - individual, pair, and small group work- included class discussions, instruction, individual and small group presentation, and investigations. Students were involved in individual seatwork as well as actively engaged in activities that included movement about the room and school, particularly when dealing with measurement. One of the students' favorite activities was the following adaption of a problem presented on the NCTM Home Page.

Estimation: Measurement



A: How Many People Can Stand in Our Classroom? (NCTM Home Page)

After correctly answering a mathematical skill testing question in a MTV promotion you have won an area the size of this classroom in the grandstand for big concert next week. You can invite your friends (standing room only) for free. How many people should you invite?

1. Quickly estimate the number of people that could fit into this classroom. Your teacher will record the guesstimates on the board.
2. If you invite too many people they won't all fit in and some will be disappointed. If you invite too few you will have wasted your chance. With a partner come up with several methods for calculating an answer.
3. Share your methods with the class and discuss and try several methods.
4. As a class decide what you think would be the best answer.
5. Using the agreed upon number from #4, answer the following questions:
   a) What area would be needed to invite the whole school?
   b) How much area would be needed to invite the 600 000 people from Mississauga?
   c) Squares around the Mosque at Mecca and Tiennamin Square in Beijing regularly have a million visitors a year. How big would a square have to be to allow this many people to stand inside its perimeter?

The unit offered the students an opportunity with hands on activities and working individually, in pairs and in small groups.

Evaluation:

Students were subjected to the following evaluation on this unit. Prior to the evaluation I had spoken with students about the value of "doing mathematics" rather than just the traditional paper and pencil test. I had stressed that their thinking, reasoning and methods must be described, not just numbers written down. The evaluation was in booklet form with lots of space provided for diagrams and writing.

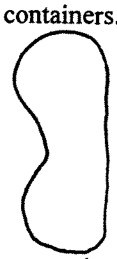
Estimation Evaluation: Performance Assessment

Name:____________________

All rough and good work is to be recorded on the paper provided. You may use any materials available in the classroom, as well as your calculator. For each question describe your reasoning and method(s) to justify your answer.

Required Materials: Drinking boxes
Tennis balls
Meter sticks and
Rulers

1. Guess how high a tennis ball would bounce if it was dropped from a height of:
   a) 100cm
   b) 3m
   c) a 300m tower
2. Estimate, using two different methods how high a tennis ball would bounce if it was dropped from a height of:
   a) 100cm
   b) 3m
   c) a 300m tower
3. Guess how long it would take a tennis ball to bounce if it was dropped from a height of :
   a) 100cm
   b) 3m
   c) a 300m tower
4. Estimate, using two different methods, how long it would take a tennis ball to bounce if it was dropped froma height of:
   a) 100cm
   b) 3m
   c) a 300m tower
5. Estimate the perimeter (circumference) of a tennis ball.
6. Estimate how many tennis balls it would take to place them end to end (no gaps) around the perimeter of the classroom.
7. Estimate how many tennis balls it would take to cover the floor of the classroom.
8. For a school fair you have decided to turn a classroom 4m by 3m into a jumping box filled with foam balls which are the same size as a tennis ball, to a height of 1m. Estimate how many tennis balls you would need.
9. You can buy the balls from:
   -Sports & Games at 55 for $9.99
   -Sports Emporium at 100 for $19.25
   - Used Gaming Equipment at 175 for $23.75
   a) Estimate which would be the best buy.
   b) Estimate how much it would cost
   you for the jumping room.
10. A drink company has decided instead of packaging its orange drink in the standard drinking box, it would like to package it in a spherical package shaped and coloured like an orange. Estimate how large the package would have to be if it was to contain the same amount as a juice box.
11. If the company decided to package 24 of these orange-like containers in a case of some type:
    a) Estimate how much the case would weigh.
    b) Estimate the size of the case.
12. One of the engineers has suggested a new case base (shown below) that she thinks will allow the customer to carry the case more easily.
    Estimate the size of the case needed to carry 24 orange like containers.



    a) If you were the Marketing Manager would you recommend this packaging or not. Why?

To evaluate student performance I used a combination of the four level Standards of Performance for Number Sense and Numeration and Measurement from The Common Curriculum: Provincial Standards, Grades 1-9, and observations gathered during the class.

Results:

Since students would be moving about the class I expected chaos and was very surprised that even with 30 students all engaged in various activities, it wasn't. I was also very surprised that students paid very little attention to what their classmates were doing. The different levels of thinking and reasoning became very clear when observing. For instance on the question of how many tennis balls would be needed to line the perimeter of the classroom, students' methods ranged from a student on his hands and knees with two tennis balls placing them end to end down two sides of the room (at least he only did two sides) to a student estimating the diameter of the ball and the length and width of the room taking into account the corner ball and calculating the number. The variety of methods and solutions were far more than I anticipated. Generally the results fell in the level 2, low level 3 range, with only one level 4 in two classes. I had expected the categorizing of their tests to be difficult but found it not nearly as onerous as anticipated.

Observation of student activity was a far better measurement of their understanding than their written work. Students were poor at describing and recording their methods. It became clear that they need a great deal more opportunity to write about mathematics.

In assessing the test, students stated that they really enjoyed it. They have asked to do another similar test, especially now that they feel they know much more of what is expected of them. On Parents' Night it became clear that the test had generated a great deal of discussion around the dinner table. Many parents had not only read the test, but then had also looked through the unit. It definitely had piqued their interest.

General Comments:

1. The test needs refining. But for a first attempt, I was not unhappy. I probably learned more than my students.
2. Start small. This test was too ambitious. Next time I would try to design a simpler open-minded problem.
3. Design your curriculm to incorporate more opportunity to write about mathematics: journals, class activities, assignment and test questions etc.
4. Don't be afraid to try a performance assessment.

Performance Assessment In Mathematics

by Jeff Irvine (Brampton S.S.)

Recently I had a chance to interview Margaret Warren, Program Coordinator with the Peel Board of Education, on the topic of assessment in Mathematics. Here are some of the issues she addressed.

Q: Please tell me about your personal philosophy of assessment in Mathematics.

A: I believe that assessment should not be an "event", such as a chapter test or an exam. Rather, assessment should be an ongoing process during which the teacher continually collects assessment data while the student is involved in the doing of Mathematics. Tests and exams would still be included in assessment, but only as parts of the whole assessment, rather than the entire basis of evaluation. Students should be given continual opportunities to demonstrate their level of mastery of Mathematics skills and knowledge, and their improved mastery at later times.

Q: What role do you see portfolios having in performance assessment in Mathematics? What do they add to the assessment process?

A: Portfolios allow the teacher to build a broader picture of student achievement. The inclusion of different kinds of assessment articles in a portfolio (tests, quizzes, reflection pieces, possibly a video clip of the student performing, models and false starts) which the student has selected for inclusion reinforces the concept of continuous assessment. The portfolio peices are probably a more real life picture of the student. In addition, since the evaluation criteria are known to the student (and possibly student-generated), the student has the opportunity to learn about judging quality and engaging in self-assessment.

Q: Classroom observation is usually a part of our current evaluation process. Is there a danger that the resulting "mark" will be inflated and not reflect the student's true abilities in Mathematics?

A: There is certainly a danger of this, so it is important that "observation marks" have a limit and not constitute the major portion of the evaluation. We also need to pay close attention to the quality of these observation marks. If we value affective attributes in students, we need good criteria for assessment and good rating scales. It isn't good enough that a "nice kid" gets a subjective 18 out of 20 mark. We need sophisticated rating scales, and we need to continually tell students what the criteria are which are being rated, and what "satisfactory" and "superior" performance looks like.

The new elementary report card de-emphasizes affective attributes, and focuses more on achievement (What students do, know and value in Mathematics). However, affective attributes (study habits, social skills, work habits) should also be reported.

> "Students should be given continual opportunities to demonstrate their level of mastery..."

Q: How would you respond to someone who feels overwhelmed by attempts to include quality observation-based assessment in their Mathematics program?

A: Don't try to do everything at once. For example, the teacher could focus on assessing one or two attributes for everybody (and note other obvious things, but stay focused). Or the teacher could focus on assessing a limited number of students on a broader number of criteria. However, if this is chosen, the teacher needs to insure that there will be enough opportunities for everyone in the class to demonstrate their proficiency in these attributes. As electronic tracking tools are developed, these should help teachers cope with the volume of data.

Q: How would you respond to Mathematics teachers who are very comfortable with "objective" kinds of assessment, but feel less comfortable with more subjective assessment tasks?

A: Here again, good rubrics and rating scales are a must, to help make assessment tasks less subjective and more consistent across classes and grades. We need to clearly articulate what Levels 1 2, 3 and 4 behaviour looks like. In addition, teachers need good exemplars of what constitutes behaviours at each level. For questions only having right-wrong answers, we don't need rubrics. However, as we move towards a curriculum which emphasizes problem solving and more open ended questions, good rubrics with well defined indicators are critical.

Q: What position does OAME have regarding performance assessment?

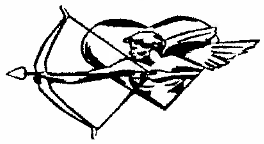
A: OAME has produced resources such as "Linking Assessment and Instruction" for the Junior and Intermediate divisions, and a Primary division package will be available by the end of Spring. These documents clearly indicate that instruction and assessment must be linked, i.e. that assessment must be ongoing. These booklets provide examples of scales and observation checklists. They also include exemplars, which help ensure consistency of assessment.

Q: What impact will the new Ontario Curriculum have on performance assessment in Mathematics?

A: Problems-based curriculum and rich learning tasks force assessment of student achievement and behaviour. Students will need clear criteria up front, indicating what is valued in assessment. For example if content is valued and presentation is not, students will need to know this going in. Portfolios will become more important, particularly if they include a collection of responses to open-ended problems.

Thank you Margaret for taking time out of your busy schedule to share these thoughts with us.

Fabulous February Fun



by: **Marlene Dewey (Clarkson S. S.)**

With Valentine's Day recently passed here are 2 activities that can add an element of fun to a math class at any age or level.

Activity 1 MATH POEMS

Ask the students to write a Math Poem for Valentine's Day. Here are two, written by **Gill Dunn (Notre Dame S. S.)**

My heart beats 4 U
And always will B true
Till Pi is exact and
Hemispheres are flat
And 1 is proved = to 2

You disintegrate my differential,
You dislocate my focus
My pulse goes up like an exponential
Whenever you cross my locus,
Without you, sets are null and void,
So won't you be my cardioid?

If the students have trouble starting, allow them to begin their poems with,

ROSES ARE RED,
VIOLETS ARE BLUE,
________ __ _____,
________ ____ ____ ______.

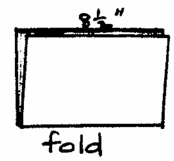
VARIATIONS FOR ACTIVITY 2

-any size heart is possible by adjusting size of U-shapes
-use shiny, sparkly papers for a bold effect
-the number of legs can be odd number in each U-shape
(the weaving takes longer and is more challenging but the final effect is gorgeous)

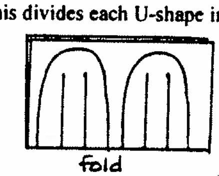
Activity 2 HAVE A HEART!!!

This is a fast, easy paper construction that amazes the participant.

STEP 1
Use 2 sheets of 8 1/2" x 11" paper of two different colours
(start with xerox - weight paper)
-pink & white
-red & white
-red & pink
(best colours!)
Fold both, together, in half:

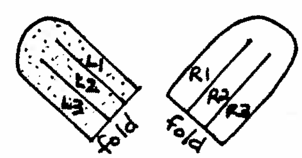


STEP 2
Draw 2 U-shape towards the fold and 2 parallel lines inside each as shown. This divides each U-shape into thirds approximately.



STEP 3
Cut out one of the U-shapes and cut along the parallel line segments, cutting through all 4 layers of paper. Reserve the second U-shape.

STEP 4
You will now have 2 U-shapes of different colours. Pull them apart and place them as such:



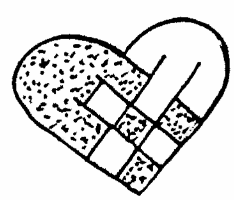
I have numbered the legs on the Left and Right to help you with the next step.

STEP 5
Insert R1 inside L1 (i.e. between L1's two layers). Then pull L2 through the inside of R1. Then put R1 inside L3. You will have woven R1 through all 3 legs on the Left, L1, L2 and L3.

STEP 6
Weave R2 inside the Left U-shape by reversing the order. Insert L1 inside R2, then R2 goes inside L2, and then L3 goes inside R2.

STEP 7
Weave R3 into the Left U-shape by following the directions in STEP 5 again but with R3 instead of R1.

STEP 8
When you are finished weaving you have a **Heart...** but even better, the heart opens up as a little bag or container as well. Students can practice this again on the second drawn U-shape which has not yet been cut out.



COMMUNITY SERVICE IN MATHEMATICS ? HOW ONE SCHOOL MAKES IT HAPPEN !

Donna Del-Re
Applewood Heights Secondary School

For the past three years, the Mathematics department at Applewood Heights Secondary School has run a highly successful Mathematics Community Service Independent Study in our OAC courses. This project began from a department discussion of the recommendation from the Royal Commission: "*For the Love of Learning*" that all students should experience some community service work. The report stressed the importance of fostering a sense of community and civic mindedness in our young people. It was decided this would be a department objective for the upcoming year and a small group of people agreed to work out the implementation details over the summer and present their model to the mathematics staff in September. As luck would have it, one month later the Applewood department heads decided to make Community Service a school-wide initiative.

Each student in one or more OAC mathematics courses must give ten hours of their time back to the mathematics community at Applewood. The service mark, which is made up of 50% service time and 50% quality of service, is worth 5% of a student's final mark. Students may apply the service mark to the OAC course of their choice. Students also choose a host teacher (the teacher they will work with) and one of the following service options: mathematics classroom assistant, computer technology assistant, peer mathematics tutoring, contest coach, mastery test administrator, tutorial assistant, Mathematics Day co-ordinator, feeder school classroom assistant, SLD core support, and design your own proposal. The host teacher provides feedback and evaluation (see Fig. 1) to the student each day. At the end of the service the student submits a personal reflection and the tracking sheet for evaluation to the host teacher (see Fig. 2).

The Community Service has many positive aspects for both the students and the Mathematics department. The support to the teachers is invaluable. We receive an extra pair of hands to help out in our classrooms. The Community Service students get the chance to apply their many skills and knowledge, and many of them are surprised at how much they actually do know! They also get a chance to advise the junior students on possible strategies for success. The service also forges bonds between the junior and senior students. The junior students often feel it is easier to talk to another student than their teacher. It is not unusual to have students continue to tutor and monitor the progress of their junior students, many students start the community service with some trepidation, but are pleasantly surprised at how much they actually enjoy the experience!

The recent announcements from the Minister of Education indicate that community service will be a required component of a student's high school education. We wholeheartedly support this initiative, because we have seen the many positive effects it has on the entire student body. If you would like any additional information on this program please feel free to contact Applewood at (905) 279-6090.

MATHEMATICS COMMUNITY SERVICE UNIT STUDENT TRACKING SHEET

STUDENT NAME ______________________________

CREDITED MATH COURSE ____________ ***OAC MATH TEACHER*** ____________

C.S.U. HOST TEACHER ____________ ***SERVICE OPTION*** ____________

Circle one of: BLOCK A or BLOCK B

Performance Evaluation Scale:

4 - EXCELLENT - **consistently meets and occasionally exceeds expectations**
3 - GOOD - **consistently meets expectations**
2 - ACCEPTABLE - **meets minimum requirements**
1 - UNACCEPTABLE - **does not meet minimum acceptable level**

DATE	SERVICE DESCRIPTION and COMMENTS	EVALUATION	HOST TEACHER
1		1 2 3 4	
2		1 2 3 4	

(Fig. 1)

APPLEWOOD HEIGHTS
O.A.C. MATH COMMUNITY SERVICE
STUDENT EVALUATION

STUDENT NAME ______________________________

CREDITED MATH COURSE ________________ *OAC MATH TEACHER* ______________

HOST TEACHER ____________________ *SERVICE OPTION* ______________

Performance Evaluation Scale

4	EXCELLENT	consistently meets and occasionally exceeds expectations
3	GOOD	consistently meets expectations
2	ACCEPTABLE	meets minimum requirements
1	UNACCEPTABLE	does not meet minimum acceptable level

Skills Evaluation

	Mark
1. Listens carefully (for instructions, to gain information, and to ask or answer questions	
2. Accepts suggestions/criticism from host teacher or students, and takes action	
3. Communicates effectively with host teacher and students (verbal and written)	
4. Shows initiative (self starter)	
5. Works well with minimal supervision / makes appropriate classroom decisions	

Attitude Evaluation

	Mark
1. Is punctual (notifies host teacher of all variances)	
2. Is cooperative, respectful and courteous with host teacher and students	
3. Accepts full responsibility for own actions	
4. Is reliable	
5. Student's Personal Reflection (1page, typed, reasonable insights and revelations)	

Service Quality Total ______

Attendance Total
(5 per full period) ______

C.S.U. Evaluation Total ______
80

Host Teacher Comments

Comments about OAC Student Reflection (please attach to this evaluation form!)

(Fig. 2)

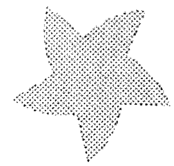
It's in the Stars!

More paper-folding by Marlene Dewey
(Clarkson S.S.)

In this issue, I've decided to give you two different paper-folding constructions which result in stars. Both are nifty, but the first type is much easier. Try the second one after your students have done a few paper-folding projects with you (from previous issues of this CHAMP newsletter, for example)

STAR-TYPE I

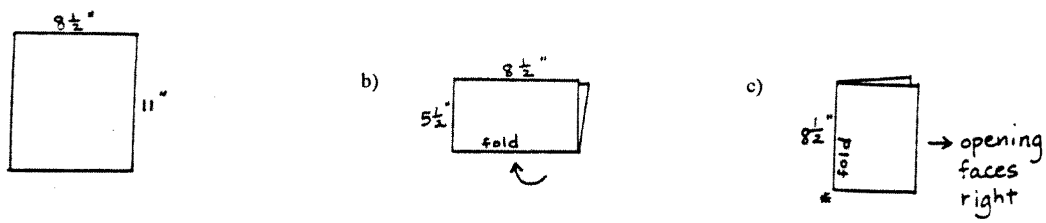
Teacher Notes

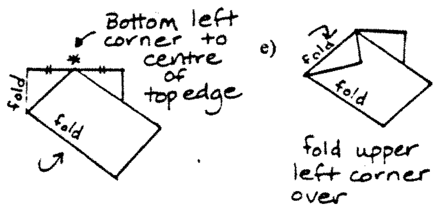


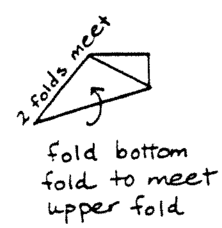
1. The activity can be done individually or in groups
2. The instructions can be given out in written form (the best way to encourage critical reading and interpretation skills) or verbally
3. Encourage the students to make several stars and then use them for a display in your classroom if possible

Use sheets of 8 1/2" x 11" paper

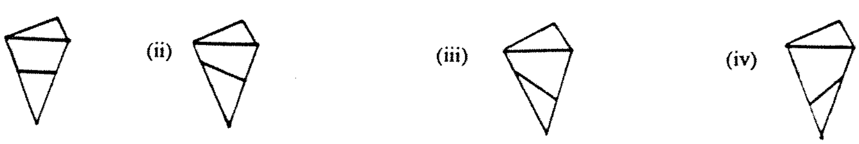
1. Fold as illustrated:







2. Make 4 of these. See if, after the first 2, you can do this without looking at the instructions.
3. On your four folded figures draw lines as shown:



4. Cut along the line for each figure, unfold and record information about the resultant figure (set aside the upper parts of the cut figures)

5.

Figure	Resultant Figure	Comments
(i) 		
(ii) 		
(iii) 		
(iv) 		

STAR TYPE II

TEACHER NOTES

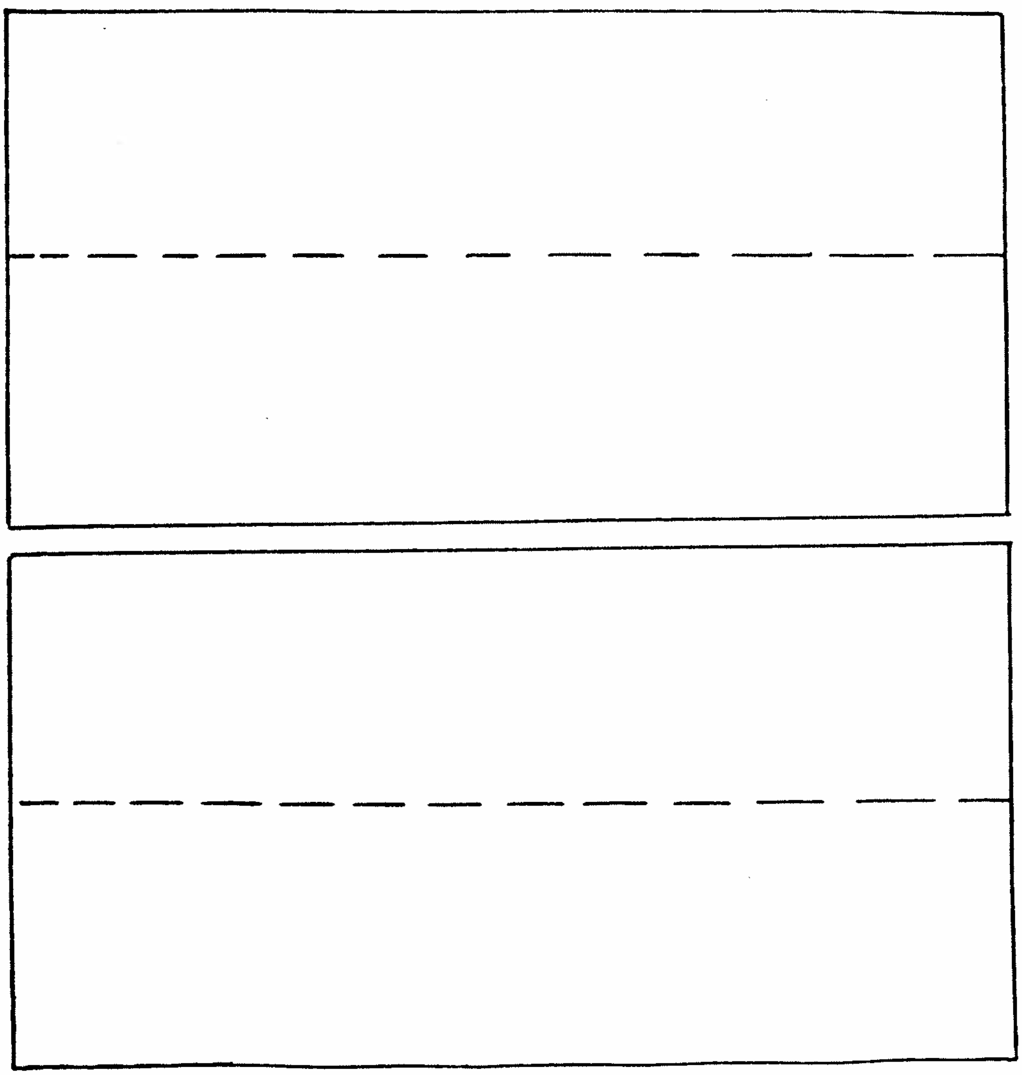
1. Teams of two will probably work best
2. Verbal and demonstrative assistance may be needed from the teacher
3. If you have the students make several of these stars the class can use them as decorations for a Christmas tree, a mobile, a bulletin board, etc.

ACTIVITY

With a few simple steps you can make these very decorative stars. They can be made from foil gift wrap for more dramatic glitter effect. Be sure the shiny side of the paper is on the OUTSIDE after step 2.

STEP 1: Cut out the 2 rectangles below

STEP 2: Fold each rectangle in half along the dotted line so the shading is on the outside



Step 3:

Put both papers next to each other. Fold the outside corners down to the bottom edge as shown.

Step 4:

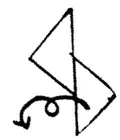
Fold the other corners up to the top edge as shown.

Step 5:

Fold both strips as shown ON THE DOTTED LINES

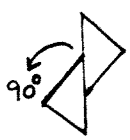
Step 6a: FOR THE FIRST PAPER

Turn the front to the back, making the move from right to left



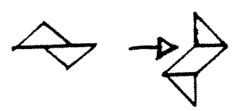
Step 6b: FOR THE SECOND PAPER

Rotate it 90° to this position.



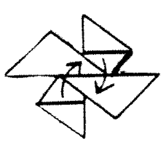
Step 7:

Slide both papers on top of each other.



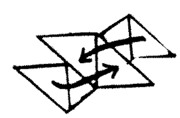
Step 8:

Fold the top corner down and tuck it in the "pocket" below.
Fold the bottom corner up and tuck it in the "pocket" above.



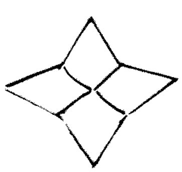
Step 9:

Turn the star over from right to left. Tuck the two big corners into the "pockets" as before.



Step 10:

You should have a super star. If you do, you are a SUPERSTAR!



Step 11:

Practise this a few more times until you can do it easily without reading the steps. Use extra sets of rectangles.

Step 12:

Teach a friend how to make this star, without using written instructions

You Should...CNML!

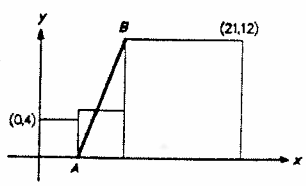
By: Marlene Dewey (Clarkson S.S.)

At my school Math Contests are very popular. Our students participate in almost all of them... Pascal, Cayley, Fermat, Euclid, Descartes, The Canadian Open Mathematics Competition, AHSME, AIME, Leonardo da Vinci, CHAMP (for grades 9, 10, 11) and CNML. One of their favourites is CNML (the Canadian National Mathematics League). I have been the Staff Sponsor for the CNML Contests for many years and I must admit that it is one of my favourite contests also!

Why? It's easy to explain. CNML is a series of 6 half-hour Contests, one per month from October until March. There's only 6 questions and 30 minutes to do them. Anwers only are required. Students can use any type of calculator and rough paper only! After the contest is collected the answers are shared with the participants immediately and they leave already knowing their score for that contest. Solutions are provided by the Mathematics League for the students who want to see "how" the problems were solved. Alternate solutions are recommended and usually published if Staff Sponsors contribute these to the Contest organizer. The top 5 students of each contest form the team score (a team score can only range from 0 to 30 since each contest is out of 6 points). The students, I and my colleagues love the timing of this contest since its short duration adds to the excitement and increases participation because of the short time commitment. Over the course of the 6 contests our participants eagerly await their school results (which are sent to us, updated after each contest) and they enthusiastically watch their individual cumulative scores rise. In my school this year I have been counting 44 participants at each after-school contest! I would highly recommend that your school participate, if you do not already do so! Contact the University of Windsor for registration infromation. I don't think they would mind if I shared with you a set of 6 questions from a CNML contest from many years ago...(question # 1 will help you guess the year!)

Good Luck Trying These:

Time Limit: 30 minutes

	Answer Column
1-1. If $(A)\left(\frac{1}{B}\right) = 1 + \frac{1}{1990}$, what is the value of $(B)\left(\frac{1}{A}\right)$?	1-1.
1-2. The sum of 20 positive numbers is what per cent of the average of these same 20 numbers?	1-2.
1-3. Three squares are lined up along the x-axis as shown, and the points with coordinates (0,4) and (21,12) are labeled accordingly. Find AB. 	1-3.
1-4. In a pie-eating contest (whole pies only), the winner ate twice as many pies as the runner-up, 3 times as many as the third-place contestant, and 4 times as many as the person in fourth place. Together, these four contestants ate fewer than 60 pies. What is the greatest number of pies the winner could have eaten?	1-4.
1-5. If $x \neq y$, but $\frac{x}{y} + x = \frac{y}{x} + y$, what is the value of $\frac{1}{x} + \frac{1}{y}$?	1-5.
1-6. Al divided his age into each of five consecutive integers, and the sum of the five remainders he got was 32. When Sue, several years older, divided her age into each of a different set of five consecutive integers, the sum of the five remainders she got was also 32. What is the sum of the ages of Al and Sue?	1-6.

Answers:

1-1 $\frac{1990}{1991}$ 1-2 2000 1-3 13

1-4 24 1-5 -1 1-6 43

A License for MATH!

Don't you just love Bumper Stumpers—especially those with numbers in them?! Here are a few for you to enjoy figuring out. Please send other good Number Bumper Stumpers to the Editor for future use in subsequent issues of this newsletter (see address or fax number on front page)

1. ONTARIO 24TNT42 YOURS TO DISCOVER
2. ONTARIO IM2QT4U YOURS TO DISCOVER
3. ONTARIO ABUT 2 YOURS TO DISCOVER
4. ONTARIO 10SNE1 YOURS TO DISCOVER
5. ONTARIO A42N2 YOURS TO DISCOVER
6. ONTARIO 4TNONO YOURS TO DISCOVER

Upcoming CHAMP Events

Thursday, April 2 — Spring Mathfest at North Peel

For Students - Awards Presentations and refreshments

For Teachers - Dinner and Workshops

ONTARIO MATH OLYMPICS:

- Tuesday, April 21 — Halton
- Wednesday, April 22 — Peel
- Thursday, April 23 — Dufferin-Peel Separate
- Friday, April 24 — Halton Separate

Wednesday, May 20 to Saturday, May 23

— OAME Annual Conference in North Bay (see back cover of this issue)

— When we know how many CHAMP members will be attending, a CHAMP get-together may be planned at the conference.

ARE YOU A MEMBER OF CHAMP?

Membership Form

Name In Full : ______________________________

School : ______________________________ Board : ______________________________

Position : ______________________________

	Home	School Information
Address		
Tel.		
Fax No.		
E-Mail		

Application for Membership

O.A.M.E. (includes membership in your chapter affiliation, CHAMP) $40 for one year. Make cheque payable to O.A.M.E.

- OR -

CHAMP membership <u>only</u> $9 for one year. Make cheque payable to CHAMP

Signature: ______________________________ Date: ______________________________

Please send completed application and cheque to:

Mrs. Donna Del Re
Applewood Heights S.S.
945 Bloor Street E.
Mississauga, ON L6Y 2M8

For new/returning CHAMP members :

Please tell us :

1. What do you personally get from your membership in CHAMP?
2. What would you LIKE to get as a member?
3. What would you like to see in our next issue of the CHAMP newsletter?
4. Would you like to make a contribution to a future issue? If so, please send your article, clearly with your name, address and phone number to : Mrs. Marlene Dewey
   Clarkson S.S.
   2524 Bromsgrove Rd.
   Mississauga, ON L5J 1L8
   Fax No. (905) 822- 6896
   Phone No. (905) 822-6700 x 237

Thank you for your SUPPORT of CHAMP

GATEWAYS

ONTARIO ASSOCIATION FOR MATHEMATICS EDUCATION
ASSOCIATION ONTARIENNE POUR L'ENSEIGNEMENT DES MATHÉMATIQUES

25th Annual O.A.M.E. Conference
May 20 - 23, 1998
Nipissing University
North Bay

Learn about the latest in mathematics education. Work with the best math teachers from across the country and the province!

Keynote Speakers:
- ♦ Ivars Peterson
- ♦ Theoni Pappas

and others

150 elementary & secondary workshops

entertainment, banquet
25 anninersary celebration

Publishers' Display

Registration Fee:(approximate at this time)
O.A.M.E. Member,
Full Conference $140.00
One Day $75.00
Non-member $185.00

Accommodations:
Nipissing University Residence
$90.00 for 3 nights
Many local hotels & motels
Reasonable rates

LOOK FOR REGISTRATION FORMS SOON. FOR MORE INFORMATION, CONTACT:

Susan Stuart 705-474-3461. ext 4236
Shawn Godin 705-494-8600
Dan Charbonneau 705-566-9605 (Subury)

e-mail sues@einstein.unipissing.ca
shagodin@enoreo.on.ca
charbod@sudburyrc.edu.on.ca