Ontario Mathematics Gazette

FRIDAY SPECIALS

December, 2003—June, 2007

Fridays at the University of Guelph, five minutes before the end of class, I say, "Pens down, books closed, it's "Friday Special" time!" Then I show on screen an article or cartoon or letter or...something that has to do with math, the "real world" and has absolutely nothing to do with class, assignments, or tests. It is math for fun. Often, it is some flagrant example of how the media abuse math. I hope you use some of these. Make them "Monday Morning" specials or "We need a break!" specials. If one falls flat, blame me. If it works, you take the credit.

December, 2003

Column Title: Jack Weiner's Friday Specials!

Hello, everyone. Well, it's nice to be back at the OMG. It's especially nice to be back contributing a column but not having to edit the whole darned issue. Been there, done that, from 1992 to 1996. It was exciting and exhilarating and I felt that I was making a significant contribution to the Ontario mathematics education community.

But it's Marilyn's turn. She has to maintain and even raise the high bar set by Louis Lim and John Egsgard. Judging by September's OMG, I have every confidence that she will raise the bar even higher.

Fridays at the University of Guelph, five minutes before the official end of my class, I instruct my students (now up to 1000! That's "!" for emphasis--God forbid, it should in this context be for factorial), "Pens down, books closed, it's Friday Special time!"

Then I show on screen an article or cartoon or letter or…something that has to do with math, the "real world" and has absolutely nothing to do with class, assignments or tests. It is math for fun. Often, it is some flagrant example of how the media abuse math. I tell you truely: the students need only one Friday special early in the fall semester to drool, Pavlov like, in anticipation every subsequent end of week.

So here, I propose for the next couple of years, to share some Friday specials with you. I hope you enjoy them. I hope you use them. Make them Monday morning specials, or just, "We need a break!" specials. If one falls flat, you are welcome to blame me. If a Friday Special goes over well, you take the credit.

Now, having built up your expectations, I would like my first column to be an exception. With the new curriculum and especially facing the double cohort in my classes, I am going to share with you something I have used successfully both as a high school teacher and a university teacher for, well, a long time. This works! And is more relevant now than ever. I hope you approve. I hope you use it. I hope at least one of your students becomes a better math student by applying it: "How to get an "A" in Math!". See you next issue.

Jack

Get Extra Help

1 **Have your questions ready.** When you see your teacher for extra help, **don't say anything like**, "I don't have a clue what's going on." Rather, work through your class notes – definitions, examples, theorems, and proofs – thoroughly, and be prepared to say, "I understand everything up to this point. How did we get from here to here?" In other words, **do your part!** Spend quality time with the material.

2 **Get into study groups.** Then one representative of your group can see your teacher for help with problems and report back to the others. Also, with group expertise, more often than not, you will solve most problems yourselves.

3 **Struggle more than a little.** Don't give up after one attempt. Make a sincere effort to sort out your problems. That way, when you say, "I am stuck RIGHT HERE!", you will be so **up** on the problem that your teacher's explanation will be clear.

Have you ever had this experience? A teacher is explaining a concept or technique in answer to your question. You are nodding your head, saying, "Uh huh! Uh huh! Yes, I understand." Yet you're thinking, "I don't have a clue what the teacher is talking about."

It can happen, but it's rare, that the teacher isn't explaining the problem well. Usually, though, the blame lies, yes, with the student, who hasn't struggled enough so that the teacher's explanation can work. **Struggle more than a little!**

SOME SPECIFIC STRATEGIES

- Review each day's notes as soon as possible – definitely before the next class.
- Do your homework before the next class.
- Participate in class.
- Form study groups with classmates.
- Don't fall behind.

Reprinted from *The Mathematics Survival Kit* (Thomson Nelson publishers), by Professor Jack Weiner, Department of Mathematics and Statistics, University of Guelph
www.mathematicssurvivalkit.ca

UNIVERSITY of GUELPH

How to... How to... How to... How to...

Get an "A" in MATH!

How to... How to... How to... How to...

1 After class, **DON'T** do your homework! Instead, ***read over your class notes.*** When you come to an example done in class...

2 **DON'T** read the example. Copy out the question, set your notes aside, and do the question yourself. Maybe you will get stuck. Even if you thought you understood the example completely when the teacher went over it in class, you may get stuck.

And this is **GOOD NEWS!** Now, you know what you don't know. So, consult your notes, look in the text, see your teacher/professor. Do whatever is necessary to figure out the steps in the example that troubled you.

Once you have sweated through the example, **DO IT AGAIN! And again.** Do it as often as you need so that it becomes, if not easy, then at least straightforward. Make sure you not only understand each line in the solution, but why each line is needed for the solution. In part, you have memorized the solution. More importantly, you have made the subtleties of the problem unsubtle!

This is the great equalizer step. If your math or science aptitude is strong, then maybe you will have the example down pat after doing it twice. If not so strong, you may have to do it several times. But after you have done this for every class example...

3 **DO YOUR HOMEWORK!**

If you follow this method and if the teacher chose the examples well, then most of the homework questions will relate easily back to problems done in class and the rest should extend or synthesize the ideas behind those problems. Guess what you'll find on 80% or more of your tests and exams? The same kinds of problems! And you will have your "A". Good luck, although if you use this method, luck will have nothing to do with your INEVITABLE success.

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March, 2004:

Well, hello and welcome to 2004. I know, I know, it's late March already as you read this, but I am writing at 2:20 pm on January 1. So, Happy New Year!

Here is my first official Friday Special, since I used the last issue for "How to Get an 'A' in Math"--a really terrific card trick.

About 10 minutes before the end of Friday's class (or anytime you feel is the right time for a break from the routine), have your students close their books and join you at the front of the room between your desks and theirs. Have them form a circle around you, some sitting, some standing behind so that everyone can see as you sit on the floor in the centre with a deck of cards.

1) Have three students pick one card each from the face down proffered deck and have a fourth student hold all three cards.
2) Ask, "Do any two cards add up to 10?" If the answer is "Yes", exchange cards so the answer is "No!"
3) Place about 12 cards face up on the floor.
4) From the remaining deck, cover face-up pairs that add to 10, such as 4 and 6. Cover any 10 with one card. Cover Jack, Queen, King as a set.
5) If at any stage, there is nothing left to cover, put another four or five cards from the remaining deck face-up to make new piles.
6) When you run out of cards, you may have one left over. Let it be a separate pile. **(DO NOT use it to cover one half of a pair that adds to 10.)**
7) Now, combine piles using the same rules as in step 4. Set these aside. For example, if 3 and 7 are the top cards face up on two piles, put these together and discard all the cards in these two piles.
8) When there are no piles left that you can collect, you will be able to figure out the three missing cards. Congratulations!

Examples: Look at the top card on each of the remaining piles.

1) Leftovers: 2 5 9	Solution: 8 5 Ace
2) Leftovers: 3 6	Solution: 7 4 10
3) Leftovers: 4 K	Solution: 6 J Q
4) Leftovers: J Q	Solution: K 10 10
5) Leftovers: Nothing!	Solution: J Q K **OR** 10 10 10.

Which? You will remember, I am sure, whether you covered hardly any 10's. If this is the case, the answer is three 10's. Otherwise, J Q K!

Why does it work?

Some students may suggest you are memorizing the forty-nine cards as each makes an appearance and thus determine the missing three. I don't know about you but I am not that smart. (I once lost a game of "concentration" to my senior high school crush Jan by a score of 50 to 2! Ruined our relationship! I was too embarrassed to see her again. Sorry, too much information.)

Consider, for example, leftovers 2 5 9. You only cover a 2 in conjunction with an 8. This is key: **ALL FORTY-NINE CARDS APPEAR FACE UP DURING THIS TRICK**. Three 2's are covered with three 8's. The remaining 2 could not be covered because one 8 is missing and so this 2 must remain atop an uncollected pile. Similarly, one 5 and one Ace were missing from the forty-nine cards forcing a pile topped with a 5 and another with a 9 to be leftover.

Go back to step 2. Why ask the "add to 10" question? Suppose the three missing cards were 2 8 7. At the end, there would be one pile with a 3 on top. You could only conclude that one of the missing cards is a 7 and the other two comprise a pair that adds to 10.

An alternative to exchanging cards is to renumber J, Q, and K as 11, 12, and 13 and ask if any pair adds to 13. If the answer is no, do the trick based on sums to 13. King is covered by itself, and all the other cards are covered in pairs. For example, Ace is paired with Queen (1 + 12).

One of my aims with Friday Specials is to design each so that it can be fun and effective K to infinity. I don't always succeed. This card trick, however, is ideal! For early grades, it is great "sum to ten" practice. A little later, sum to 13 with J, K, Q, becoming numbers, can become your method of choice. Higher up the grade scale, we can start to ask WHY?

Another feature of Friday Specials: kids show them to mom and dad, sibs, friends. You get great feedback! Isn't it neat to get a letter or a phone call out of the blue from a happy parent, enthused about her son or daughter's enthusiasm? I did, more than once. Well, twice. But still… BW, Jack

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June, 2004

Here is an awesome Friday special. This page is, **BELIEVE IT OR NOT**, from two successive issues of my weekly advertising paper, The Pennysaver (no relation to our desktop publisher, The PennyClemens.)

Make a transparency and then reveal each ad one at a time.

Start with the RCA 12" Black and White. **$333?!** This is hardly a great price for a small black and white television. However, you can get a 20" colour TV for **$69!** The crowds at Krazy Kelly's door demanding he live up to the advertised price were Krazy!

So naturally, there was a very contrite correction notice in the next issue of the PennyClemens, er, Pennysaver. Now you'd think that if someone is writing a correction notice, he or she would take extra care to get it right.

"The RCA 20" COLOUR TV for $60..." For $60? But it gets worse.

"We are sorry if this has **CASUED** any inconvenience to our valued customers and readers." Whew.

Now, I swear, in the very same issue of this Pennysaver, we find the ad for sports clothing. Check the bottom right.

"Children's ANDIGO TRACK SUITS.
Reg $24.98. **1/2 PRICE. NOW $19.98"**

Hmmm.

And finally, Mr. Pizza. **SAME ISSUE!**

"Save $1.50 on an 18" large pizza." Fine, but not too enticing a bargain. However, **"Save $7.00 on a small..."**

$7 on a small? At that price at that time, the pizza shop would owe you money.

Enjoy. Have fun. As I write this, spring has finally sprung. Enjoy. **Have fun.**

RCA 12" BLACK & WHITE

Perfect 2nd Set!

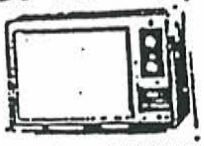
$333

Non Optional Warr. 9.95

RCA 20" COLOR TV

SUPER BUY!

100%
Solid State
Rent to Own
$3.20 Weekly



$69

Non-Optional Warr. $39.95

CORRECTION NOTICE

An error was made in the AUGUST 6th EDITION of the PENNYSAVER in the

KRAZY KELLY ADVERTISEMENT

The RCA 20" COLOR TV for $60 should have been shown as $333.
The RCA 12" BLACK & WHITE TV for $333 should have been shown as $60.
We are sorry if this has casued any inconvenience to our valued customers and readers.

Ladies OCEAN PACIFIC PANTS Reg. $33.98 70% OFF NOW $9.98	Ladies ADIDAS SHORTS Reg. $12.98 ½ PRICE NOW $6.50	Ladies PENMAN'S FLEECE PANTS Reg. $19.78 ½ PRICE NOW $9.98
Ladies GH SHORTS Reg $7.98 ½ PRICE NOW $3.98	Men's NIKE SHIRTS Reg $20.98 ½ PRICE NOW $10.98	Children's ANDIGO TRACK SUITS Reg. $24.98 ½ PRICE NOW $19.98

Mr. Pizza

VALUABLE COUPON • CLIP N' SAVE • COUPON

DAILY SPECIALS

Mon. SPAGHETTI	$2.99
Tues. LASAGNA	$3.49
Wed. FETUCINI with mushrooms	$3.25
Thurs. RAVIOLI	$3.49
Fri. FETTUCINI with clam sauce	$4.99
Sat. VEAL SCALLOPINI	$6.99
Sun. GNOCCHI	$3.99

SAVE $1.50 on an 18" LARGE PIZZA
- SAVE $7.00 on a SMALL OR MEDIUM PIZZA

Offer Valid with Coupon Only

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September, 2004:

I am writing this on June 21, one week from the federal election. I am really hoping that this is the year of the Green Party. That would surprise EVERYONE, including, I am sure, the Green Party. I imagine if it happened, the new members of the governing party would look at each other somewhat perplexed and say, "So, uh, what do we do now?"

Because of the ubiquitous polls in this pre-election week, I decided the Friday Special would be a polling example of, "When the media does math, the media usually gets it wrong!" (I was tempted to write "an 'a-polling" example, but decided against it!)

Look at the accompanying page, reprinted from the Toronto Star in February, 1992. In January, 1992, the Tories were at a very low 12%, according to a poll.

Note the italicized explanation.

"*Today's results are based on 1001 personal interviews with adults, conducted Feb. 5 to 8, 1992. A national sampling of this size is accurate to within a 4-percentage-point margin , 19 in 20 times.*"

With a little nudging from you, your students should be able to interpret this. Assuming the same polling methods were used in January, we can say with 95% confidence (that is, 19 times out of 20*), that the **true value** of where the Tories stood in January is between 8% and 16%, that is in an interval centred at and within 4 percentage points of 12%. The true value? This is the actual percentage that the pollster would have found if **every** voter had been polled.

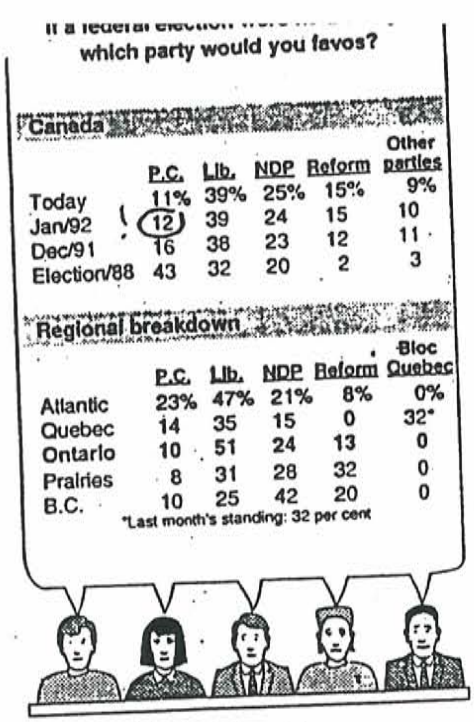
The problems. The February poll has the Tories at 11%. First, in spite of the italicized proviso, the newspaper implies this is the true value of where the Tories stood. It is not necessarily the true value, but an estimate from another sample. Second, and this is the more important problem for me, **even if 11% were the true value**, it lies between 8% and 16%. This is **NOT A SIGNIFICANT CHANGE from January's sample!**

Why, then, is the headline, "Tories hit record low with 11%"? When the media does math, the media usually gets it wrong!

So, did the Greens get in? I'm writing in June but you are reading in September. Have a great 2004/2005 year!

Best wishes, Jack

*Basically, this means that if we did, for example, 2000 samples, we would expect the true value to be in **approximately** 1900 of the confidence intervals from these samples. Note the true value may not in fact lie between 8% and 16%.



Tories hit record low with 11%

FROM GALLUP CANADA

The governing Progressive Conservatives have reached an all-time low in voter support, a new Gallup poll shows.

The Tories have the support of only 11 per cent of Canadian voters, a figure that also represents a record low for any national party.

It marks a one-percentage-point drop for the party since last month's Gallup poll. On only one occasion in the past two years — August, 1990 — have as many as 20 per cent of decided voters backed the Conservatives.

The Liberal party remains well ahead in the national standings with 39 per cent support, unchanged from January's poll. The New Democratic Party has the backing of 25 per cent, up one percentage point over the past month.

The Reform party has 15 per cent of decided voters, also unchanged from January. Other parties, including the Bloc Quebecois, have 9 per cent support.

Today's results are based on 1,001 personal interviews with adults, conducted Feb. 5 to 8, 1992. A national sampling of this size is accurate within a 4-percentage-point margin, 19 in 20 times. The margin of error is higher for the regions, reflecting smaller sample sizes. For example, in Quebec 260 interviews were conducted, with a margin of error of plus or minus seven percentage points, 19 in 20 times.

More than four in 10 voters (41 per cent) are undecided as to which federal party to support, up from 38 per cent last month. The last time the undecided figure reached 41 per cent was in May, 1991.

In Quebec, there has been almost no change in popular support for the federal parties over the past month. The Liberals remain in the lead with 35 per cent backing, down from 38 per cent in January.

The Bloc Quebecois has maintained the 32 per cent support it had last month, while the Tories have dropped from 15 per cent to 14 per cent. The NDP has climbed from 12 to 15 per cent.

In Ontario, the Liberals have risen from 48 to 51 per cent, while the NDP follows with 24 per cent, down one percentage point from January.

The Reform party has risen from 12 to 13 per cent while the Tories have dropped from 13 per cent to 10 per cent.

In the Prairie provinces, the Reform party leads with 32 per cent, one ahead of the Liberals and four ahead of the NDP. Only 8 per cent of Prairie residents back the Tories.

In British Columbia, the NDP leads with 42 per cent, followed by the Liberals (25 per cent), Reform party (20 per cent) and Conservatives (10 per cent).

In Atlantic Canada, the Liberals lead with 47 per cent support, more than the Tories (23 per cent) and NDP (21 per cent) combined. The Reform party has 8 per cent support.

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December, 2004:

Look at the accompanying ad. This picture bothers me more than a little. Is that fella supposed to look like a "math prof"? Hmm.

More importantly, look at the stuff on the blackboard. It is absolute and total gibberish. Awful. And yet it contains symbols and terms that will seem familiar to most of us. I imagine a lot of people who found math tough would look at the nonsense on the board, and, not realizing it is garbage, think to themselves, "Oh that brings back such scary memories. I am sooooo glad to be outta there!" Great. The ad reinforces negative attitudes towards math. Those whose math foundation is solid will recognize the nonsense for what it is and give it no further thought.

The ad agency and its client really messed up. I think the math phobics would be turned off by the ad because of the math and by extension, not consider the company. I believe people who know some math would not be kindly disposed to a company that would get it all so wrong. Given what is on display, would you trust an investment broker that would certify the guy in the picture as a "math genius"?

What a missed opportunity! What a shame! The ad agency could have gone to any competent grade 9 student and said, "Here is fifty bucks! Fill this blackboard with math!" The student would no doubt have come up with glorious results by comparison with, with, arrrgggg, that GARBAGE.

So discuss this with your class as a Friday Special. Maybe, as a pre-holiday activity, devote a class or two to the following project:

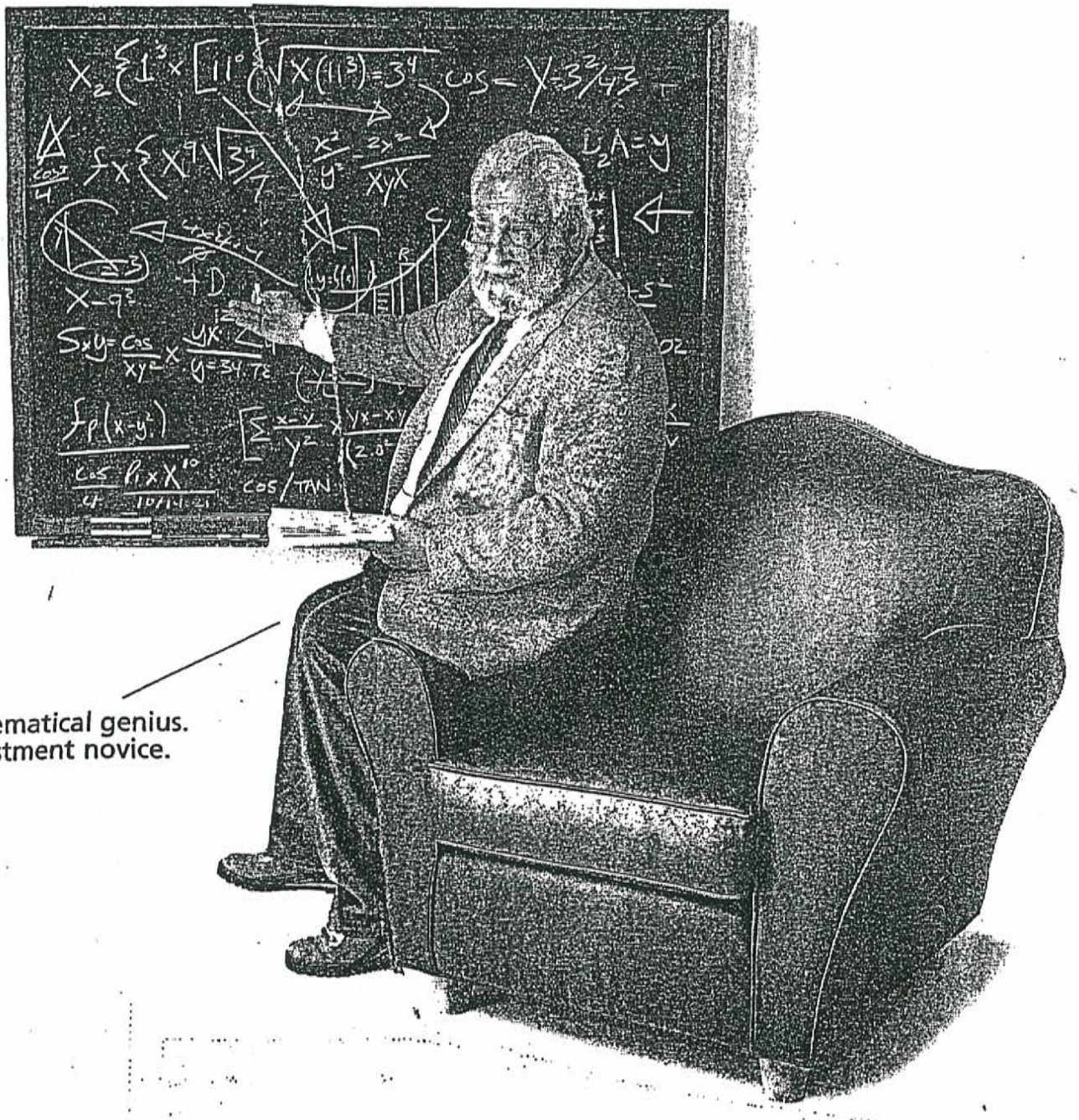
"Fill this sheet with math!"

Give each student a sheet of bristol board, provide the markers, and let them go at it. The only instruction: Whatever goes on the sheet has to be related to math and must be correct. They will have fun. They will consolidate and solidify a lot of mathematics. You will get terrific posters to display in your classroom.

Happy holidays!

Best wishes, Jack

Even experts
can use professional advice



Mathematical genius.
Investment novice.

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March, 2005:

A few years ago, I received a letter from a mom, advocating on behalf of her teenage son. It seems he entered a contest to win a Honda Nighthawk. He won second prize: $200 in CD's. In order to claim his prize, he had to answer the…

SKILL TESTING QUESTION!

The question was the usual bit of arithmetic: $22+14\div3\times4-3$.

He submitted the correct answer of $37\frac{2}{3}$. However, Honda informed him, "We are sorry. We can't give you the prize because your answer to the **SKILL TESTING QUESTION** was incorrect. You see, 22 + 14 is 36, which divided by 3 is 12. Multiply this by 4 to get 48. Finally, subtract 3 to arrive at the correct answer of 45."

Honda didn't obey "Order of Operations", otherwise known as" BEDMAS"!

Mom asked me to intercede on her son's behalf.

I wrote a letter to Honda. I explained that "…the order of operations are the logical consequences of the axiomatic properties of the real numbers."

Knowing the stunned reaction this explanation would likely induce, I then offered a numerical example. In **your** class, set up the example this way. Ask for a volunteer. "You have $100 saved and are working part-time at MacDonald's. How much can you save each week for ten weeks?" The student will answer some amount like $40.

Now everyone in your class will agree that the student will, after ten weeks, have $\$100+\$40\times10$ = $500 saved. However, according to Honda, the student will have $\$140\times10$ =$1400. Hmm. Maybe we should all use Honda's method. Maybe that is how Honda prices their cars!

I mailed the letter and sent a copy to mom. My friend and really smart colleague, Gary Flewelling, suggested that while helping out is fine, my time is valuable and I should charge a consultation fee. I explained this in a note to mom which I attached to her copy of the Honda letter. "My consultation fee is $\$1000-\$500\times2$." So in reality, she owes me …But according to Honda, I should receive…

Several weeks later, I contacted her. "Did your son receive his prize?"

"Yes," she said, "and thanks for your help."

"What about my consultation fee?"

With a smile in her voice, she replied, "The cheque is in the mail!"

Best wishes, Jack

Professor Weiner: Here is a copy of the Honda Ballot with the "skill testing" question.

FEEL FREE!

to win a Honda NightHawk

1st prize Honda Nighthawk 250cc and Canada Safety Council Course (Approx. value $3,650.00).

2nd prize 10 Compact Discs (Approx. value $200.00). See reverse for rules.

Name: _____

Address: _____

Phone: _____

Winners must correctly answer the following skill testing question:

22 + 14 ÷ 3 x 4 – 3 = _____

Honda has stated that 45 and 37⅔ are both correct answers.
Would you please answer the question & explain how (why?) you arrive at your answer?
Would you also state your opinion on whether both 45 and 37⅔ are correct answers.
Thank you very much for your time. Your assistance with this is greatly appreciated.

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June, 2005:

Well, I am writing this column on March 31. Spring is in the air, we have had a few days with temps in the teens, and the trails where my canine pal Denver and I run each day are a muddy mess.

Which brings me to the accompanying "springish" picture printed in the Toronto Star a few years ago.

I guess the road somehow straightens itself out from September to March. Not.

Show this to your class and ask for an explanation.

I suspect that at least one of your students will think outside of the box and realize the solution is not what we see, but what is missing. Some miscreant stole the sign which originally appeared above the "April to August". The purloined piece: "Turtle Crossing!"

This kind of thinking is actually not rare in mathematics. How often do we ask students to prove or find a counter-example to a stated assertion. For example:

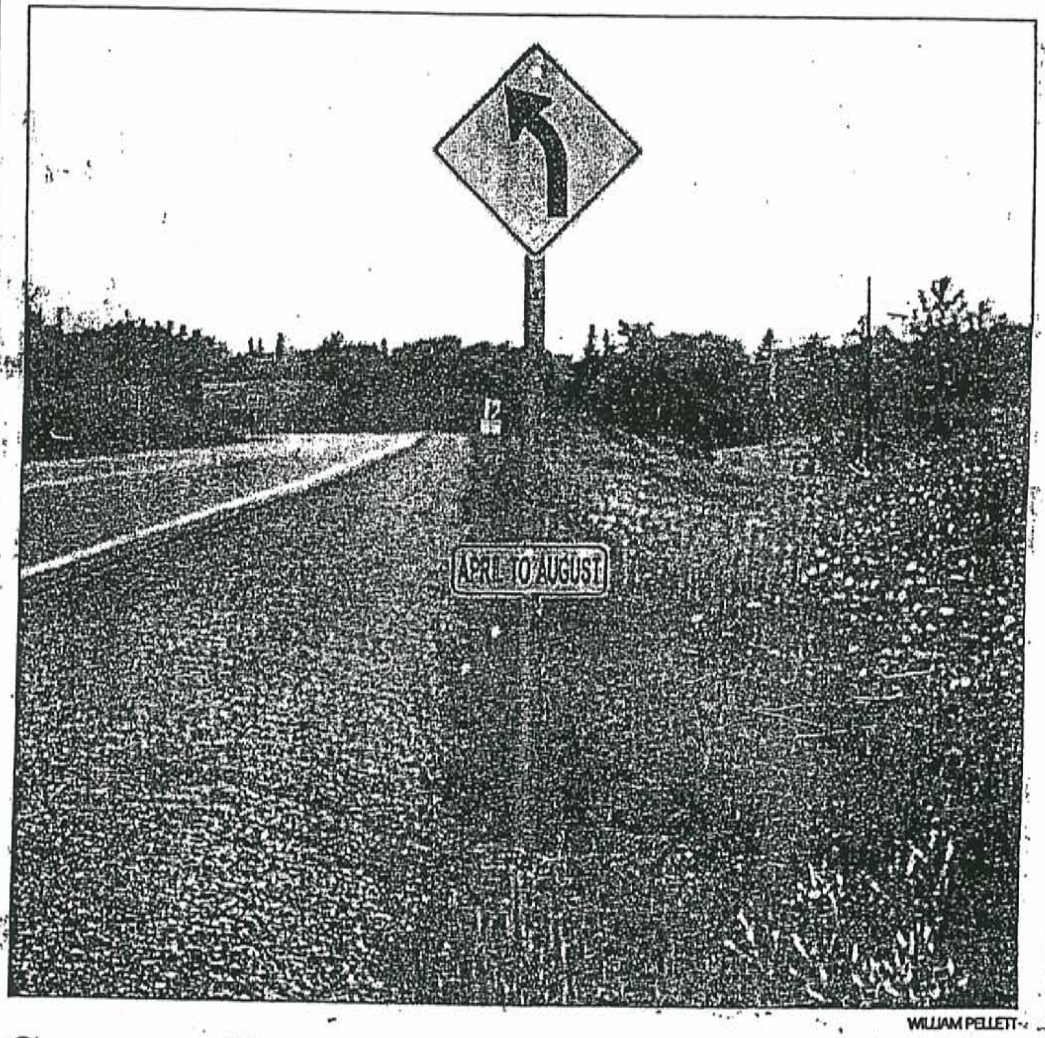
If two corresponding sides of two triangles and one angle of each triangle are equal, then the two triangles are congruent.

The assertion is false and it is not hard to find two non-congruent triangles that satisfy the hypothesis. What's missing? If we strengthen the hypothesis to say, "*and the contained angles are equal*", then the assertion is true.

I occasionally ask my students to prove an un-provable result by providing an insufficient hypothesis. It is a neat, albeit somewhat underhanded way of driving home what a "hypothesis" really is.

Best wishes, Jack

Drive-by



WILLIAM PELLETT

Seasonally adjusted curve?

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September, 2005:

After the tragedy of Walkerton, we were all so much more conscious of water quality and water safety that assurances from proper authorities became common. Witness the ad accompanying this column, placed in the Toronto Star on December 3, 2001 (six months post Walkerton).

According to this ad, Toronto tests its water 300,000 times per year? That seems really high. I mean that seems **REALLY** **HIGH!!**

Let's bring a numeracy eye to this number. The ad claims the water is tested every 4 hours. So, there are 6 tests per day or 365 X 6 = 2190 tests per year. Are we missing something here? How does this translate to 300 000 tests per year?

I know! There must be several testing stations. In fact, there must be $\frac{300\,000}{2190} \doteq 137$ stations. Hmm.

I realize that Toronto is a **BIG** city. But even so, does Toronto have 137 testing stations?

Luckily, the people responsible for the ad gave us a phone number.

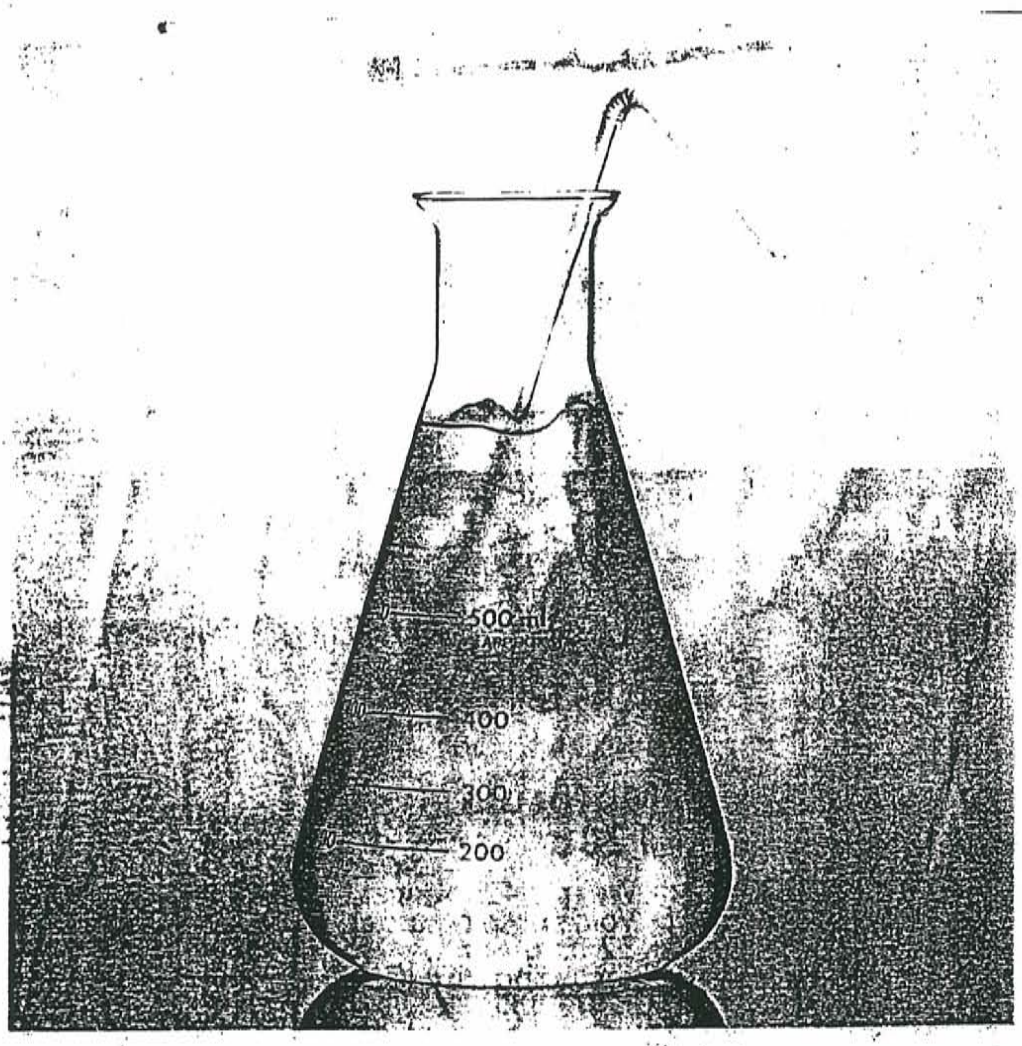
I called. I got voice mail. I left a message.

"Do you really have 137 testing stations?"

As I write this, it is June 21, 2005. I am still waiting for a reply. It could drive you to drink!*

Best wishes, Jack

*But don't drink and drive!



TORONTO DRINKING WATER. PURITY-TESTED MORE THAN 300,000 TIMES/YR.

Every day, Toronto's drinking water is tested for purity, and then tested again. In fact, water samples are taken every four hours to confirm the absence of bacteria. What's more, compared to bottled water, it's environmentally friendly, and a small fraction of the price. How refreshing is that? Visit www.city.toronto.on.ca/water or call 416.392.4546.

TORONTO

Toronto Star Dec 3, 2001

Fridays at the University of Guelph, five minutes before the end of class, I say, "Pens down, books closed, it's "Friday Special" time!" Then I show on screen an article or cartoon or letter or...something that has to do with math (well, usually), the "real world"(well, most often), and has absolutely nothing to do with class, assignments, or tests (always!) It is math for fun. Often, it is some flagrant example of how the media abuse math. I hope you use some of these. Make them "Monday Morning" specials or "We need a break!" specials. If one falls flat, blame me. If it works, you take the credit.

December, 2005

There was an interesting and rather sad story about six months ago that involved a minor consumer revolt. An elderly gentleman (that's middle-aged hubris talking) was incensed that the price of gas at the pumps had shot up to the stratospheric heights of 91 cents per litre. He filled his tank and, with excellent numeracy skills, determined the cost of his purchase at 70 cents per litre. He paid **this amount** and, to the amazement and chagrin of the employee at the kiosk, drove off.

Yes, the employee wrote down and reported the license number to the police. The authorities in turn had no choice but to charge the gentleman with theft.

Thankfully, sane heads prevailed. The fella's son, upon hearing of the details, came forward and paid the difference. All was forgiven. Well, 91 cents per litre now sounds like a bargain. It didn't and doesn't take us a long to become inured to a new reality. What I don't understand is that, as I write, the price per barrel of oil is now below pre-Katerina prices and yet the price per litre of gas is definitely way up from pre-Katerina prices. We went from 70 cents to $1.40 and are relieved to be paying a just under a buck a litre.

With this background, I thought it would be timely to share the accompanying photograph, reprinted from the Toronto Star. Show this to your classes and ask your students for the evidence that the picture is ancient! Here are three good answers.

Reason 1) Gas per litre at 14.4 cents!
Reason 2) The 1970's vintage cars!
Reason 3) The sign hailing "Canada's First Metric Gas Station"!

Of course, none of these reasons can be considered conclusive. Why?

Reason 2) It could just be a coincidence that the 2005 photograph caught only 1970's cars in its composition!
Reason 3) The station might have continued to display a commemorative sign of that significant distinction! And last...
Reason 1) Many gas stations have signs that are not able to post prices over $1 per litre. That station could be selling at $1.144 per litre!

Did I miss anything?

Best wishes for the holiday season, Jack

BORIS SPREMO.CM/TORONTO STAR FILE PHOTO

A gas station at Jarvis and Isabella Sts. sells gas for 14.4 cents a litre in April 1975. As Toronto prices hit an average yesterday of 91.5 cents, one small business owner who uses her car daily said, "I'm outraged. Don't get me going."

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March, 2006:

Here is a recurring Friday Special theme:

When the media does math, more often than not, the media gets it wrong!

Please indulge me as the column allows another subject to make an appearance as a guest Friday Special. It seems that…

When the media does geography…

After the collapse of the Soviet Union in 1989, many countries in Eastern Europe attained autonomy for the first time in decades, a few for the first time period. The Warsaw Pact dissolved. Its western counterpart, NATO, did not. In fact, many former Warsaw Pact countries decided that membership in NATO would be to their advantage and initiated efforts to join.

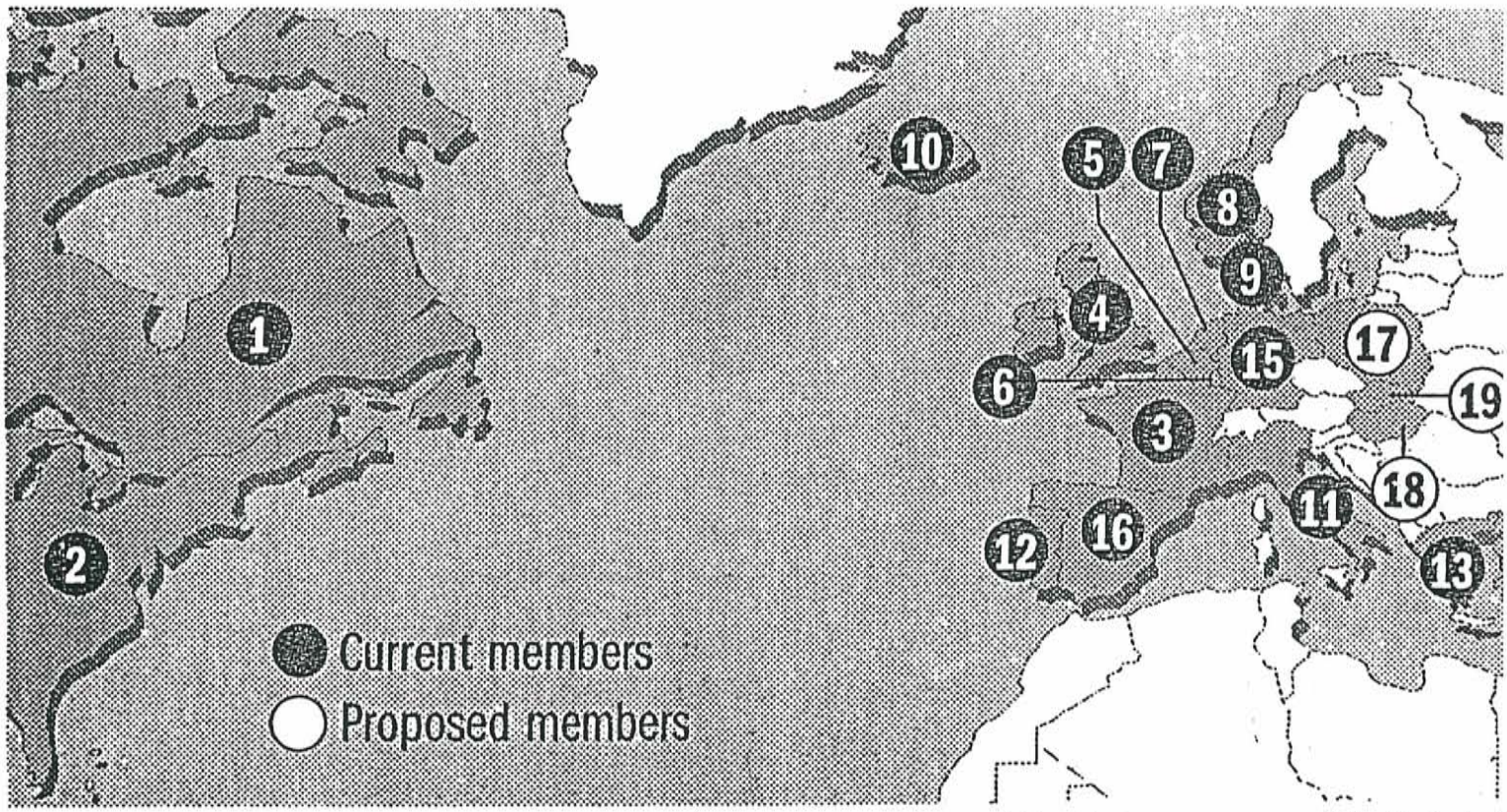
Reporting on this phenomenon, the Toronto Star commissioned the accompanying graphic. It shows, at the time of the article, current and proposed membership in NATO. Aware of the possibility for error in identifying the small, closely neighbouring countries in Europe, great pains were likely taken to ensure the European labels were correct. As far as I can tell, the Toronto Star did a good job. That is, across the pond.

Take a five minute diversion to give your students a little history/geography lesson on this topic. Have them check out Canada and the United States on the map. **OUCH!** And remember, this graphic was commissioned for and published by the Toronto Star.

When the media does geography…

Best wishes, Jack

NATO expands



1. United States
2. Canada
3. France
4. Britain
5. Belgium
6. Luxembourg
7. Netherlands
8. Norway
9. Denmark
10. Iceland
11. Italy
12. Portugal
13. Greece
14. Turkey
15. Germany
16. Spain
17. Poland
18. Hunga
19. Czech

TORONTO

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June, 2006:

Here is a recurring Friday Special theme:

When the media does math, more often than not, the media gets it wrong!

However, you would expect the tech giants of our generation to get it right. Always.

This is in part a story about computer sales mammoth Dell. Mostly it's about the power behind the Dell machines, Intel.

In November, 1994, Intel admitted that it had produced a processing chip that **couldn't do the math.** Here is a quote from a Lynchburg College (Lynchburg,Va.) mathematics professor Thomas Nicely that, at the time, brought a problem Intel knew about into the open.

"The Pentium floating-point unit is returning erroneous values for certain division operations. For example, 1/824633702441 is calculated incorrectly (all digits beyond the eighth significant digit are in error). This can be verified...by computing (824633702441.0) X (1/824633702441.0), which should equal 1 exactly (within some extremely small rounding error; in general, coprocessor results should contain 19 significant decimal digits). However, the Pentiums tested return 0.999999996274709702 for this calculation."

The magnitude of this error might seem inconsequential but, hey, when you depend on the machine's calculations to send a rocket to Mars, you need accuracy.

Let's not be too harsh. Everyone makes mistakes. I am especially fallible. Thank goodness I have bright, attentive students ready to correct me at every slip.

However, Intel did something unforgivable from a public relations point of view. The company decided it would be too expensive to replace the chips in all the shipped machines with the potentially faulty chip installed. It was up to you, the end of the line customer, to convince Intel that your work required arithmetic precision. Only then would your machine would then be, grudgingly, serviced.

Well, screams of protest prompted Intel eventually to do the right thing and every one with a potentially bad chip had the chip replaced on request.

So now please take a look at the accompanying ad, from the late 1990's, for the new generation of Dell computers. "Why cruise at 60 (MHz) when you can speed at 75?"

You might think my point has to do with how far we have come in terms of processing speed. We are now at 2GHz, 2.5 GHz, 4GHz!

Not my point at all. At the time, 75 MHz was a substantial improvement over 60. The ad goes on to say (Did you read ahead?), "You get 15% more processing power…"

Now, unless there is an incredible coincidence in the curve of processing performance, I think that going from 60 Mhz to 75MHz is a 25% increase in processing speed.

Let's be fair. The people who write the ads may, by the very nature of the jobs, be people who, in school, shied away from math. Understandable math fallibility. But on the heels of the Intel fiasco, you would think the tech folks of these super companies would double check something as important as advertising copy and catch errors like this.
Here is a more scary scenario. Maybe they did. If that's the case, well, oh oh.

Best wishes, Jack

PS For the whole story well told, go to

http://davefaq.com/Opinions/Stupid/Pentium.html

From that website, here are two paragraphs that describe in detail Intel's dismissal of the potential problems and in fact their under-estimating that potential. The boldface is mine.

"Intel's initial public response stoked the flames, rather than calmed them: the company set up a fax-back system to brief worried users. The message described the bug as a "subtle flaw" and estimated that the average "spreadsheet user" would encounter the problem only once in every 27,000 years. The idea that Intel wanted to get across was that the rest of the PC was bound to fall apart before your Pentium processor produced an incorrect answer. **However the users immediately interpreted this as meaning that around 3 spreadsheet users a day worldwide would be getting erroneous results from their spreadsheets, with even more frequent errors for people doing serious scientific work. Most importantly, anyone doing iterative functions, where a variable is repeatedly calculated, could see the inaccuracies snowball through their calculations.**

But above all, the question raised by the newsgroup was, "Why didn't you tell us as soon as you knew that there was a problem, rather than keeping us in the dark?" The second question is invariably "Will you replace my chip?", to which the answer seems to be, "Probably not." **Unless you can show Intel that you are doing high powered mathematics that needs full double precision figures Intel is unlikely to oblige. To-date we only have two reported examples to draw on: one Pentium user, an undergraduate mathematics student, says that he had his request for a replacement chip turned down, despite the fact that he could be doing these complex calculations on his PC. The other user, using his computer for medical analysis ("If you were going under the knife, would you want to know that the analysis may be wrong?") says that he was put on the list for a replacement after 10 minutes of discussion with an Intel rep."**

NEW 75MHz PENTIUM PROCESSOR-BASED SYSTEM ONLY $1999

Dell Dimension™ XPS P75
A Pentium™ Processor-based 75MHz System
Business Lease*: $74/Mo.

SYSTEM SPECS:

- Mini Tower Model
- 8MB RAM
- 340MB Hard Drive (13ms)
- VS15 Monitor (15" CRT, NI)
- NEW 64-bit #9 PCI 1MB DRAM Video Card
- 256KB Writeback Cache
- One Diskette Drive (3.5")
- Spacesaver Keyboard
- MS-DOS® 6.2/Microsoft® Windows™ 3.1/Mouse

Order Code #500033

WHY CRUISE AT 60 WHEN YOU CAN SPEED AT 75?

Introducing the new Dell Dimension 75MHz Pentium-chip based system. The perfect desktop for those of you with a lead foot and a light wallet.

You get 15% more processing power than a 60MHz system. That's one heck of a machine for under $2000. What's more, it's all backed by the stability of Dell, a Global FORTUNE 500® company.

Call today to take advantage of this great deal. And then throw caution to the open road.

TO ORDER, CALL NOW.

800-716-3355

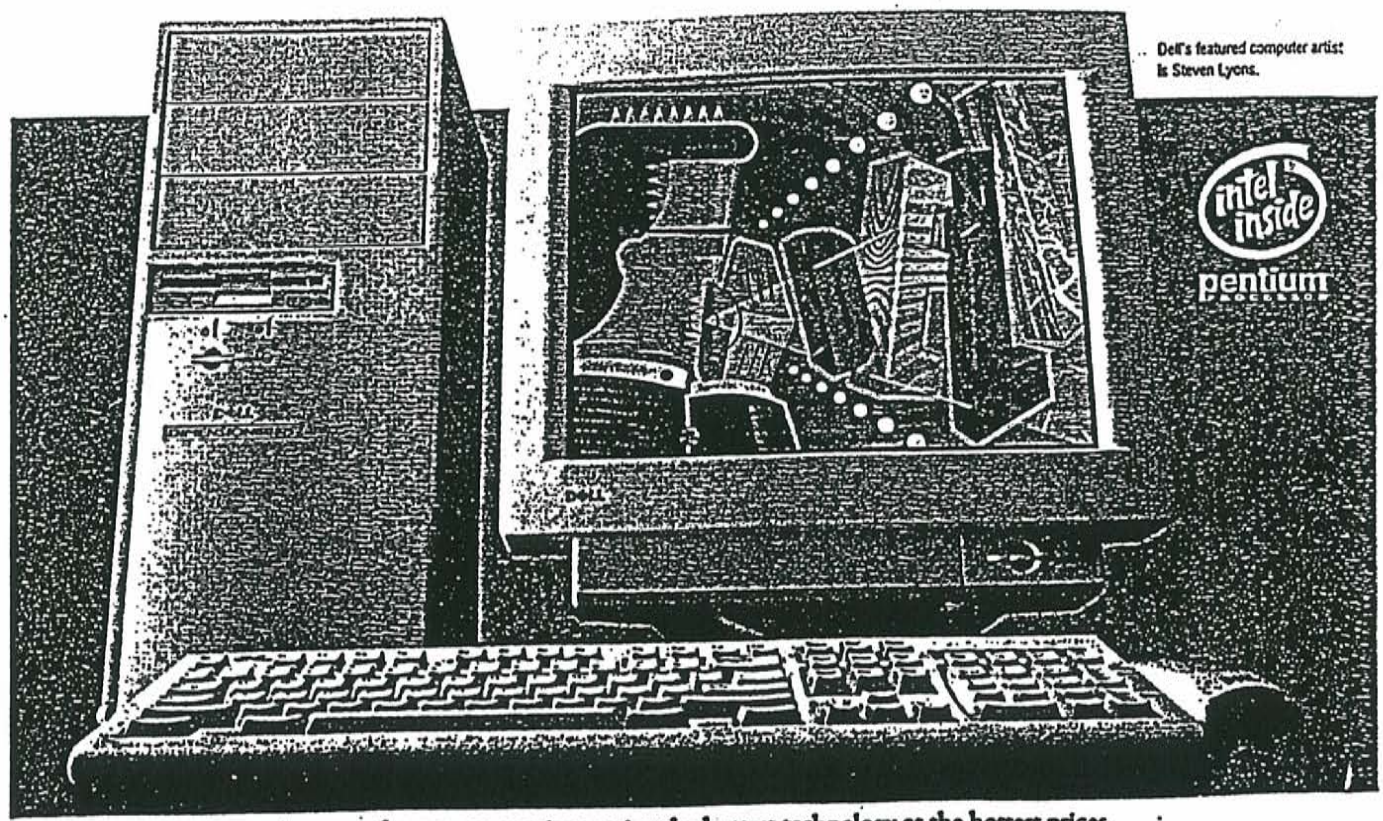
Mon-Fri 7am-9pm CT • Sat 10am-6pm CT • Sun 12pm-5pm CT
In Canada: Call 800-668-3021

Keycode #04007

DELL

60 MHz → 75 MHz

15% increase?



Dell's featured computer artist is Steven Lyons.

Just turn the page to continue seeing the hottest technology at the hottest prices.

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September, 2006

I recently talked to about 200 enthusiastic grade 7 and 8 students at Dundas District in Dundas, Ontario (just a little west of McMaster in Hamilton and very close to Parkside High School where I taught for five happy years.)

It was May 31. Neither teacher organizer Lesley nor I anticipated when we set the date that the temperature would hover above 30 C. So we were nervous that everyone would be a little uncomfortable. We were, until we got started. Then …

… we had fun. If I had to do it over again, I would have taken a break after 30 minutes for a quick walk around the schoolyard. Maybe pull a Ron Lancaster and point out some "math in the world all around them."

We did some math, talked about school and life, and what's ahead in high school. We decided that college, apprenticeships, university were all good options and that career enjoyment was more important in the long run than money.

All in all, a neat 60 minutes.

As part of the "math" portion (we had to do sooooommmmme math), I brought up the "deviant mediant". I prefaced by saying this:

"Okay, this is going to get me in trouble, but, sorry, the evidence is there for all to see. Guys on average are better at sports than girls. They are stronger and better coordinated. Maybe in another universe, males and females would be equally talented or females superior, but here, well…

"Look, for example, at the statistics from the coed baseball league to which Julie and John belong. Do the math. In season one, Julie has a batting average of 40/200=.200 while John has a batting average of 100/400=.250. John has the better average. Guys are better at sports than girls.

“Season two: Do the arithmetic and you see that Julie’s average of 93/300=.310 is no match for John’s average of 32/100=.320. Guys are better …

“So cumulatively over the two seasons, Julie’s average of 133/500=.266 is of course lower than John’s average of .132/500=.264 again showing that guys are…uh, wait a minute. John’s average is supposed to be higher than Julie’s.

“Okay, something must be wrong. John has the higher average in both season one and season two. Both John and Julie have the same number of at bats over the two seasons. How can John’s cumulative average be lower?”

THE DEVIANT MEDIANT

The reaction from the students. First and predictably, when at the start I claim guys are better, guys cheer and girls jeer. Then they get caught up in the numbers. By the way, ask them to tell you how batting averages are measured. (“Vernon Wells is batting two fifty this year.”) Then the genders switch roles for cheering and jeering when we see Julie’s winning average over two years.

And we talk about how this could happen.

One point students rarely notice: who gave us permission to add fractions this way: “$\frac{a}{b}+\frac{c}{d}=\frac{a+c}{b+d}$”, that is adding the numerators and adding the denominators? That’s precisely what we did to compute the combined season stats.

This incorrect fraction addition contains the seed of the real answer which, usually, at least a few students will discern. Julie’s high average of .310 occurs for many more at bats that John’s .320. So it carries more “weight” when computing this “deviant mediant”. If we took the average of the batting averages, Julie would, over two seasons, have .255 versus John’s higher .285.

Then ask the question: “Which is the better measure of average over the two seasons?”

Ask this question too: “Which way would you prefer to add fractions:
the right but admittedly a little more difficult way or the deviant mediant?”

Best wishes, Jack

THE DEVIANT "MEDIANT"

PROBLEM The "mediant" of two fractions, a/b and c/d , where a, b, c, and d are positive real numbers, is defined by the fraction:

$$\text{mediant} = (a + c)/(b + d).$$

Given that $a/b < e/f$ and $c/d < g/h$, prove that

$$(a + c)/(b + d) < (e + g)/(f + h) .$$

SOLUTION COUNTER-EXAMPLE using the batting averages of Julie and John!!!!

SEASON	**JULIE**	**JOHN**
	hits/at bats	hits/at bats
1	40/200 =	100/400 =
2	93/300 =	32/100 =
Cumulative averages	133/500 =	132/500 =

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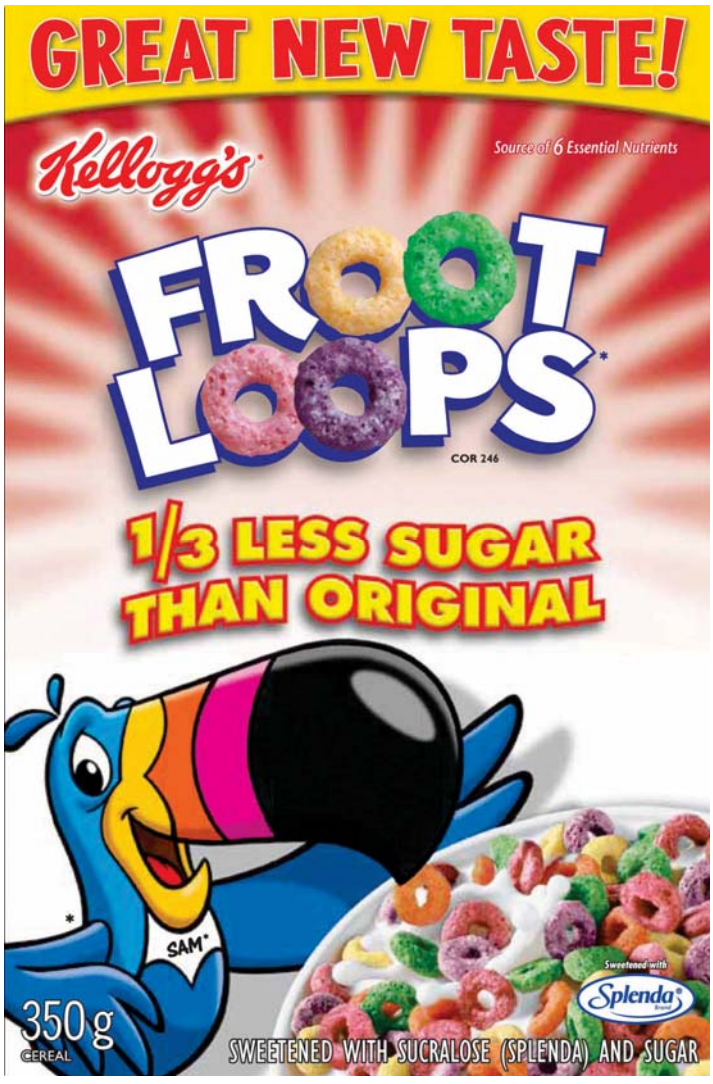
December, 2006

Vice Squad: Froot Loops 1/3 less sugar

Less sugar, yes, but more calories

Suzanne Carere



Product: Froot Loops 1/3 Less Sugar
Price: $4.49-$5.29 for 350g box
Total calories: 112 for a 27g serving
Manufacturer: Kellogg Canada Inc.
The position: Froot Loops 1/3 Less Sugar gives consumers choice if they are looking to limit their sugar intake.
Top 4 ingredients: Flour mix (corn/white/whole oat flour, sugar, salt), sugar, hydrogenated coconut oil, colour
Nutritional breakdown for a 27g serving: Froot Loops 1/3 Less Sugar: 23g carbohydrate (0.9g fibre, 8g sugar, 14g starch), 0.9g fat (0.3 saturated), 2g protein, 149g sodium. Regular Froot Loops: 24g carbohydrate (0.9g fibre, 12g sugar, 11g starch), 0.5g fat (0.5 saturated), 1g protein, 110g sodium and 110 calories

Analysis: Take a moment to compare the nutrition information of both products and see if anything stands out as being a little ... strange? Now give yourself a point if you found each of the following:

- 1/3 Less Sugar is higher in fat
- 1/3 Less Sugar is higher in sodium
- 1/3 Less Sugar is higher in calories
- 1/3 Less Sugar is only lower in carbohydrates by 1g

Shocked? I sure was. When scanning the numbers, the first three were probably easy — although no less surprising — to pick out. The last one may have been a little trickier. In the process of reducing the sugar content in this cereal, Kellogg's ended up using an artificial sweetener — sucralose — and more flour. This increased total starch by 3g and led to a slightly higher sodium, iron, thiamin, niacin and protein content.

Research has shown, however, that some starches (like white bread) actually turn into sugar in the blood faster than table sugar itself. In the end, it's the concentration of fibre that plays a larger role than the number of grams of sugar. To your body, this means there's basically no difference in sugar content between these two cereals.

You don't have to go by my word on this, however. You can ask any dietitian you want — even Johanne Trudeau, director of nutrition for Kellogg's Canada. Despite quotes from Kelloggs.ca stating that they are dedicated to the health of children and nutrition education, Trudeau was quick to clarify with me that Kellogg's 1/3 Less Sugar wasn't formulated with the health of children in mind. Say what? Apparently it was created to meet the consumer demand that moms want their children to consume less sugar.

Stunned, I asked: "Wouldn't that be for health reasons though?" Her answer: "You're going too deep." According to Trudeau, Kellogg's didn't take the time to find out why moms wanted their kids to eat less sugar, they simply made a product that would "make moms feel better."

When I pushed her on the fact that both cereals would provide a similar sugar load to the blood, she told me that although she and I might know that, "most kids and moms don't."

Alternative: I know I've been hard in the past on companies that are trying to make healthy products but in the end fall short of their goals. This, however, is an entirely different ball game. If I'm going to treat myself to a high-carbohydrate, low-fibre cereal like this one, I'd rather buy one that doesn't take advantage of consumers' lack of knowledge.

Take it or leave it: I think my work here is done.

Suzanne

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March, 2007

It is January 3, 2007 as I write and March something, 2007 as you read. A belated Happy New Year to you all.

This Friday Special, I would like to share an experience I had when, "several years ago" (okay, 1980!), I was teaching a grade 9 class at Parkside High School in Dundas, Ontario.

Joel was working on this two-part question.

1. Solve for x in each of the following:

(a) $3x - 6 = 32$ (b) $3x - 12 = 32$

Here was Joel's **COMPLETE** solution.

(a) $x = 8$ (b) There is no solution.

Now when I looked over his work, instead of just saying, "WRONG, WRONG, WRONG!", I asked Joel to explain how he arrived at his answers. It turns out that he had a completely logical way of doing math in which his answers were absolutely correct. Of course, he was living in a different mathematical universe than you and I.

I have shared this example at many conferences. I always leave some time for participants to try to find a "consistent" way of solving these problems so that Joel's answers are correct, at least, correct in this alternate universe.

Before reading further, try this yourself. Find a method of solving these problems where the first answer is 8 and the second is "no solution."

**********INSERT THE JEOPARDY THEME******

Okay, are you back? Any success?

Many of you will have discovered the method in Joel's madness. He reasoned in (a) that "thirty **SOMETHING** minus 6 = 32. Well, 38 – 6 = 32. So $x = 8$." Oh, in Joel's world, x is a digit.

He continued, “In (b), thirty **SOMETHING** – 12 must be a number in the 20’s or even smaller! It can’t be 32! There is no answer!”

WOW! To Joel, x is a digit! He somehow missed the class(es) where we decided that $3x$ meant 3 times x.

This is not a mathematical mistake. It’s a misunderstanding of a notational convention. And we math teachers are at least partly at fault.

Consider this: if $r = 3$ and $x = ½$, then $rx = \frac{3}{2}$. However, if we substitute for r and x directly, we would write 3 ½. You and I interpret this as 3 + ½. But Joel and all students can ask, “How did times turn to plus?” Darned good question!

By the way, inevitably, some teachers at these conferences find **other** alternate universes.

(a) $3x – 6 = 32$. Therefore, $3x = 38$. Cancel the 3’s and $x = 8$.

The method has to work in (b) as well. So …

(b) $3x – 12 = 32$. Therefore, $3x = 44$. We can’t cancel the 3 so there is no solution.

Here is my favourite teacher solution.

(a) $3x – 6 = 32$. Cancel the 3’s so that $x – 6 = 2$. Therefore, $x = 8$.

Does this work in (b)?

(b) $3x – 12 = 38$. Cancel the 3’s so that $x – 12 = 2$. Now cancel the 2’s so that $x – 2 = …$ Wait a minute! There is no longer a right side! The right side has become **the black hole of mathematics!** We can’t solve it if there is no right side! No solution!

Math teachers: what a twisted bunch we can be.

Best wishes, Jack

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June, 2007

Here is a letter that goes back a LONG way. The issues, both in terms of the price of gas and the underlying math avoidance, are as contemporary as ever!

GAS PRICE HIKES ELIMINATE SAVINGS
(Letter to the Editor, The Toronto Star, March, 1981)

Despite the milder weather, I cannot agree we are saving any dollars using gas.

My last gas bill showed an amount of $128.50 for February against $83.40 for the same time last year. When I asked about this of Consumers' Gas, I was informed I had used 15% less gas this year than last. When asked why my account was $45 more, the reply was that the price of gas increased 24% in the last year. Where are the 6 and 5% guidelines, or don't they apply to Consumers' gas?

MG
Downsview

When I talk about this with students or teachers, I first give a little history lesson.

"Where are the 6 and 5% guidelines…" This was an era of rampant inflation! In 1979, in order to bring double digit inflation under control, then Prime Minister Joe Clark proposed wage and price controls. Opposition leader Pierre Trudeau ridiculed Mr. Clark for this "dumb" idea. The Conservative minority government brought in a budget which was defeated. The Liberals won the resultant election, and promptly instituted wage and price controls. That Pierre, love him or hate him, he had chutzpah!

I also talk about the disaster of 20% inflation for hundreds if not thousands of homeowners of that time. In the mid-seventies, builders made a hard to resist offer to renters: "**Own your own home: $0 down with mortgages at 4% amortized over 25 years.**" That would have been great, save for the built in 5 year term. Around 1980, the mortgages were renegotiated at as much as 20%. If you do the math, you will see: monthly mortgage payments doubled, tripled, worse. And people simply walked away from their homes. We all know the nature of the up-front interest in a mortgage. Those folks took little equity with them when retreating to the rental world. Crazy and for many, tragic times.

That is not what this Friday Special is really all about.

Reread the letter. Doesn't there seem to be something wrong with the numbers, apart from the wage and price control issue?

MG rightly complains that Consumer's Gas should not be allowed a 24% increase in price when the government imposed 5 and 6 percent limits on him and everyone else. **However, there is something else going on here that MG and most people completely ignore because their minds stop working well when numbers, even worse, percents, come into play.**

Notice that MG doesn't tell us exactly how much gas he used in February, 1980 or the price per litre he paid. Same for 1981. But he does tell us his monthly bill. This table summarizes what we know.

Month	Climate	Amount of gas in litres	Price per litre	Total paid
February, 1980	Brrr	g	p	gp
February, 1981	Ahhh	$.85g$	$1.24p$	$(.85g)(1.24p)$

By the way, when you ask students about how much gas MG used in 1981, you will be surprised (and maybe a little depressed by) how often $g - 15$ is given as the answer.

Anyway, MG paid gp = \$83.40 in 1980. So the next year, he SHOULD have paid

$(.85g)(1.24p) = (.85)(1.24)gp = (.85)(1.24)(\$83.4) = \$87.90$

Yes, MG, you should have paid more, \$4.50 more, **not** \$128.50 − \$83.40 = \$45.10 more!

That should have been MG's first complaint. Sadly, as we all know, when numbers come up, most minds shut down.

Did the gas company try to cheat the customer? Of course not. If MG has his numbers correct, then someone inadvertently punched in the wrong numbers. This is a good lesson for us all. Check your bills, just as you check (I hope) your credit cards to ensure the charges there are valid.

The reason I really love this Friday Special, apart from getting to talk about history, inflation, tragedy, all that meaty stuff, is that it shows the power of math, and in particular here, the power of abstraction in math. We didn't know g nor p. However, we had enough information that we were able, by labeling these quantities, to determine what we needed. Powerful, this thing we call mathematics!

BW, Jack