

# THE MATH LOCUS

Published periodically by the Mathematics Department  
at Kirtland Community College, Roscommon, Mich.  
<http://kirtland.edu/themathlocus>

## Want to win \$25? Enter this math contest

The MATH LOCUS again offers a math contest question. All you have to do is solve this story problem and follow the rules. Good luck!

### Here is the problem:

A company received a grant from the state for a special project. 2009 was the first year it received money — \$20,000. The next year they received \$27,000. The amounts will continue as a quadratic function until the money runs out. They expect that the amounts will peak in the year 2013 at \$36,000.

### Here are the questions:

1. In what year will they get their last payment?

2. How much will they get that year?

Submit your answers with your name, address and phone number by e-mail or U.S. mail by Jan. 10, 2011 (postmark deadline) to: [helen.scheer@kirtland.edu](mailto:helen.scheer@kirtland.edu) or

Helen T. Scheer  
Kirtland Community College  
10775 N. St. Helen Road  
Roscommon, MI 48653

The \$25 winner will be drawn from the pool of correct answers. Tell the MATH LOCUS what resources or help you used — no penalty, just learn.

## Technology — pros and cons

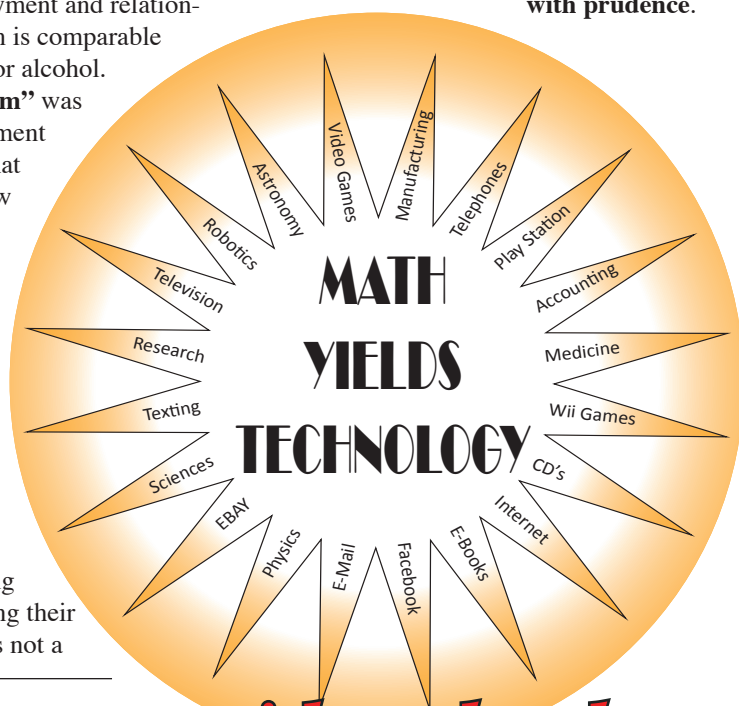
Some of the people at KCC have shared their technology pros and cons, and some of these were found on Google.

**Internet addiction:** Some people are preoccupied with using the Internet. They are unable to control their use and they are jeopardizing employment and relationships. This addiction is comparable to drugs, gambling or alcohol.

**“Go to your room”** was the time-out punishment for children. But what is in their rooms now is not a punishment because one would find VCRs, Play Stations, games, musical CVs, Wii games, etc. A time-out should better be to take their cell phone away for awhile.

Jokes are made about people walking into walls while using their cell phones. But it is not a

joke if they are driving a car. Instructors also have a concern about cell phones as a distraction in the classroom or their use for cheating. Math is necessary to develop technology, but people decide how and when to use it — **all in moderation and with prudence.**



## *CIS in step with technology*

Until just recently, Kirtland Community college was a dead zone as far as cell phone coverage was concerned. Now we have cell phone coverage by two major

towers — Verizon and AT&T.

KCC's Computer Information Systems (CIS) Department updated its mail service

*See CIS, page 8*

## *About Us*

The Tutoring and Student Success Center, under the leadership of Kate Jakobson, is a great resource for the students

of KCC. It is a place to get individual help or to work in groups. Caryn Ann Schutte is a lead tutor and Helen Scheer is the lead math tutor. Sarah Krohn is the office assistant. Other math tutors are Nick Anderson, Zack Berlin, John Hannah, Tim Kurzer, Joel Neorr II,

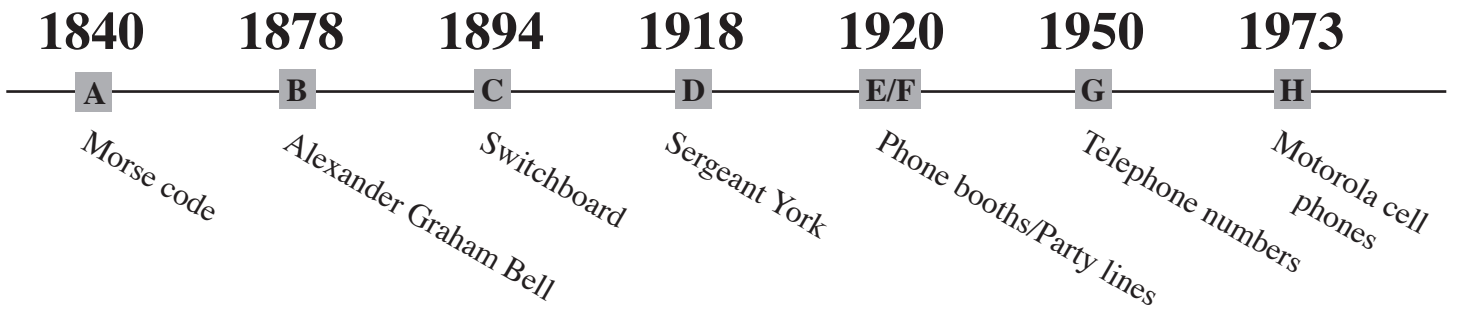
Christine Patterson, Courtney Pierce and Justin Yoder.

These tutors see the need for math in their futures: Tim will be doing blue

*See ABOUT US, page 8*

*From then to now*

# The timeline of communication



This issue of the MATH LOCUS follows the development of the technology of communication, from Morse code to cell phones, with this abbreviated timeline. None of this would have been possible without mathematics.

**A . . .** This timeline could begin with the beating of drums, but let us begin it with the **Morse code**. Morse code is a method of transmitting textual information as a series of on-off or dash-dot. It was created for Samuel F. B. Morse’s electric telegraph in the early 1840s. In the 1890s it began to be used for early radio communication before it was possible to transmit voice. In the early part of the 20th century, most high-speed international communications used Morse code on telegraph lines, undersea cables and radio circuits. (<http://sln.fi.edu/franklin/inventor/bell.html>)

**B . . .** A pioneer in the field of telecommunications, **Alexander Graham Bell** was born in 1847 in Edinburgh, Scotland. Throughout his life, Bell had been interested in the education of deaf people. This interest led him to invent the microphone and, in 1876, his “electrical speech machine,” which we now call a telephone. News of his invention quickly

spread throughout the country, even throughout Europe. By 1878, Bell had set up the first telephone exchange in New Haven, Conn. By 1884, long-distance connections were made between Boston, Mass., and New York City.

Bell imagined great uses for

his telephone, like this model from the 1920s, but would he ever have imagined telephone lines being used to transmit video images? Since his death in 1922, the telecommunication industry has undergone an amazing revolution. Today, non-hearing people are able to use a special display telephone to communicate. Fiber optics are improving the quality and speed of data transmission. Actually, your ability to access this information relies upon telecommunications technology. Bell’s “electrical speech machine” paved the way for the Information Superhighway.



calls to the organization and usually maintain internal communication through telephones and pagers.

Depending on the employment setting, the roles and level of responsibilities of a switchboard operator can vary greatly, from performing wake-up calls in a hotel to coordinating emergency responses, dispatching and overhead paging in hospitals. Operators employed in healthcare settings have other duties, such as data entry, greeting patients and visitors, taking messages, triaging, or acting as an after-hours answering service. Experienced, well-trained operators generally command a higher salary.

The first telephones in the 1870s were rented in pairs which could only talk to each other, but the example of a central exchange was soon found to be even more advantageous than in telegraphy. Small towns typically had the switchboard installed in the operator’s home so that she could answer calls on a 24-hour basis. In 1894, New England Telephone and Telegraph installed the first battery operated switchboard on Jan. 9, in Lexington, Mass.

In the early days of telephony, through roughly the 1960s, companies used manual telephone switchboards and switchboard operators connected each call by inserting a pair of phone plugs into the appropriate jacks. Each pair of plugs was

**C . . .** As the number of phones and phone numbers increased, more problems arose. Medium to large organizations often employ **switchboard operators** — specialized staff who answer general telephone

**International Morse Code**

1. A dash is equal to three dots
2. The space between parts of the same letter is equal to one dot.
3. The space between two letters is equal to three dots.
4. The space between two words is equal to seven dots.

A · —	N — ·
B — · · ·	O — — —
C — · — ·	P · — — ·
D — · ·	Q — — · ·
E ·	R · — ·
F · · — ·	S · · ·
G — — ·	T —
H · · · ·	U · · —
I · ·	V · · · —
J · — — —	W · — —
K — · —	X — · · —
L · — · ·	Y — · — —
M — —	Z — — · ·

1 · — — — —
2 · · — — —
3 · · · — —
4 · · · · —
5 · · · · ·
6 — · · · ·
7 — — · · ·
8 — — — · ·
9 — — — — ·
0 — — — — —

# TIMELINE

*Continued from page 2*

part of a cord circuit with a switch associated that let the operator participate in the call. Each jack had a light above it that lit when the telephone receiver was lifted (the earliest systems required a generator on the phone to be cranked by hand). Lines from the central office were usually arranged along the bottom row. Before the advent of direct-distance dialing, switchboard operators would work with their counterparts in the central office to complete long-distance calls.

**D . . .** Continuing on the timeline of communications, we come to the point where there might be one phone in the town. **“Sergeant York”** was a true-life movie about a fellow who came from such a town and his name was Alvin York. He was a conscientious objector in World War I, but when faced with the choice of the lives of his comrades or to kill the enemy, he chose to shoot. He became a decorated hero in the United States and abroad. While he was in Washington visiting the president, they made a phone call to his home. The whole town crowded around the phone at the general store to talk to the hero miles away. (Google: Sergeant York)

**E . . .** The **telephone booth**, telephone kiosk, telephone call box or telephone box is a small structure furnished with a pay phone and designed for a telephone user’s convenience. Such a booth usually has a door to provide privacy and a window to let others know if the booth is in use. The booth may be furnished with a printed directory of local telephone numbers. 19th century long-distance telephony suffered from high [sound] losses, so “silence cabinets” were built to allow hearing faint voices from distant places and shouting across a country without disturbing neighbors. Most were on telephone company premises, and luxuriously appointed, until the turn of the century when they began to appear in railway stations, hotels and other places where well-heeled customers were expected. They became com-



monplace, though less luxurious, in industrialized countries in the 1910s. Starting in the 1970s pay telephones were less and less commonly placed in booths in the United States. Call boxes were used for emergencies by the police.

**F . . .** The next step up in communications was the **party line** concept or private line. If you paid extra, you could have a private line. Otherwise, when the phone rang, one ring could be your number or two rings could be your neighbor’s. By 1920, more than one third of all households nationwide had Bell telephones. Most had party lines with two to four households on the same circuit. Callers were urged to be brief and to honor privacy . . . please!!

**G . . .** Permutations and combinations: Soon there was a problem finding a **unique number** for all the persons requesting telephone service. For example, in the 1950s, a phone number might be Lakeview 5464 (or LA5464). The question is how many combinations or, better still, how many permutations are there in 10 numbers taken four at a time for the LA exchange? The order of the four numbers was important, so combinations would not work. Also the calculations are an “at most” possibility. There are limitations, such as 000 would probably not be used for an area code, certain numbers or their position are reserved for intrinsic uses, etc.

The 10 numbers are obviously 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 and the formula for combinations is  ${}_n C_r$  or  ${}_n C_4$  is equal to  $10!/[(10-4)! 4!]$  or 210 combinations with no regard for order. But, if the order matters, as it would with phone numbers, we need to do a permutation calculation.

${}_n P_r$  or  ${}_n P_4$  is equal to  $10!/[(10-4)!]$  or 5,040 permutations. This gives us more possible phone numbers. As the demand for more telephone numbers became more critical, a phone



number might be changed to LA 6 6564. This slight change would increase permutations to  ${}_{10} P_5$ , equal to  $10!/[(10-5)!]$  or 30,240 permutations. But it soon became apparent that any two-letter combination should be replaced with a three-number area code. After all, what name could be used for XX, DQ or AZ? So the permutations became  ${}_{10} P_{10}$ , equal to  $10!/[(10-10)!]$  or just  $10! = 3,628,800$  permutations. Even with the changes in area codes, we will probably run out of numbers soon. Our telephone numbers will soon look like credit card numbers!

*Reference note: 10! means 10x9x8x7x6x5x4x3x2x1.*

**H . . .** The first **handheld cellular phone** was demonstrated by Dr. Marin Cooper of Motorola in 1973 using a handset weighing 2 kg. (4.4 lb.). Motorola released the first commercially available mobile phone, the DynaTAC 8000x, in 1983. In the year 1990, 12.4 million people worldwide had cellular subscriptions. By the end of 2009, only 20 years later, the number of mobile cellular subscriptions worldwide reached approximately 4.66 billion, 370 times the 1990 number, penetrating the developing economies and reaching the bottom of the economic pyramid.

*([http://en.wikipedia.org/wiki/Mobile\\_phone](http://en.wikipedia.org/wiki/Mobile_phone))*

Cell phones have many features and applications: texting, Internet access, cameras, voice and data communication, Facebook, GPS, etc. Where will it end? And what are the pros and cons?

# DECEMBER 2010

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
<p><i>Kate Jakobson</i> <i>Helen Scheer</i> <i>Caryn Schutte</i></p>	<p><i>Heidi Sura</i> <i>Sarah Krohn</i></p>		<p>One million raised to the zero power</p>	<p>Base on the binary number system</p>	<p>Two raised to the X power is eight</p>	<p><math>4(\sin^2 + \cos^2)</math></p>
<p>How many sides to a pentagon?</p>	<p>Half a dozen</p>	<p>How many sides to a heptagon?</p>	<p><math>Y = 8X + 21</math> What is the slope?</p>	<p>Square of what number is 81?</p>	<p>How many solutions does this equation have? <math>2x^{10} = 35 + x</math></p>	<p><b>Ocean's number</b></p>
<p>A gross divided by 12</p>	<p>The cube root of 2,197</p>	<p>y-intercept of <math>Y = X^2 + X + 14</math></p>	<p>Composite number whose factors are 5 and 3</p>	<p><math>2^4</math></p>	<p><b>Sweet sixteen plus one</b></p>	<p>In a right triangle A = 72 degrees B = C = 90 degrees</p>
<p>Complement of a 71-degree angle?</p>	<p>Round 19.79 to whole number.</p>	<p><math>21 \cdot 2^3</math></p>	<p>An even number between 21 and 23</p>	<p><math>4X - 12 = 3X + 11</math></p>	<p>4 factorial <math>4!</math></p>	
<p>The supplement of 154 degrees</p>	<p><math>\log_3 N = 3</math></p>	<p>Seven factorial divided by 180</p>	<p>Largest prime number less than 30</p>	<p>X days has November</p>	<p><b>XXXI</b></p>	

# PUZZLES TO PONDER

## Number Fill-Ins

### How to solve

Number fill-in puzzles have become widely popular in the last five years.

Here's how to solve them: when you are done with the puzzle, each of the nine boxes that make up the puzzle - each of which contain nine squares - should be filled with the dig-

its 1 through 9. In addition, all of the nine horizontal rows and nine vertical columns - each of which contain nine squares - should contain the digits 1 through 9. No duplicates or missing digits are allowed, in either the boxes, rows, or columns.

7		6		1		5		2	
	1				3			4	
				9		8			
9						3		1	
		5			9	1			6
1		2						3	
6		4		3		9	7		
	2					4		8	
3					8	2			1

## Who done it?

Andy:

- 1) I didn't do it.
- 2) I have never seen Dandy before.
- 3) Sure, I know the football coach.

Sandy:

- 1) I didn't do it.
- 2) Andy lied when he said that he never saw Dandy.
- 3) I don't know who did it.

Dandy:

- 1) I didn't do it.
- 2) Andy and Sandy are both friends of mine.
- 3) Andy has never stole anything.

Who is not telling the truth and also steals things?

Read the Morse code message on the back page to check your answer.



## Texting abbreviations and Twitter slang translation dictionary

Google offers a huge list of texting and Twitter abbreviations, chat shortcuts and text slang, some of which are offered here (in alphabetical order, starting with numbers). If you need a little help translating text code, here's a quick way to find out what a texting shortcut means.

- ?4U I have a question for you.
- <3 A sideways heart, love, friendship
- @TEOTD At the end of the day
- .02 My (or your) two-cents worth
- 121 One-to-one, private chat

- 14AA41 initiation One for all, and all for one.
- 10X Thanks
- 1CE Once
- 2EZ Too easy
- 2G2BT Too good to be true
- 2MI Too much information
- 2MOR Tomorrow
- 2NTE Tonight
- 411 Meaning "information"
- 4COL For crying out lowd
- ^5 High-five
- AAF As a friend

- AAK Asleep at keyboard
- AAK Alive and kicking
- AAMOF As a matter of fact
- AAP Always a pleasure
- AATK Always at the keyboard
- ABT About
- ABT2 Meaning "About to"
- ACD Alt/Control/Delete
- ADK Acknowledge
- ADAD Another day, another dollar
- ADBB All done, bye-bye
- ADD Address
- AYT Are you there?

# Women in Math Today

## Daubechies earned physics Ph.D. in 1980

Born in Houthalen, Belgium, Ingrid Daubechies received her B.S. degree in physics from the Free University Brussels in 1975 and her Ph.D. in physics in 1980 from the same institution. After teaching at the Free University Brussels for 12 years, she joined AT&T Bell Laboratories where she became a leading authority on wavelet theory. In 1987 she constructed a class of wavelets that were



**Ingrid Daubechies**

identically zero outside a finite interval, now among the most common type of wavelets used in applications. Since 1993 she has been a full professor in the Mathematics Department and the Program in Applied and Computational Mathematics at Princeton University. She was the first woman full professor of mathematics at Princeton.

Daubechies received the Louis Empain Prize for Physics in 1984, awarded once

every five years to a Belgian scientist on the basis of work done before age 29. Between 1992 and 1997 she was a fellow of the John D. and Catherine T. MacArthur foundation and in 1993 was elected to the American Academy of Arts and Sciences. In 1994 she received the American mathematical Society Steele Prize for Exposition for her book “Ten Lectures on

Wavelets.” The American Mathematical Society awarded her the 1997 Ruth Lyttle Satter Prize in Mathematics for “her deep and beautiful analysis of wavelets and the applications.”

Daubechies presented a Math Matters Public Lecture on Oct. 29, 2008, at the Institute for Mathematics and Its Applications. View her lecture on “Surfing with Wavelets” at <http://www.ima.umn.edu/2008-2009/PUB10.29.08/>.

# Early interests lead to stellar achievements

Born William Henry Gates III, on Oct. 28, 1955, in Seattle, Wash., this American entrepreneur began to show an interest in computer programming at the age of 13 at the Lakeside School.



**Bill Gates**

He pursued his passion through college. Striking out on his own with his friend and business partner Paul Allen, Gates found himself at the right place at the right time. Through technological innovation, keen business strategy and aggressive competitive tactics he built the world’s largest software business, Microsoft.

In the process he became one of the richest men in the world.

<http://www.biography.com/articles/Bill-Gates>

*None of this would be possible without mathematics!*

# Bill Gates takes advantage of online learning

Sal Khan can count Bill Gates as his newest fan. Gates is a voracious consumer of online education. This past spring a colleague at his small think tank, bgC3, e-mailed him about the nonprofit [khanacademy.org](http://khanacademy.org), a vast digital trove of free mini-lectures all narrated by Khan, an ebullient, articulate Harvard MBA. Gates and his 11-year-old son, Rory, began soaking up videos, from algebra to biology. Gates said, “I’d say we’ve moved about 160 IQ points from the hedge fund category to the teaching-many-people-in-a-leveraged-way category.”

Google: [CNNMONEY.COM/KHAN](http://CNNMONEY.COM/KHAN)



**Bill Gates is a big fan of the online mini-lecture series created by Sal Khan (left).**

# Then and Now

By Kaulana Tyson  
KCC student

Have we evolved? To evolve means to make progress. Today we have all kinds of technology that we didn't have when I was a kid. The progress we have made has made life easier, but is life better?

Kids today live a completely different life than when I was a child. Today it is very common to see 12- and 13-year-old children

walking around with a cell phone glued to their ear, or their fingers going a mile a minute texting all their friends. Most kids even have a cell phone in their pocket

while they are at school. Twenty years ago only the rich people had cell phones. The only phones common people had were attached to the wall and weighed two or three pounds. Carrying a phone around that fit in your pocket was like something out of Star Trek.

There are advantages to having cell phones. Cell phones are very convenient — they make it easy to get hold of your child in an emergency. But cell phones are also a distraction. Having a cell phone go off in class is a distraction. Having a cell phone go off in class is a disruption to teachers and the distraction makes it difficult to learn.

Computers are also one of today's technological breakthroughs. Computers are great, but they are also a double-edged sword. You literally have as much information as you can possibly grasp at your finger-

tips. Instead of using computers for the vast amount of information that they hold, kids are chatting it up on Facebook, or checking out the latest viral video on YouTube. When I have a paper to do for college, I have to fight to get some computer time at home. While I was growing up, we didn't have computers or Internet at home. The only computers to be found were at school and the library, and they were only used to do papers for school.

**“Computers are great, but they are also a double-edged sword.”**

*Kaulana Tyson*

Then there are video games and game systems. My family owns a Play Station 3.

The graphics in the game system are ab-

solutely amazing. Some of the games are very lifelike. It amazes me how far they have come. It just seems to me that the only thing people want to do is play these games. When I was a little girl, I didn't have a game system. My brothers and I spent most of our time playing outside making up our own games. If I wanted to play a video game, it cost me a quarter at the local arcade.

I think that we as a society are spending too much time on all the technological gadgets. We need to unplug and maybe spend some time outdoors. I can never seem to get my kids to leave the house. When I was a kid, my mother fought to get us to come in the house. We have amazing minds and imaginations. We should use them on things other than making the next gadget. I feel we have lost a sense of reality with all the technological advances.

# The Math Locus Topics in issues past

The first issue of the MATH PAPER was published winter semester of 2004-5 on St. Patrick's Day. (Notice in the upper left corner of the MATH LOCUS there is a green shamrock with the motto "One with the math.") Other issues of this fun and informative paper were published in winter 2004 and winter 2005. These issues are not online.

The MATH LOCUS, at it is known now, has been published since the fall of 2005 and most issues may be found online at <http://kirtland.edu/themathlocus>. These issues show examples of the dependency of technology on mathematics:

Fall 05: Trigonometry to measure high objects or great distances.

Win 06: Einstein became an engineer at the Swiss Federal Institute of Technology.

Fall 06: Rene Descartes is the Father of Modern Mathematics.

Win 07: George Boole incorporated logic used in applications in telephones and computers.

Fall 07: Leonhard Euler introduced concepts, such as:  $f(x)$ , "e" for natural logs, and pi.

Win 08: Math Dept@KCC and Catastrophe Theory about icebergs and the Titanic.

Fall 08: Spotlight on the nursing program at KCC and its dependency on mathematics.

Win 09: Tim Davis was featured as a future math teacher who is needed in technology.

Fall 09: Statistics show the epidemics the world has faced.

The sunburst on this issue's front page is obviously a circle with math as its center and fields of technology as the radii. In geometry, there are locus problems such as this: What is the locus of points equidistant from a point within called the center? (In Latin, locus means place or location. Thus the name, The MATH LOCUS, means a place for math.)

Other radii of the sunburst could be future issues. Mathematics is necessary, especially in technology of medicine, science and physics.

A very interesting Internet address is [http://www.youtube.com/watch?v=hbsX12oI\\_K8](http://www.youtube.com/watch?v=hbsX12oI_K8). (Submitted by Karen Dillon, former KCC math instructor.)



*From the MATH LOCUS!*

# BACK-PAGE BUSINESS

## About Us

*Continued from page 1*

prints and drawings; Sarah will be calculating and comparing percentages in the communication field; Courtney will be in the nursing field, dealing with metric measurements and vital statistics; Christine will be analyzing data and balancing equations.

And these tutors have their own opinions about the pros and cons of texting:

**PROS:** Provides faster connection and communication with others; great for business applications and entertainment; screens your calls; excellent for emergencies.

**CONS:** Facebook gives too much information; miscommunications and misinterpretations happen all the time; cell phones and texting can be a great distraction.

The MATH LOCUS had some help from students and friends. Angela helped with the selection of the Women in Math Today section. Check the article on Ingrid Daubechies, with permission from Agnes Scott College. Kualana Tyson submitted the article "Then and Now: Pros and cons on modern technology. And Shirley Schaffer designed the sunburst drawing of "Mathematics Yields Technology."

## CIS

*Continued from page 1*

from WebMail/Outlook to SparkyMail on a Google platform. Also, online/hybrid classes and grading information have moved from MyClassroom to WebStudy. More virtual PCs on campus are on the horizon. Kirtland has been WiFi (Wide Fidelity) for a long time. Many areas of our buildings offer wireless Internet connections.

Who invented fractions?

Henry the Eighth !

*"Our teacher has a bad memory. For three days she asked us how much is two and two. We told her it was four. But she still doesn't know. Today she asked us again!"*

Fred: I got 100 in school today.

Mother: Wonderful. What did you get 100 in?

Jason: Two things: I got 50 in Spelling and 50 in History.

Mother: Well, at least you can add !

*Why are misers good math teachers ?  
They know how to make every penny count !*

## PUZZLE SOLUTIONS

7	9	6	1	4	5	3	2	8
2	1	8	7	3	6	4	9	5
4	5	3	9	2	8	1	6	7
9	6	7	2	5	3	8	1	4
8	3	5	4	9	1	2	7	6
1	4	2	8	6	7	5	3	9
6	8	4	3	1	9	7	5	2
5	2	1	6	7	4	9	8	3
3	7	9	5	8	2	6	4	1

### Answer to the *Who done it?* riddle

dot dot dot dot dash dash dot  
dash dot dot dash dot dash dash  
dot dash dot dot dot dot dot  
dash dot dot dot dash dash dot  
dash dot dot dot dot dot dash  
dot dash dot dot dot

*(Use the Morse code guide on page 2 to translate!)*

### Classifieds

**TUTORS AND TUTEES are needed for mathematics. Apply at the Kirtland Community College Tutoring Center, Instruction Building (INS) Room 20.**

It is the policy of Kirtland Community College that no person shall, on the basis of race, color, religion, national origin or ancestry, age, sex, disability, physical proportions, sexual orientation, marital status, or genetic information be excluded from participation in, be denied the benefits of, or be subjected to, discrimination during any program, activity, service, or in employment. For information, or to register a grievance, contact the Director of Human Resources, Room 226 ADM Building, 10775 N St Helen Rd, Roscommon, MI 48653, 989-275-5000 x 271 or 239.