About *Joy of X*

Joy of X is a *math performance* project by George Gadanidis. George is Associate Professor at the Faculty of Education, University of Western Ontario.

Music by an Parliament, Ryan Casselman + friends.

This *Joy of X* performance is generously sponsored by the Fields Institute. To arrange a math performance, please contact George Gadanidis (ggadanid@uwo.ca).

Our goal is to celebrate mathematical thinking and help K-8 students, teachers and parents experience mathematics as a fully human activity, that can be discussed with family and friends as one would with a favourite book or a good movie.

If you would like to sponsor one of our performances, please contact Pat McLaughlin at pmclaug@uwo.ca or 519-661-2111 x87643 to make a tax-deductible donation to the Faculty of Education, University of Western Ontario, towards this project.

Resources

- **Joy of X** ... www.JoyofX.com ... download math songs as mp3 files
- **Windows into Elementary Mathematics** ... www.fields.utoronto.ca/mathwindows
- ... posters and cool interviews with prominent mathematicians ...
- **Math Performance Festival** ... www.MathFest.ca ... neat math performances ... submit your own!
- **Imagine This!** ... www.ImagineThis.ca
- ***Who's the Big Bad Wolf?*** ... www.BrainyDay.ca

www.JoyofX.com

Joy of X

"I Love Math" tour

St. Andrew's Public School
7 December 2009

Sponsored by the Fields Institute
www.fields.utoronto.ca

Program

1. We found math
www.joyofx.com/music/foundmath.html

2. Chocolate bar
www.edu.uwo.ca/mathscene/mathfest2009/mathfest235.html

3. Math surprise
www.joyofx.com/music/mathSurprise.html

4. We made 12 in a story
www.edu.uwo.ca/mathscene/mathfest2009/mathfest224.html

5. Big party, small party
www.edu.uwo.ca/mpc/bigideas/arrays/perimeter.html

6. She's a mathematician
www.joyofx.com/music/m4t-song6.html

7. Parallel lines
www.edu.uwo.ca/mathscene/mathfest2009/mathfest232.html

8. I love mathematicians
www.joyofx.com/music/mst-song2.html

9. Round is a pancake
www.joyofx.com/music/pancake.html

FIELDS

This *Joy of X* performance is sponsored by the Fields Institute.

Round is a Pancake

Round is a pancake,
Round is a plum,
Round is a doughnut,
Round is a drum.
Round is a puppy,
Curled up on a rug.
Round are the spots,
On a wee ladybug.
Look all around,
On the ground, in the air,
You will find round things
everywhere!

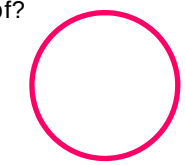
Math is everywhere,
everyday
From the time you arise
To the end of the day
It's seen in the most
unusual place
The beauty and surprise
Makes your heart race

I see circle everywhere
I see circle in clock
Tick tick tick tock
I see circle in plate
More more more
I see circle in wheel
Beep beep beep
I see circle in light
Cross cross cross
I see circle in ok
Right right right
I see circle in globe
No wonder
Why there are so many
circles all around us!

Math is everywhere,
everyday
From the time you arise
To the end of the day
It's seen in the most
unusual place
The beauty and surprise
Makes your heart race

Circles are everywhere

- We asked teacher candidates at UWO to find math around them. The lyrics above came from their ideas about circles. Where else might you see a circle?
- Try this: take a hoola hoop, hold it at the ends of its diameter, and spin it—what shape is it cutting out of space?
- Now put the hoola hoop on the ground: stand inside the hoola hoop, bend down and lift it straight up—what three-dimensional shape are you standing inside of?
- What if all of the circles disappeared? How would our world change? See … www.ImagineThis.ca



I Love Mathematicians

I think math is beautiful
The geometry I do
Is so intuitive
Something I can doodle

I studied many things
Literature, anthropology
Linguistics, philosophy
But I love mathematicians

They are the most fun
They love what they do
More than many many
Other people I know

La lala lala
La lala lala
I love math
I love mathematicians
La lala lala
La lala lala
I love math
I love mathematicians

We stay up with a problem
Work on it together
This sense of solidarity
Attracts me to math

I love doing math
Everyone contributing
Reminding each other
Why we do what we do

Math is a treasure trove
Playing, swimming
Finding jewels in it
Math is bigger than me

La lala lala
La lala lala
I love math
I love mathematicians
La lala lala
La lala lala
It's what keeps me in math

Megumi Harada

- Dr Megumi Harada is a mathematician at McMaster University.
- The song *I Love Mathematicians* is based on some of the ideas she shared in an interview.
- You can see the interview at … www.fields.utoronto.ca/mathwindows/sphere
- Why does Megumi Harada love mathematics and mathematicians?

We Found Math

We found a hoola hoop
A world spider.
I can't see.
Well, it's a circle.
We're in the circle.

A leaf.
A green leaf.
And a spider.
A leaf inside the circle.

We found a cylinder
It's a line.
It would be a tree.
Giraffe's long neck.
That's not a grasshopper.

We found math
In a meadow
All around us
In a meadow

We found a stump
It's a log.
Let's pick it up.
It's a cylinder.
See how strong we are.

There's a bug on it.
Don't step on it!
It runs really fast.
A cricket bug or a mosquito.

We found a spruce cone
Layers of cones.
Stairs. Feel them.
Some are green.
It's Spring all around us.

We found math
In a meadow
All around us
In a meadow

What math might you find?

- Take a look around you.
  - Can you see a cylinder in a coin or a rectangular prism in a sheet of paper?
  - What other math might you see?
- Once you start using your math imagination, it's difficult to stop!
  - How many leaves in a tree?
  - How many bricks in a house?
  - How many blinks in a day?
  - What questions might you ask?
- This song is based on a poem written by the poet Cornelia Hoogland, after exploring math in a meadow with a group of pre-school children

Chocolate Bar

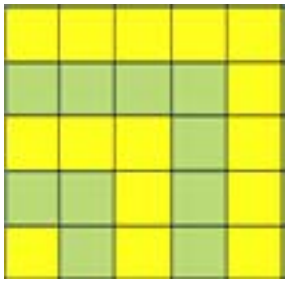
Here's a square
Chocolate bar
Eat this piece
Said the Wolf
Eat some more
And some more
Here's a square
Chocolate bar
There are……
Odd numbers hiding in squares

Squares are cool
Cause they have
Odd numbers
inside of them
1,3,5,
7,9,11
Hey Sis
Do you want to see,
Something cool……...
Odd numbers hiding in squares

In a square chocolate bar,
Odd numbers fly by
1, 3, 5, 7, 9,
They fly through the sky

Here's a square
Chocolate bar
Eat this piece
Said the Wolf
Eat some more
And some more
Here's a square
Chocolate bar
There are……
Odd numbers
hiding in squares
Odd numbers
hiding in squares
Odd numbers
hiding in squares

Odd numbers hiding in squares?



- Do you see odd numbers hiding in the square? How many are there?
- How many odd numbers fit in a 10 by 10 square?
- What is the sum of the first 100 odd numbers?
- See an interview on this topic with Dr. Ken Davidson of the University of Waterloo at … www.fields.utoronto.ca/mathwindows/oddnumbers
- See the story *Who's the Big Bad Wolf?* at … www.brainyday.ca/fairytales/bigbadwolf.html

Parallel lines

Paaaraaalleeell lines
Paaaraaalleeell lines

Tiles on the ceiling
Lines on the cupboard
Wires on the
guinea pig cage
Paaaraaalleeell lines

Parallel lines
Never meet
But they meet,
at the north pole
paaaraaalleeell lines

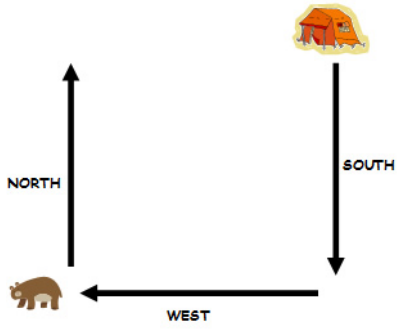
The world is a sphere
A 3D solid
The world is not flat
like a circle
Paaaraaallell lines

Molly in her tent
How did she get back
She saw a bear,
what colour was it?
Paaaraaalleeell lines

Molly went south
Then went west
Then went north,
how did she get back?
Paaaraaalleeell lines

Parallel lines
in a triangle
At the north pole,
is how she got back
Paaaraaalleeell lines
Paaaraaalleeell lines

What colour was the bear?



- Molly stepped out of het tent.
- She walked south 100 metres.
- Then she walked west 100 metres.
- She saw a bear.
- She was scared and ran north 100 metres to her tent.
- How is this possible, and what colour was the bear?
- See the interview about parallel lines with Dr Megumi Harada at … www.fields.utoronto.ca/mathwindows/sphere

She's a mathematician

She's got a really cool job
Every day a new challenge
Loves to create something new
Loves to "crack" the problem
She's so passionate
Loves the sense of a group
Working together on math
Feels accomplished and proud

She's a mathematician
Applied mathematician
She's a math, mathematician
Applied mathematician

Curiosity and suspense
She's a detective
A math detective
Collecting clues

The winding path
To an elegant solution
She loves the process
And the rigour too

Solves a mystery
Feels accomplished
and proud

She's a mathematician
Applied mathematician
She's a math,
mathematician
Applied mathematician

Lindi Wahl

- This song is about Dr Lindi Wahl, who is an applied mathematician at the University of Western Ontario.
- See the interview with Lindi Wahl at … www.fields.utoronto.ca/mathwindows/growth
- See Lindi Wahl's song about zero (called *I am nothing*) at www.ImagineThis.ca

Math Surprise

Hi Stella!
What did you learn
in math today?

If it's a surprise!!
Please tell me.
OK.

I learned that even numbers
They hide in a rectangle.
Even numbers
hide in a rectangle

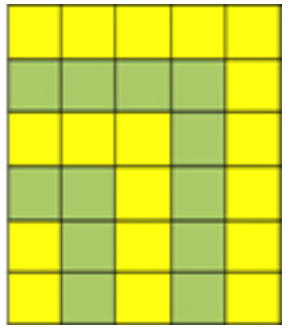
CHORUS
Evens hide
They play hide-and-seek
Take a look or take a peek
Bet you didn't know
that even numbers
Hide in a rectangle
Even numbers
hide in a rectangle

Take a piece,
Hey it's a 2.
Take some more,
Hey a 4.
Take another,
Hey it's 6,
And another
Hey 8,
And another
Hey 10, good job.

CHORUS
Evens hide
They play hide-and-seek
Take a look or take a peek
Bet you didn't know
that even numbers
Hide in a rectangle
Even numbers
hide in a rectangle

Even numbers hiding in rectangles?

- Do you see even numbers hiding in the rectangle? How many are there?
- How many even numbers fit in a 10 by 11 rectangle? What is their sum?
- Which of the following is a formula for the sum of the first N even numbers?
  - NxN + N
  - N(N+1)
  - $N + N^2$



We Made 12 in a Story

We made 12 in a Story
2 by 6 and 6 by 2
We made 12 in a Story
Have a look at the pictures
we drew.

12 Kids on a bus
Have a look from the bird's
eye view
See my caterpillar
It has 12 polka dots too.

We made 12 in a story
3 by 4 and 4 by 3
We made 12 in a story
Look close at the pictures
you see.

A cell phone with 12 buttons
12 dogs on a water slide
12 wheels on a bus
Boy can those dogs glide.

We made 12 in a Story
1 by 12 and 12 by 1
We made 12 in a Story
Have a look at the pictures
they're fun.

12 people in a house
12 people in a line
Eggs in an egg carton
And buttons on the stove
tell time.

We made 12 in a Story
2 by 6 and 6 by 2
We made 12 in a Story
Have a look at these
bunnies too.

We made 12 in a Story
Even Half by 24
We made 12 in a Story
That's what this songs for.

Making 12

- Multiply 2 numbers so that the product is 12.
  - How many different pairs of numbers can you find?
- Divide 2 numbers so that the quotient is 12.
  - How many different pairs of numbers can you find?
- Add 2 numbers so that the sum is 12.
  - How many different pairs of numbers can you find?
- Subtract 2 numbers so that the difference is 12.
  - How many different pairs of numbers can you find?

Big Party, Small Party

16 tables
In a rectangular array
How many …
Chairs fit all around?

The 1 by 16 array
Fits 34 great chairs
Lots of room
For a big party

The 4 … by 4 array
Fits 16 wonderful chairs
There's room
For a smaller party

The 2 by 8 array
Fits 20 solid chairs
That's good
For a medium party

1 by 16,
2 by 8,
4 by 4
In a rectangular array

The numbers of tables
Is always the same
But the number of chairs
Keeps changing

The number of tables
Is always the same
But the number of chairs
Keeps changing

Tables and chairs

- Arrange 16 square tables in a rectangular array.
  - Which arrangement would fit the most chairs?
  - Which arrangement would fit the fewest chairs?
  - Why?
- Arrange 36 square patio stones in a rectangular array.
  - Which arrangement would have the shortest perimeter?
  - Which arrangement would have the longest perimeter?