

CROSSING THE EQUAL SIGN

Marion D. Cohen

Points were blinking.
Lines were beckoning.
How was I to know?
What could i have done?

I heard some voices.
I had some time.
There was a tenderness.
There was a weeping.

How was I to know
the points would not point?
How was I to know
the lines would not line up?

I could think about those twittery lines
while brushing my teeth
or washing the floor.
So why do I want to just stand here
preferably sit here
maybe even curl in a crooked ball?

Why do I bend?
Why do I roll?
Why do I need to identify
my head with my knees?

I am not crying.
I am only thinking.
So why do I need
to be so small?

Yes, points were blinking.
Lines were flirting.
Spaces were trampolines.

I could have consulted the Math Reviews.
I could have leafed through a graph theory text.
I could, that is, have notified the authorities.

But I'm a do-it-yourself-er.
I'm a rugged individualist.
I'm a learner and a lover.
I'm a very foolish heart.

Someone wrote a book called The Joy of Math.
Maybe I'll write a book called the Pathos of Math.
For through the night I wander
between intuition and calculation
between examples and counter-examples
between the problem itself and what it has led to.
I find special cases with no determining vertices.
I find special cases with only determining vertices.
I weave in and out.
I rock to and fro.
I am the wanderer
with a lemma in every port.

I feel so sorry for the insides of things.
I imagine them sweating and cramping.
I hear them trying to flex.

I know from Complex Analysis that sometimes outsides determine the insides.
And I think maybe the insides are tired of being determined.

And MOST things are inside.
Most things are encased.
I am afraid most things are alive.

I would like to go around rescuing all the insides.
I would like to dig into everything and pull the insides outside.
But there is not enough outside to go around.

If I can't rescue them, maybe I can put them out of their misery.
I know I can't shoot them.
But I can try to squash them.
Or I can go around injecting poison into them.
But what kind of poison works
for this form of life?

Once I've proved a theorem, I know it's true, that should be that.
But I keep thinking of things.

When your ankle is broken you're tempted to contract it
as though it had a muscle
as though it WERE a muscle.
"Tap me," says the bone. "Test me. Hurt me."

A theorem is muscles.
A proof is muscles.
Math is full of muscles
which, despite the pain, I'm tempted
to tap or flex.

There is a sibling rivalry
between this conjecture and its negation
and I, poor mother
throw up my hands.
“Anything, anything
“whatever you decide.
“Just please
“hurry up
“and make up your minds.”

A mathematician just sits there.
There is empty paper in front of her.
And it stays empty.
A cat also just sits there with empty paper.
But the cat doesn't mind that.
The cat, in fact, gets right on top of the empty paper.
The cat believes his sitting will fill it up.

After awhile making a proof is like making a calculation.
There are certain things you automatically do.
You move with closed eyes, clenched eyes
unseeing eyes, no eyes.
You move, sometimes, with no brain.
After awhile crossing the implication sign is like crossing the equal sign.
After while a proof is collapsed to a point.

Today Devin catches me at it.
"Mommy, what're you trying to do?"
"Oh," I say, "well, these lines."
"I'm trying to fix these lines."
And then I explain triangles.
And then I explain transitive.
"Sometimes it can't be done," I tell him, "and other times it can."
"I'm trying to figure out when it can."
"I get it," he says. "I get it, Mommy."
And later he catches me at it again.
"THAT one WORKED, right?"

'Cause maybe, if that one worked, we can go play Parchesi.
Or cards. Or ice cream.
Or at least Mommy won't
keep staring at those lines.

(Dream of Math Research on Anti-Equivalence Relations)

There are two sets of four objects each.

Within each set each of the objects
has nothing to do with any of the other objects.

Furthermore, there are two objects, one in each set
which have nothing to do with each other.

What conclusions can you draw?

Every 4:00 A.M. Substance is the first of six cats to arise and go rummaging through the wastebasket.
He needs something, anything.
It doesn't have to be food.
As long as he can chase it around.
As long as it scratches along the floor.

Devin says he's frightened.
Frightened of everything.
But I say Substance is looking for something to prove.

So give him definitions.
Notations.
Axioms.
Yes, Substance needs some axioms
to scratch along the floor.

Another mathematician I know does nature photography.
She says she likes to pretend she doesn't know what's in front and what's behind
or what's a reflection and what isn't
or what are the objects and what are the spaces.
She says she likes to look at things
as though she doesn't know what they are.

Who needs Agathe Christie, today
when it is not yet known
whether every set can be ordered
whether that every set can be ordered is equivalent to the Axiom of Choice?

And who needs Sharon Olds, who needs Anne Sexton
who needs my own poor worn-out words
when I simply would rather
I simply keep turning
keep being turned towards
this?

And who needs thrift-shopping this week
when there are all these MATHEMATICAL objects?
And you can put subscripts on them and make them even more like objects?
It doesn't have to be geometry.
It can not take up space and still be pretty.

And who needs love
when it's all right here?
And there are, and were, those who PUT it here
a whole bibliography of Tortured Souls
people who care whether or not every set can be ordered
or who don't care
must only know?
Yes, who, alas, needs love?
Who, right now, needs a man or a child?
when I can, and do
lingo
and whisper sweet nothings
to this
about this?

(The Stuttering Mathematician)
In order to get to the first word
you have to get to the first half-word
and in order to get to the first half-word
you have to get to the first fourth-word.
So how can ANYBODY do it?
get smaller than syllables?
smaller than letters?
How does ANYBODY start?

One morning I wake up counting.
I realize I'm counting and I just keep it up.
There's nothing to count.
Nothing to own.
Nothing to try to win.
I'm practicing counting
preaching counting
maybe even learning to count.

In the dream I had not been counting.
I had only been wandering.
The horizon had been approaching
and the sky had been flat.
Also, that sky
might have been folded.

There's no reason to count footsteps.
No reason to count years.
Maybe no reason to count numbers.
To fall asleep you count sheep.
What do you count to fall awake?

What is this business of things existing?
What is this business of people existing?
What is this business of math existing?

When I get that far gone i imagine a piece of paper with math written on it.
I imagine cutting out the math
cutting around all the numbers and symbols.
I imagine the cut-out math and I imagine the stencil.
The paper is very white.
The math is also white.
Maybe I even imagine cutting out the math without it having been written.

I have to admit it: These lines are abusing me.
Or someone or something is wielding these lines.

Yes, the dentist has placed extra teeth in my mouth
and the night has placed extra lines in the plane.

When nails grow too long you bite them.
When a man gets violent you leave him.
But when lines take aim
and form a fence
or when points zing far and away
what
do you do?

It's a kind of transitive law when
in a house of growing children
two people who pet the same cat are petting each other.
Especially if one of them is holding the cat.
Especially if both of them are holding the cat.
And if Devin gets under the blanket with Mirage
and lets only their heads stick out
and smiles up in that way
if the pug of Devin's nose is close to that spot between Mirage's ears
and if i grab hold of it all
and kiss it all. . .

well, Devin also knows
and Mirage also knows
that something is necessary
something is sufficient
and something else is scared.

These lines didn't ASK to be here.
They simply NOTICE that they are here.
And so they sizzle.
And so they sway.
Like a bag of spiders.
Like a litter of mice.
They are surprised.
Maybe scared.
If they had eyes, those eyes would widen.
Those eyes would have no brows.
They might also have no mouths.
Or their eyes and mouths might be the same.

(First Day at the Beach)

After the heat of the day I get past the breakers to where I can graze
where I become aware that we are all of us in the lap of Mother Earth
where and when I can believe in Earth as a mother
playing with us children, playinig with us kindly.

But then I catch sight of the horizon
it's alight frown.
And I see that I am looking down at it
not across.

I see that Earth is a CONVEX mother.
We are on, not in, her belly.
We are, in face, on top of her belly.
It is not us she is in labor with.

Not that we fall.
Not that we'll fall off.
Only that there is that peripheral vision.
There are those two wings
and they bend, then sway.

And perhaps we are the balancers rather than the balanced.
Perhaps we are tightrope walkers
bearing the x-axis.

(Portrait of the Mathematician as a Young Woman)

Addition is commutative.

Multiplication is commutative.

How come exponentiation isn't commutative.

Or: Exponentiation isn't commutative.

How come addition and multiplication are commutative?

What a quest, for a sixteen-year-old kid.

What a journey, for a seventeen-year-old adult.

What kind of hormones were those?

What kind of raging was that?

Is math hungry?
The way I always say a baby's hungry?
And the way Anne Sexton says "O my hunger!"?

Oh, I know I wrote "Math is a cat; feed it" but does that mean math is hungry?

Well, SOMETHING is hungry.
And math, maybe math
is thirsty? Aghast?

Or is math the food?
The plates? The spoon?
Maybe math is the stomach?
What should be fed? And how?

The hardest job in the world is not being a mother.
The hardest job in the world is characterizing comparability.

Oh, the first round of determination works fine.
It sleeps us well.
And in the morning
are equivalence classes.

But in the evening
the points run amuck.
The lines go astray.
They all fly into
another backyard.

To whose home should I call them?
What do I have for dinner?

I save unused lemmas.
No matter how silly.
Just like I saved my old diary.
I was fourteen and outgrew it.
But I would not divorce it.
I would not banish it.
I certainly would not kill it.
Instead I put a sign on it.
“Never throw this away.
“Never throw this away.”

I have a new idea
so I get to make new lines.
Fresh clear runners
like tadpoles in the brook.
At first there are only six.
Then there will be twelve.
Soon the paper will be resembling my jar of straight-pins
some of which are bent pins.

In other words, these lines
will soon be dangerous.
They will be needles.
They will be knives.
Knives with no handles
with blades at both ends.

If you ask "Why math?"
I'll say "same as science fiction".
Same fuss. Same fury.
Same stretching over the universe.
And not only infinity.
But each and every count.
Especially the single digits.
Each, separate, a pearl.
Each, separate, a face.
A nose. A bud. An insect. A cell.
Also, each a question mark
in some language.

(The Successful Stutter)

One day I suddenly just-couldn't ask whether this train stopped at Willow Grove.
But I stayed in the middle of the just-couldn't.
I watched the guy watch the just-couldn't.
And the just-couldn't lasted awhile.
And he and i just-listened
just-waited.

I wasn't exactly relishing.
I was even turning away.
But he, I, and the word
formed a little triangle.
The way the first three fingers of a hand
can bunch and then huddle.
The kind of triangle formed by refugees in a storm.
Namely, not three sides meeting in three points
but three lines emanating from one point.
In other words, not a triangle at all
but a three-pointed star.

Today I teach parabolas.
Soon I'll teach loops and scallops.
And sin one-over-x with its big and little fusses.

But I also remember straight lines.
I mean straight lines without axes.
Straight lines without slope.
Straight lines that aren't tangents.

I remember trying to prove Euclid's Fifth Postulate
and coming close
finding smaller and smaller triangles
little lights passing through a diamond
eensy weensy triangles
climbing up the wall.

Oh, calculus says that curves are okay
and they are
I agree
but I haven't forgotten straight lines.
I keep coming back to straight lines.
I'm still not finished
with straight lines.

Someone just told me that Mozart was thirty-four when he died.
I had thought he was thirty-seven.
So now I lie awake, then sit and wander awake
counting again
subtracting again
grieving for those three years.

(Dream of Two Vacation Licenses)

(One) If, around noon
I decide I don't like the day
I'm allowed to go back and dream
that it's 7:00 A.M. again.
I can do that as often as I choose
so that, by induction
I eventually get a noon I like
and not the set containing the set containing
that noon.

(Two) I can begin the day by covering myself
first with any color I like
then any other color I like.
Then, when I've done all the colors
I can apply the last coat, black.
Then, around noon, I can scratch
with the point of a gentle scissors
any design I please

making pretty flowers
hearts and smiles
parametric curves
rainbow equations
as pretty and as true
as I damn please.

We begin with an equation
and then we do everything we need to solve it.
And not only is the equation equivalent to the solution.
It's equivalent to every equation along the way.

The important things are the equation at the beginning and the solution at the end.
The unimportant things are the equations in the middle.

They're little lemmas.
They're there when we need them.
And when we don't need them
they stay out of the way.

I don't invent math.
I don't discover math.
I only PLAY math.

Like I play the piano.
Playing Partial Differential Equations is like playing Liszt.
Playing Complex Analysis is like playing Mozart.
Playing Abstract Algebra is like playing Vivaldi.

Or perhaps I PRACTICE math.
I practice and practice until i'm ready to preach.
Then I preach and preach until I'm ready to perish.

Is there phrasing?
Is there dynamics?
No, but there's fingering.
And there's running out of fingers.
And there's shaking out my hands
and starting anew.

(How I Know This Isn't a Dream)
I believe what I'm told.
And I believe what I read.

And besides, this table feels pretty solid.
When I knock-on-wood it's there.

True, points are blinking.
And lines are squirming.
But planes hold steady.
Planes hold flat and firm.

And my hands fold nicely.
My fingers wriggle well.
And here I am staring
at the center of my palm.

Maybe leaves are ghostly.
But trunks are not.
Also, I widen my eyes
and I don't wake up.

(Dream of Two Women Sharing a Wheelchair)

Are they friends, lovers?

Are they Siamese twins?

Or merely too poor to afford separate seats?

Are they side by side or front to back?

And is one a lot taller?

Or one a lot wider?

Do they hold hands?

Do they rub feet?

And IS it just two?

Is there some small fraction
of another woman?

And if so, where?

Between them? Behind them?

Is she around them?

And how many times?

A mathematician should never watch action films.
She has already swum through iron, run without roads, flown without sky
has already known too many directions
has already been reduced to a point.

She has had enough of thinking hard
enough of hoping that thinking will save her.

John Conway looks for things to prove.
Things to prove keep looking for me.
These things are a burden.
They render me lost.
They render me locked.
They render me away.

Lectures to prepare.
Onions to chop.
These are things
but not to prove.

I have things to prove, things to prove.
Like "caps for sale, caps for sale".
Could somebody prove my things?
Could somebody prove even
a red
thing?

(Portrait of the Mathematician as a Younger Woman)

Mr. Magic 4 isn't as interesting as Mr. Magic 9.

But I thought it was.

it was certainly more interesting than geography or American History.

So I sat at my little desk pouring out 12, 16, 20, 24...

3, 7, 2, 6...

I soon saw the pattern but I kept adding up the digits.

Then I tried Mr. Magic 5.

There were no points.

There were no lines.

But something was beginning

to throb.

Remembering unused lemmas is like remembering childhood.
Maybe even deeper.
Maybe even thicker.
Maybe like remembering
something that wasn't there.

Math memories are different from other memories.
They're less clear.
And I ask more questions.

What did I write in the margins?
And were the margins big enough?
Was there a point blinking?
And was it on the page?

Yes, I ask more questions
because I want more answers.
And I want more answers
because there are more answers to want.

I have a new idea
so I get to make new lines.
Fresh clear runners
like tadpoles in the brook.
At first there are only six.
Then there will be twelve.
Soon the paper will resemble my jar of straight pins
some of which are bent pins.

In other words, these lines
will soon be dangerous.
They will be needles.
They will be knives.
Knives with no handles
with blades at both ends.

When you need more than you prove, it's a nightmare.
But when youu prove more than you need, it's unnerving.
You don't need more
than one revelation.
You don't need more
than one excuse.

If you ask, "Why math?"
I'll say "same as science fiction".
Same fuss. Same fury.
Same stretching over the universe.

And not only infinity.
But each and every count.
Especially the single digits.
Each, separate, a pearl.
Each, separate, a face.
A nose, a bud. An insect, a cell.
Also, each a question mark
in some language.

The idea is not to solve.
The idea is not to learn.
To understand the cosmos
is not the idea.

The idea is to think.
The idea is to do.
To rub a stone.
To pet a dustball.
To love a patch of space
even if it's empty.

And to love that for which
there is no space.

Then what worked for years suddenly plays
when what played for years suddenly dies
when insides are not all that need to be rescued

when the ports in which we deposited our lemmas
suddenly become portals

when a theorem has neither application nor implication

when the easiest lemma to prove
the one you were not even proving
the one you were saving for last
when that lemma isn't true

a mathematician doesn't give up.
A mathematician insists on insisting,
"SOMETHING is going on."

I have said that math can feel nostalgic
but these nagging lines
and the shapes they try to enclose
are not the dancing Klee figures
under my clenched eyelids
nor that toddler nightmare
of the spot many colors.
Rather, these hellkites
are in the present tense.
They're twigs
or stems
with flowers at neither end.

Theorem or counter-example, it does not matter.
No, it does not matter
whether or not squiggle is admissible if and only if there exists no
odd determining chain.
It does not matter whether.
It matters only how.

If I know the ending of a movie, I still have to watch it.
I have to see the middle.
I have to see it through.

(Math Research, Age 4)

One day I set out through the Queen Anne's lace.
There was no end to what I set out on.

After awhile the grass got sharp.
And the white field became like outer space.
Later still it rained
slobbering the sharp wet grass against my legs.
Destination faded into rumor
and so did home.
I was stranded in the middle.

But I was not lost.
The way back was the straight line behind me.
I was only STUCK
on the straight line before me.
I knew the way back.
It was the will I couldn't find.

I think I've solved the problem.
But I still lie in a ball.
What I wait for is time.
It has to pass the two-day test.
And it might not.

Well, Kerin didn't.
Kerin was merely born by me.
She did not get
to stay by me.

So I lie here and curl.
I lie here and wait.
Not for a phone call.
Not for an ambulance call.
Only for my own mind
to think too much.

A theorem is not a child.
No, a theorem is not a child.

(Another Thing I Like about Math)

It doesn't get written in cursive.

Each little bug is free to crawl.

Each little stone is free to shift.

Each is itself.

A fresh start.

And writing is as simple

as before third grade

before every plunge down

became such a commitment.

Remember Eureka?
Well, what's Greek for "I lost it"?
Did Archimedes ever hit the streets with THAT word?
Did he shriek it? Did he bellow it? Did the cries diverge?
Or did he sob and tremble it?
Bay it at the moon?

And his bathrobe -- did he pull and tear at it
as though it were a straitjacket?
Did he weep into it?
Clutch a corner and crumple?

And then, eventually, did he pick up again
into the next street
under the next sky
muttering that one Greek word?

Eureka!
Pretty Eureka!
Pretty Eureka with sugar on top!
I have read the signs.
I have broken the code.
I have figured out which lines to pluck.
I collected my lemmas from every port and brought them on board.
I brought them to my country.
I see the scene, I see the act.
I have not solved the cosmos but I have solved this house.
Most of infinity is still unsolved but I have this picture.
I have this brain.

You can draw pictures without analytic geometry.
Straight lines don't need $ax + b$.
Circles don't need x -square plus y -square.
Loops and scallops don't need polar coordinates.

But they wouldn't be as pretty.
They're prettier with axes running through them and equations running along them.

Spirals aren't as pretty without θ .
Four-leaf clovers aren't as pretty without \sin -square θ .
Beauty isn't as pretty without truth.

Points are not blinking.
Lines are not waving.
No, this new problem is not about space.
Not yet.

