RAMIFICATION

by Serena An

Characters

MOM

KATHY, a high school student

REESE, a middle school student

Synopsis

A mom and her two daughters Kathy and Reese are stuck in a parking garage. No matter whether they drive up or down, they end up going between the same two floors. Using Kathy's knowledge of algebraic geometry and Reese's passion for science, they figure out a way to escape.

The family is in a car in an underground parking garage, represented by a sloped stage with four chairs. MOM is in the driver's seat, while KATHY and REESE are in the back.

MOM

Can't we have a normal family outing for once? I thought the mall might be a fun break for us but you still brought your math textbook, that Hart-shorne *Algebraic Geometry*…

KATHY

It's *Harts-horne*.

MOM

That "abstract nonsense" is not going to be useful in life. This summer, I'm signing you up for soccer lessons.

KATHY

Nooo I'm allergic to grass!

MOM

You are not. And I know the Science Olympiad tournament is coming up, but do you have to bring your science kit everywhere?

REESE

It's more fun than looking at clothes.

MOM

You will also join your sister in soccer lessons.

REESE

Hmmph.

MOM

We're going home now anyways, after only an hour. *(pause)* Although that is a record.

(drives up one floor of the parking garage)

I don't remember it looking like this… Do we really have to go up one more floor? I thought we parked just one floor underground.

KATHY

(without looking up)

We did.

MOM

Okay, I guess we'll go up another floor… Why does it feel like we're back where we started? And where'd all the other cars go?

REESE

(without looking up)

You're smart mom, you got this.

MOM

We already went up two floors!

KATHY

(without looking up)

Go up one more.

MOM

I did! Why aren't we out yet?

KATHY

(without looking up)

Good job.

MOM

If you think you're so smart, why don't you drive!

MOM and KATHY switch seats.

KATHY

Uh, I haven't driven in awhile.

REESE

Thank god.

KATHY

Shut up.

REESE

20% of car accidents happen in parking lots.

KATHY

Then good thing there aren't any cars around to crash into. Okay, going up a floor… Up again… Now down… Stay here, I'm gonna walk up two floors.

MOM

Be careful!

KATHY

Reese, pass me some chalk.

(draws a big "0" on a concrete beam, exits towards the left side of the stage, and returns from the right side)

I see what's going on now. I wrote a "0" on this floor, and on the floor above… see I wrote a "1." And if we go up again… we're back to floor 0. And up again… it's floor 1. Thus, the floors are indexed by Z mod 2.

MOM

What the heck is Z mod 2?

KATHY

It's remainders after dividing by 2: the only possible remainders are 0 and 1.

REESE

She means that there are only two floors, 0 and 1, and every time we go up twice, or down twice, we end up where we started.

KATHY

Exactly.

MOM

How is this physically possible?

KATHY

Who knows? But fortunately, I spend most of my time thinking about things that aren't physically possible.

REESE

She's an excellent mathematician, making big contributions to society.

KATHY

Actually, I might have an explanation. My math teacher once showed us the "plate trick." Reese, give me a plate.

(holds her right hand up, with her palm flexed backwards and facing up, as if she is about to throw a football, and places the plate on top of her palm)

See how I'm holding it? Now I'm gonna rotate the plate 360 degrees…

(rotates the plate by 360 degrees clockwise, as viewed from above, by moving her fingers towards the left and sticking out her elbow, until her hand ends up lower)

until it's down here. Notice that it's not in its original position. However, if I rotate it 360 degrees again…

(rotates the plate by 360 degrees clockwise by tucking in her elbow and lifting her palm back to the original position)

then it does return it to its original position. See how it took two 360 rotations to get back to the original position? Not one.

MOM

What does that mean?

KATHY

It shows that Z mod 2 shows up naturally in our 3D space, especially when rotations are involved.

MOM

How does that help? Please just get to the point.

KATHY

I am getting to the point, namely the *ramification point*.

MOM

The what?

KATHY

Reese, pass me a scarf. The parking garage looks like the Riemann surface of the square root.

(bends the scarf in the shape of the surface)

Look how the surface intersects itself. It's ramified there. But there's a very special technique in algebraic geometry for dealing with them, called "blowing up." If we "blow it up" to a higher dimension,

(throws the scarf into the air)

it eliminates the ramification.

MOM

I have no idea what you mean.

REESE

I know exactly what you mean.

KATHY

Good.

REESE

Blow up this parking garage!

MOM

What?! That's damaging property!!

REESE

Or what? Starve to death underground? There's no signal, and no one else around.

KATHY

Based on this garage's spiral design, the ramification point must be at the very center, right… here.

(marks it with chalk)

Mom, if this works, promise that we don't have to take soccer lessons.

MOM

That's not what's important right now!

KATHY

Reese, contained explosion please.

REESE

Oxymoron, but whatever.

Loud explosion. They cover their ears.

MOM

Ahh!! Are you okay?

REESE

Yeah that was chill. Did it do anything?

KATHY

Let's see.

They drive up a floor.

MOM

We're outside again!

KATHY

See, algebraic geometry is useful!

REESE

And that's why I always bring my science kit around!

MOM

Alright sweetie, I understand better now. Let's go home.

END OF PLAY