



MS Math

March 14, 2008

Dear RMDS Parents

Perhaps I should have written the date as 3.14. After all, today is “pi day” (it even has an “official website”). Only Einstein’s *emc*<sup>2</sup> has managed to do a better job of branding itself within today’s popular culture. Recent visitors could recite it to 5 or 6 decimal places, but when asked where that number actually came from they confessed that they didn’t really know. My own attitudes are expressed by the  $\pi \approx 3$  t-shirt I am wearing today. Incidentally, that was the value used in Europe during the Middle Ages for a period of time. Obviously, I want the local pizzeria to multiply the diameter of their crust by 3.14, but anything beyond 3.14159 isn’t exactly going to make much difference from a practical everyday point of view. On hearing that someone has managed to memorize and recite the first 100,000 decimal values of pi, I wonder just how long that would actually take. It isn’t that I’m completely immune to its charm or mystery, it is just that 3.14 works well enough for me.

Every circle’s circumference divided by its diameter will generate, we are told, the value of pi. Almost all math students have outlined a circle, measured its circumference with a piece of string and divided that measurement by the diameter and managed to get a value pretty close to pi. The deeper question that is often asked by the more thoughtful student, is what is it about the properties of a circle that generates this weird irrational number?

We’ve experimented in trying to find decimals that when multiplied by themselves give us values of 2 or 3. As it turns out, it can’t be done. These numbers are also irrational like pi. A few minutes spent with a calculator manages to convince us that while we can get closer and closer, we can never actually seem to get there. The Greeks proved that  $\sqrt{2}$  was irrational thousands of years ago and that proof is accessible and understandable to a modern middle schooler. Pi wasn’t proven to be irrational until 1761 following a similar logical argument but with modern high school mathematics. Each proof merely establishes that pi is irrational (a non-terminating decimal with no apparent pattern) but does nothing to address the question of why it is so. Thinking this would be a good topic to write about today, I set off to research the answer to why pi is irrational and was amazed to find out that we, or so it would seem from my limited search, don’t really know. Perhaps I just missed it, what is clear to me is that our students continue to ask questions that go to the heart of

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mathematics on a frequent basis. They are less prone to just accepting that things are the way they are and demand to know the “whys” of things.

Sincerely,  
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