



MS Math

February 8, 2008

Dear Parents:

We spend a great deal of time dealing with proportions and the mathematical thinking behind comparing two quantities starting in the fifth grade. We have approached our study of circles in this manner. We probably all remember that the ratio of π is approximately 3.14159... , and that there is no apparent pattern within the infinite stream of decimals. Number theory tells us this value can't be written as a fraction and is labeled irrational as a result.

However, many of us may well have forgotten how it is obtained. It is simply the ratio of a circle's circumference divided by it's diameter. The built in mystique of π tends to obscure the fact that all circles are approximately 3.14 times longer around it's "perimeter" than the length of it's diameter.

$$\frac{c}{d} = \frac{\pi}{1}$$

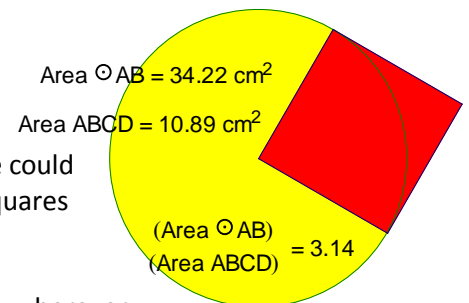
$$c = \pi d$$

$$d = \frac{c}{\pi}$$

$$A = \pi r^2$$

We set up the initial proportion that creates the value of π . Solving this proportion for c, we realize that the circumference of a circle is simply calculated by multiplying the diameter of a circle by π . Similiarly, solving the proportion for d reveals that the formula for the diameter is to divide the circumference by π . This, of course, is no more complex than saying ten divided by two is five and subsequently five times two must be ten. We also explored the possibility of finding another ratio that would yield π without using the circumference and the diameter using Geometer's Sketchpad.

Most students were able to obtain the desired result by dividing the area of the circle by the area of a square constructed with it's radius. It is a nice visual way of seeing that four of these adjacent squares provides a very rough estimate of the area of the matching circle. The formula is close to $4 \times r^2$. We could say that we can only fit about 3 (3.14159... to be a little more exact) of these squares into our circle.



I am attempting to avoid teaching math the way it was taught to many of us by, wherever, possible, exploring how the formulas are actually derived to help us better understand and use them instead of merely committing them to rote memory.

Sincerely,
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