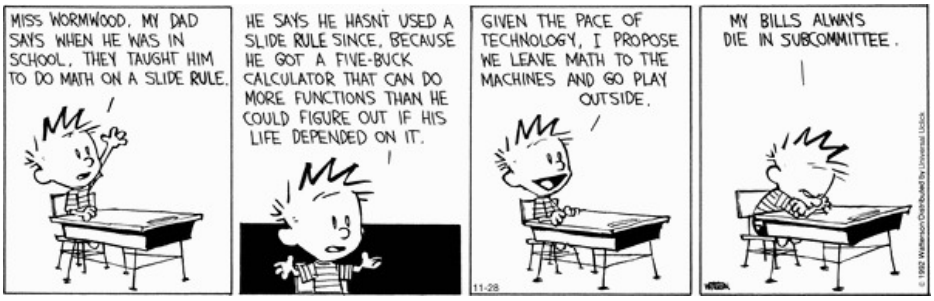
February 8, 2017 Physics 132 Prof. E. F. Redish

- **Theme Music:** **Ella Fitzgerald**

  Little Girl Blue

- **Cartoon:** **Bill Watterson**

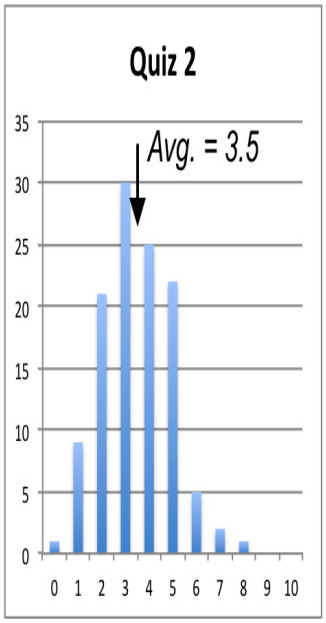
  Calvin & Hobbes



2/8/17 Physics 132 **1**

Quiz 2

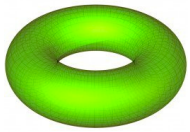
1	2 Sc		2 ans		3 Sc			3.KE	3.U	3.Q	3.W
3%	0	14%	A	16%	0	16%	P	40%	41%	54%	44%
52%	1	22%	B	66%	1	28%	0	16%	46%	16%	16%
6%	2	35%	C	65%	2	44%	M	43%	13%	28%	40%
30%	3	13%	D	27%	3	13%					
8%	4	14%	E	62%	4	1%					
0%			F	41%							

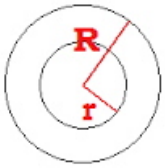


2/8/17 Physics 132 **3**

Example

A torus is the mathematical name for the shape of a donut or bagel. Its volume can be expressed as a function of the inner and outer radii of the torus (distance from the center to the inner and outer edge). Which of the following equations could be the correct equation for the volume of the torus?





$A.\ V = (2\pi R)(\pi r^2)$

$B.\ V = \frac{\pi^2}{4}(R+r)(R-r)^2$

$C.\ V = \pi R r$

$D.\ V = \frac{\pi^2}{4}(Rr)^2$

1/29/17 4

The Special Case / Extreme Case Tool

- When we are working with symbolic equations, it often helps to think of specific cases (putting in numbers!) or considering extreme cases where we have strong intuitions as to what the result should be.

1/30/17 Physics 132 5

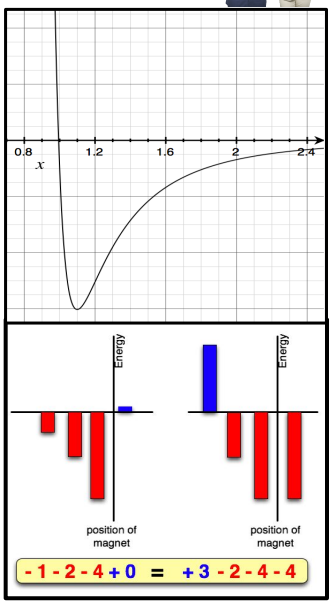
The Mapping Math to Meaning Tool

- Math in science isn't just equations and symbolic manipulations.
- Typically, our symbols represent something physical and that changes the way we think about and use those symbols.

1/30/17 Physics 132 **6**

Sketch

1. What the potential energy curve must look like between the magnet and a metal sphere as a function of distance. (Hint: think about the WEΘ)
2. Energy bar graphs that show the initial and final energies of each of the 4 spheres (when the moving one is far from the magnet)



1/30/17 Physics 132

Telling the story tool

- A critical element in understanding how equations (and the physics) works is understanding *mechanism* − How things happen.
- Learning to tell the story is a critical piece of learning to do any science.