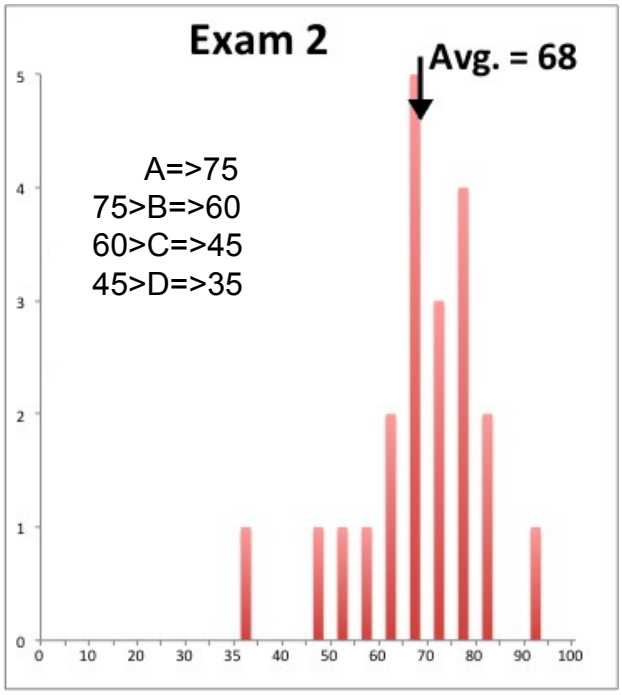
November 14, 2011 Physics 131 Prof. E. F. Redish

- **Theme Music:**
  Billy Joel
  Second Wind

- **Cartoon:**
  John McPherson
  Close to Home



Results on Problem #1

	1.1		1.2	1.3	1.4	1.5
>	62%	A	0%	0%	0%	19%
=	19%	B	0%	95%	14%	10%
<	19%	C	5%	0%	0%	71%
		D	95%	100%	24%	0%
		E	0%	0%	62%	0%

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Success on individual problems

	#1	#2	#3	#4	#5
Pct Correct	56%	76%	57%	95%	71%

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Principles for #1

- Archimedes principle:
  Buoyant force = weight of displace water
- Free-body diagram: net force & N2
- Fluid flow: volume is conserved then $A_1 v_1 = A_2 v_2$
- Young's modulus: for same material, E depends only on the material and stress is proportional to strain: $\frac{F}{A} = E\left(\frac{\Delta L}{L}\right)$

Principles for #2

- Reading position and velocity graphs from an understanding of the motion (what happens)
- Mechanical energies

$$KE = \tfrac{1}{2}mv^2 \quad U_{grav} = mgy$$

- If resistive forces can be ignored

$$KE + PE = E_0 = \text{ constant}$$

Principles for #3

- Force due to pressure $\vec{F} = p\vec{A}$
- Estimation of size (of disk) and weight (of pencil holder) from experience and known measurements.
- Balance of forces and N2.

Principles for #5

- Coulomb's law (as a vector)

$$\vec{F}_{A\to B} = \frac{k_c Q_A Q_B}{r_{AB}^2}\hat{r}_{A\to B}$$

- Geometry – Pythagorean theorem
- Forces add as vectors
  - Being able to take components.