October 23, 2015   Physics 131   Prof. E. F. Redish
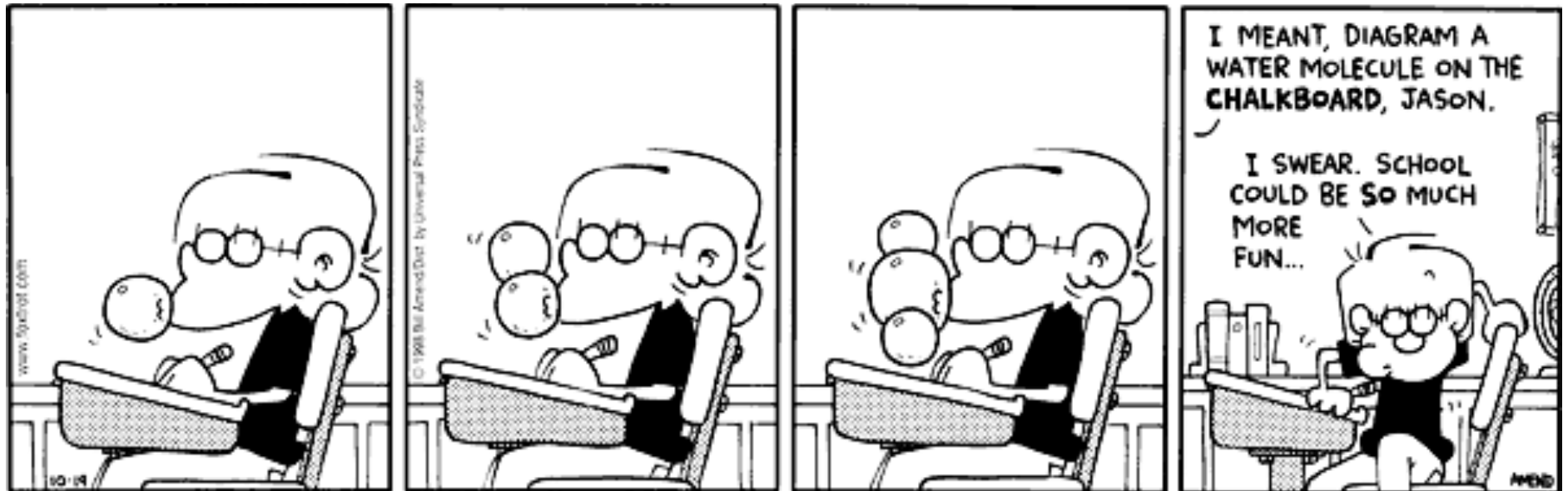
■ **Theme Music:** **Robert Alda**

Luck Be a Lady _(from Guys & Dolls)_
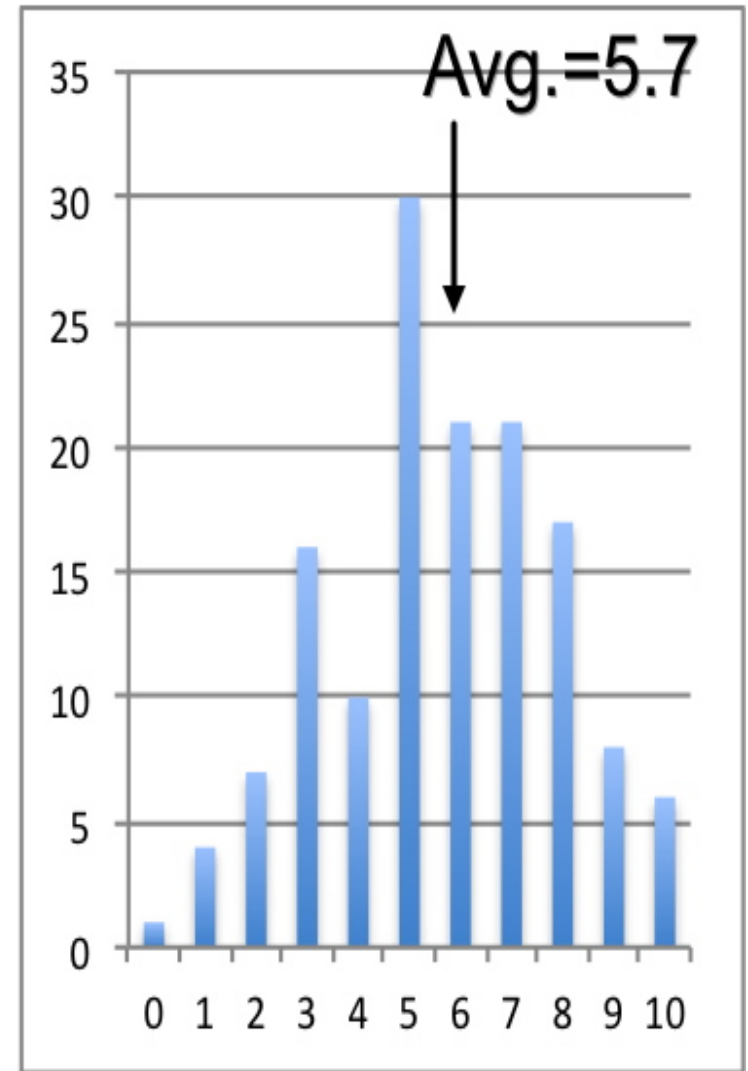
■ **Cartoon:** **Bill Amend**

FoxTrot

Quiz 6

	1	2	3
a	**68%**	0%	**28%**
b	17%	10%	**62%**
c	15%	**90%**	9%
d	0%	0%	1%
e	0%		

	4
b>d>a>c	**11%**
c>a>b=d	16%
b>a>d>c	8%
a>c>b=d	5%
b=c=d>a	4%
a>b=d>c	4%
b=c=d>a	4%

Foothold idea: Coulomb's Law

■ Point charges attract each other with a force whose magnitude is given by

$$\vec{F}_{q \to Q} = -\vec{F}_{Q \to q} = \frac{k_C qQ}{r_{qQ}^2} \hat{r}_{q \to Q}$$

■ k_C is put in to make the dimensions come out right.

$$[k_C] = \left[\frac{Fr^2}{q_1 q_2} \right] = \frac{\text{ML}}{\text{T}^2} \frac{\text{L}^2}{\text{Q}^2} = \frac{\text{ML}^3}{\text{Q}^2 \text{T}^2}$$

Adding forces for many charges!

$$\vec{F}_q = \vec{F}_{Q_1 \to q} + \vec{F}_{Q_2 \to q} + \vec{F}_{Q_3 \to q} + \vec{F}_{Q_4 \to q} + \ldots$$

$$\vec{F}_q = \frac{k_C q Q_1}{r_1^2} \hat{r}_1 + \frac{k_C q Q_2}{r_2^2} \hat{r}_2 + \frac{k_C q Q_3}{r_3^2} \hat{r}_3 + \frac{k_C q Q_4}{r_4^2} \hat{r}_4 + \ldots$$

where

$r_1 = $ distance from Q_1 to q $\quad\quad\quad \hat{r}_1 = $ direction from Q_1 to q (mag. 1, no units!)

$r_2 = $ distance from Q_2 to q $\quad\quad\quad \hat{r}_2 = $ direction from Q_2 to q (mag. 1, no units!)

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