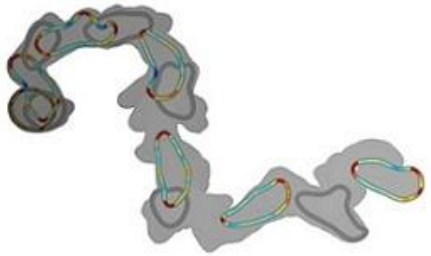
Physics 131- Fundamentals of Physics for Biologists I



Potential Energy

Heat

12/5: NO office hours Zac Bowen will be in Course Center at 12.30-2

Office Hours:

12/4 Wednesday 5.30-6.30pm AV Williams

12/9 Monday 3-4pm AV Williams 3341

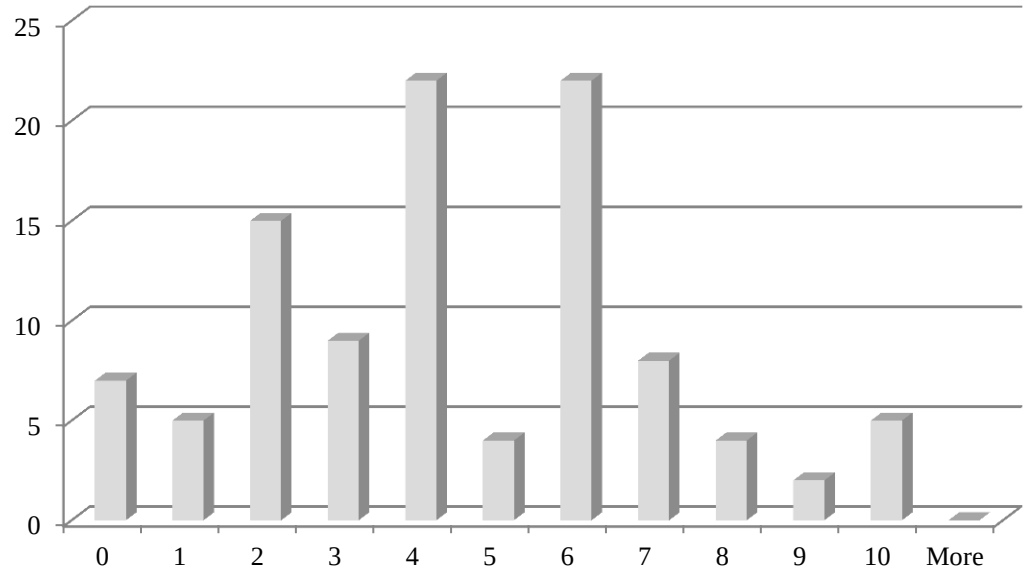
12/10 Tuesday 1-2pm AV Williams 3341

12/12 Thursday 2pm-3.30pm Course Center

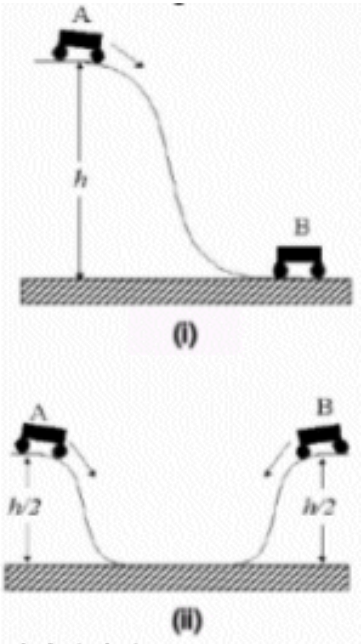
Quiz 10

Average: 4.4

BC	E	BC	CD

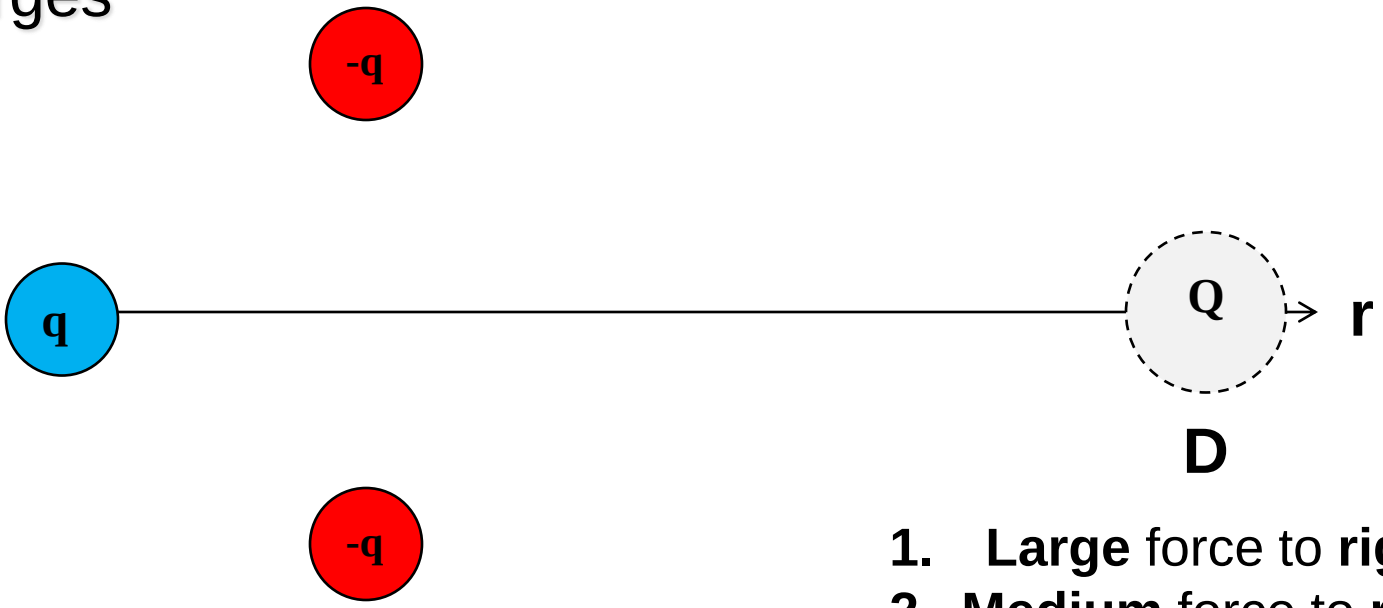


1 Two identical carts A and B roll down a hill and collide as shown in the figures at the right.
(i): A starts from rest. It rolls down and collides head-on with B which is initially at rest on the ground. The two carts stick together.
(ii): A and B are at rest on opposite hills. They roll down, collide head-on and stick together.



A. The momentum of the system is zero in both cases.
B. The momentum of the system is zero in case (ii).
C. The momentum of the system is greater in case (i) than in case (ii).
D. The momentum of the system is greater in case (ii) than in case (i).
E. The momentum of the system is the same in both cases (but not 0).

Consider a system with two positive charges (blue) (one of them dashed) and two negative charges (red). The charge Q can only move along the line. For the positions shown what is the magnitude and direction of the net force on Q exerted by the other charges

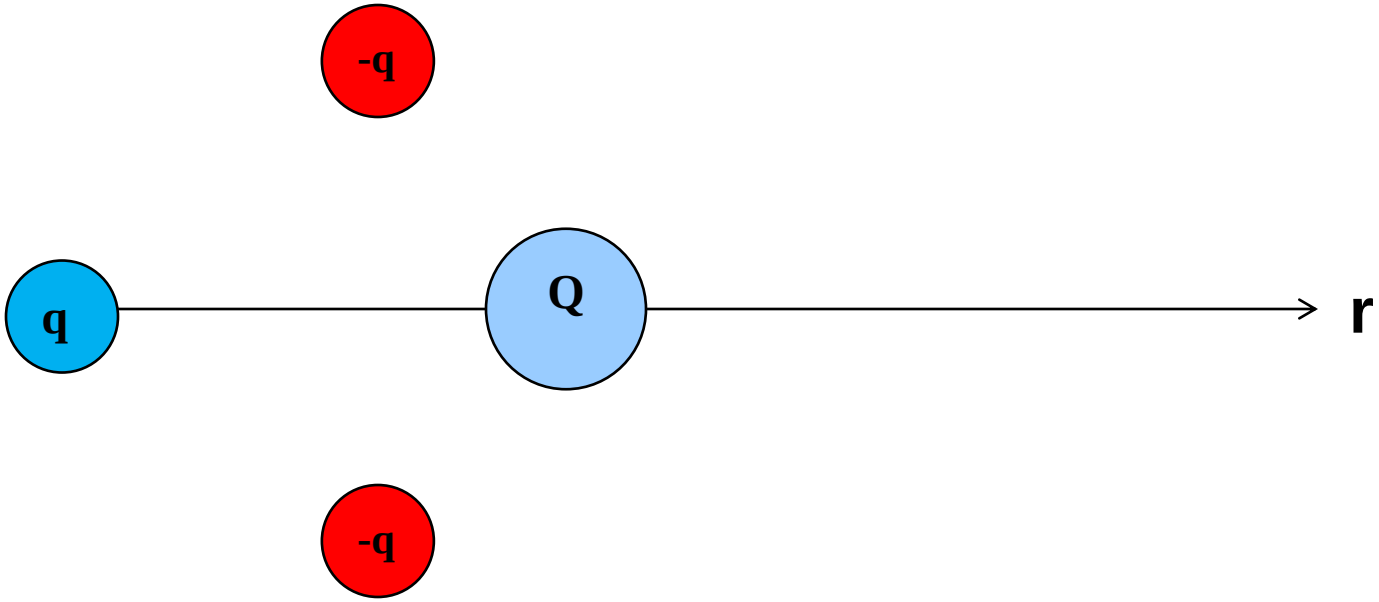


1. **Large** force to **right**
2. **Medium** force to **right**
3. **Weak** force to **right**
4. No force
5. **Weak** force to **left**
6. **Medium** force to **left**
7. **Strong** force to **left**

Whiteboard, TA & LA

Sketch total potential energy as a function of position r of charge Q

$$\vec{F} \cdot \Delta\vec{r} = -\Delta U$$



Whiteboard, TA & LA

Energies between charge clusters

- Atoms and molecules are made up of charges.
- The potential energy between two charges is

$$U_{12}^{elec} = \frac{k_C Q_1 Q_2}{r_{12}}$$

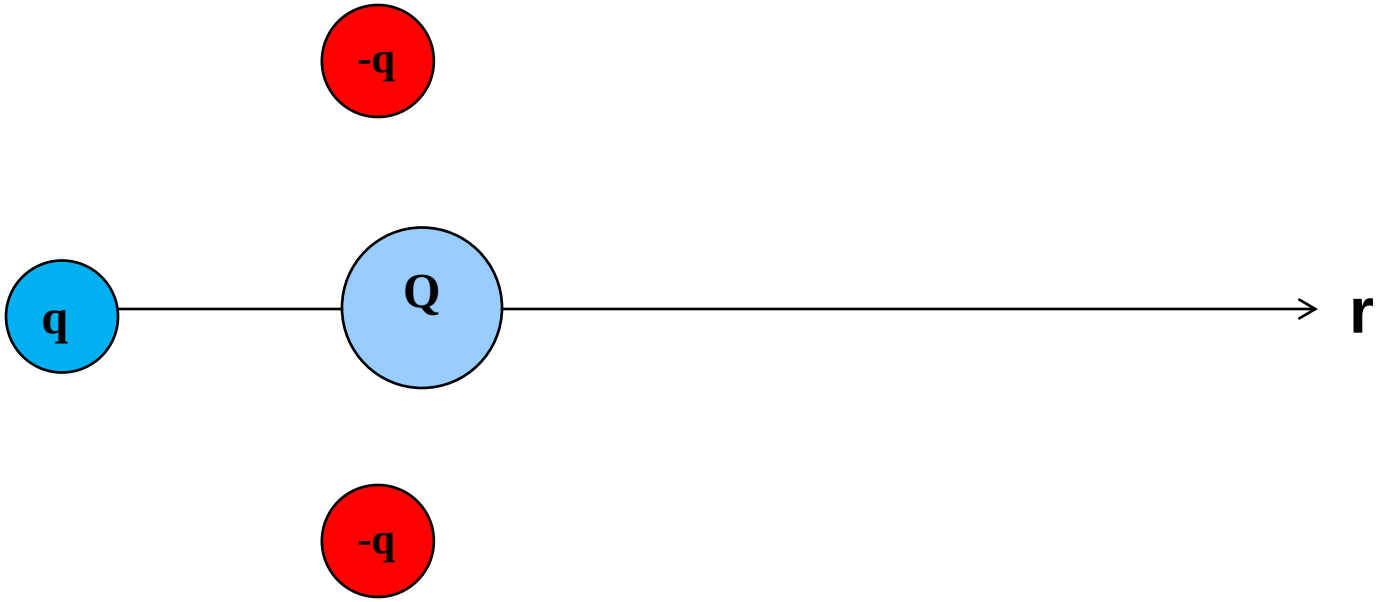
No vectors!

- The potential energy between many charges is

$$U_{12\ldots N}^{elec} = \sum_{i<j=1}^{N} \frac{k_C Q_i Q_j}{r_{ij}}$$

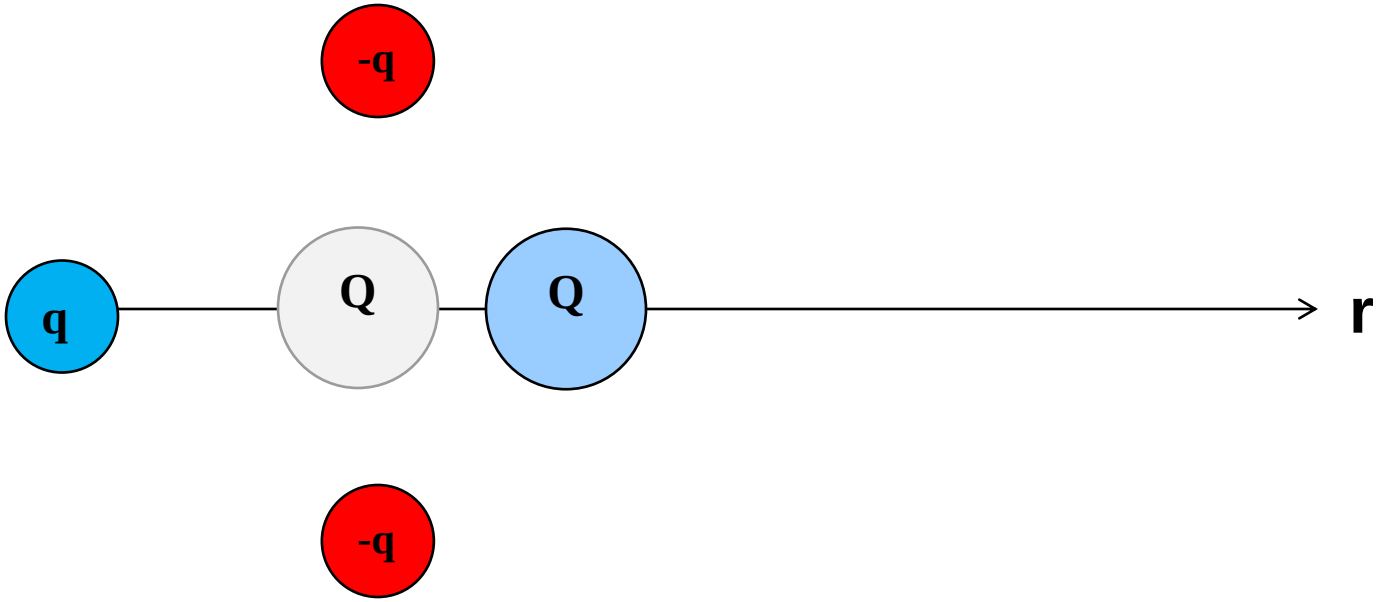
Just add up all pairs!

How many interactions in the system hold potential energy?

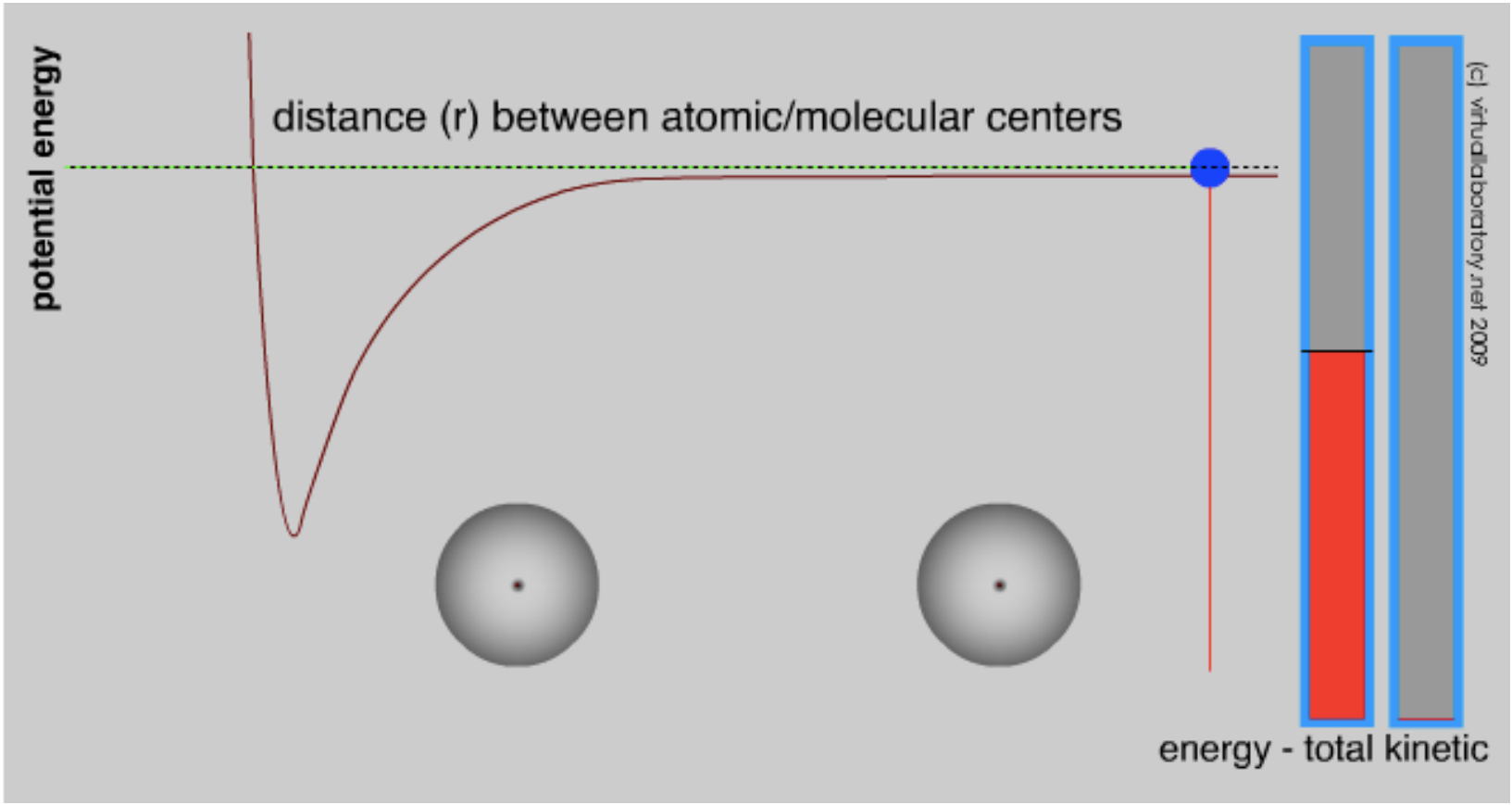


Whiteboard, TA & LA

How many of the potential energies change when the charge Q moves to the right?



Molecular forces



http://besocratic.colorado.edu/CLUE-Chemistry/activities/LondonDispersionForce/1.2-interactions-0.html