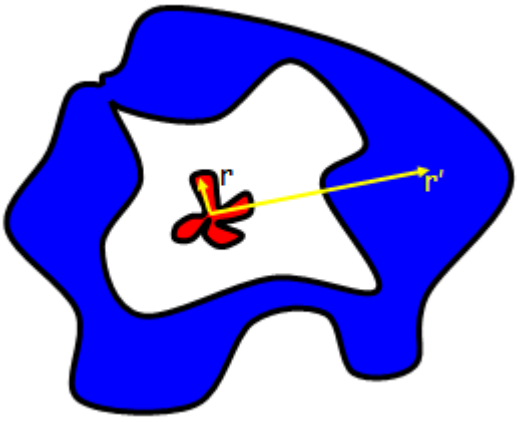
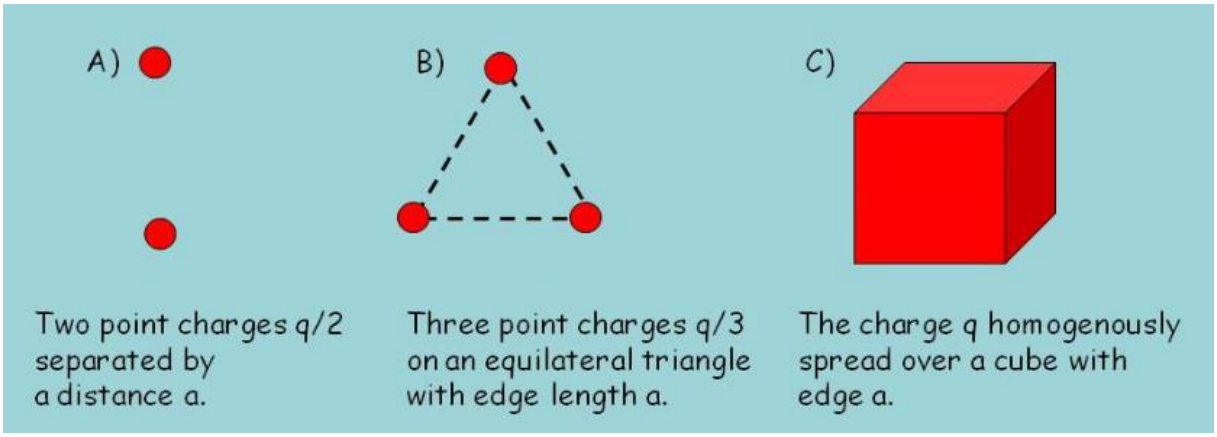
gravitational analogue

1. We derived the general, unapproximated expression for the gravitational potential energy of two mass distributions. We took the point of view of considering the potential energy of mass distribution 1 being in the gravitational field due to mass distribution 2. Show that you get the same expression if you take the alternative point of view.



2. In the example at the left, the condition r<r' is always fulfilled. Draw an example of a case where this condition is not always fulfilled.

3. Calculate the electric monopole moment of a total charge q that is distributed in space as given in the picture for three cases *(be careful: if that feels complicated, it probably means you are doing something wrong!)*. For cases A and B, calculate the mean square radius as well (you may do so for case C as well, if you feel able to handle the math):



4. Show an example of a situation where you used previously in your education a Principle Axis System