

## Matter and interactions 1

When we write with a pencil carbon from the core of the pencil is transferred to paper. A pencil core is an intriguing example of how matter can be built up from elements through a combination of interactions and forces between elements, and between the nanoscale objects (molecules, nanoparticles) that are a result of combining elements. Further assembly then leads to macroscopic matter.

Apply these ideas to understand how writing with a pencil works, by deconstructing the process starting from the macroscopic scale and working your way back to the molecular level.

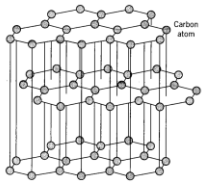


<http://oupeltglobalblog.com/tag/ann-snow/>

Start by sorting the images in the correct order to illustrate this sequence of thought. Then write a discussion to explain how the process of writing with a pencil works. Your discussion should reflect your thought process that helped you to sort the images in the correct order. Your discussion should include appropriate scientific content and terminology for dissemination to an audience of scientists .

### Images to be sorted:

Highly oriented pyrolytic graphite (HOPG)

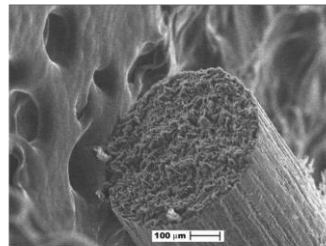


<http://batteryblog.ca/2010/06/lithium-ion-anode-materials-ordered-and-disordered-carbon/>



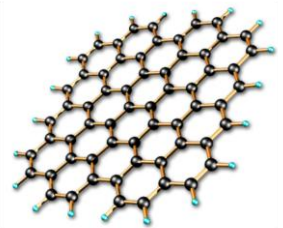
[http://en.wikipedia.org/wiki/File:Pencils\\_hb.jpg](http://en.wikipedia.org/wiki/File:Pencils_hb.jpg)

Pencil core (graphite) SEM



[http://ion.asu.edu/cool71\\_lead/images/cool71\\_sem4\\_100x.jpg](http://ion.asu.edu/cool71_lead/images/cool71_sem4_100x.jpg)

Graphene



<http://www.quirkyscience.com/graphene-isolation-characterization-application-and-production/>