Review guide: Test 1. Physics in the universe with B. Clark

Test date: Next Tues/Wed Oct 6th/7th.

Note to student: This test will be our first test using Canvas as a testing platform. It's as much an experiment for Clark as it is for you. There will likely be a mix of multiple-choice, short answer and likely some 'drawing' questions (in which you draw a picture to illustrate some point).

Origins of the universe.

How old is the universe? What are the major 'epochs' of the universe? What was significant about each one? What does it mean to say the universe has a finite size? How can the universe be growing? What evidence do se see to suggest that the universe is growing? What was the first observation that showed this? Who was the astronomer that first saw 'the expansion'? What additional pieces of evidence emerged to reinforce this idea? What do scientists currently think about the 'rate of expansion' of the universe? (slowing down? Speeding up? Reaching a 'steady state'?)
What is a quasar? What is a black hole? What event did the Chinese 'see' (and record!) back in the 1500's that we can still see today? Why are astronomers still interested in observing it? How far is a light year? How big is our own solar system? How big is our Galaxy, the Milky way?

Light and telescopes:

What are the major 'divisions' of the electromagnetic spectra? How does 'visible light' differ from other 'colors' of light? What was the first evidence that there were colors that we couldn't see with our eyes? What are absorption spectra? How did the launch of the Telestar satellite provide new clues about the origin of the universe? How does reflection differ from refraction in general and how do the different kinds of telescopes use each? How does our own atmosphere affect 'the light' coming from our sun and from distant stars? Why was the Hubble Space telescope such a game changer? Why is it the case that looking at galaxies far away also allows us to look back into time itself? How is it possible that black holes can give off light?

Atomic physics:

How is the periodic table of elements organized? What 'number' defines what element you are looking at? Why does that number determine what the element is? How are 'chemical reactions' different from 'nuclear' reactions? What are isotopes? What do they have in common? How are they different? How does the isotope number affect the 'chemistry' that the element can engage in? How does the isotope number affect the nuclear stability? How does fusion differ from fission? What forces are at work during these two types of nuclear events? Why are neutrons required for atomic nuclei to remain stable? What happens to neutrons if they are left alone for very long? Why is Iron the 'last' element to be formed inside stars during their 'normal' lifetime? How is it possible for elements 'heavier' than iron to be formed? What evidence do we have that our star (the sun!) is the third star to exist in this region of space? What materials do conventional 'fission' nuclear reactors make use of? What materials do hypothetical 'fusion' reactors make use of? What are the pro's and cons of each kind of nuclear reactor? What are the most significant challenges in bringing Fusion reactors 'on-line'?