

Name _____ Student ID _____

TA's Name _____ Section _____ Date 10/10/11 _____

Nell Byler – AA, AB – 8:30 & 9:30 am	Nick Hunt-Walker – AC, AH – 10:30 am & 3:30 pm
Nicole Silvestri – AF, AG – 1:30 & 2:30 pm	Ben Vega-Westhoff – AD, AE – 11:30 am & 12:30 pm
Instructor's name: Ana Larson	

Please do not start this exam until directed to do so. You will not be allowed to leave the room once the exam starts, so make sure you are ready to go to work once the bell rings. Extra pencils, erasers, bathroom run, etc. should be considered right now.

CHECK NOW TO MAKE SURE YOUR NAME IS ON THIS EXAM AND THAT YOU HAVE 8 PAGES AND A TOTAL OF 18 QUESTIONS! 40 points total.

PLEASE TURN OFF YOUR CELL PHONE RIGHT NOW! THANK YOU!

All books, packs, cell phones, papers, Course Packs, etc. must be placed under your seat. You are allowed to leave the room to come and go between rows. **NO CALCULATORS ARE NEEDED. ALL CALCULATORS MUST BE TURNED BACKWARDS.**

Any student who continues to work beyond the class bell will have 1 point deducted for every minute of overtime s/he uses.

You are free to raise your hand during the exam and ask questions involving clarification of exam questions.

Newton's Laws

- An object at rest stays at rest, an object in motion stays in motion unless acted upon by an outside force.
- The acceleration of an object is directly proportional to the force exerted on it and inversely proportional to its mass; acceleration = force/mass or $a = F/m$ (usually written as $F = ma$).
- For every action there is an equal and opposite reaction; forces come in pairs.

Gravity of a planet: $F_{gravity} = G \frac{Mm}{R^2}$,

F represents the force of gravity, G is the gravitational constant, M is the mass of the planet, m is the mass of the object on the surface, and R is the radius of the planet.

Mathematical logic: What is done on one side of the equation must be balanced by doing the same thing on the other side.

Wien's Law

$$T = \frac{2.9 \times 10^6}{\lambda_{peak}} \text{ K; wavelength } (\lambda) \text{ must be in nanometers and temperature } (T) \text{ in Kelvins.}$$

kinetic energy = $1/2 \times \text{mass} \times \text{velocity squared}$

$$KE = \frac{1}{2} mv^2$$

gravitational potential energy = $\text{mass} \times \text{acceleration due to gravity} \times \text{height}$

$$GPE = mgh$$

Energy (mass energy) = $\text{mass} \times \text{speed of light squared}$

$$E = mc^2$$

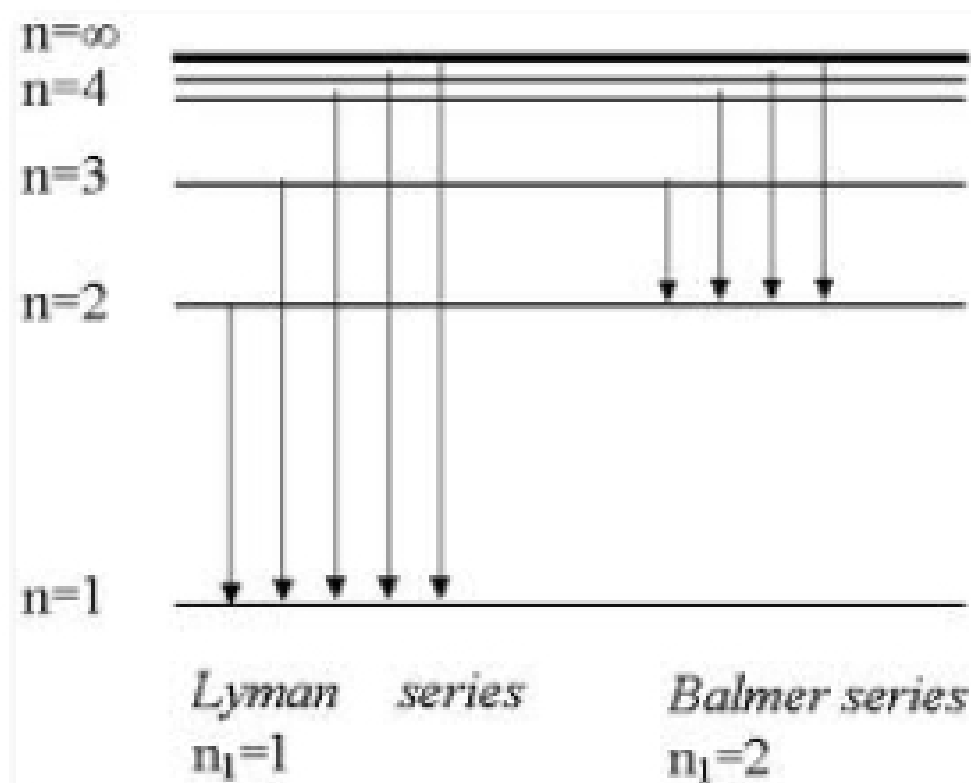
Electromagnetic radiation

Energy (of a photon) = $\text{Planck's constant} \times \text{frequency of light}$

$$E_{\text{photon}} = h\nu \quad (\text{or } hf)$$

Wavelength \times frequency = speed of light

$$\lambda\nu = c$$



Lyman series (ultraviolet wavelengths) and Balmer series (visible wavelengths) for hydrogen.

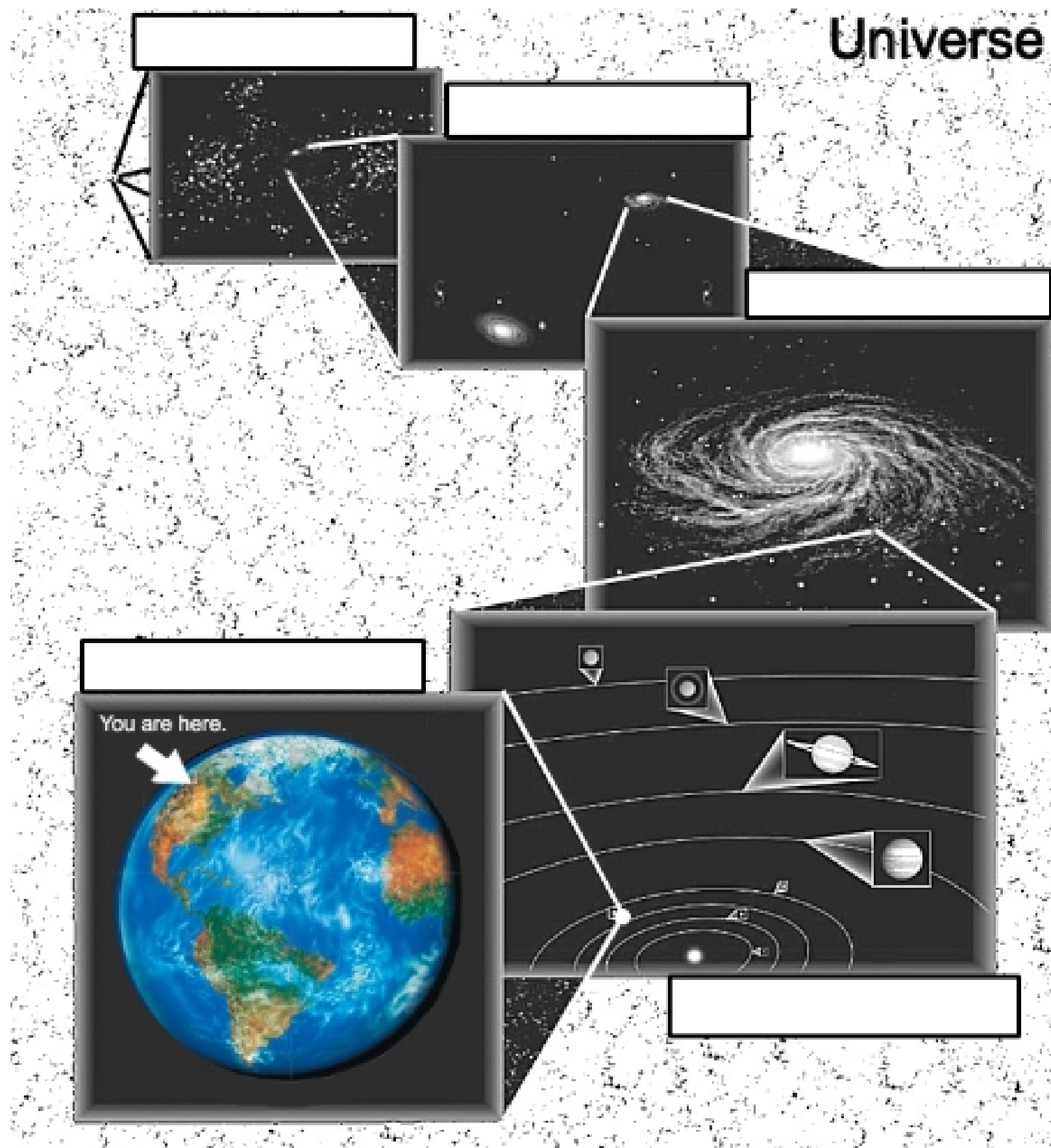
Balmer wavelengths shown:

656.3 nm

486.1 nm

434.1 nm

410.2 nm



01. (5 pts) Fill in the blanks above with the **appropriate label** for the **major structures of the Universe** from our point of view. . Choose from: **planet, planetary system, star, galaxy, super-galaxy, local group, local galaxies, cosmic galaxy, universal supercluster, local supercluster.**

02. (3 pts) Would it ever be possible for a planetary system to contain a galaxy within it? Explain.

No. Galaxies (A galaxy) contain(s) planetary systems, planetary systems don't contain a galaxy.

ALSO OK No. A planetary system contains only a star (or stars) and planets (and other stuff).
