NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

FIRST EXAM

APAS 1020 SECTION 001

February 16, 2010

DO ALL 15 PROBLEMS.

MARK YOUR ANSWERS ON THIS SHEET AND TURN IT IN.

Multiple Choice are worth 5 points each. Written problems worth 10 points each.

All constants in mks units unless otherwise specified:

c=3x108 G=6.7x10-11 h=6.6x10-34 =5.7x10-8 REarth=6400km

1pc=3x1016m 1AU=1.5x1011m M=2x1030kg R=7x108m

   F=ma  x=vt v=at

   

\_\_\_\_\_ 1) Evaluate 2.4x10-2 + 1.2x106 x 4x10-8

1. 6000 b) 7.2x10-2 c) 2.05x108 d) 4.6x109 e) 7.32x1011

\_\_\_\_\_ 2) The closest star is how distant?

a) 40 thousand km b) 40 million km c) 40 billion km d) 40 trillion km e) 40 quadrillion km

\_\_\_\_\_ 3) If you accelerate at 10m/s/s (1gee) for four months (107s), how fast will you be going as a fraction of the speed of light?

a) 10-5 b) 4.73x10-3 c) 0.33 d) 0.99 e) 10

\_\_\_\_\_ 4) The temperature at the center of the Sun is closest to

a) 0k b) 0C c) 273K d) 104K e) 107C

\_\_\_\_\_ 5) The Solar Wind is generated in the:

a) core b) envelope c) photosphere d) corona e) Van Allen belts

\_\_\_\_\_ 6) A photon has all the following properties except:

a) mass b) energy c) wavelength d) direction e) polarization

\_\_\_\_\_ 7) If an object is receding from you sufficiently quickly, then an IR photon it emits could be detected in the

a) visible b) radio c) ultraviolet d) gamma-ray e) x-ray

\_\_\_\_\_ 8) Which of these is the stellar classification system in order of increasing temperature?

a) OBFGKM b) MKGFABO c) ABCDEFG d) GFEDCBA e) IDONTKNOW

\_\_\_\_\_ 9) Shortly after the Big Bang the Universe was made of

a) hydrogen b) H and He c) He only d) C, N and O e) Unobtainium

\_\_\_\_\_ 10) A sixth magnitude star relative to a first magnitude star is

a) 5x brighter b) 12.5x brighter c) 6x fainter d) 15x fainter e) 100x fainter

11. A planet orbits a black hole which has the same mass as the Sun (2x1030kg). It orbits at 1.5x1011m. What is its orbital period? Show your calculation or explain your scaling.

12. A star is seen to have a parallax of 0.004 arcseconds. How far away is it in meters?

13. An object has a mass 108 times that of the Sun, and a radius of 3x108km. What is the escape velocity from its surface? What kind of object do you think it is?

14. What is the thermal luminosity of the Earth?

Note: We have not covered this yet this semester (Fall 2014). It will not be on the exam.

15 Galactica (M=109kg) throws a tractor beam onto Pegasus (M=2x109kg) with a force of 1010N for one minute. How fast will the two Battlestars be moving toward each other when the beam is released?