FINAL EXAM

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1 TEST1 REDO

The first question of the exam is worth 30 points. The above table is required.
1) Consider the earth moving around the sun.

a. Determine the orbital angular velocity of the earth.

$$\omega = \frac{2\pi}{T}$$

$$\omega = \frac{2 * 3.14}{365.24 * 24 * 60 * 60}$$

$$\omega = 1.99 \times 10^{-7} \frac{rad}{sec}$$

b. Determine the speed of the earth relative to the sun.

$$V = \omega r$$

$$v = \frac{2\pi r}{T}$$

$$V = 1.99 \times 10^{-7} * 1.5 \times 10^{11} = 3.0 \times 10^{4} m/s$$

c. Determine centripetal acceleration of the earth relative to the sun.

$$a = \frac{V^2}{r}$$

$$a = \frac{(3 \times 10^4)^2}{1.5 \times 10^{11}} = 6 \times 10^{-3} m/s^2$$

d. Determine the net force on the earth considering this acceleration.

$$Fnet = ma$$

$$Fnet = (5.98 \times 10^{24}) * 6 \times 10^{-3}$$

$$Fnet = 3.6 \times 10^{22} N$$

e. Determine the mass of the sun from the above.

$$M = \frac{Fg * r^2}{mg}$$

$$M = \frac{(3.6 \times 10^{22}) * (1.5 \times 10^{11})^2}{(5.98 \times 10^{24}) * (6.67 \times 10^{11})}$$

$$M = 2.0 \times 10^{30} kg$$

2) Consider gravitation at the surface of the moon.

b. Determine the launch velocity for circular orbit.

$$a = \frac{V^2}{r}$$

$$1.62 = \frac{V^2}{1.74 \times 10^6}$$

$$V^2 = 1.62 * 1.74 \times 10^6$$

$$V = 1680 m/s$$

c. Determine the launch velocity for escape from the moon's gravity.

$$E = 0$$

$$KE + PE = 0$$

$$\frac{1}{2}mv^2 - \frac{mMG}{r} = 0$$

$$v = \sqrt{\frac{2MG}{r}}$$

$$v = \sqrt{\frac{2 * 7.3610^{22} * 6.67 \times 10^{11}}{1.74 \times 10^6}}$$

$$v = 2370 m/s$$

Question three is worth 40 points.

3) Consider a capacitor. Two very large parallel conducting plates are connected to the leads of a 9 Volt battery.

a. Determine the separation between the plates to generate a 30.0 $\frac{N}{C}$ electric field.

$$E = \frac{-\Delta V}{X}$$

$$X = \frac{\Delta V}{E}$$

$$X = \frac{9}{30}$$
$$x = 0.3m$$

b. Determine the force of this electric field on a 0.012 Coulomb charge.

$$F = q * E$$

$$F = 0.012 \times 30$$

$$F = 0.36N$$

c. Determine the change in potential energy for the 0.012 C charge moving from the 9V plate to the 0V plate.

$$PEq = qV$$

$$PEq = 0.012 \times 9$$

$$PEq = 0.108Joules$$

2 class review

What magnitude of B will cause this particle to move in a straight line

Fe=qE FB=qvb

$$B = \frac{E}{V}$$

Centripetal forces: A forces caused by centripetal acceleration and therefore move the object in the circle.

Electric + to -

$$F = q \times E$$

$$E = \frac{V}{x}$$

(v=volts)

$$unitV = \frac{kgm * 2}{cs * 2}$$

Describe a situation where the centripetal force is mass attracted for a rope moving in the circle

tension ,gravity,electric forces,magnetic forces,friction

3 Circular motion

3.1 Polar coordinates

$$r, \theta$$

3.2 Angular velocity

$$\omega = \frac{\Delta\theta}{\Delta t}$$

3.3 Angular acceleration

$$\alpha = \frac{\Delta\omega}{\Delta t}$$

3.4 Centripetal acceleration

$$a = \frac{v^2}{r}$$

3.5 Tangential speed

$$V = \omega r$$

4 Gravity

$$F = \frac{mMG}{r^2}$$

$$PE = -\frac{mMG}{r}$$

when something is escaping FE=0 , when it stay in orbit gravity=MA

5 Antripetal force

$$F = \frac{mv^2}{r}$$

$$V = \omega r$$

$$\frac{mMG}{r^2} = \frac{m\omega^2 r^2}{r}$$
$$\omega = \frac{2\pi}{T}$$
$$T^2 = \frac{4\pi^2 r^3}{MG}$$

6 Electricity point charge

$$F = qQkr^2$$
$$E = Qkr^2$$
$$PE = \frac{qQk}{r}$$
$$V = \frac{Qk}{r}$$

7 Electric general

$$E = \frac{-V}{X}$$
$$F = qE$$
$$PE = qV$$
$$I = \frac{Q}{t}$$
$$C = QV$$
$$V = IR$$
$$P = IV$$

8 B field

$$F = qvB$$
$$F = ILB$$
$$B = \frac{\mu I}{2\pi r}$$