PHYS 408

1. θ 1mm θ

$m_e = 9.1E^{-31}\,kg$

$q_e = -1.6E^{-19}\,C$

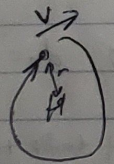
$F_e = k\frac{q_e^2}{0.001^2} = 2.3E^{-22}\,C$

$\frac{2.3E^{-22}}{5.5E^{-65}} = 4.2E^{42}$

$F_g = G\frac{m_e^2}{0.001^2} = 5.5E^{-65}\,N$

2. We are at all times, in some way or another, in constant contact with a very large mass. We are not as close to any objects with comparable charge

3. $a = F/m$ $\quad r = 5.29E^{-11}\,m$ $\quad m_p = 1.7E^{-27}\,kg$



$V = \sqrt{\frac{Gm_p}{r}} = 4.6E^{-14}\,m/s$

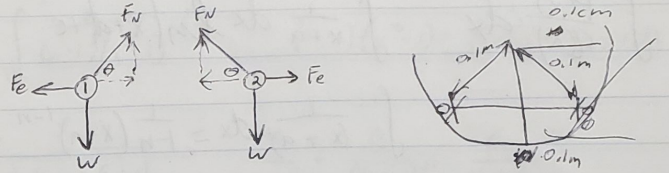
$C = \pi d = 3.3E^{-10}\,m$

$V = \frac{C}{2}\cdot\frac{RPM}{60}$ $\quad \frac{120V}{C} RPM = 0.017$

$V = \frac{CRPM}{120}$ $\quad 120V = C\,RPM$ $\quad = 2.8E^{-4}\,rps$

PHYS 408

4.



$\sum F_{x_1} = F_e - F_{N_1}\cos\theta = 0$ $\quad \theta = 60°$

$\sum F_{y_1} = F_{N_1}\sin\theta - W = 0$

~~$F_N = W\cos 30$~~

$F_{N_1}\sin\theta = W$ $\quad F_{N_1} = \frac{W}{\sin\theta} = 0.11N$

$m = 0.01kg$

$k\frac{q^2}{r^2} = \frac{W}{\sin\theta}\cdot\frac{\cos\theta}{1}\tan\theta$ $\quad k\frac{q^2}{r^2} = W\tan\theta$

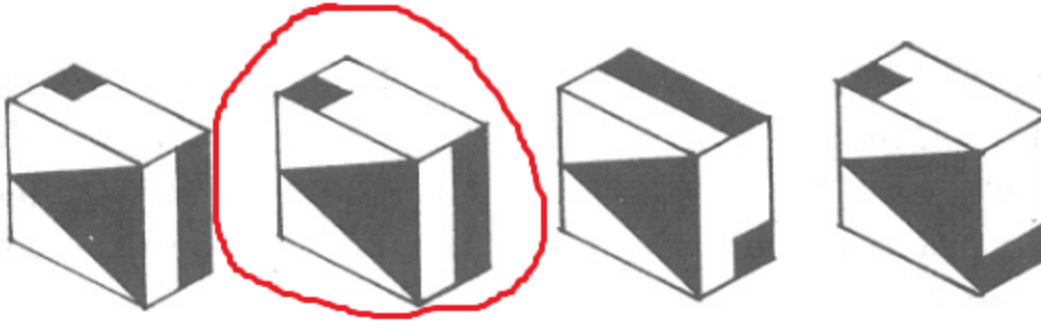
$q = \sqrt{\frac{r^2 W\tan\theta}{k}}$

$n_e = \frac{q}{q_e}$

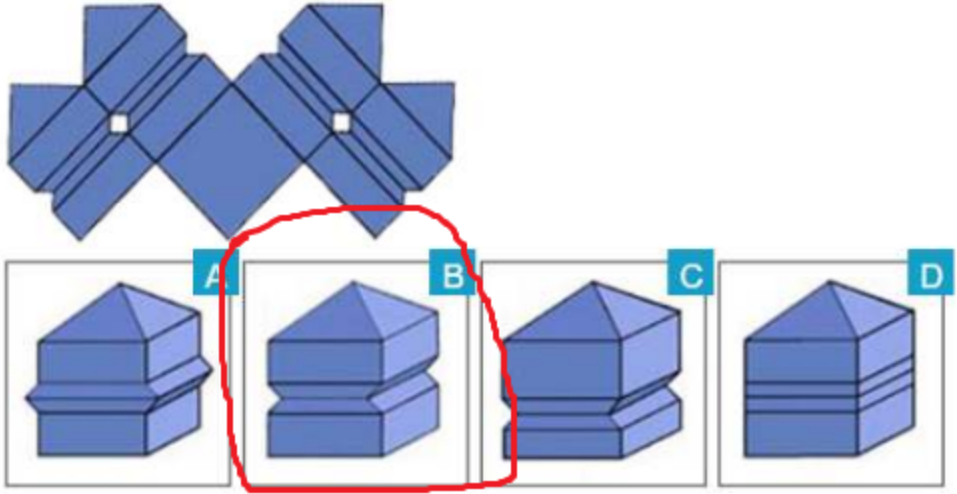
$2.7E^{12} = \#electrons = \frac{\sqrt{\frac{r^2 W\tan\theta}{k}}}{q_e}$

5.

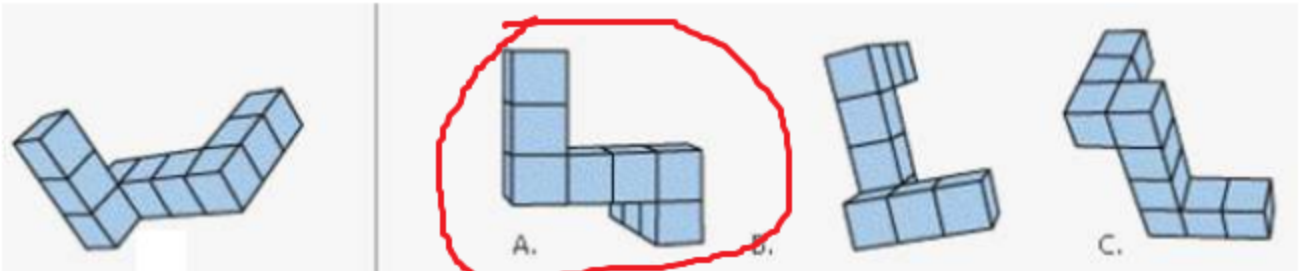
7. (1 point) For this unfolded object to the right, which of the four objects below could be made by putting it back together? (circle one)



8. (1 point) Let's try a harder one:



9. (1 point) For the next two, choose which of the three objects is the same object as the one on the far left, just seen from a different angle.



10. (1 point)