HONORS PREX#4 MG – SOLUTIONS

1. $g = \frac{GM}{r^2}$ so the acceleration due to gravity (and the weight of an object) is proportional to the mass of the planet and inversely proportional to the distance from the center of the planet squared. M × 2 = g × 2 and if the net effect is g = g_{Earth} then r must be $\sqrt{2}$ times that of Earth C

2. $g = \frac{GM}{r^2}$ so the acceleration due to gravity (and the weight of an object) is proportional to the mass of the planet and inversely proportional to the distance from the center of the planet squared. M ÷ 10 = g ÷ 10 and r ÷ 2 = g × 4, so the net effect is g × 4/10 D

3. At the bottom swing, $\Sigma F = F_C = 90 - 60 = 30$, so $30 = ma_C$ and $m = 6kg$, so $a = \frac{F}{m} = \frac{30}{6}$, $5 \, m/s^2 = g/2$ B

4. Due to inverse square nature of gravity, to get a F/2, one must have a '2' in the denominator, but this means the bottom must be sq rt B

8. $\Sigma F = 20 = 6a$ C

10. $a_c = \frac{v^2}{r} = \frac{4\pi^2 r^2 / T^2}{r}$ B

17 NL3 C

19 N is the force the surface feels, in this case, $N = Mg - F\sin\theta$

20. Friction is coefficient times normal. $F_f = \mu(Mg - F\sin\theta)$

21. $W = Fd = \mu(Mg - F\sin\theta)d$

1. $\Delta P = \Delta K$, $\frac{1}{2}kx^2 = \frac{1}{2}mv^2$, $v = \sqrt{\frac{kx^2}{m}}$ D

2. Duh… C

3. PE is zero at center A

6. $\Sigma F = ma = m\frac{v_f^2 - v_i^2}{2d}$ A

13. Area under Fx graph is work done which shows up as a ΔK E

17. $mv = 3mv_f$ A

24. Same as #17 E

27. Since same mass, collision results in 90^o. Must be C) or D). Ball X has an x-component of MV = $MV = 6\cos 53 = 3.6M$. Ball Y MUST have an x-component = 6.4M so is still has 10 D