

# **Ch 13 HW Assignment: Answers & HW Hints (Pt. 1)**

## **Part 1: Gravitation & Orbit**

**Pg. 351-356 #1, 7, 17, 19, 61a, 67ab**

# Answers

1. 19.02m

7.  $2.61 \times 10^8 \text{m}$

17.  $2.65 \times 10^6 \text{m}$

19a. 17N

b.  $2.4 R_E$

61a. 2.8 yrs

67a. 7543m/s

b. 1.62 hrs

# **Ch 13 HW Assignment: Answers & HW Hints (Pt. 2)**

## **Part 2: Gravitational Energy**

**Pg. 353-354 #30, 35, 37**

# Answers

30a.  $-4.37 \times 10^{-11} \text{ J}$

b.  $-2.9 \times 10^{-11} \text{ J}$

c.  $+2.9 \times 10^{-11} \text{ J}$

35a.  $+5 \times 10^{-13} \text{ J}$

b.  $-5 \times 10^{-13} \text{ J}$

37a.  $1732 \text{ m/s}$

b.  $2.5 \times 10^5 \text{ m}$

c.  $1414 \text{ m/s}$

## Ch 13 #35

You'll be calculating the work 'you' have to do to move mass B, which can be found through  $W = -\Delta U$ . You should start by calculating the initial energy of mass B. Keep in mind that energy is not a vector quantity, so you can simply find the energy due to A and due to B, and then add those (negative) values. Then apply the same thinking to find the final energy of mass B, and subtract initial from final to finish. Part B should be pretty easy after all of that junk for part A.

## Ch 13 #37

Part A should be a pretty straight-forward calculation of escape velocity, with the exception that you don't know the planet's mass and radius, but you instead know its value of 'g' near its surface. So you can start with a quick setup of  $mg = GmM/R^2$ , which you can solve for  $gR = GM/R$ . Then substitute this  $gR$  value when you need it.

Now brace yourself, because part B's a doozy.

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## Ch 13 #37 (cont.)

You should realize that the energy equation is  $Ke_i + U_i = U_f$  for the object that will reach a maximum height. But getting this equation fleshed out more can be a little rough. You should be able to get it looking something like this...

$$\frac{1}{2}v_i^2 - gR = -(gR^2)/(R+h)$$

Once that setup makes sense to you, then you just need to go about the hassle of solving it.

For part C, you should find it a little easier, because you'll be making similar substitutions that you just performed in part B.