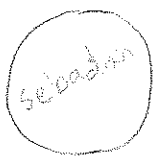


Gravitational Potential Energy: Relative to 0 at ∞ .



A B C D E

1. E

* E is furthest from Schuloh

2. A

* F_g decreases as you move further from planet.

3. C

* W must be positive (\vec{F} is right, \vec{d} is right)

4. A

* $W_{net} = \Delta E_k$, constant speed

$\Rightarrow \Delta E_k = 0$

5. A

* $E_{p2} > E_{p1}$, but still negative

6. C

* Tough one! $E_{p1} < E_{p2} < E_{p3}$. B.C that's true for B, C and D. So ALSO, the

difference in E_p between A and C is GREATER than the difference in E_p between C and E!

7. $W_{nc} = \Delta E_k + \Delta E_p$

$$W_{nc} = E_{p3} - E_{p1} = 0 - (-8.9 \times 10^{10} \text{ J}) = 8.9 \times 10^{10} \text{ J}$$

8. $W_{nc} = \Delta E_k + \Delta E_p$

$$W_{nc} = E_{p3} - E_{p1} = 0 - (-8.9 \times 10^{10} \text{ J}) = 8.9 \times 10^{10} \text{ J}$$

9. $W_{nc} = \Delta E_k + \Delta E_p$

$$W_{nc} = E_{p3} - E_{p1} = 0 - (-8.9 \times 10^{10} \text{ J}) = 8.9 \times 10^{10} \text{ J}$$

10. a. $E_{pg} = \frac{-GMm}{r} = \frac{-6.67 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2 (2.0 \times 10^{25} \text{ kg}) (4.0 \times 10^{20} \text{ kg})}{5.0 \times 10^9 \text{ m}} = -1.0672 \times 10^{26} \text{ J} = -1.1 \times 10^{26} \text{ J}$

b. $\sum \vec{F} = m\vec{a} \Rightarrow \frac{GMm}{r^2} = \frac{mv^2}{r} \Rightarrow v = \sqrt{\frac{GM}{r}}$

$$v = \sqrt{\frac{6.67 \times 10^{-11} (2.0 \times 10^{25})}{5.0 \times 10^9}} = 516.826 \dots \approx 520 \text{ m/s}$$

c. $E_k = \frac{1}{2}mv^2 = \frac{1}{2}(4.0 \times 10^{20})(516.826 \dots)^2 = 5.336 \times 10^{25} \text{ J} = 5.3 \times 10^{25} \text{ J}$