· KEY ·

This is P110, Quiz 8, As always, you are allowed to use a cheat sheet and a calculator.

1. In class we saw that a modern driver with swing speed 120 mph and $\kappa = 0.83$ produces a 180 mph ball speed that would travel 290 yds. How far would a ball travel with a hot ($\kappa = 0.90$) driver, assuming the same swing speed?
   a. 295 yds
   b. 291 yds
   c. 290 yds
   d. 300 yds
   e. (e.) 310 yds

$v \propto 1+k$ since $V$ is same

$\frac{v_{90}}{v_{83}} = \frac{1+0.90}{1+0.83}$ $\quad R_{90} = 214\left(\frac{v_{90}}{100}\right) - 88 = 312$

2. A fastball and softball have roughly the same mass and differ in top speed by a factor of roughly ½. Compare the maximum baseball kinetic energy to that of the softball:
   a. Same
   b. Factor of two large
   c. Factor of two smaller
   d. (d.) Factor of four larger
   e. Factor of four smaller

$KE \propto m v^2$ ($m$: same; $v$: 2x's) $\rightarrow$ KE: 4x's

3. Which two objects would have comparable kinetic energies?
   a. 16 lb shot put moving at 4 m/s and 1 lb rock moving at 8 m/s
   b. 16 lb shot put moving at 4 m/s and 2 lb rock moving at 8 m/s
   c. (c.) 16 lb shot put moving at 4 m/s and 4 lb rock moving at 8 m/s
   d. Both (b) and (c)

see above.

$\leftarrow \frac{1}{4} m_{2kg} 2^2 v$

4. In class we saw that an adult pole vaulter (80kg) fell from a height of 5m, landing in the pit with roughly 4000J of kinetic energy. What was their energy half way down?
   a. 1000 J
   b. (b.) 2000 J
   c. 3000 J
   d. 4000 J
   e. 8000 J

$\Delta KE = mgd$ ($d$: distance falling)

$\Delta KE = mg\frac{H}{2}$, so half KE of bottom

5. Suppose in problem (4) we switched from the adult vaulter to a kid vaulter with half the mass. Assuming the kid falls from the same height, which of the following is true at the end of the fall?
   a. Same speed, same kinetic energy
   b. Adult moves twice as fast and has four times the kinetic energy
   c. (c.) Same speed, kid has half the kinetic energy
   d. Adult moves at twice the speed and has twice the kinetic energy

$v^2 \propto g \cdot x$ independent of $m_{2kg}$ $\leftarrow$ same

$KE \propto mv^2$ $\quad m: \frac{1}{2} \rightarrow KE: \frac{1}{2}$