Name ______________________________

Kinetic Energy: $KE = \frac{1}{2}mv^2$ (v is speed of object, not velocity), KE always positive

Work-Energy Theorem: $W_{tot} = \Delta KE = KE_f - KE_i = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$

If $W_{tot} = +$, $\Delta KE = +$: Object speeds up

If $W_{tot} = -$, $\Delta KE = -$: Object slows down

1. How would KE change if

   - speed of the object is doubled?
   - mass of the object is doubled?

   A doubles **B** quadruples **C** Won't change **D** halved **E** Decreases by 1/4

2. What is the kinetic energy of a car with a mass of $1000kg$ moving at $25m/s$ (35mph)?

   How fast would a person with a mass of $100kg$ have to move to have the same kinetic energy as the car?

3. A ball with a mass of 2kg has a speed of $10m/s$. Only one force acts on the ball. After this force acts, the speed of the ball is $3m/s$. Has the force done positive or negative work on the ball?
   How much total work was done?

4. A $10kg$ block is initially moving with a velocity of $+2m/s$ and some forces act on the block such that the total work done is $+100J$. What is the final speed of the block?

Recall: Work $= W = F\cos\theta d$

5. Boxing gloves are designed to lessen the force of a blow to the face. What force is exerted on an opponent's face if the glove and face compress by $5cm$ during a punch in which the $8kg$ arm is brought to rest from an initial speed of 10m/s?

   Compare that to the force with no glove, in which the knuckles and face compress only $1cm$.

6. A car that turned on its side after an accident is initially sliding across the road at $5m/s$. If the car stops in a distance of $2m$, what must be the coefficient of kinetic friction between the car and the road?