Worksheet energy solutions

**1.** A ball with a mass of 10kg is lifted to a height of 2m above the ground. The ball is then allowed to fall to the ground. Disregard friction.

 A) Calculate the gravitational potential energy of the ball when held 2m above the ground.

$$PE=mgh=\left(10kg\right)\left(9.8\frac{m}{s^{2}}\right)\left(2m\right)=196J$$

 B) Calculate the kinetic energy of the ball when held 2m above the ground.

$$KE=0J due to all the energy being potential energy at that point.$$

 C) Calculate the kinetic energy of the ball just as it reaches the ground.

$$KE=196J because all of the potential energy converted to kinetic energy.$$

 D) Calculate the velocity of the ball just as it reaches the ground.

$$KE=\frac{1}{2}mv^{2}\rightarrow v=\sqrt{\frac{2KE}{m}}=\sqrt{\frac{2\left(196J\right)}{10kg}}=6.26\frac{m}{s}$$

**2.** A ball is raised to a height of 30Mm above the ground. Starting from rest, what would its velocity be when it has fallen halve that distance?

$$E\_{o}=E\_{f}$$

$$KE\_{o}+PE\_{o}=KE\_{f}+PE\_{f}$$

$$Since all of the energy is potential at the greatest height, there^{'}s no initial kinetic energy.$$

$$PE\_{o}=KE\_{f}+PE\_{f}$$

$$mgh\_{o}=\frac{1}{2}mv\_{f}^{2}+mgh\_{f}$$

$$gh\_{o}=\frac{1}{2}v\_{f}^{2}+gh\_{f}$$

$$gh\_{o}-gh\_{f}=\frac{1}{2}v\_{f}^{2}$$

$$v\_{f}=\sqrt{2g\left(h\_{o}-h\_{f}\right)}$$

$$v\_{f}=\sqrt{2\left(9.8\frac{m}{s^{2}}\right)\left(30x10^{6}m-15x10^{6}m\right)}=1.7x10^{4}\frac{m}{s}$$