Mechanical Energy (grade 11 review)

Work	$W = F\Delta d$

Gravitational Potential Energy	$E_g = mgh$
Kinetic Energy	$E_k = \frac{1}{2}mv^2$

Relating Energy to Work

1. How much work must be done to accelerate an 800 kg car from 15m/s to 30 m/s?
2. A hammer has a mass 2.0kg and is moving horizontally at a speed of 4.0 m/s when it strikes a nail, driving it 2 cm farther into piece of wood.
    a. What was the kinetic energy of the hammer?
    b. What is the average force exerted on the nail by the hammer?
3. 4,800J of work is done on a 17kg object by lifting it at a constant velocity in a vertical direction. What vertical displacement does the object undergo?

Kinetic Energy

4. What is the kinetic energy of a rock of mass 12kg sliding across ice at 2.0m/s?
5. What is the speed of an electron in an accelerator, if it's mass is 9.1×10^{-31} kg and its kinetic energy is 9.2×10^{-18}J?
6. How fast is a 1800kg car travelling if it has 560kJ of kinetic energy? If the energy doubles how fast is the car now travelling?

Gravitational Potential Energy

7. If a 25kg boy is at the top of a slide that is 4.5m tall, what is the boy's gravitational potential energy with respect to the surface of the earth? What is his gravitational potential energy with respect to a point halfway down the slide?
8. What is the mass of an object that has 250J of gravitational energy and is 12m above the reference point.