

## Work and Energy #1

1. How much lifting work is done by a 50 kg woman as she climbs a 4 m high flight of stairs?
2. How much work must be done to lift a 5.0 kg child through a vertical distance of 0.40 m?
3. A car pulls a trailer with a horizontal force of 2500 N a distance of 1500 m. How much work is done by the car?
4. A child pushes his toy box 4.0 m along a floor with a force of 6.0 N directed downward at an angle of  $37^\circ$  to the horizontal. How much work does he do?
5. A box is dropped from a height of 12.5 m. What is its velocity just before it hits the ground?
6. A 200 g ball is thrown straight up with a speed of 12 m/s. How high will the ball rise (ignoring air resistance)?
7. A 3.0 kg block slides down a 2.5 m high incline with an angle of  $30^\circ$ . If the frictional force is negligible, what is the velocity of the block at the bottom of the incline?
8. A vertical spring stretches 15 cm when a mass of 250 g is attached to it. What is the value of the spring constant for spring?
9. Suppose a 0.50 kg mass is dropped a distance of 0.40 m onto an uncompressed spring ( $k = 20.0 \text{ N/m}$ ). How far will the spring compress?
10. A 0.25 kg block is placed directly in front of a spring ( $k = 5.0 \text{ N/m}$ ) that is compressed 0.10 m. The spring is released and the block is pushed forwards by the spring. Ignoring friction, what is the velocity of the block when it leaves the spring?
11. A vertical spring has a light platform (negligible mass) on top of it. When a 500 g mass is set on the platform, the spring compresses 0.25 m. The mass is now pushed down 0.75 m further and released. How high, from the bottom position, will the mass fly?
12. A 5.0 kg block is dragged 10.0 m across the floor with a horizontal force of 250 N. The coefficient of friction between the floor and the block is 0.12.
  - (a) How much work is done by friction?
  - (b) How much work is done by the pulling force?
  - (c) What is the net work done on the block?