

Change in gravitational PE = **weight** × **change in height**

or **change in gravitational PE** = **mass** × **g** × **change in height**
 (in J) (in kg) (N/kg) (in m)

since **weight** = **mass** × **g** (see p. 75)
 (N) (kg) (N/kg)

g = **10** here on Earth

Kinetic energy = $\frac{1}{2}$ × **mass** × **speed squared**
 (in J) (kg) (m/s)²

See the examples on page 117.

Questions

For each question show all your working clearly.

1. A diver, of mass 40 kg, climbs up to a diving platform 1.25 m high.
 - a) What is his weight, in N?
 - b) What is his change in P.E.?
 - c) Where does this energy come from?
 - d) He walks off the platform and falls down. What is his K.E. as he hits the water?
 - e) What is his speed as he hits the water?

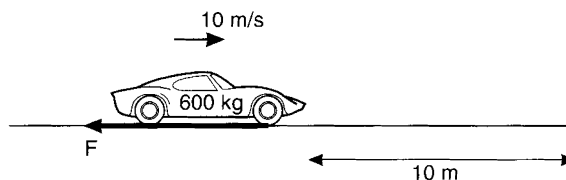
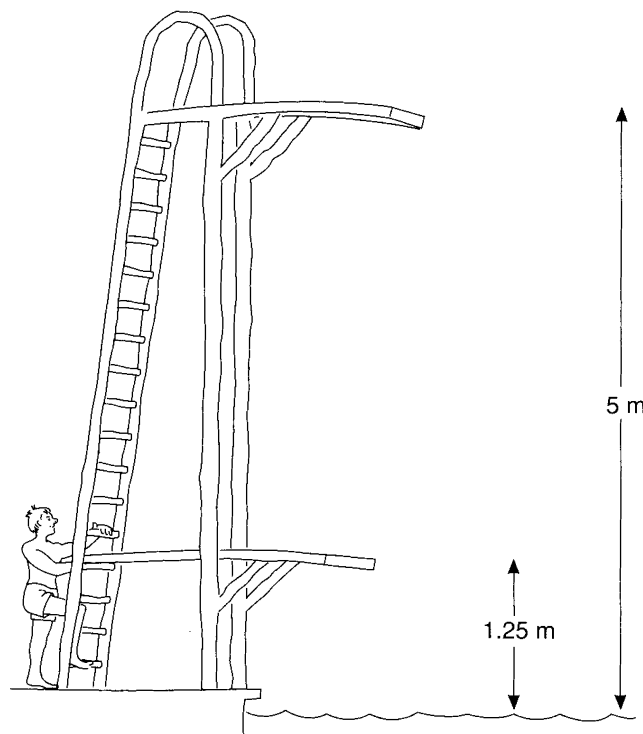
2. The same diver now climbs to the 5 m platform, **four** times as high.
 - a) What is his change in P.E. now?
 - b) What is his speed as he hits the water?
 - c) What do you notice about this answer?

3. Another diver, of mass 80 kg, climbs to the 5 m platform.
 - a) What is her speed as she hits the water?
 - b) What do you notice about your answer?

4. A stone is dropped from a window 5 m high. At what speed does it hit the ground?

5. A tennis player hits a ball vertically with a speed of 10 m/s. How high does it go?

6. A car of mass 600 kg is travelling at 10 m/s. When the brakes are applied, it comes to rest in 10 m. What is the average force exerted by the brakes?



7. A car of mass 800 kg is at rest. The engine exerts a resultant force of 2000 N for a distance of 5 m.
 - a) What is then its K.E.?
 - b) What is then its speed?