9le MORE MACHINES

4 Look at diagram B. Calculate the work done to:

a| lift the block directly upwards

b| push the block up the ramp.

c| Comment on your answers to parts a and b.

4 **a** work done = force × distance = 1000 N × 2 m
= 2000 J

b work done = 500 N × 4 m = 2000 J

c The values are the same. The ramp allows a smaller force to be used, but it has to move further (or the block has the same amount of gravitational potential energy at the top; however, it was lifted, so it must have taken the same energy to lift it).

5 Look at diagram B. Explain why it will need more energy to lift the block using the ramp than it will to pull it directly upwards.

5 There will be some friction between the block and the ground as the block is pushed up the ramp. This means that the force needed will be a little more than 500 N, so the total energy transferred (work done) will be more than 2000 J.

6 A heavy box is pulled along the floor. The work done is 200 J. Explain the final form of this energy store.

6 The box is not moved upwards or deformed/stretched, so it is not storing elastic or gravitational potential energy. A force is needed to move the box because of friction between the box and the floor. The energy is transferred by heating, and stored as thermal energy in the box and/or the floor.