Name; Date:

1 **State** the units used to measure:
   a energy
   b work done.

2 **Recall** the equation used to calculate kinetic energy.

3 **State** whether a car has more kinetic energy when travelling at 10 km/h or when travelling at 60 km/h.

4 **Recall** the three factors that change the amount of gravitational potential energy possessed by an object.

5 **List** three objects that use elastic potential energy to do work.

6 **Describe** what happens to the:
   a gravitational potential energy of an object when its height above the ground is doubled
   b kinetic energy of an object when its speed is doubled.

7 Energy is sometimes defined as 'the ability to do work'. **Explain** how an object with potential energy or kinetic energy can do work.

8 A child of weight 250 N climbs 1.5 metres up a rope ladder in 5 seconds. **Calculate** the:
   a work done
   b power of the climb.

9 **Identify** in which of the following situations work is being done.
   a A softball is thrown into the air.
   b A person rests against a chair.
   c Water runs from a tap into a sink.
   d A car is held on a hill by its brakes.

10 **Calculate** the kinetic energy of:
   a an 80 kg jogger running at 4 m/s
   b a 10 000 kg bus travelling at 54 km/h
   c a 100 g tennis ball hit at 30 m/s.

11 **Calculate** the gravitational potential energy of a:
   a 0.5 kg bird flying 20 m above the ground
   b 20 000 kg helicopter hovering 300 m above the ground
   c 2 kg money box sitting on a bookshelf at a height of 2 m.

12 A 1 kg ball is dropped onto concrete from a height of 2 m. **Analyse** this situation and **calculate**:
   a its gravitational potential energy before it is dropped
   b its kinetic energy as it hits the ground
   c the speed with which it hits the ground (round off to one decimal place).

13 Researchers estimate that the risk of serious injury or death approximately doubles for every 5 km/h that a car travels above 60 km/h. **Justify** how this could be possible.

14 Figure 8.4.7 shows a section of a rollercoaster used at a theme park.

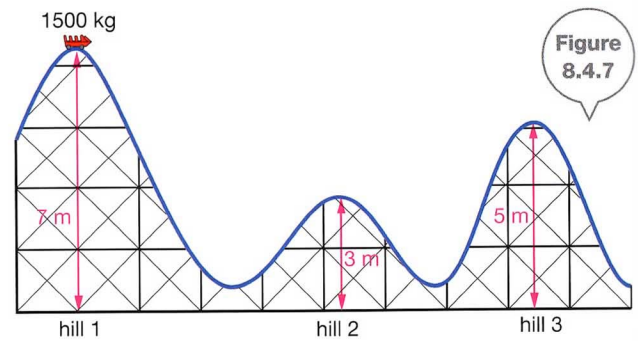

Figure 8.4.7

The rollercoaster, fully loaded with passengers, has a total mass of 1500 kg. Assume that it starts from rest and ignore the effects of friction.
   a **Calculate** its gravitational potential energy at the start of its journey.
   b **Calculate** its kinetic energy at the top of hill 2.
   c **Calculate** its kinetic energy at the top of hill 3.
   d **Calculate** its speed (to one decimal place) over hill 3.
   e If friction was taken into account, **propose** how your answers to these questions would differ.

15 **Justify** why the first hill on a rollercoaster track is usually the largest.