1 **State** the formula used to calculate average acceleration.

2 **List** two different units used to describe acceleration.

3 **List** four factors that affect the response of your body to a g-force.

4 **State** what is represented by the gradient of a velocity–time graph.

5 Although acceleration due to gravity is 9.8 m/s^2, in practice, an object dropped from a height on Earth, such as a ball dropped from a tree, will not accelerate this rapidly. **Explain** why.

6 **Explain** why your body does not tolerate vertical g-forces, particularly those downwards, as well as it tolerates horizontal g-forces.

7 **Explain** the difference in motion between a train travelling at 8 m/s^2 and another travelling at –8 m/s^2.

8 A toy truck was stationary then rolls down a long ramp with a constant acceleration of 0.2 m/s^2. **Calculate** its speed after:
- a 1 second
- b 2 seconds
- c 3 seconds
- d 10 seconds.

9 **Use** Table 8.2.1 to **calculate** the average acceleration of each car as it accelerates to 100 km/h in the time stated. Express your answer in km/h/s and round off to one decimal place.

Table 8.2.1 Time taken for a range of cars to accelerate from 0 to 100 km/h

Car	Time (s)
Nissan GT-R (Figure 8.2.2)	3.5
BMW 135i	5.6
Volkswagen Golf GTI	7.3
Ford FG Falcon	7.3
Holden VE Commodore	8.1
Honda Civic	9.8
Toyota Tarago	17.7

10 John Strapp accelerated to a speed of 1017 km/h in 5 seconds and then came to a stop in 1 second. Convert this speed into m/s and **calculate** his:
- a average acceleration in reaching 1017 km/h (in m/s^2)
- b deceleration in coming to a stop (in m/s^2).

11 Figure 8.2.7 illustrates the motion of a leaf floating in a running stream of water.

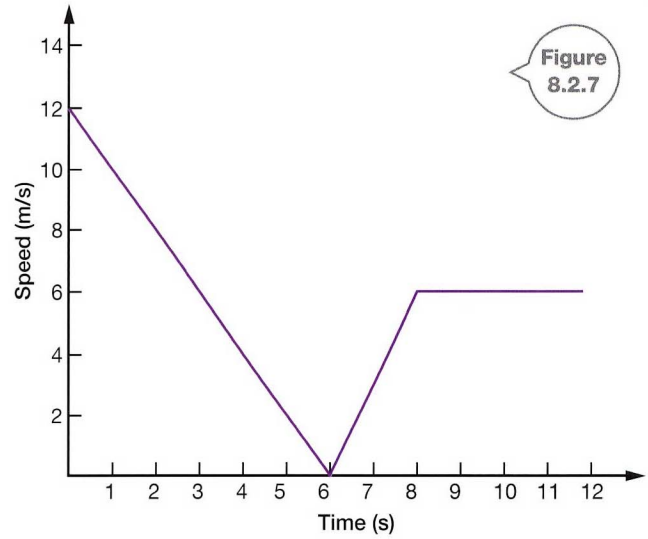

Figure 8.2.7

- a **Describe** its motion over the 12 seconds shown on the graph.
- b **Calculate** the acceleration of the leaf in the first 6 seconds.
- c **Calculate** the distance it travelled in this time.
- d **Calculate** its acceleration between 6 and 8 seconds of its journey.

12 **Analyse** the three distance–time graphs shown in Figure 8.2.8 to determine which shows an object:
- a speeding up
- b slowing down
- c travelling at constant speed.

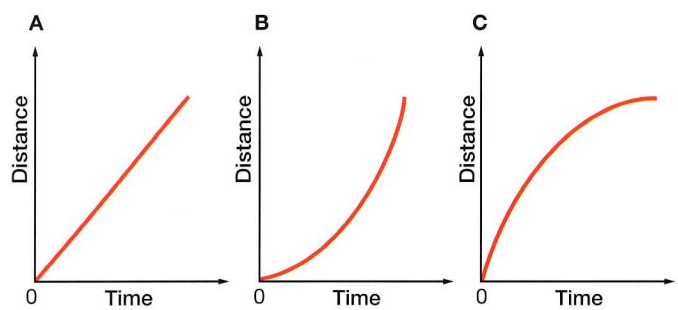

Figure 8.2.8

13. Table 8.2.3 shows the speed of one cheetah at 5-second intervals as it chased its prey.

Table 8.2.3 Speed of cheetah chasing its prey

Time (s)	0	1	2	3	4	5	6	7	8	9	10
Speed (m/s)	0	6	14	27	27	27	27	20	12	3	0

- **a** **Construct** a speed–time graph from this data.
- **b** **Identify** the time intervals in which the acceleration of the cheetah is:
  - **i** zero
  - **ii** positive
  - **iii** negative.

15 **Construct** a short story that could describe the motion described by Figure 8.2.9.

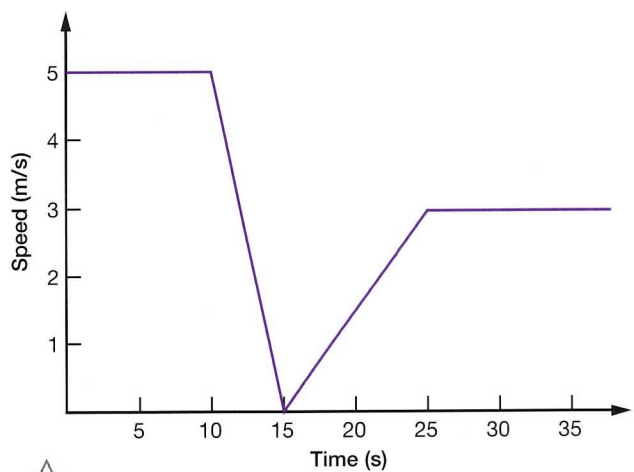

Figure 8.2.9

14. Aristotle was an ancient Greek philosopher. He believed that objects fell towards the Earth because of a homing instinct, and that heavier objects fell faster than lighter objects. These ideas were popular for some 2000 years, but were challenged by the Italian physicist Galileo Galilei (1564–1642).
   - **a** Explain how Galileo's approach to science differed from that of Aristotle.
   - **b** Describe experiments Galileo conducted with falling bodies.
   - **c** State Galileo's conclusion about falling objects.

15. Research the experiments that Galileo performed using ball bearings or marbles rolling down ramps of different inclinations. Repeat some of the experiments and summarise your findings.