**Questions to Think About:**

Q1) a) T

b) T

c) F – a typical accident takes 0.1 – 0.2 seconds to stop

d) F – there is no time in a collision for someone to brace themselves

e) T

Q2)

* When a car approaches a curve on an icy highway too fast, it will not be able to turn around the curve
* The car requires a net force to change its direction. This is according to Newton’s First Law as it states that if an object is to accelerate then a net force is required.
* The faster a car goes around a curve, the greater the force required to change its direction.
* This force comes from the friction created when the rubber tyres contact the road
* This friction force is reduced due to the ice and hence the car will not make the turn

Q3)

* When a car suddenly comes to a stop, it must put on the brakes. The brakes cause a backwards force on the car to stop it
* There is no force on the people in the car and hence they will continue to move forward at the car’s original speed. This is Newton’s First Law – an object moving with constant speed will continue at this constant speed unless there is a net force acting on them
* Hence seat belts are needed to provide that force and stop us from hitting the steering wheel

Q4) a) If the bottom thread is pulled quickly then the mass will not have time to move and the bottom string will break

b) If the bottom thread is pulled slowly then the mass will have time to move and the top string will break.

**Extension Questions) 9.4 Inertia — Newton’s first law**

Remember

1. Friction (between the bus tyres and the road) and air resistance
2. An object will remain at rest, or will not change its speed or direction, unless it is acted upon by an outside, unbalanced force.
3. Responses will vary. For example: a stationary car and a bowling ball rolling from height down a ramp and onto a flat surface.

Think

1. While the impetus theory held that a force exerted on an object gave it ‘impetus’ and that the slowing motion of an object was due to the fact that it had ‘run out of’ impetus, Galileo held that a force exerted on an object would put it into motion and that it would continue this motion forever unless something stopped it.
2. (a) Thrust
3. Resistance forces
4. They are equal
5. When you step off, you will have the same speed as the vehicle from which you have stepped. Your body will, therefore, continue to move with that speed until acted upon by an unbalancing net force. Newton’s First Law of Motion describes this behaviour. Stepping from a moving vehicle, you are likely to fall before you can slow yourself.
6. In keeping with the Law of Inertia, the passengers’ bodies are remaining in the same state of motion they had before the lights turned green (at rest) while the car accelerates from beneath them. Relative to the car, the passengers move backwards.
7. (a) You’d be thrown quickly backwards in your seat.
8. You’d feel very little change in your motion.
9. You’d feel as if you were being pushed hard to the left.
10. You would be thrown forwards from your seat at a high speed.