Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1.

(a) An adult of mass 80 kg has more inertia than a child of mass 40 kg

What is inertia?

_____

_____

(1)

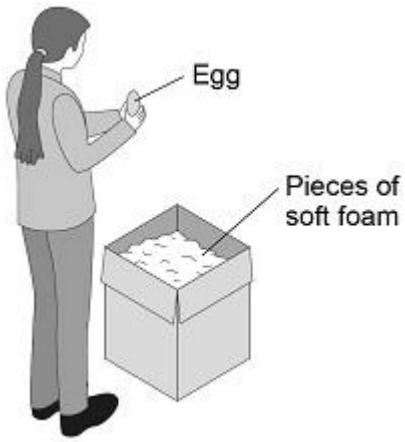
(b) A teacher demonstrated the idea of a safety surface.

She dropped a raw egg into a box filled with pieces of soft foam.

The egg did not break.

Figure 1 shows the demonstration.

Figure 1



Explain why the egg is less likely to break when dropped onto soft foam rather than onto a concrete floor.

_____

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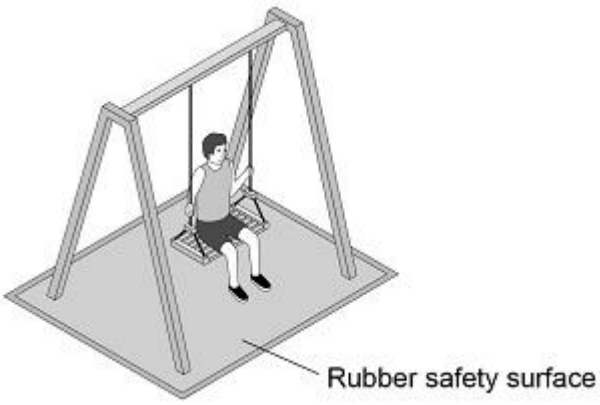
(3)

(c) **Figure 2** shows a child on a playground swing. The playground has a rubber safety surface.

Figure 2



A child of mass 32 kg jumped from the swing.

When the child reached the ground she took 180 milliseconds to slow down and stop.

During this time an average force of 800 N was exerted on her by the ground.

Calculate the velocity of the child when she first touched the ground.

Use the Physics Equations Sheet.

_____

_____

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_____

Velocity = _____ m/s

(4)

(Total 8 marks)

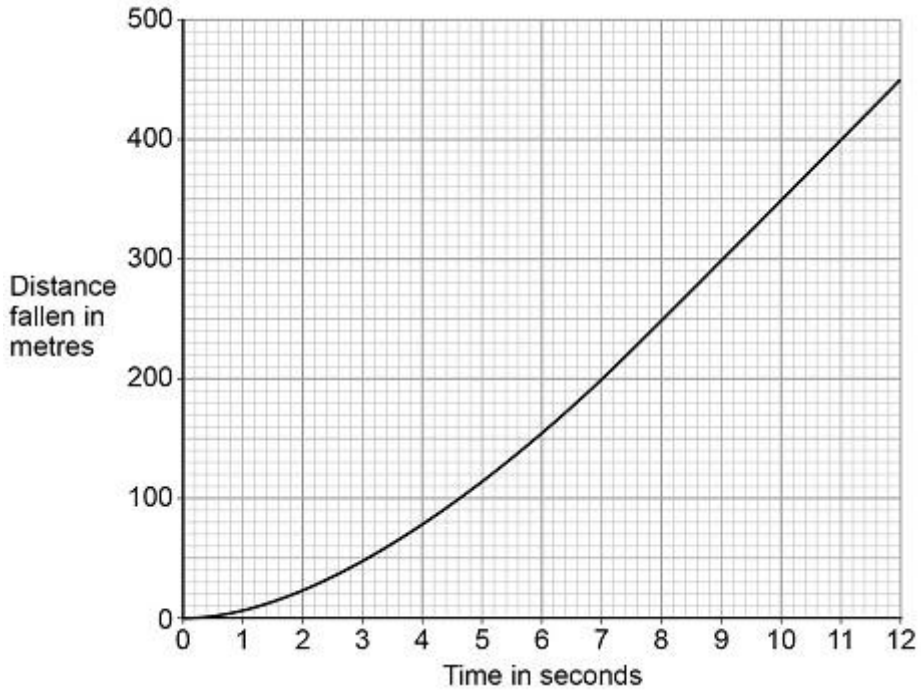
Q2.

An aeroplane is 4000 m above the Earth's surface.

A skydiver jumps from the aeroplane and falls vertically.

Figure 1 shows the distance the skydiver falls during the first 12 seconds after jumping.

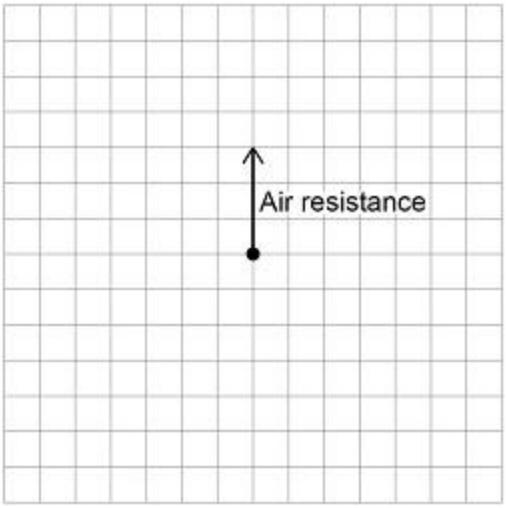
Figure 1



(a) **Figure 2** shows part of the free body diagram for the skydiver three seconds after jumping.

Complete the free body diagram for the skydiver.

Figure 2



(2)

(b) Explain the changing motion of the skydiver in terms of the forces acting on the skydiver.

_____

_____

_____

_____

_____

(4)

(c) Use **Figure 1** to determine the speed of the skydiver between 7 seconds and 12 seconds.

Speed = _____ m/s

(3)

(d) In 2012 a skydiver jumped from a helium balloon 39 000 metres above the Earth's surface. The skydiver reached a maximum speed of 377 m/s

Jumping from 39 000 metres allowed the skydiver to reach a much higher speed than a skydiver jumping from 4000 metres.

Explain why.

(3)

(Total 12 marks)