0 1

A group of friends are doing some archery.

When Brian fully stretches the bow, it stores 10 J of energy.

0 1 . 1

Describe the energy transfer that occurs as Brian stretches the bow.

[2 marks]

0 1 . 2

When Brian releases the bow, an arrow of mass 50 g is projected horizontally towards the target.

Show that the arrow leaves the bow at a speed of **20 m/s**.

[3 marks]

0 1 . 3

By using a slow-motion video system, Daniela measures the speed of the arrow as it strikes the target to be approximately **18 m/s**.

Calculate the **decrease** in the **kinetic energy** of the arrow as it travelled between Brian and the target.

Decrease in kinetic energy = _____ J

[3 marks]

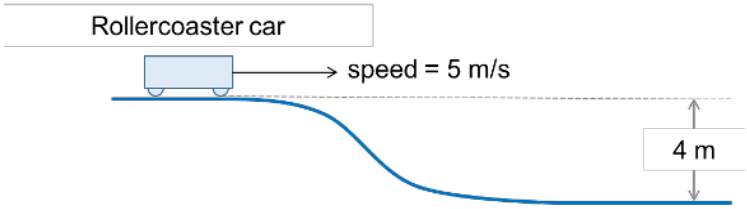
0 1 . 4

Explain why the speed at which the arrow struck the target was lower than the speed at which it left the bow.

[2 marks]

0 2

An empty rollercoaster car of mass 200 kg is travelling horizontally at a speed of 5 m/s as it approaches a downwards section in the track, as shown below



0 2 . 1

Calculate the initial kinetic energy of the car.

Kinetic energy = _____ J

[2 marks]

0 2 . 2

Calculate the amount of gravitational potential energy lost by the car as it completes the downwards section of track. Take g = 9.8 N/kg.

Loss in gravitational potential energy = _____ J

[2 marks]

0 2 . 3

Hence, assuming the rollercoaster car to be a closed system, calculate its speed at the bottom of the hill.

Speed at bottom of hill = _____ m/s

[3 marks]