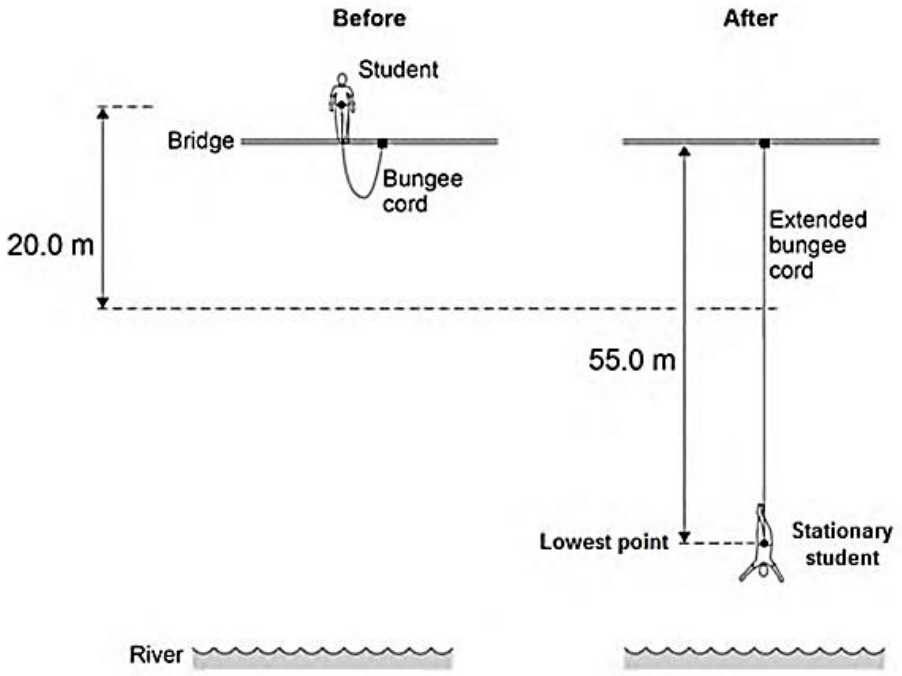
Material Physics GCSE AQA Higher Physics Past Papers Questions

01. **Figure 17** shows a student before and after a bungee jump.

The bungee cord has an unstretched length of 20.0 m.

Figure 17



The mass of the student is 50.0 kg.

The gravitational field strength is 9.8 N/kg.

. 1 Write down the equation which links gravitational field strength, gravitational potential energy, height and mass.

[1 mark]

. 2 Calculate the change in gravitational potential energy from the position where the student jumps to the point 20.0 m below.

[2 marks]

Change in gravitational potential energy = _____ J

3 80% of this change in gravitational potential energy has been transferred to the student's kinetic energy store.

How much has the student's kinetic energy store increased after falling 20.0 m?

[1 mark]

Kinetic energy gained = _____ J

4 Calculate the speed of the student after falling 20.0 m.

Give your answer to two significant figures.

[4 marks]

_____

_____

_____

_____

Speed = _____ m/s

5 At the lowest point in the jump, the energy stored by the stretched bungee cord is 24.5 kJ.

The bungee cord behaves like a spring.

Calculate the spring constant of the bungee cord.

Use the correct equation from the Physics Equation Sheet.

[3 marks]

_____

_____

_____

_____

_____

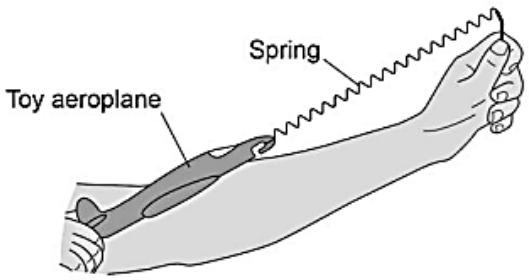
_____

Spring constant = _____ N / m

02. **Figure 11** shows a student launching a toy aeroplane.

To launch the aeroplane, the student pulls on it to stretch the spring and then releases it.

Figure 11



. 1 Just before the toy aeroplane is released, the spring has an extension of 0.12 m.

mass of aeroplane = 0.020 kg

spring constant of the spring = 50 N/m

Calculate the maximum speed of the toy aeroplane just after it is launched.

Use the Physics Equations Sheet.

Give the unit.

[6 marks]

Speed = _____ Unit _____

. 2 Complete the sentence.

[1 mark]

As the aeroplane moves upwards through the air there is a decrease

in the _____ energy of the aeroplane.

. 3 Give **one** factor which would increase the distance the toy aeroplane travels horizontally before hitting the ground.

[1 mark]

_____

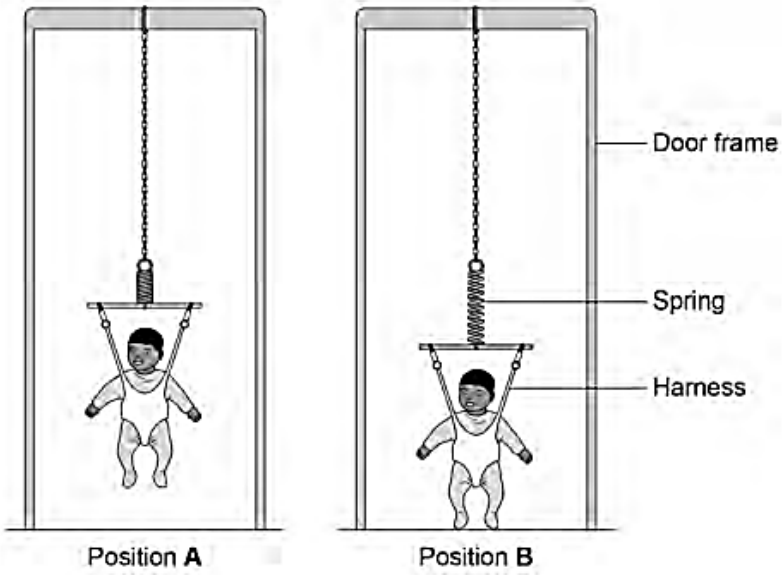
_____ 8

03.

A baby bouncer is a harness attached to a spring that hangs from a door frame.

Figure 7 shows a baby in a baby bouncer in two positions.

Figure 7



1 The baby bouncer should not be used with babies that have a mass greater than 12 kg.

Suggest **one** reason why.

[1 mark]

. 2 In positions **A** and **B** the baby is stationary.

Describe the energy transfers as the baby moves from position **A** to position **B**.

[3 marks]

3 In one position the extension of the spring is 8.0 cm.

The elastic potential energy stored by the spring is 4.0 J.

Calculate the spring constant of the spring.

Use the Physics Equations Sheet.

[4 marks]

Spring constant = _____ N/m

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