

Name of the Student: _____

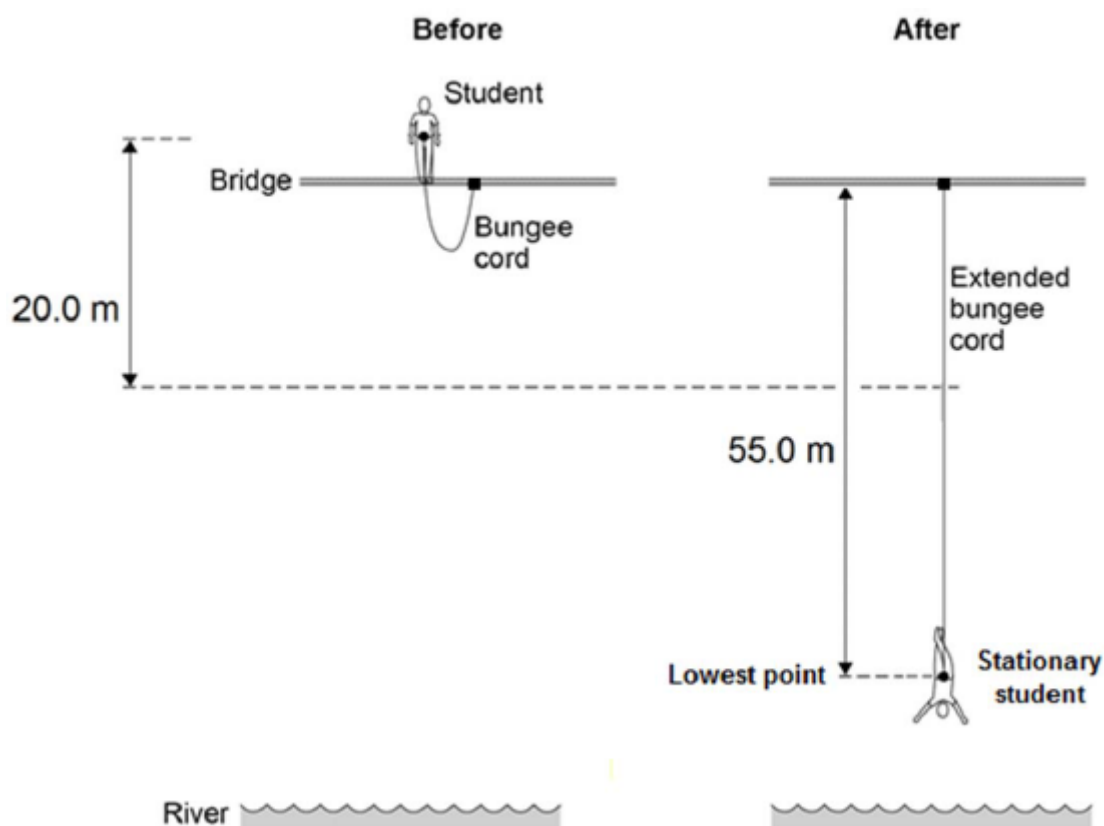
Max. Marks : 19 Marks

Time : 19 Minutes

Q1.

The figure below shows a student before and after a bungee jump.

The bungee cord has an unstretched length of 20.0 m.



The mass of the student is 50.0 kg.

The gravitational field strength is 9.8 N / kg.

- (a) Write down the equation which links gravitational field strength, gravitational potential energy, height and mass.

(1)

- (b) Calculate the change in gravitational potential energy from the position where the student jumps to the point 20.0 m below.

Change in gravitational potential energy = _____ J (2)

- (c) 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?

Kinetic energy gained = _____ J (1)

- (d) Calculate the speed of the student after falling 20.0 m.

Give your answer to two significant figures.

Speed = _____ m / s (4)

- (e) 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.

Spring constant = _____ N / m (3)

(Total 11 marks)

Q2.

All European Union countries are expected to generate 20% of their electricity using renewable energy sources by 2020.

The estimated cost of generating electricity in the year 2020 using different energy sources is shown in **Table 1**.

Table 1

Energy source	Estimated cost (in the year 2020) in pence per kWh
Nuclear	7.8
Solar	25.3
Tidal	18.8
Wind	10.0

France generated 542 billion kWh of electricity using nuclear power stations in 2011. France used 478 billion kWh of electricity and sold the rest of the electricity to other countries in 2011.

- (a) France may continue generating large amounts of electricity using nuclear power stations instead of using renewable energy resources.

Suggest **two** reasons why.

1. _____

2. _____

(2)

- (b) Give **two** disadvantages of generating electricity using nuclear power stations.

1. _____

2. _____

(2)

- (c) A panel of solar cells has an efficiency of 0.15.

The total power input to the panel of solar cells is 3.2 kW.

Calculate the useful power output of this panel of solar cells in kW.

Useful power output = _____ kW

(2)

- (d) **Table 2** shows the manufacturing cost and efficiency of different types of panels of solar cells.

Table 2

Type of Solar Panel	Cost to manufacture a 1 m ² solar panel in £	Efficiency in %
A	40.00	20
B	22.50	15
C	5.00	10

Some scientists think that having a low manufacturing cost is more important than improving the efficiency of solar cells.

Use information from **Table 2** to suggest why.

(2)
(Total 8 marks)