

Name of the Student: _____

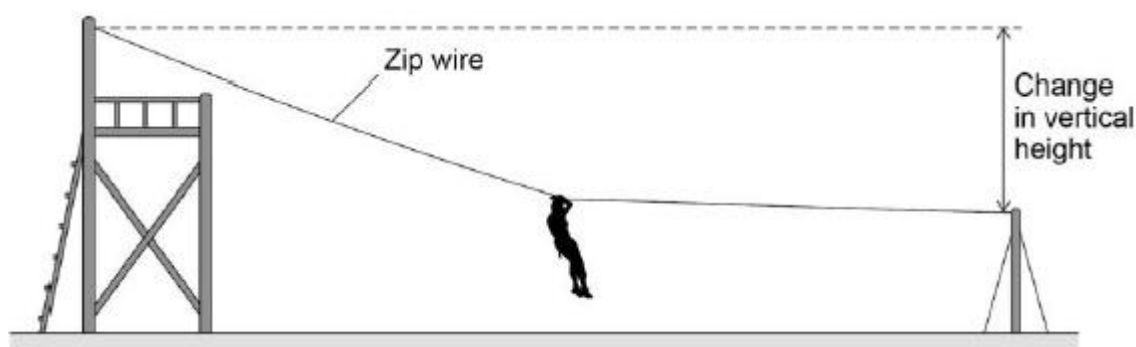
Max. Marks : 27 Marks

Time : 27 Minutes

Q1.

Figure 1 shows a person sliding down a zip wire.

Figure 1



- (a) As the person slides down the zip wire, the change in the gravitational potential energy of the person is 1.47 kJ

The mass of the person is 60 kg

gravitational field strength = 9.8 N/kg

Calculate the change in vertical height of the person.

Change in vertical height = _____ m

(3)

- (b) As the person moves down the zip wire her increase in kinetic energy is less than her decrease in gravitational potential energy.

Explain why.

(2)

(c) Different people have different speeds at the end of the zip wire.

Explain why.

(2)

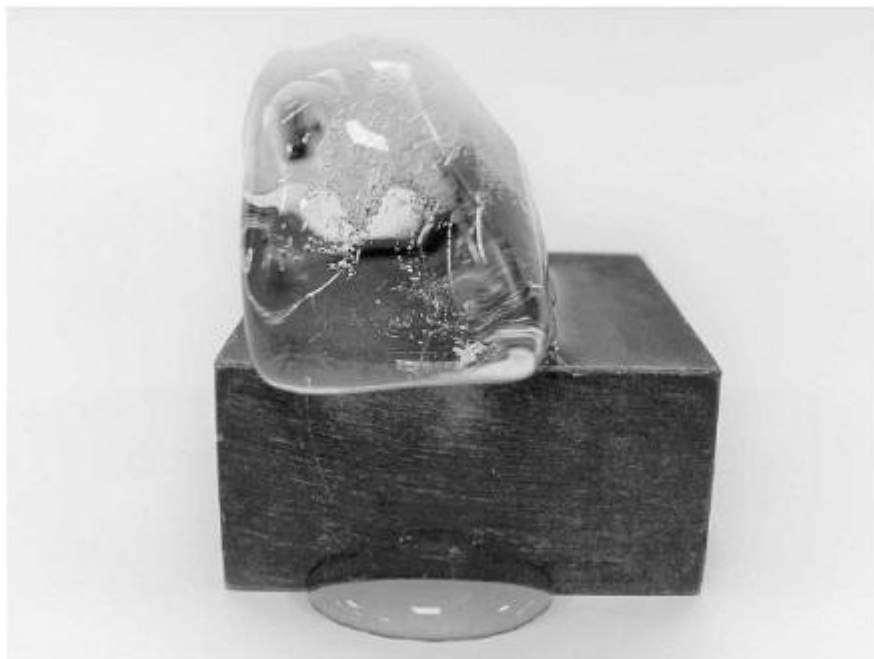
(Total 7 marks)

Q2.

A student investigated the thermal conductivity of different metals.

This is the method used:

1. Measure the mass of an ice cube.
2. Put the ice cube on a metal block which is at room temperature.
3. Measure the mass of the ice cube after one minute.
4. Repeat with other blocks of the same mass made from different metals.



The following table shows the student's results.

Metal	Initial mass of ice cube in grams	Final mass of ice cube in grams	Change in mass of ice cube in grams
Aluminium	25.85	21.14	4.71
Copper	26.20	20.27	5.93
Lead	25.53	21.97	3.56
Steel	24.95	19.45	5.50

- (a) The initial temperature of each ice cube was -15°C

Why was it important that the initial temperature of each ice cube was the same?

Tick (✓) **one** box.

Initial temperature was a continuous variable.

☐

Initial temperature was a control variable.

☐

Initial temperature was the dependent variable.

☐

Initial temperature was the independent variable.

☐

(1)

- (b) Which metal had the highest thermal conductivity?

Give a reason for your answer.

Metal: _____

Reason: _____

(2)

- (c) Suggest **one** source of random error in the student's investigation.

(1)

- (d) An ice cube has a temperature of -15.0°C

The total thermal energy needed to raise the temperature of this ice cube to $0.0\text{ }^{\circ}\text{C}$ and completely melt the ice cube is 5848 J

specific heat capacity of ice = $2100\text{ J/kg }^{\circ}\text{C}$

specific latent heat of fusion of ice = $334\,000\text{ J/kg}$

Calculate the mass of the ice cube.

Mass of ice cube = _____ kg

(5)

(Total 9 marks)

Q3.

Figure 1 shows a cyclist riding along a straight, level road at a constant speed.

Figure 1



(a) Complete the sentences.

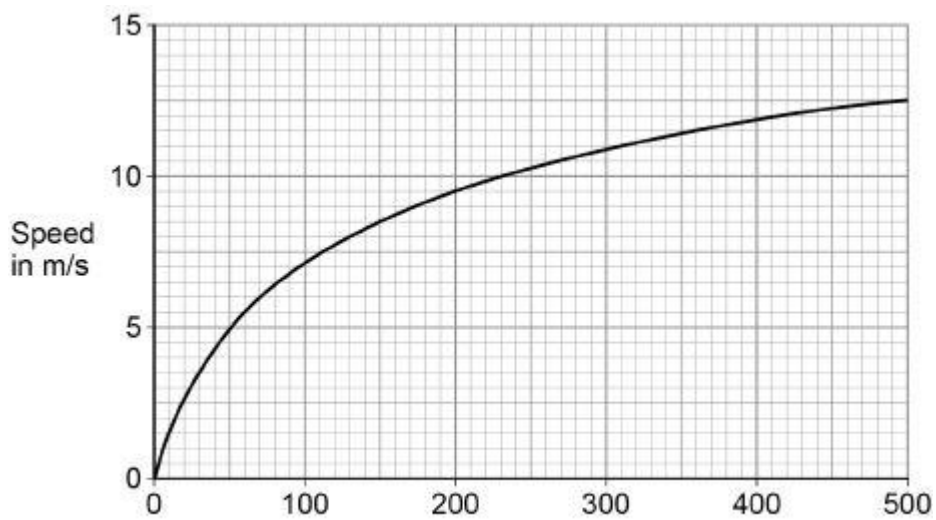
As the cyclist rides along the road, the _____ energy store in the cyclist's body decreases.

The speed of the cyclist is constant when the work done by the cyclist is _____ the work done against air resistance.

(2)

Figure 2 shows how the speed changes as the power output of the cyclist changes.

Figure 2



- (b) Write down the equation that links power, time and work done.

(1)

- (c) Calculate the work done by the cyclist when his power output is 200 W for 1800 seconds.

Work done = _____ J

(3)

- (d) Calculate the percentage increase in speed of the cyclist when the power output changes from 200 W to 300 W.

Percentage increase in speed = _____

(2)

- (e) The maximum speed this cyclist can travel on a level road is 14 m/s.

How does cycling uphill affect the maximum speed of this cyclist?

Explain your answer.

(3)

(Total 11 marks)