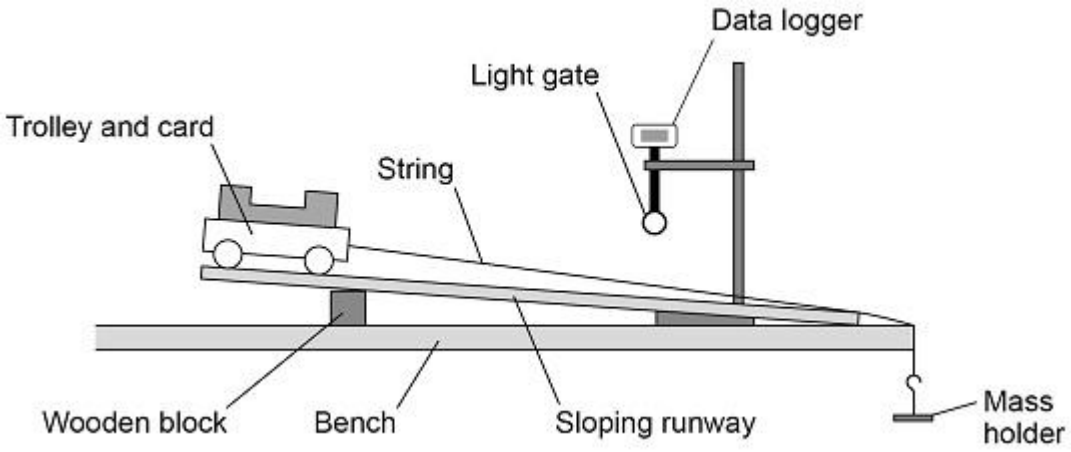
Name of the Student:_____
Max. Marks : 26 Marks **Time : 26 Minutes**

Q1.

A student investigated the acceleration of a trolley.

The diagram below shows how the student set up the apparatus.



(a) Before attaching the mass holder the student placed the trolley at the top of the runway. The trolley rolled down the runway without being pushed.

What change to the apparatus in the diagram could be made to prevent the trolley from starting to roll down the runway?

Tick (✓) **one** box.

Move the wooden block to the left. ☐

Shorten the length of the runway. ☐

Use a taller wooden block. ☐

(1)

(b) The student attached the mass holder to the string.

The string rubbed along the edge of the bench as the mass holder fell to the floor.

Suggest what the student could do to prevent the string from rubbing.

_____

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(1)

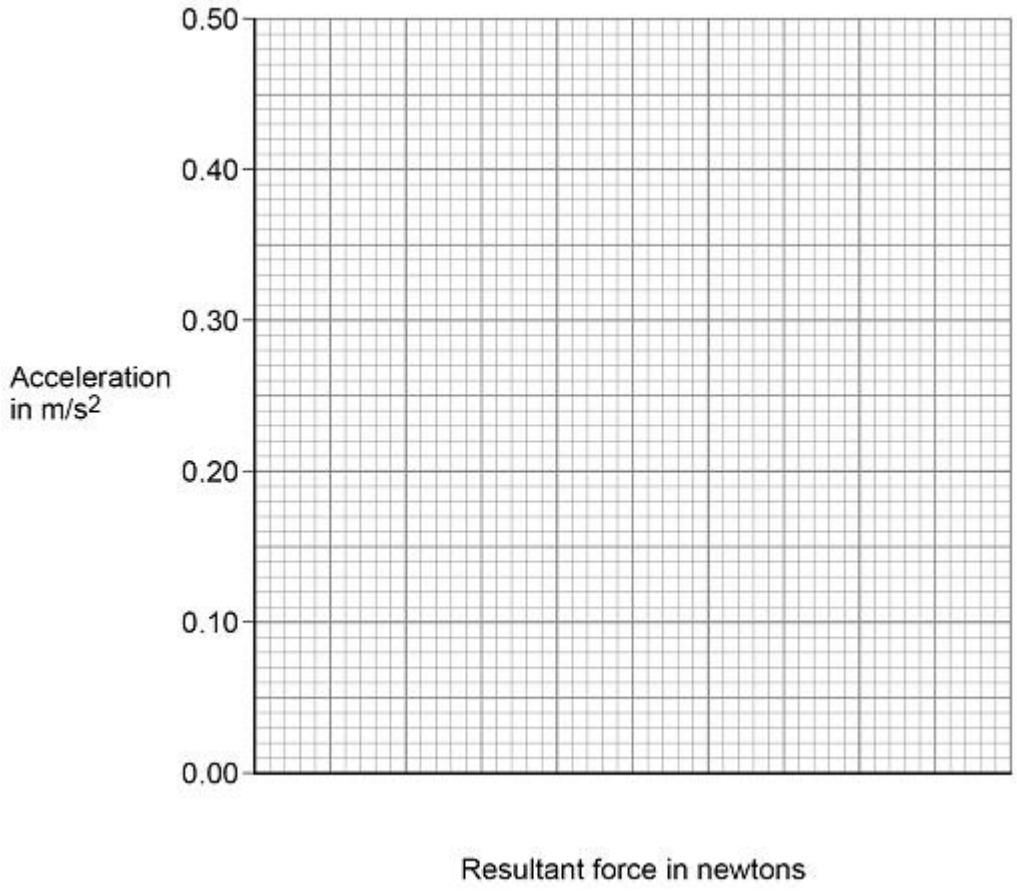
The light gate and data logger were used to determine the acceleration of the trolley.

The student increased the resultant force on the trolley and recorded the acceleration of the trolley.

The table below shows the results.

Resultant force in newtons	**Acceleration in m/s²**
0.05	0.08
0.10	0.18
0.15	0.25
0.20	0.32
0.25	0.41

The graph below is an incomplete graph of the results.



(c) Complete the graph.

- Choose a suitable scale for the x-axis.
- Plot the results.
- Draw a line of best fit.

(4)

(d) Describe the relationship between the resultant force on the trolley and the acceleration of the trolley.

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_____

_____

(1)

(e) Describe how the investigation could be improved to reduce the effect of random errors.

_____

_____

_____

_____

(2)

(f) Write down the equation that links acceleration (*a*), mass (*m*) and resultant force (*F*).

_____

(1)

(g) The resultant force on the trolley was 0.375 N.

The mass of the trolley was 0.60 kg.

Calculate the acceleration of the trolley.

Give your answer to 2 significant figures.

_____

_____

_____

_____

_____

_____

Acceleration (2 significant figures) = _____ m/s^2

(4)

(Total 14 marks)

Q2.

(a) The driver of a vehicle sees a hazard on the road.

The driver uses the brakes to stop the vehicle.

Explain the factors that affect the distance needed to stop a vehicle in an emergency.

_____

_____

_____

_____

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(6)

(b) Write down the equation which links distance, force and work done.

(1)

(c) The work done by the braking force to stop a vehicle was 900 000 J

The braking force was 60 000 N

Calculate the braking distance of the vehicle.

Braking distance = _____ m

(3)

(d) The greater the braking force, the greater the deceleration of a vehicle.

Explain the possible dangers caused by a vehicle having a large deceleration when it is braking.

(2)

(Total 12 marks)

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