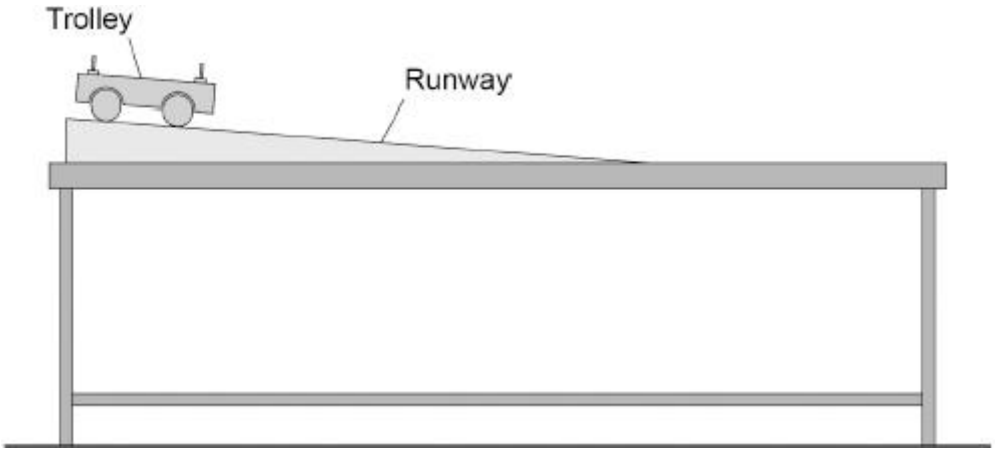
Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

Q1.

A student investigated how the acceleration of a trolley is affected by the force acting on the trolley.

The figure below shows some of the equipment used.



(a) Describe a method the student could use.

Your answer should include any extra equipment needed.

_____

_____

_____

_____

_____

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_____

(6)

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The table below shows one set of results for a similar investigation.

Resultant force in newtons	Acceleration in m/s^2
1.2	1.6

(d) Which of Newton's laws predicts that the acceleration of the trolley is proportional to the resultant force on the trolley?

Tick (✓) **one** box.

First law ☐

Second law ☐

Third law ☐

(1)

(c) Determine the acceleration of the trolley when the resultant force is 3.6 N.

Use the table above.

_____

_____

_____

Acceleration = _____ m/s^2

(2)

Use the Physics Equations Sheet to answer parts (d) and (e).

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

_____

_____

(1)

(e) A resultant force of 0.42 N acts on a different trolley.

The acceleration of the trolley is 1.2 m/s^2.

Calculate the mass of the trolley.

_____

_____

_____

_____

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Mass of trolley = _____ kg

(3)

(Total 13 marks)

Q2.

The figure below shows competitors in the wheelchair race at the London Marathon.

The distance of the London Marathon is 42 000 m



Use the Physics Equations Sheet to answer parts (a) and (b).

(a) Write down the equation that links distance (*s*), force (*F*) and work done (*W*).

_____

(1)

(b) During the race competitors work against air resistance.

The work done against air resistance by the winner of the race was 3 360 000 J

Calculate the average air resistance acting on the winner of the race.

_____

_____

_____

_____

Average air resistance = _____ N

(3)

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Use the Physics Equations Sheet to answer parts (c) and (d).

(c) Which equation links distance travelled, speed and time?

Tick (✓) **one** box.

distance travelled = speed × time ☐

time = distance travelled × speed ☐

speed = distance travelled × time ☐

(1)

(d) The distance of the London Marathon is 42 000 m

The winning time for the race was 5600 seconds.

Calculate the average speed of the winner of the race.

Average speed = _____ m/s

(3)

(e) Explain why the speed of a competitor changes during the race.

(4)

(Total 12 marks)

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