Practice Question Set For A-Level
Subject : Physics
Paper-3 Topic : Practical Skills

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Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

A trolley, mass 0.50 kg, has a speed of 2.0 m s^{-1}. A second trolley, mass 1.0 kg, has a speed of 2.0 m s^{-1}. The two trolleys are travelling in opposite directions and collide.

Which of the following could be a correct value of total momentum, in kg m s^{-1}, after the collision?

(1)

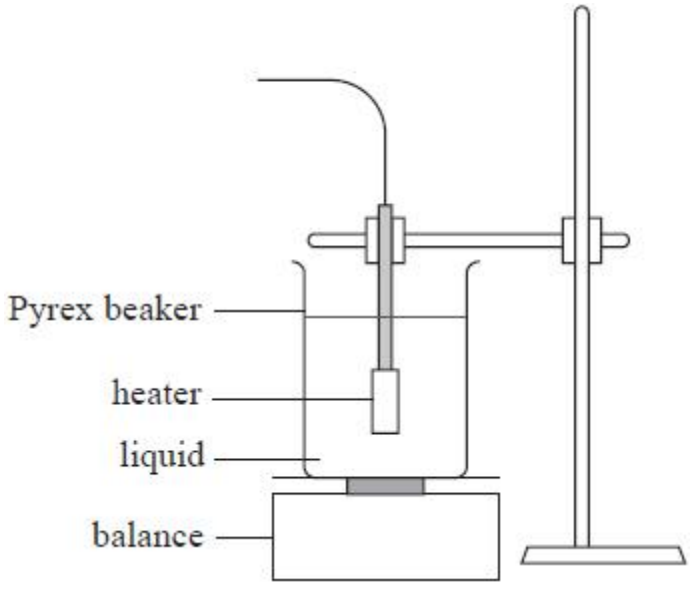
- ☒ **A** 0
- ☒ **B** 1.0
- ☒ **C** 2.0
- ☒ **D** 3.0

(Total for question = 1 mark)

Q2.

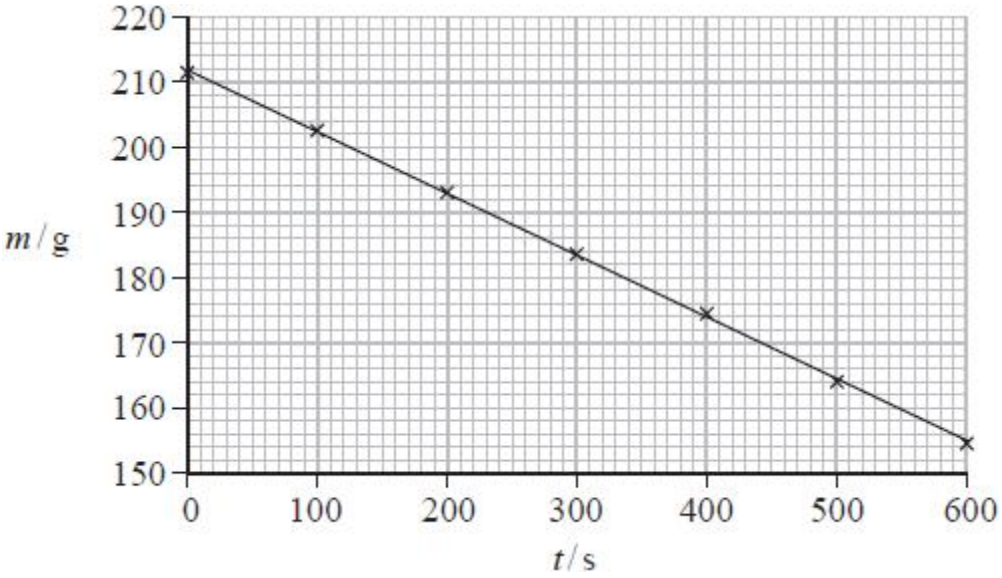
A student determined the latent heat of vaporisation of a liquid using an electrical heater to boil the liquid in a Pyrex beaker.

The apparatus used is shown below.



The student monitored the mass of the beaker and the liquid *m* over the time *t* for which the liquid was boiling. Her results are plotted on the graph.

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The student used her graph to determine a value for the latent heat of the liquid in the beaker. She concluded that the liquid was pure water.

Liquid	Latent heat of vaporisation / MJ kg^{-1}
Pure water	2.26
Weak salt water solution	2.10
Strong salt water solution	2.00

Comment on the validity of the student's conclusion.

V = 20.5 V

I = 10.5 A

(7)

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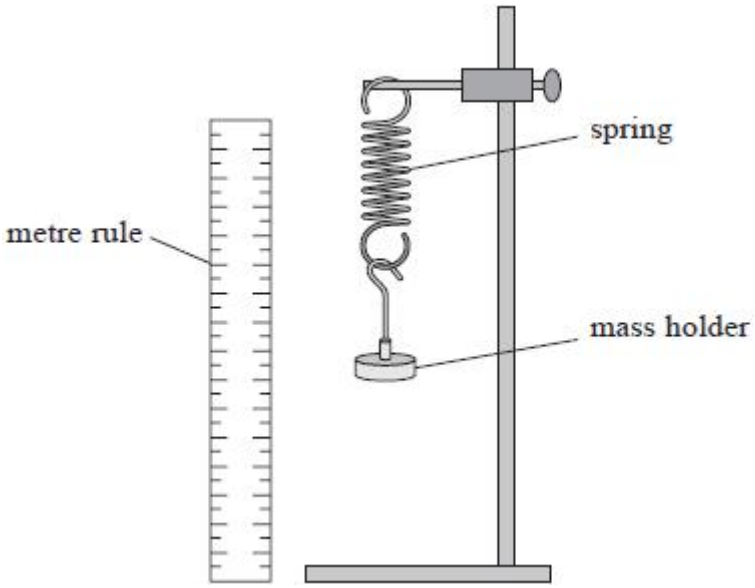
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(Total for question = 7 marks)

Q3.

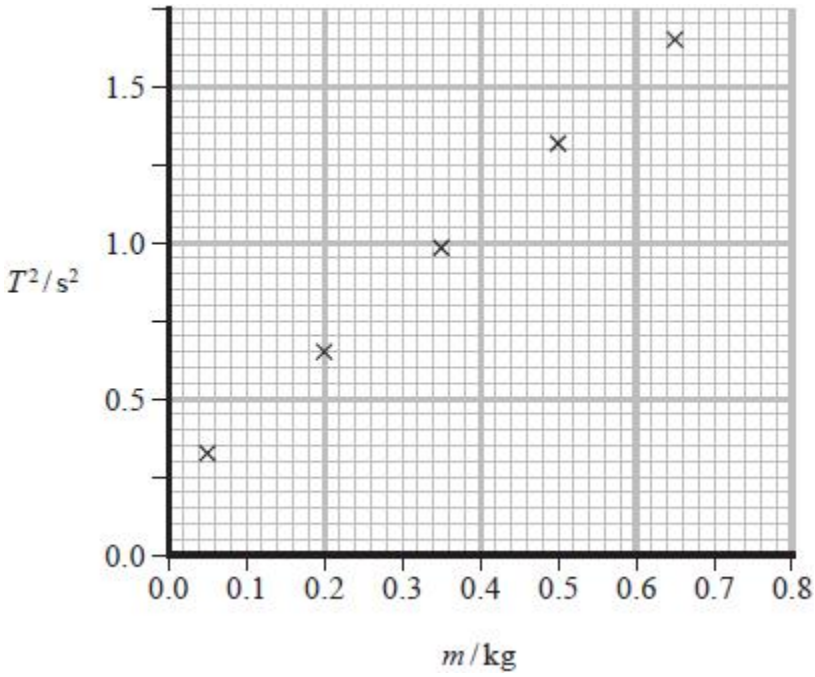
A student investigated the behaviour of a spring under tension. The spring was hung vertically with a mass holder attached as shown.

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In another experiment, the student displaced the mass vertically each time a mass was added to the spring. He used a stopwatch to determine the period of vertical oscillations of each mass.

The student used his data to plot a graph of T^2 against m as shown.



The student expected the graph to be a straight line through the origin. He thought that there may be systematic error due to reaction time.

(i) Give an example of another possible systematic error in this experiment.

(1)

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(ii) Another student suggests that to reduce the uncertainty in the value for the period, a data logger connected to a light gate could be used to measure time.

Comment on the student's suggestion.

(3)

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(iii) Determine a value for the stiffness of the spring.

(3)

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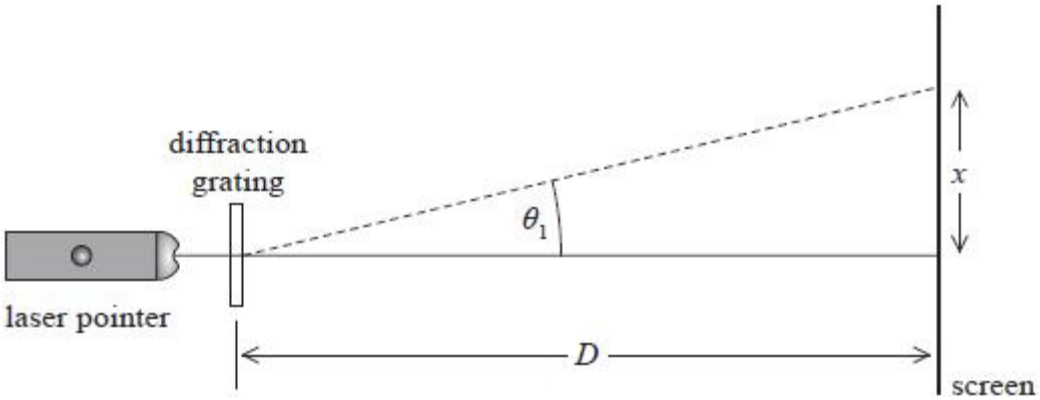
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Stiffness of spring = ...

(Total for question = 7 marks)

Q4.

Light from a laser pointer was passed through a diffraction grating. The light was perpendicular to the diffraction grating as shown. A diffraction pattern was produced on a screen.



The distance between the first order maximum and the central maximum of the diffraction pattern was *x*. The distance between the diffraction grating and the screen was *D*.

Distance x was measured to be 0.500 m with a metre rule. The wavelength of light λ_1 from the laser pointer was 650 nm.

The laser pointer was replaced with one that produced light of a different wavelength. The new distance *x* was measured to be 0.400 m.

D = 1.45 m

Explain one modification to this method that would decrease the uncertainty in the calculated value of λ_2.

(2)

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(Total for question = 2 marks)

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