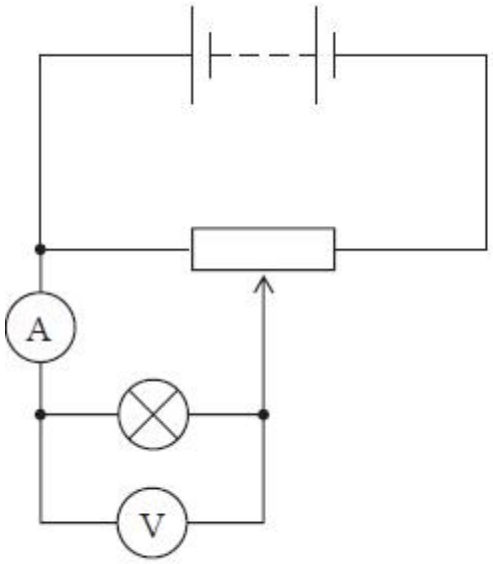
Practice Question Set For A-Level
Subject : Physics
Paper-3 Topic : Practical Skills

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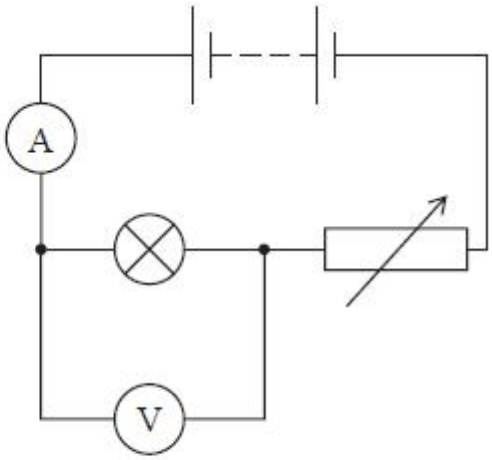
Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Q1.

A student is planning to collect data to produce a current-potential difference graph for a filament lamp. Her teacher suggests two circuits that she could use.



Circuit 1



Circuit 2

Circuit 1 uses a potential divider and circuit 2 uses a variable resistor to vary the potential difference across the filament lamp.

*Discuss the suitability of each circuit to collect the data.

(6)

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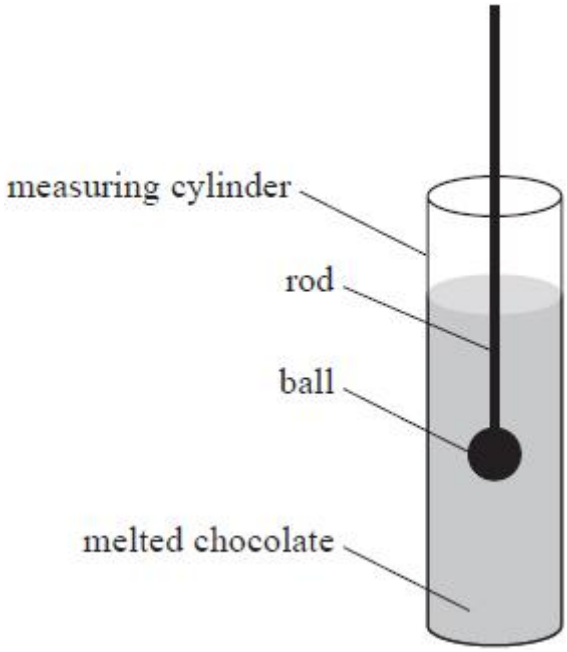
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(Total for question = 6 marks)

Q2.

Chocolate is a solid at room temperature, but melts just below body temperature.

A student investigated the viscosity of some melted chocolate using a falling-ball method. Since chocolate is opaque, a thin rod was attached to the ball so that the movement of the ball could be monitored. The apparatus is shown in the diagram.



The chocolate was maintained at a constant temperature during the investigation.

(i) The student used a stopwatch to measure the time *t* for the ball to fall 22.5 cm whilst travelling at its terminal velocity *v*.

Her results are shown in the table.

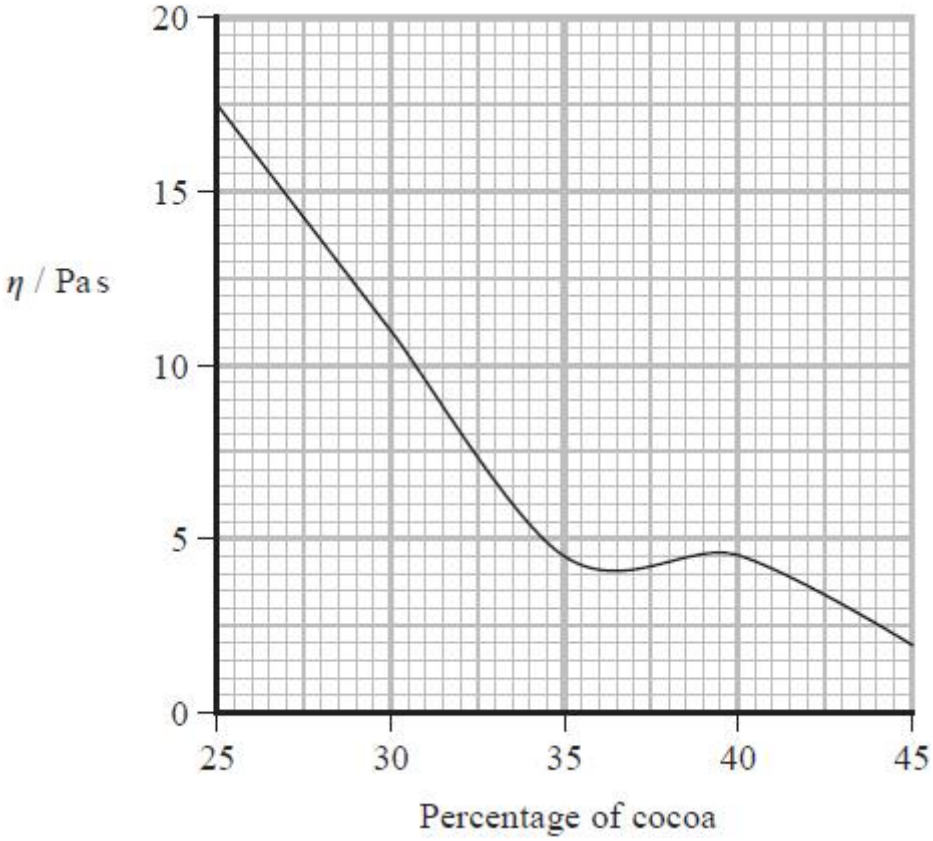
t_1 / s	t_2 / s	t_3 / s
9.6	9.9	9.6

v is given by the formula

$$v = \frac{2r^2 g(\rho_B - \rho_C)}{9\eta}$$

where
r is the radius of the ball
ρ_B is the density of the ball
ρ_C is the density of the chocolate
η is the viscosity of the chocolate.
The graph is taken from a commercial website. It shows how, at the temperature of the experiment, η depends on the percentage of cocoa in the chocolate.

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The chocolate wrapper indicated that the chocolate had a 35% cocoa content.
Assess whether the student's timing data supports this percentage cocoa content.
$r = 4.25 \times 10^{-3}$ m
$\rho_B = 7750$ kg m^{-3}
$\rho_C = 1330$ kg m^{-3}

(5)

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(ii) Explain one reason why the student's data may have led to an inaccurate conclusion about the cocoa content.

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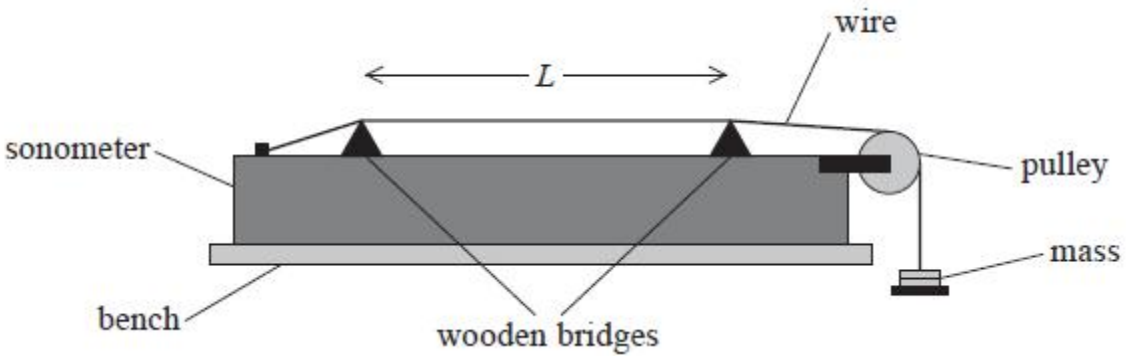
(Total for question = 7 marks)

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Q3.

A student used a sonometer to investigate the properties of a stretched wire. The sonometer is a long hollow wooden box.

A steel wire is attached to one end of the box and rests on two wooden bridges. The wire is placed under tension *T* by hanging a mass from the end of the wire, as shown.



The student placed the base of a vibrating tuning fork in contact with the wire, at one of the bridges. This set the wire into oscillation. He adjusted the position of the other bridge until a single-loop standing wave was produced on the wire between the bridges.

The student repeated this for a series of tuning forks with different frequencies *f*. For each fork he measured the distance *L* between the bridges.

The steel wire, of mass per unit length μ, was placed under tension *T* by hanging a mass of 2.10 kg from the end of the wire.

(i) State one safety precaution that should be taken when carrying out the investigation.

(1)

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(ii) The student plotted a graph of L^2 against $1/f^2$.

Show that the gradient of this graph is equal to $\frac{T}{4\mu}$

(3)

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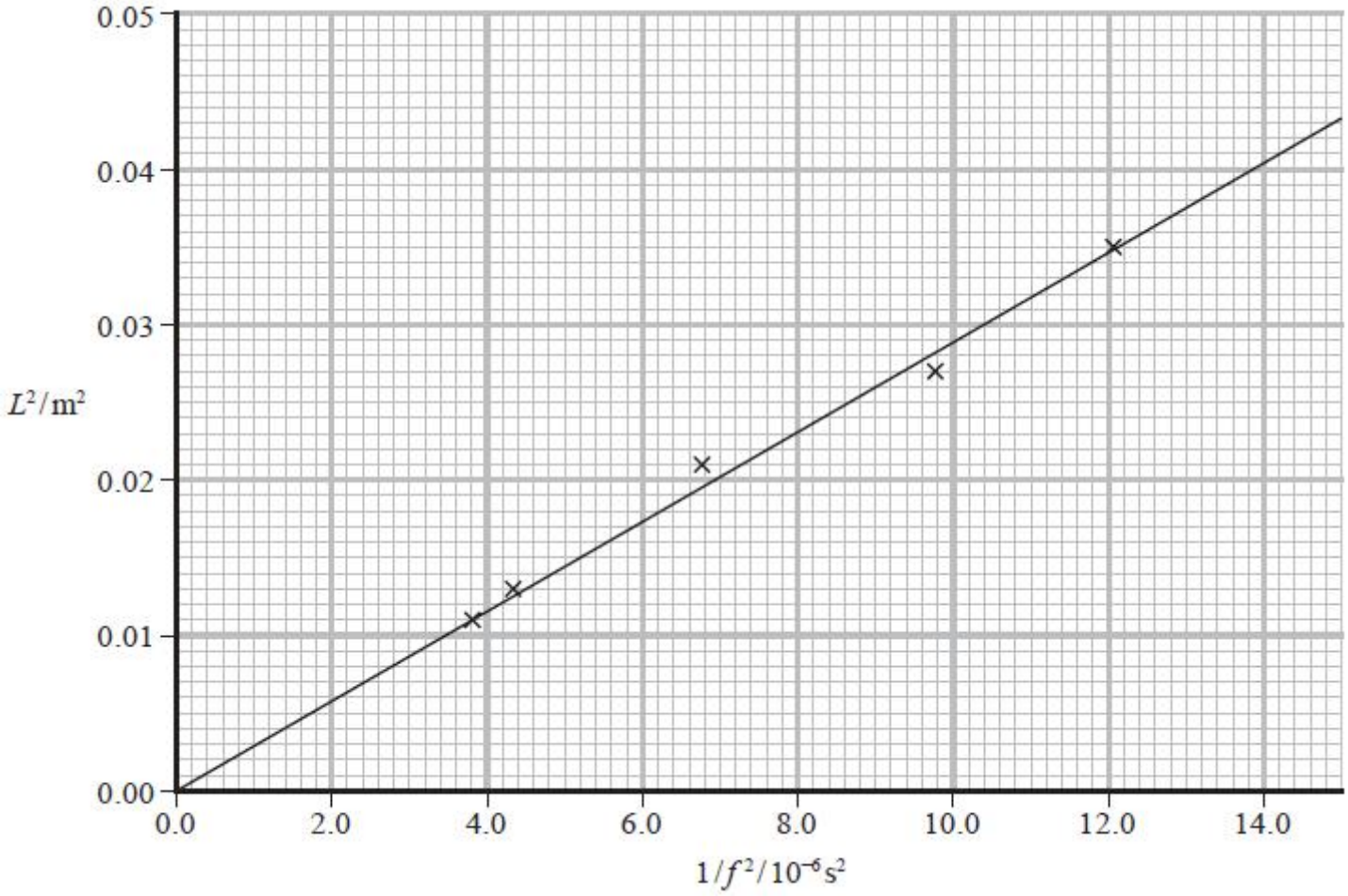
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(iii) The student's graph is shown below.

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The value of μ for different standard wire gauge (SWG) steel wire is shown in the table.

SWG	μ / g m^{-1}
22	3.15
24	1.95
26	1.31

Deduce which wire the student used in the investigation.

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(Total for question = 8 marks)

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