Practice Question Set For A-Level
Subject : Physics
Paper-3 Topic: Section A(Practical Skills Set-2)

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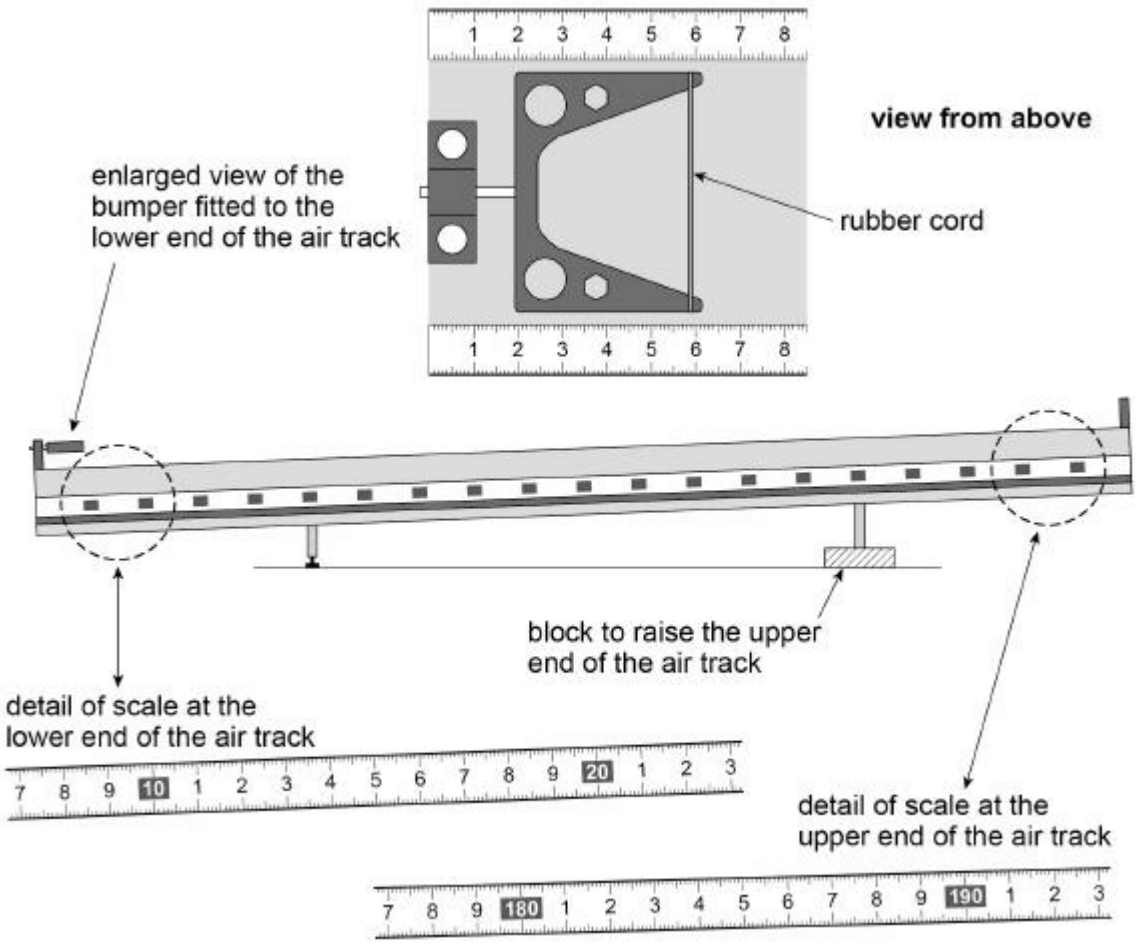
Name of the Student:_____
Max. Marks : 26 Marks **Time : 26 Minutes**

Q1.

This question is about an experiment with a linear air track.

A block is used to raise one end of the track.
A bumper fitted with a rubber cord is attached at the lower end of the track.
The air track has a length of 2 m and there is a scale with major divisions marked in centimetres along the side; the zero of the scale is at the lower end, as shown in **Figure 1**.

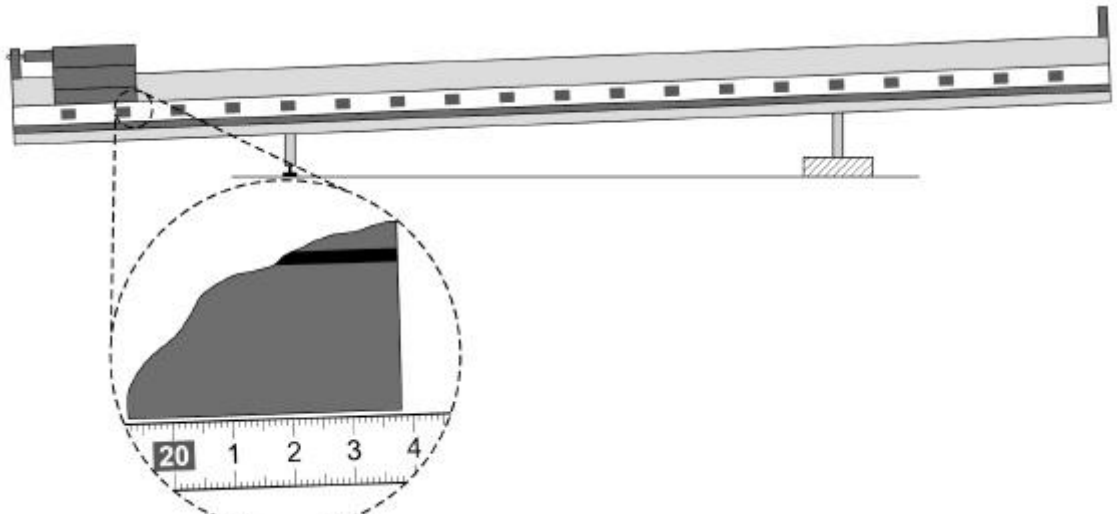
Figure 1



A glider is placed in contact with the rubber cord on the bumper at the lower end of the track. The position of the glider relative to the fixed scale can be determined using **Figure 2**.

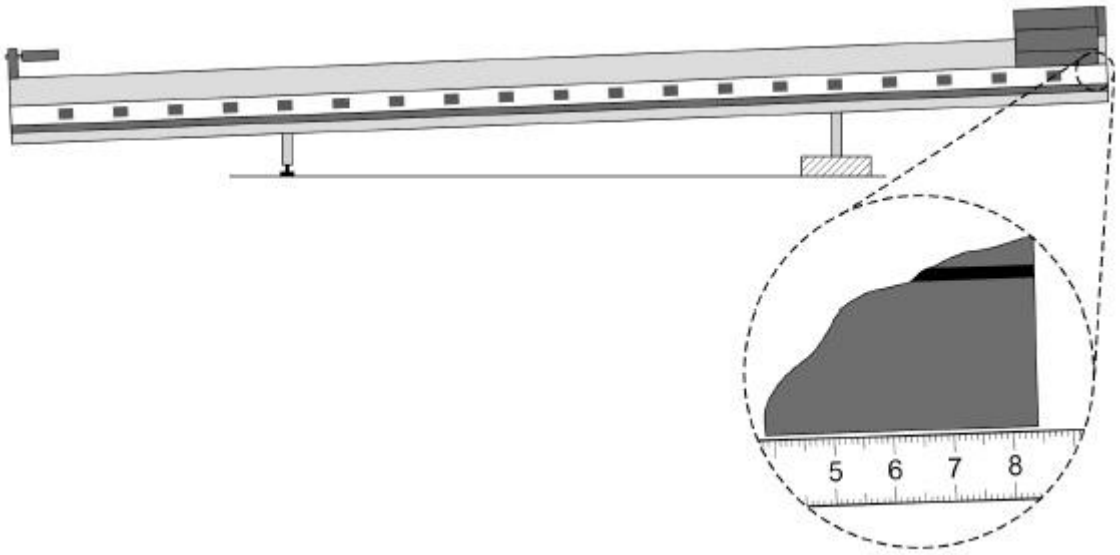
Figure 2

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The glider is then moved to the position shown in **Figure 3**.

Figure 3



The air supply to the track is turned on and the glider is released.
The glider accelerates down the track, strikes the rubber cord on the bumper and rebounds back up the track.
The glider is allowed to bounce off the rubber band 20 times before it is stopped.

A student reads and records the highest position p of the glider after each rebound n.
Some of the student's data are shown in the table.
Additional columns have been provided to allow you to complete question (b) and question (c).

n	p/cm	x/cm	ln(x/cm)
0			
2	157.0		
4	125.4		
6	101.3		
9	75.4		

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13	53.8		

(a) The value of p corresponding to $n = 0$ is the glider's initial position at the top of the track.

Deduce this value of p using **Figure 1** and **Figure 3**.
Write this result in the table.

(1)

(b) As it travels from the lower end of the track to each position p the glider moves through a distance x.

Deduce x for **all** the values of n using **Figure 2**.
Write these results in the table.

(1)

(c) Plot on **Figure 4** a graph of ln(x/cm) against n.

Record your values of ln(x/cm) in the table.

(3)

(d) Explain why the graph you plotted confirms that x decreases exponentially with n.

_____

_____

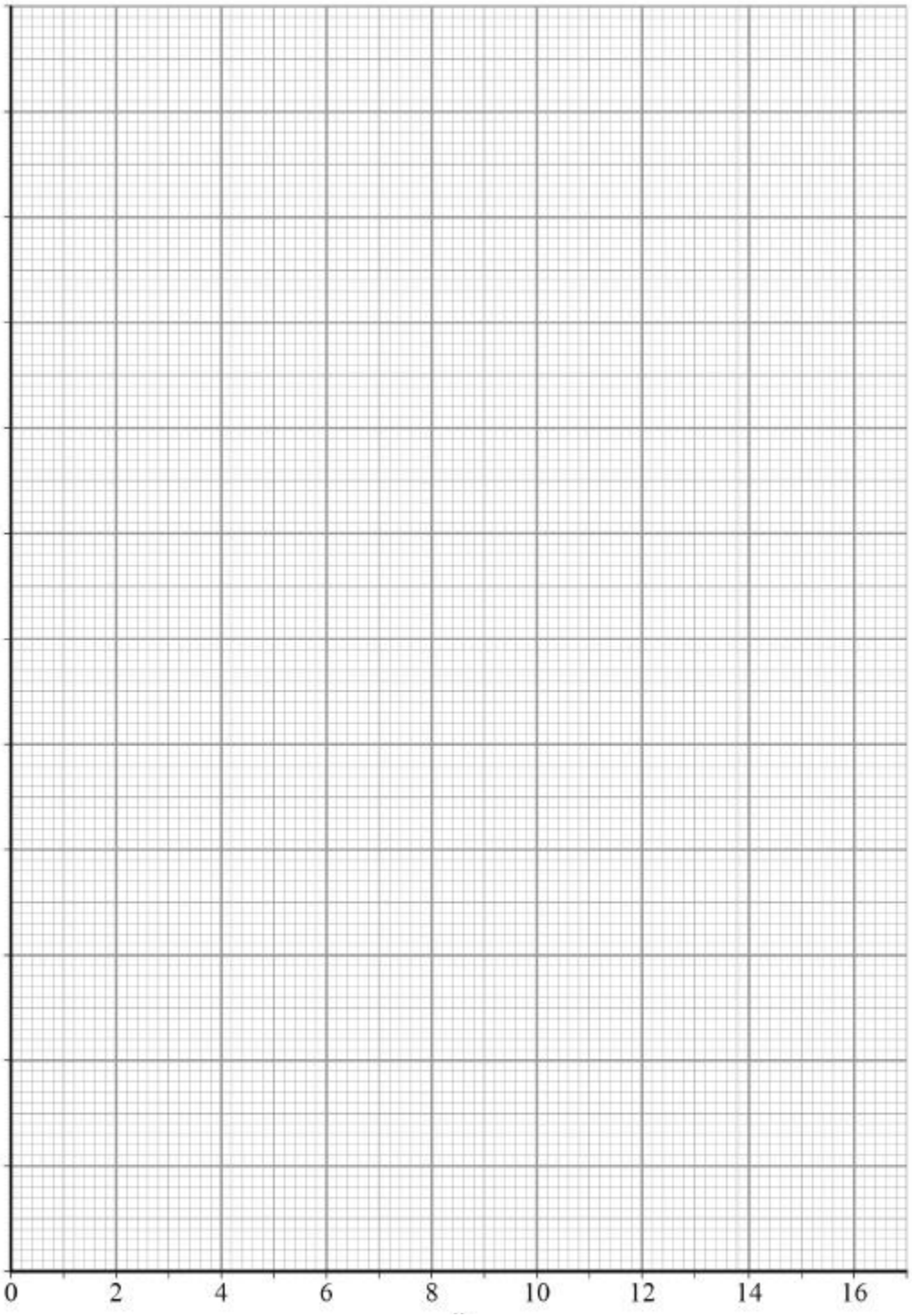
_____

_____

(1)

Figure 4

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(e) Determine, using your graph in **Figure 4**, the value of x when n is 20.

x when n is 20 = _____ cm

(3)

(f) Describe and explain **two** procedures the student should take to reduce uncertainty in the

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measurements of p.

procedure 1 _____

_____

_____

_____

_____

_____

_____

procedure 2 _____

_____

_____

_____

_____

_____

_____

(4)
(Total 13 marks)

Q2.

The table summarises some of the properties of four stars in the constellation Hercules.

Star	Distance/pc	Spectral class	Apparent magnitude
Kornephoros	43	G	2.8
Rasalgethi	110	M	3.0
Rutilicus	11	G	2.8
Sarin	23	A	3.1

(a) Define the parsec. You may use a diagram as part of your answer.

_____

_____

_____

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_____

(2)

(b) Deduce which star is larger, Kornephoros or Rutilicus.

_____

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(c) One of the four stars has the peak in its black-body radiation curve at a wavelength of 1.0 μm.

Calculate the corresponding temperature for this curve.

temperature = _____ K

(2)

(d) Explain which star produced the black-body radiation curve described in question (c).

_____

_____

_____

_____

(2)

(e) Which star has the brightest absolute magnitude?

Tick (✔) the correct box.

Kornephoros ☐

Rasalgethi ☐

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Rutilicus ☐

Sarin ☐

(1)

(f) Determine the absolute magnitude of Sarin.

absolute magnitude = _____

(3)

(Total 13 marks)

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