

Name of the Student: \_\_\_\_\_

Max. Marks : 25 Marks

Time : 25 Minutes

**Q1.**

**Figure 1** shows an electric wheelchair.

**Figure 1**



- (a) The wheelchair moves at a constant speed of 2.4 m/s for 4.5 seconds.

Calculate the distance moved by the wheelchair.

Use the equation:

$$\text{distance} = \text{speed} \times \text{time}$$

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Distance = \_\_\_\_\_ m

**(2)**

- (b) What could be a reason for the speed of the wheelchair decreasing?

Tick **one** box.

It started going downhill.

☐

It started going uphill.

☐

Its store of kinetic energy increased.

☐

It used more power from its battery.

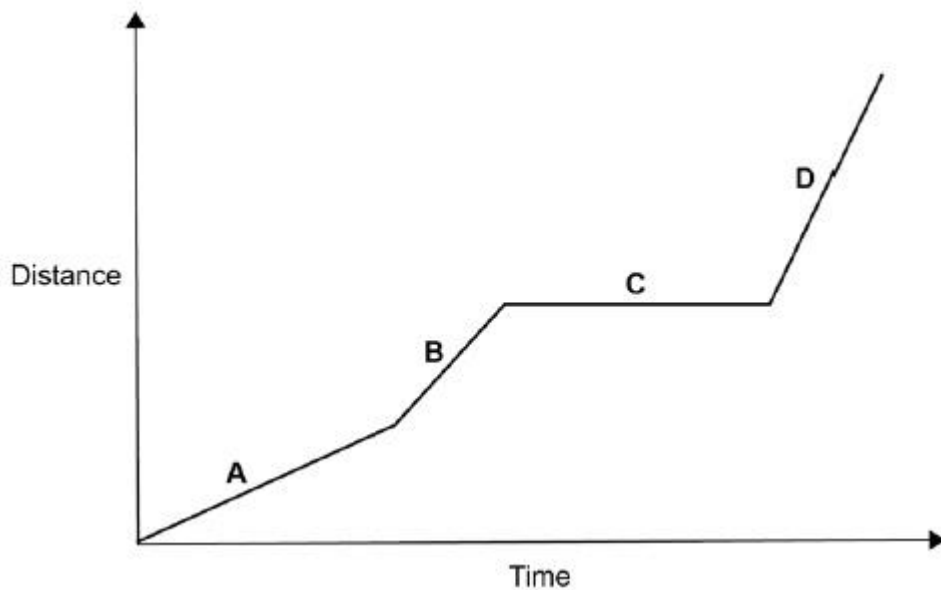
☐

(1)

A student measured how the distance travelled by the wheelchair changed over time.

**Figure 2** shows a sketch-graph of the results.

**Figure 2**



- (c) In which section of the graph, **A**, **B**, **C**, or **D**, did the wheelchair travel fastest?

Give the reason for your answer.

Section \_\_\_\_\_

Reason \_\_\_\_\_

\_\_\_\_\_

(2)

- (d) The student used a data logger with a distance sensor to record the data.

Give **two** advantages of using a data logger rather than using a stopclock and tape measure.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

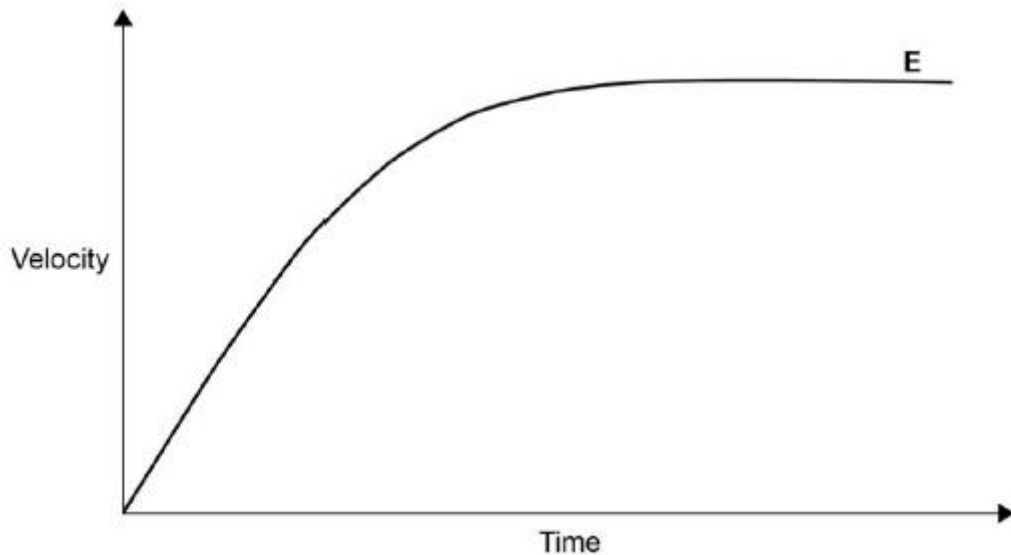
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(2)

The velocity of the wheelchair changes as it accelerates to its top speed.

Figure 3 shows a sketch-graph of the changes.

Figure 3



- (e) The forward force on the wheelchair is constant as it accelerates on flat ground.

Which force reduces the acceleration?

Tick **one** box.

Air resistance

☐

Magnetism

☐

Tension

☐

Weight

☐

(1)

- (f) Explain the acceleration of the wheelchair at point **E** on **Figure 3**.

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(2)

- (g) The wheelchair starts from rest.

It accelerates at a constant rate until it has a speed of 1.5 m/s

The wheelchair travels a distance of 2.0 m while it is accelerating.

Calculate the acceleration of the wheelchair.

Using the Physics Equations Sheet.

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Acceleration = \_\_\_\_\_ m/s<sup>2</sup>  
(3)  
(Total 13 marks)

## Q2.

Four students tested their reaction times using a computer program.

When a green light appeared on the screen the students had to press a key.

**Table 1** shows their results.

**Table 1**

| Student | Reaction time in s |        |        | Mean reaction time in s |
|---------|--------------------|--------|--------|-------------------------|
|         | Test 1             | Test 2 | Test 3 |                         |
| Boy 1   | 0.28               | 0.27   | 0.26   | 0.27                    |
| Boy 2   | 0.28               | 0.47   | 0.22   | 0.29                    |
| Girl 1  | 0.31               | 0.29   | 0.27   | 0.29                    |
| Girl 2  | 0.32               | 0.30   | 0.29   | 0.30                    |

- (a) What is meant by 'reaction time' in this experiment?

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(1)

- (b) Boy 2 had an anomalous result in **Test 2**.

Suggest a reason why.

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(1)

- (c) Give **one** conclusion that can be made from the results in **Table 1**.

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(1)

- (d) Suggest further evidence that you could collect to support your conclusion.

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(1)

- (e) Reaction time is important at the start of a race.

**Table 2** shows the time taken by a boy to run different distances.

**Table 2**

| Distance in m | Time in s |
|---------------|-----------|
| 100           | 12.74     |
| 200           | 25.63     |
| 800           | 139.46    |

Reaction time is more important in a 100 m race than in an 800 m race.

Explain why.

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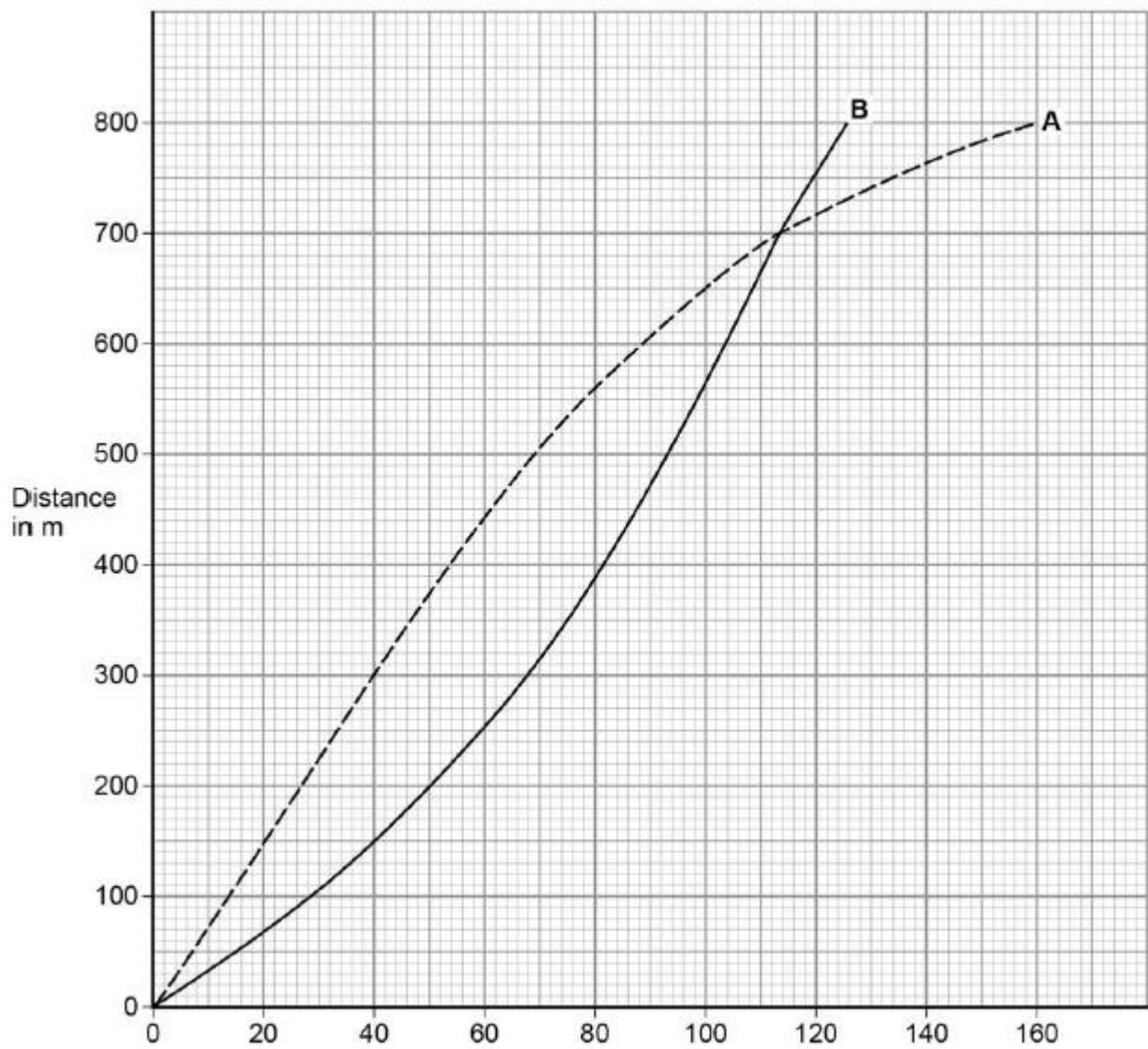
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(2)

- (f) Two girls, **A** and **B**, ran an 800 m race.

The figure below shows how the distance changed with time.



Compare the motion of runners **A** and **B**.

Include data from the figure above.

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(6)  
(Total 12 marks)