

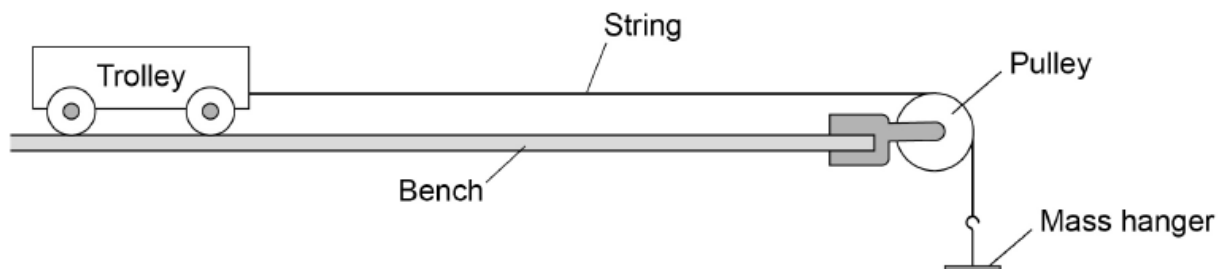
Forces and motion – GCSE Physics Paper 2

1. No.3

0	3
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A student investigated how changing the mass of a trolley affects the acceleration of the trolley.

Figure 5 shows some of the equipment used.

Figure 5

0	3	.	1
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The trolley in **Figure 5** is not moving.

Which force prevents the trolley from moving?

[1 mark]

Tick (✓) **one** box.

Friction

☐

Tension

☐

Weight

☐

The force pulling on the trolley was increased so that the trolley accelerated.

The force was then kept constant and different masses were put on the trolley.

For each different mass the acceleration of the trolley was measured.

03.2

Draw one line from each variable to the correct quantity.

[2 marks]

Variable

Quantity

Independent variable

Dependent variable

Acceleration of the trolley

Length of the bench

Total mass of the trolley

Force pulling on the trolley

03.3

For one of the masses put on the trolley, the student recorded three values of acceleration.

1.58 m/s²

1.53 m/s²

1.54 m/s²

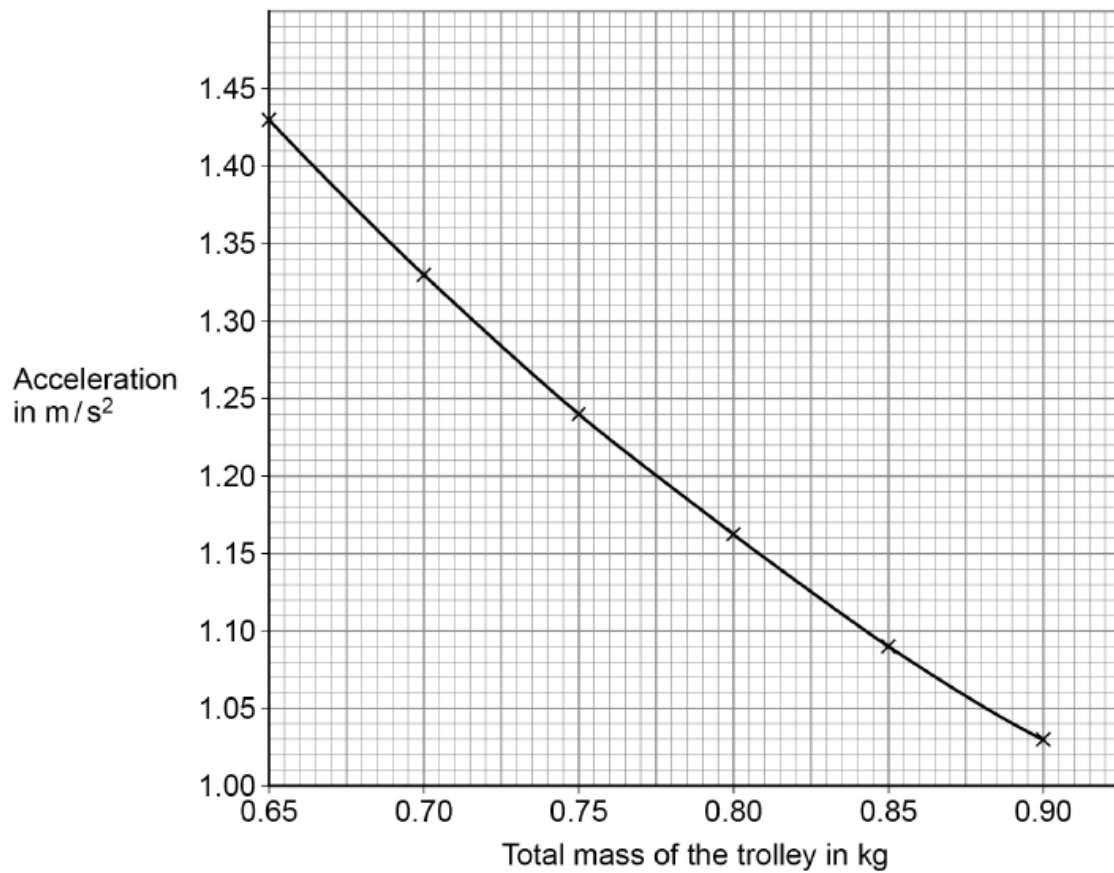
Calculate the mean acceleration of the trolley.

[2 marks]

Mean acceleration = _____ m/s²

Figure 6 shows some of the results.

Figure 6



0 3 . 4

Describe the relationship shown in Figure 6.

[1 mark]

0	3	.	5
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When the total mass of the trolley was 1.5 kg, the acceleration of the trolley was 0.62 m/s^2 .

Calculate the resultant force acting on the trolley.

Use the equation:

$$\text{resultant force} = \text{mass} \times \text{acceleration}$$

[2 marks]

Resultant force = _____ N

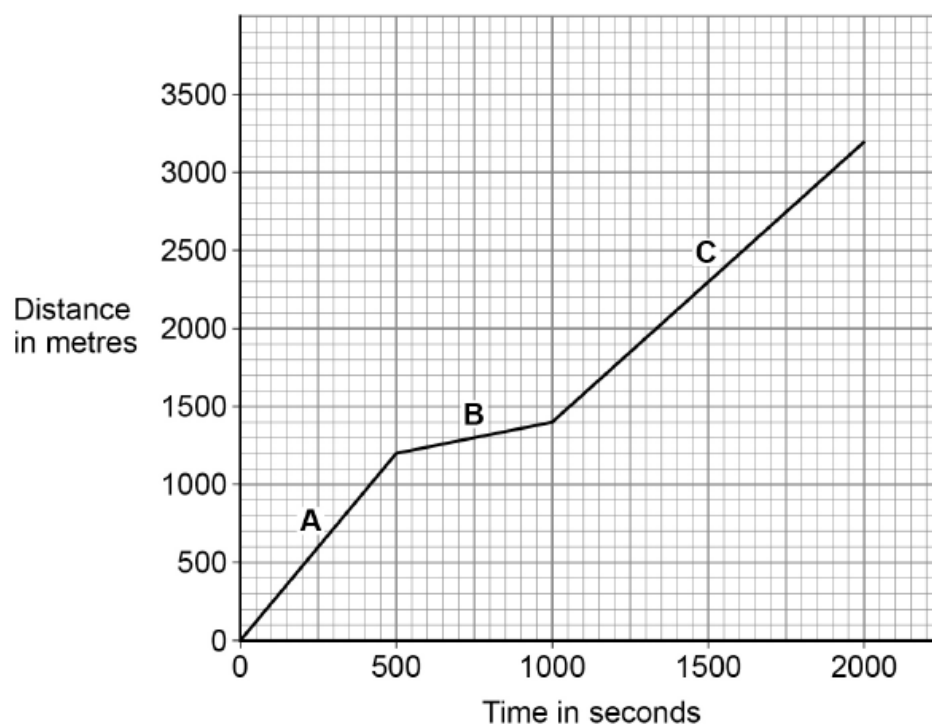
2. No.5

0 5

A person has been for a walk.

Figure 9 shows the distance–time graph for the walk.

Figure 9



0 5 . 1

Some quantities are scalar quantities and others are vector quantities.

Which of the following are scalar quantities?

[2 marks]

Tick (✓) **two** boxes.

Displacement

☐

Distance

☐

Force

☐

Speed

☐

Velocity

☐

05.2

What was the total distance walked by the person in 2000 seconds?

[1 mark]

Total distance = _____ m

05.3

Calculate the average speed of the person during the 2000 seconds.

Use your answer to Question 05.2

Use the equation:

$$\text{average speed} = \frac{\text{total distance}}{\text{total time}}$$

[2 marks]

Average speed = _____ m/s

05.4

Which section of **Figure 9** shows the person walking the slowest?

Give a reason for your answer.

[2 marks]

Tick (✓) **one** box.

A

☐

B

☐

C

☐

Reason _____

0 5 . 5

The person walked slowest when going up some steps.

Complete the sentence.

Choose the answer from the box.

[1 mark]

air resistance

friction

gravity

When walking up the steps, the person did more work against the
force of _____.

0 5 . 6

On another day, the person ran the same route.

What is a typical speed for a person running?

[1 mark]

Tick (✓) **one** box.

0.3 m/s

☐

3.0 m/s

☐

30 m/s

☐

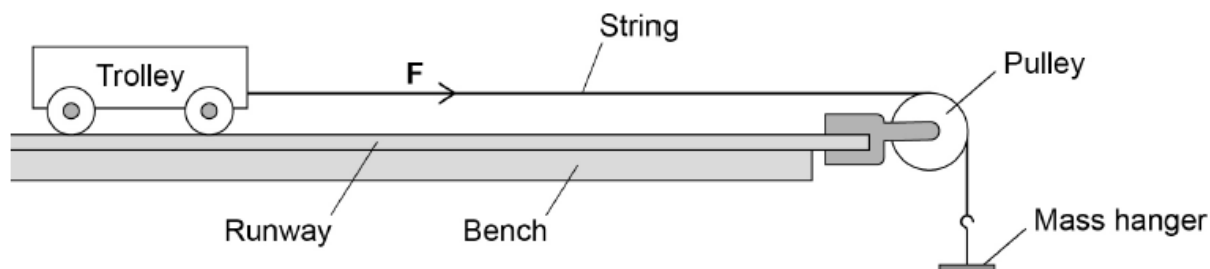
3. No.5

0 5

A student investigated how the acceleration of a trolley varies with the resultant force on the trolley.

Figure 10 shows some of the equipment used.

Figure 10



0 5 . 1

Figure 10 shows the force **F** which acts through the string.

What name is given to force **F**?

[1 mark]

0 5 . 2

Give **one** variable that should have been a control variable in this investigation.

[1 mark]

0 5 . 3

The student held the trolley stationary and then released it.

The trolley moved along the runway with a constant acceleration.

The student recorded the time taken for the trolley to travel a measured distance along the runway.

Describe how the acceleration of the trolley can be calculated using the time taken and distance travelled by the trolley.

[3 marks]

For one set of results, the force acting through the string was 2.0 N.

0 5 . 4

The student released the trolley three times and determined the following values for acceleration:

1.36 m/s²1.39 m/s²1.33 m/s²

Calculate the uncertainty in the values of acceleration.

[2 marks]

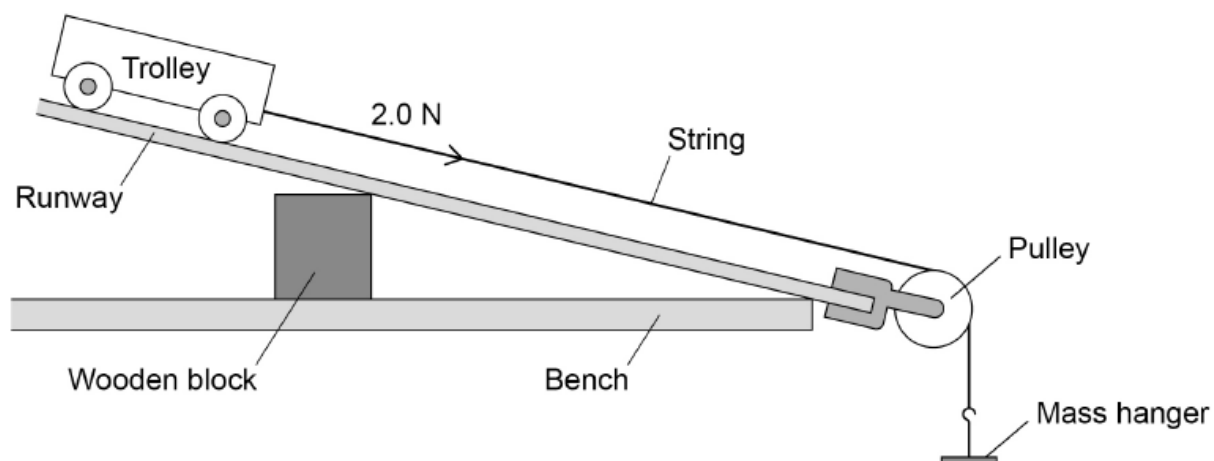
Uncertainty = $\pm$ _____ m/s²

0 5 . 5 The runway was then raised at one end.

The force acting through the string remained the same.

Figure 11 shows this.

Figure 11



Explain how the acceleration was affected by raising the end of the runway.

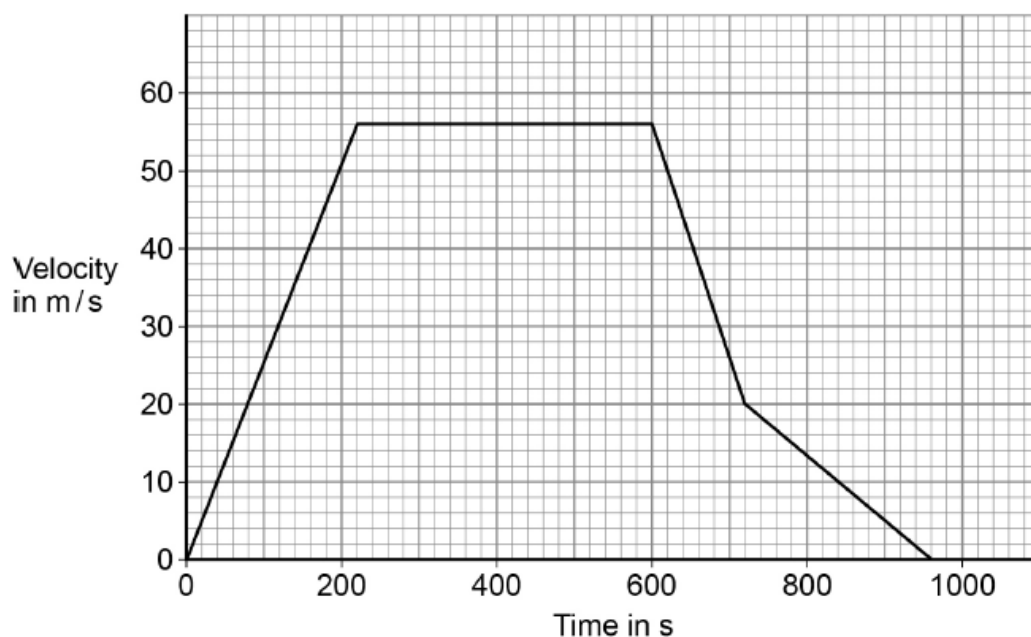
[2 marks]

4. No.7

0 7

Figure 12 shows a velocity–time graph for a train travelling between two stations.

Figure 12



0 7 . 1

Determine the distance travelled by the train in the first 600 s of the journey.

[3 marks]

Distance = _____ m

0 7 . 2 Explain what happens to the braking force as the train decelerates.

Use information from **Figure 12**.

[3 marks]

0 7 . 3 Determine the maximum deceleration of the train.

[3 marks]

Deceleration = _____ m/s^2

[6 marks]

[illegible]

Distance travelled = m

0	7	.	5
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[3 marks]
