

Required Practical Acceleration

GCSE Physics · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

In the investigation of how force affects acceleration, identify the independent, dependent and main control variable. (3 marks)

Step 1 · Independent

The force pulling the trolley (the weight of the hanging masses).

Step 2 · Dependent

The acceleration of the trolley.

Step 3 · Control

The total mass of the system (trolley + hanging masses), kept constant by moving masses from the trolley to the hanger.

Answer: IV: force; DV: acceleration; control: total mass

Check: In the second part, mass becomes the independent variable and force is kept constant.

2. Now try one with the steps

A 0.10 m card on the trolley blocks light gate 1 for 0.25 s and light gate 2 for 0.125 s. The trolley takes 0.50 s to travel between the gates. Calculate the acceleration. (4 marks)

Step 1 · Speed at gate 1

Step 2 · Speed at gate 2

Step 3 · Acceleration

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. State the independent variable when investigating the effect of force on acceleration. [1]

2. State the dependent variable. [1]

3. State the variable that must be kept the same when investigating the effect of force. [1]
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4. Calculate the weight of a 50 g mass hanger. $g = 9.8 \text{ N/kg}$. [1]
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5. Give one safety precaution for this practical. [1]
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6. Explain why masses are moved from the trolley to the hanger, rather than adding new masses. [2]
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7. A 0.10 m card blocks a light gate for 0.25 s. Calculate the trolley's speed in m/s. [2]
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8. The trolley's speed increases from 0.40 m/s to 0.80 m/s in 0.50 s. Calculate its acceleration in m/s^2 . [2]
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9. Describe the relationship between force and acceleration shown by the example results. [2]
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10. Give one advantage of using light gates rather than a stopwatch. [1]
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11. Suggest one way of reducing the effect of friction in this practical. [1]
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12. A graph of acceleration against force has a gradient of 1.0 per kg. State the mass of the system. [2]
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13. Explain why the line of best fit cuts the force axis slightly above zero. [2]
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14. In the second part, the pulling force is kept at 0.50 N. With a total mass of 0.50 kg the acceleration is 1.0 m/s^2 . Predict the acceleration when the mass is 1.0 kg, ignoring friction, in m/s^2 . [2]
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4. Before you hand it in

Adding extra masses to the hanger without removing any from the trolley

Move masses from the trolley to the hanger so the total mass stays the same.

Using the weight of the masses in grams force

Convert to kg and multiply by g: 100 g gives about 0.98 N.

Calculating acceleration from one light gate speed

Use two speeds and the time between them, or a light gate with a double-segment card.

"The line doesn't go through zero, so the results are wrong."

Explain it: friction means a small force is needed before acceleration begins.