

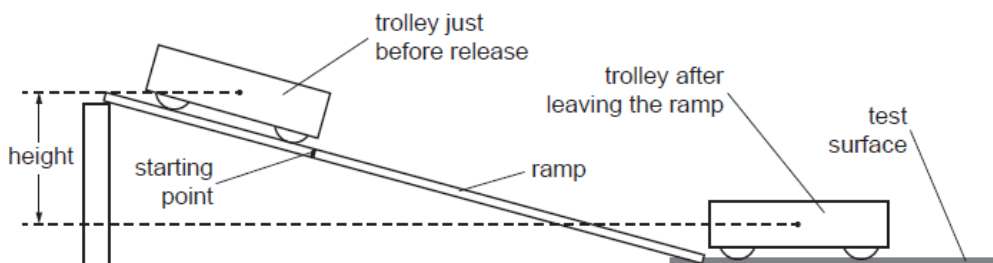
**GCSE Physics B (Twenty First Century Science)**  
**J259/02** Depth in physics (Foundation Tier)

**Question Set 6**

1

Alex is investigating the forces acting on a trolley to slow it down on different surfaces.

**Fig. 1.1** shows his apparatus. Each time, he starts the trolley at the same marked point and measures how far it goes along the test surface before it stops. The centre of the trolley is marked with a dot.



**Fig. 1.1**

(a) (i) Here are measurements that Alex takes.

Mass of trolley = 0.80 kg

Height = 0.20 m

Assume gravitational field strength = 10 N/kg

Calculate the gravitational potential energy transferred when the trolley leaves the ramp.

$$GPE = mgh = 0.8 \times 10 \times 0.2 = 1.6 \text{ J}$$

Gravitational potential energy transferred = ..... 1.6 ..... J [3]

(ii) Alex says that the kinetic energy of the trolley when it leaves the ramp is the same as the gravitational potential energy transferred.

Which of the following statements must be true if Alex is to assume this?

Tick (✓) two boxes.

Air resistance is very small.

Gravity acts downwards on the trolley.

The ramp is very flat.

The trolley is very light.

There is not much friction acting on the trolley.

[2]

- (iii) Alex repeats the experiment five times. He measures the distance the trolley travels along the test surface each time.

Table 1.1 shows his results.

Reading	1	2	3	4	5
Distance travelled (m)	1.2	1.4	1.2	0.6	1.4

Table 1.1

Calculate the mean distance the trolley travelled along the test surface.

Tick (✓) one box.

- 1.1 m
- 1.2 m
- 1.3 m
- 1.4 m

[1]

- (b) Alex carries out this experiment for a range of kinetic energy values.

Table 1.2 shows his results.

Initial kinetic energy (J)	0.8	1.6	2.4	3.2	3.9	4.8
Mean distance travelled (m)	0.80	1.35	1.60	1.85	1.90	1.95

Table 1.2

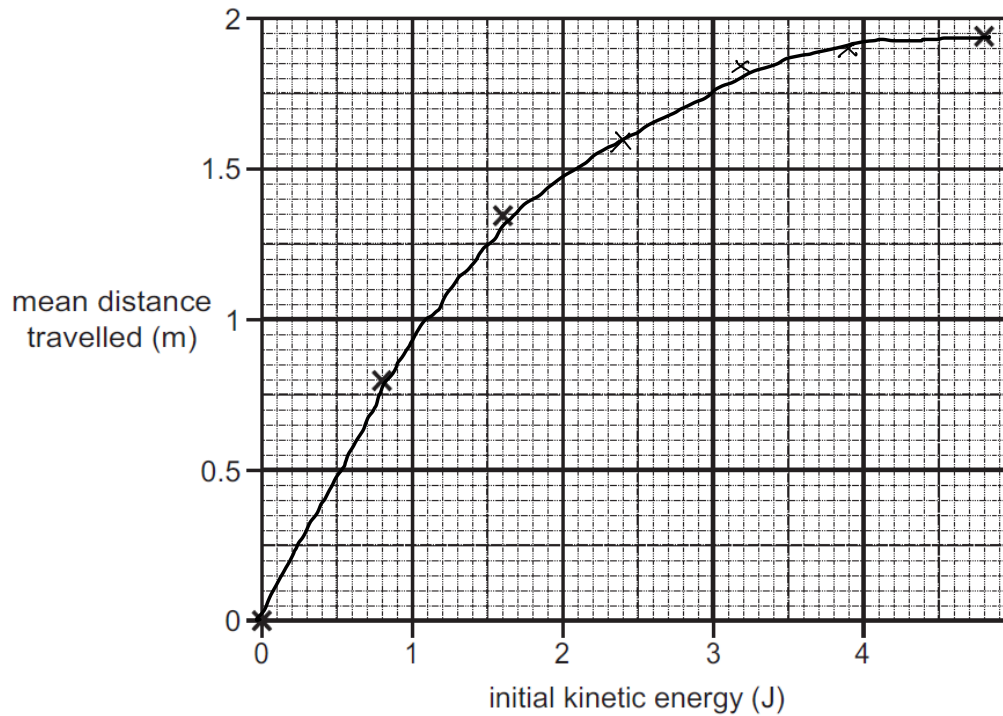
These data are plotted on the graph in Fig. 1.2. Three points have been left off.

- (i) State the reason why Alex was right to plot a point at the origin, (0,0).

[1]

if trolley has not fallen any distance, there is no potential energy to transfer to kinetic energy

- (ii) Plot the three remaining points on the graph in **Fig. 1.2** and draw an appropriate best fit curve.



**Fig. 1.2**

[2]

- (c) Describe the pattern shown by these results.

[2]

As kinetic energy increases, the mean distance travelled increases at a decreasing rate.

**Total Marks for Question Set 6: 11**

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