Oxford Cambridge and RSA

GCSE Physics A (Gateway)

J249/03 Physics A P1-P4 and P9 (Higher Tier)

Question Set 23

23 A student investigates potential and kinetic energy.

She looks at some data from experiments with motion trolleys and energy.

- The trolleys are stationary at the top of a ramp and have a gravitational potential energy of 8 J.
- Each trolley has a mass of 1 kg.

Look at the research data on the trolleys.

Trolley	Velocity at the bottom of the ramp (m / s)
W	3
X	4
Y	5
Z	6

The student thinks the data is wrong.

Use the data and your understanding of energy transfer to justify why trolley W has the most likely velocity and why X, Y and Z do not.

[4]

Total Marks for Question Set 23: 4

@ Top Stationary at top of ramp so KE = 0

GPE = mgh = 8 J

mass = 1 kg

@ Bottom

GPE = 0

$KE = \frac{1}{2}mv^2$

→ Initial GPE = final KE

$8 = \frac{1}{2} \times 1 \times v^2 \rightarrow 16 = v^2 \rightarrow v = 4$

However some energy will have been lost as friction or heat to the surroundings, meaning the final KE will be less than 8 and the final velocity less than 4, making W the most likely answer as X = 4 and Y, Z > 4.

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