

Gateway Science Physics A

J249/02 Physics A P5-P8 and P9 (Foundation Tier)

Question Set 26

26

A car on a roller coaster is stationary at the top of a slope.

The car has a weight of 6 500 N and a potential energy of 217 000 J.

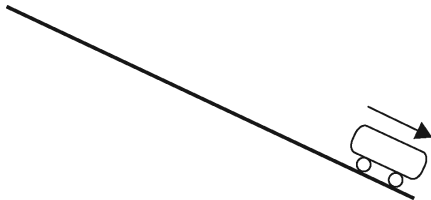
(a) Calculate the cars height above the ground.

$$GPE = mgh \quad \text{weight} = mg = 6500 \text{ N}$$
$$\frac{GPE}{mg} = h \quad \frac{217000}{6500} = 33.4 \text{ m}$$

Answer = 33.4 m

[2]

(b) The diagram shows the roller coaster car moving down a slope.



The energy at the bottom of the slope is less than expected.

Suggest two ways to improve the efficiency of the roller coaster car.

- 1) Use a smoother slope surface to reduce friction.
- 2) Increase the angle of the slope.

[2]

Total Marks for Question Set 26: 4

Equations in physics

$$(\text{final velocity})^2 - (\text{initial velocity})^2 = 2 \times \text{acceleration} \times \text{distance}$$

$$\text{change in thermal energy} = \text{mass} \times \text{specific heat capacity} \times \text{change in temperature}$$

$$\text{thermal energy for a change in state} = \text{mass} \times \text{specific latent heat}$$

$$\text{energy transferred in stretching} = 0.5 \times \text{spring constant} \times (\text{extension})^2$$

$$\text{potential difference across primary coil} \times \text{current in primary coil} = \text{potential difference across secondary coil} \times \text{current in secondary coil}$$

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