

**GCSE Physics B (Twenty First Century Science)**  
**J259/03** Depth in physics (Higher Tier)

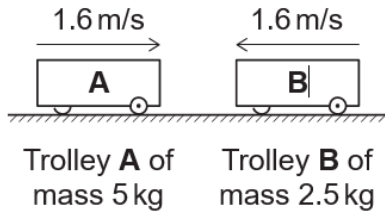
**Question Set 12**

1 Trolley **A** of mass 5.0 kg moves at a constant speed of 1.6 m/s.

(a) Calculate the momentum of trolley **A**.

Momentum = ..... kg m/s [2]

(b) Trolley **B** of mass 2.5 kg heads straight towards the first trolley in the opposite direction at the same speed of 1.6 m/s.



The two trolleys collide and stick together.

(i) Show that the velocity of the joined-up trolleys after the collision is about 0.5 m/s.

(ii) The collision takes a total time of 0.20 s.

[4]

Calculate the average force acting on trolley **A** during the collision.

Average force = ..... N [4]

**Total Marks for Question Set 12: 10**

## Resource Materials

### Equations in Physics

change in internal energy = mass × specific heat capacity × change in temperature

energy to cause a change in state = mass × specific latent heat

for gases: pressure × volume = constant  
(for a given mass of gas and at a constant temperature)

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

energy stored in a stretched spring =  $\frac{1}{2} \times \text{spring constant} \times (\text{extension})^2$

potential difference across primary coil × current in primary coil =  
potential difference across secondary coil × current in secondary coil

**Higher tier only –**

**pressure due to a column of liquid = height of column × density of liquid × g**

**force = magnetic flux density × current × length of conductor**

**potential difference across primary coil ÷ potential difference across secondary coil =  
number of turns in primary coil ÷ number of turns in secondary coil**

**change in momentum = resultant force × time for which it acts**

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