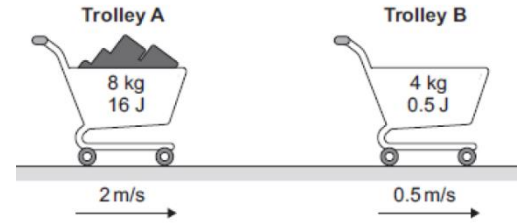


Multi-Step Calculations for Paper 2

Some of these questions are challenging and are designed to make you really think.

Gravitational field strength = 9.8 N/kg

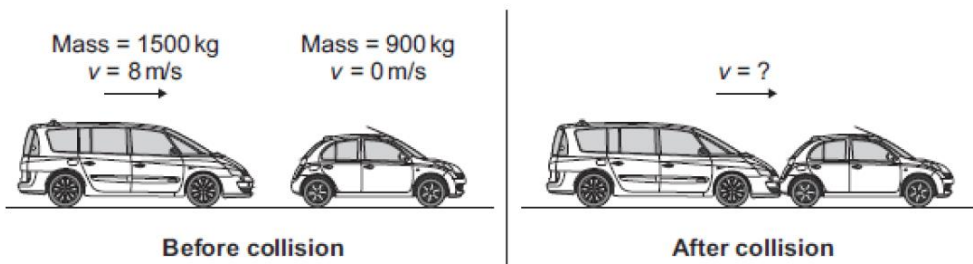
- 1 Use the data provided in the diagram to calculate the resultant velocity of the trolleys after they collide and stick together.



- a) If they are both initially moving as in the diagram.

- b) If the velocity of Trolley B is reversed to be -0.5 m/s

- 2 The diagram shows two cars, just before and just after a collision.



- a) Calculate the velocity of the two joined cars immediately after the collision.

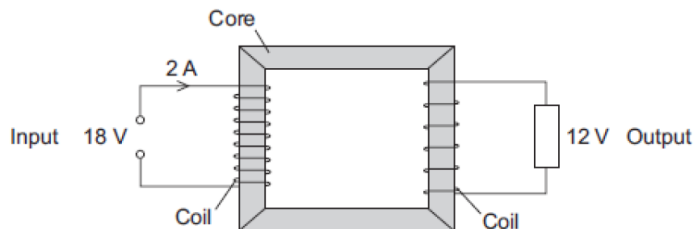
- b) The impact lasted for 0.02 s . Calculate the magnitude of the forces involved the collision.

- c) Calculate the acceleration experienced by each of the cars during the collision.

i) The larger car _____

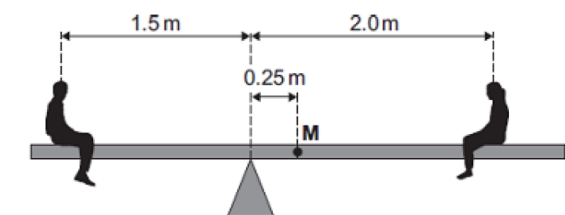
ii) The smaller car _____

- 3 a) The primary coil of the transformer contains 1200 turns. Calculate the number of turns in the secondary coil.

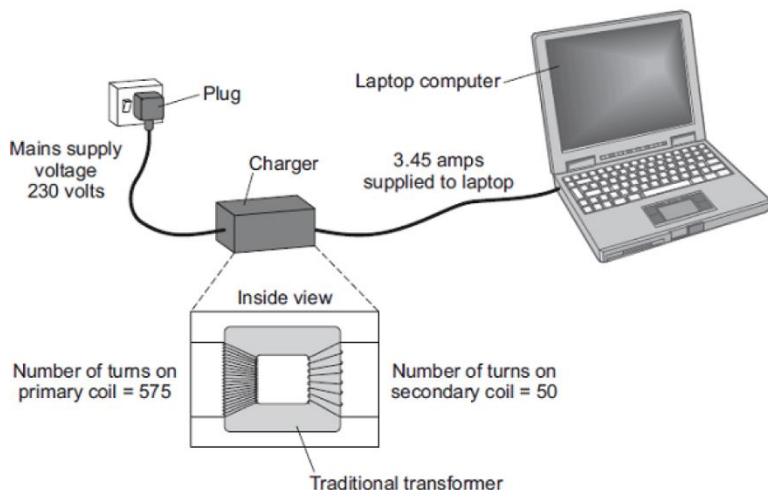


- b) The current in the secondary coil was measured to be 2.8 A. Calculate the efficiency of the transformer.

- 4 Two students sit on a see saw. One sits 1.5 m from the pivot with a weight of 800 N and the other 2.0 m from the pivot with a weight of 550 N. To make the see saw balance a bag of sand is placed at point M. Calculate the mass of the bag of sand.

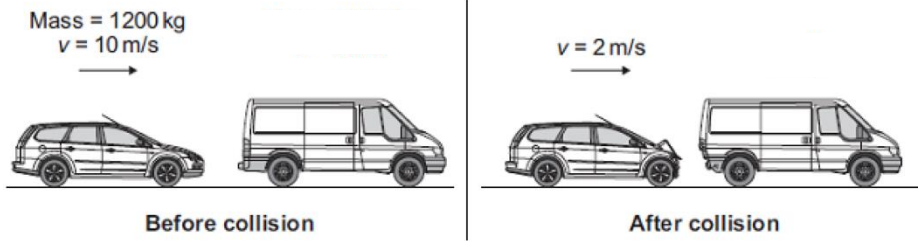


- 5 a) Calculate the voltage across the secondary coil of the transformer.

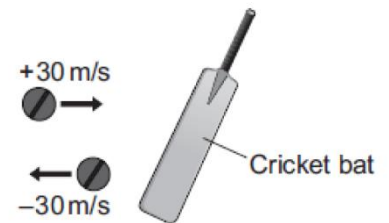


- b) Calculate the current in the primary coil.

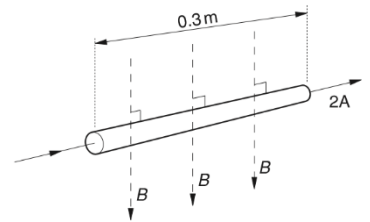
6 The diagram shows a car and a van, just before and just after a collision. The force of the impact was estimated to be 500 kN from the damage caused to the car. Calculate the duration of the impact.



7 The cricket ball in the diagram has a mass of 0.16 kg and is in contact with the bat for 0.0012 s. Calculate the magnitude of the force of the bat and ball on each other during the impact.



8 A wire of length 0.3m carries a current of 2A. It is placed in a magnetic field which is uniform over the length of the wire. The force on the length of wire is 0.05 N. Calculate the magnetic flux density B.



9 A rocket sits on its the launch pad. It contains a fuel tank filled with fuel of density of 670 kg/m³. The pressure at the bottom of the tank is 25kPa. Calculate height of the fuel tank.

10 An earthquake was detected by a seismometer. The P-waves were found to have a period of 0.5s and a wavelength 2.5km. The S-waves were found to have a period of 2s and a wavelength of 6km. The P-waves arrived 40s before the S-waves. Calculate the distance to the Earthquake.