

- 1 Fig. 9.1 shows a 12 V battery connected in a circuit containing resistors A, B, C and D. Each resistor has a resistance of $6.0\ \Omega$.

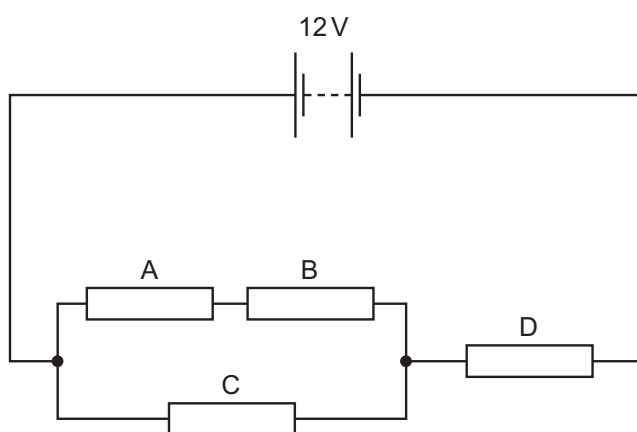


Fig. 9.1

(a) Calculate the combined resistance of

(i) resistors A and B,

resistance = [1]

(ii) resistors A, B and C,

resistance = [2]

(iii) resistors A, B, C and D.

resistance = [1]

(b) Calculate

(i) the current in the battery,

current = [1]

(ii) the energy transferred from the battery to the circuit in 50 s.

energy transferred = [2]

[Total: 7]

- 2 Fig. 2.1 shows a conveyor belt transporting a package to a raised platform. The belt is driven by a motor.

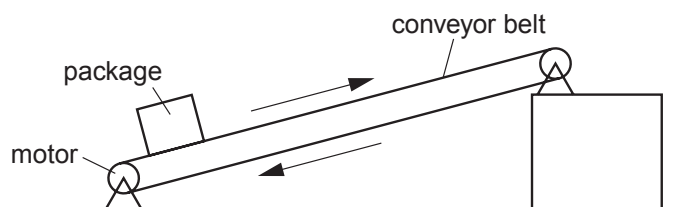


Fig. 2.1

- (a) The mass of the package is 36 kg.

Calculate the increase in the gravitational potential energy (g.p.e.) of the package when it is raised through a vertical height of 2.4 m.

increase in g.p.e. = [2]

- (b) The package is raised through the vertical height of 2.4 m in 4.4 s.

Calculate the power needed to raise the package.

power = [2]

- (c) The electrical power supplied to the motor is much greater than the answer to (b).

Explain how the principle of conservation of energy applies to this system.

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..... [2]

- (d) Assume that the power available to raise packages is constant. A package of mass greater than 36 kg is raised through the same height.

Suggest and explain the effect of this increase in mass on the operation of the conveyor belt.

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..... [3]

[Total: 9]