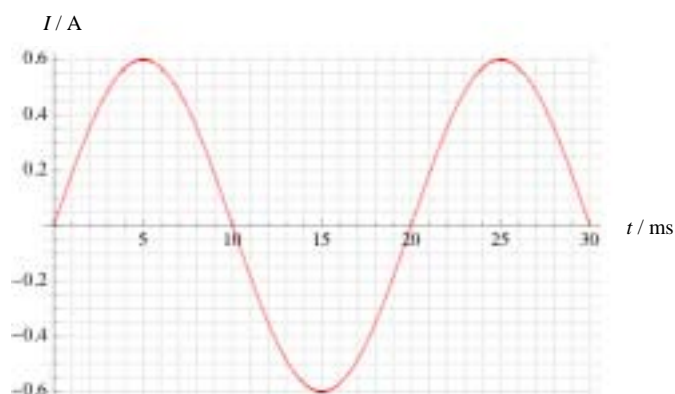


## Extension Worksheet – Topic 5, Worksheet 7

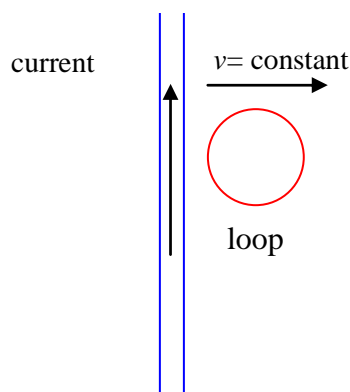
- 1 The current in a single loop of wire varies with time according to the following graph.



On the axes above label with the letter M a time where the flux in the loop is a maximum, justifying your answer.

[2]

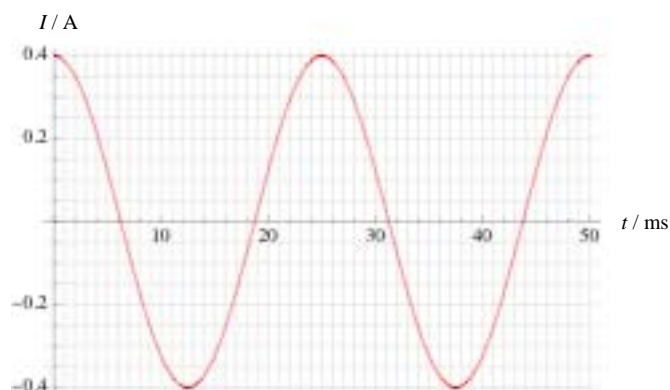
- 2 A constant current is established in a wire as shown.



A coil is placed near the wire so that the loop and the wire are on the same plane. The loop is moved to the right at constant speed.

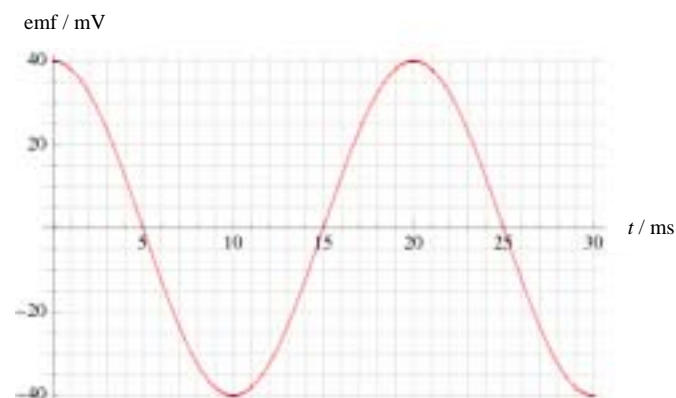
- a Explain why a current will be established in the loop. [2]
  - b Determine the direction of the current in the loop. [2]
  - c Suggest why work must be done on the loop in order to make it move at constant speed. [2]
  - d State what becomes of the work done on the loop. [1]
- 3 A rod of length  $L$  is moved at constant speed  $v$  in a region of magnetic field  $B$ . The magnetic field is at right angles to the velocity and the length of the rod. Deduce that there is an emf established at the ends of the rod equal to  $BvL$  using
- a Faraday's law [3]
  - b the force on an electron within the rod. [3]

- 4 An alternating current is established in a resistor of resistance  $4.0\ \Omega$  as shown.



Determine

- a the rms value of the current. [1]
  - b the rms value of the voltage across the resistor. [1]
  - c the average power dissipated in the resistor. [1]
- 5 The graph shows the induced emf in a coil that is rotating in a region of magnetic field.



On the axes above draw a graph for the induced emf in the same loop when the frequency of rotation is halved.

[2]