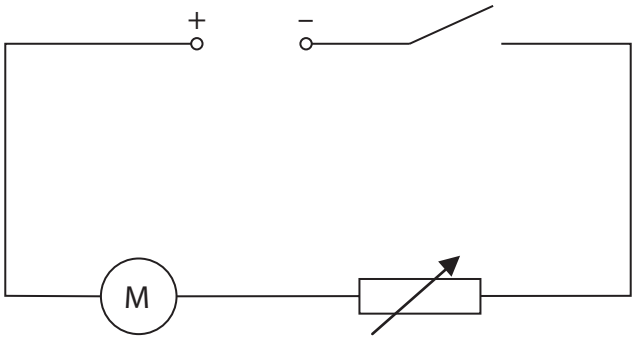
7 The circuit diagram shows a motor, power supply, switch and variable resistor connected in series.



(a) The switch is open and the motor is not moving.

State how much energy is in the kinetic energy store of the motor.

(1)

kinetic energy = ... J

(b) The switch is closed.

The motor takes 0.42 seconds to reach its maximum speed of rotation.

The mean current in the motor is 3.9 A.

The voltage across the motor is 7.1 V.

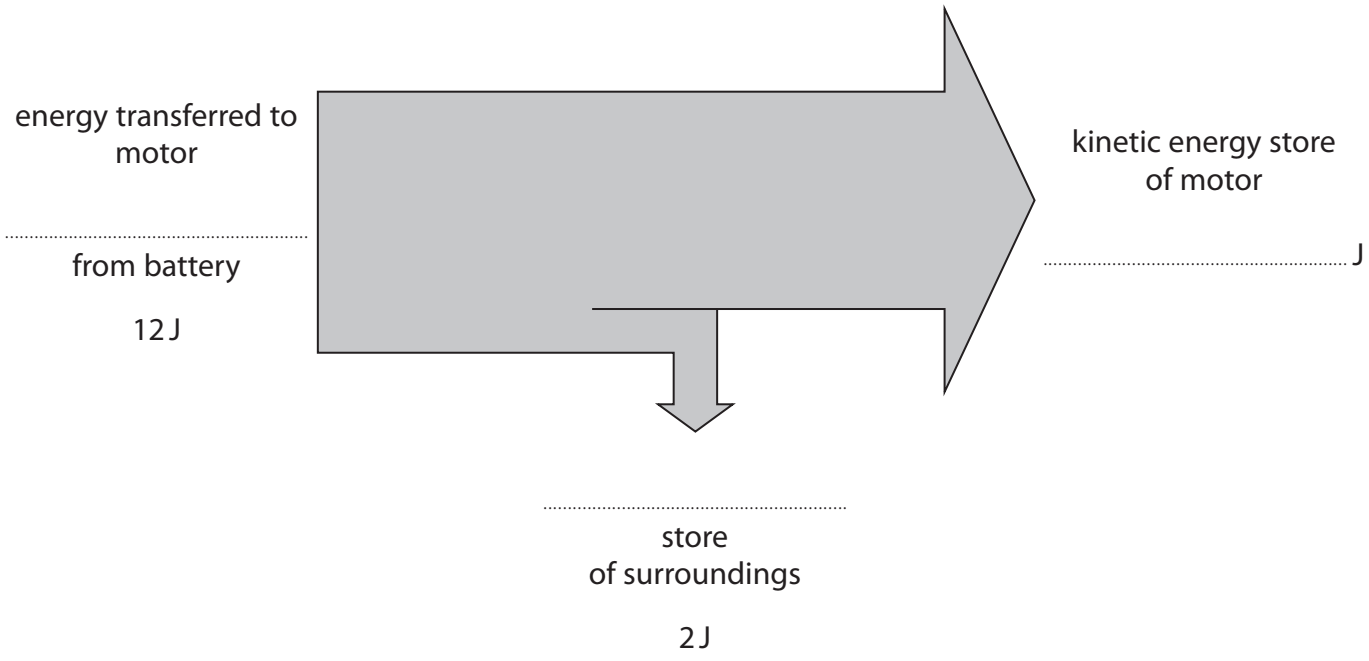
Show that the work done on the motor during the 0.42 seconds is about 12 J.

(2)

work done = ... J

(c) Complete the Sankey diagram for the electric motor during the 0.42 seconds by giving the missing information.

(3)



(d) Use the Sankey diagram to calculate the efficiency of the process of bringing the motor to its maximum speed of rotation.

(3)

efficiency = ... %

(Total for Question 7 = 9 marks)