Answer **all** the questions in the spaces provided.

1 Fig.1.1 shows an elongated block with a square cross sectional area of a particular conducting material.

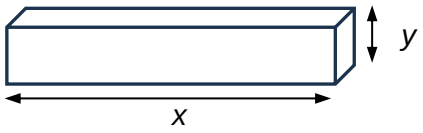

Fig. 1.1

The rate of thermal energy transfer with respect to time, q, through the block is given by

$$q = py^2\left(\frac{T}{x}\right)$$

where p is the thermal conductivity of the material;
y is the length of the square cross-sectional area of the material;
T is the temperature difference between the two ends of the material;
and x is the length of the block.

Fig. 1.2 shows the data obtained in a particular experiment.

quantity	value	percentage uncertainty
T	323 K	± 0.50%
x	1.00 m	± 1.0%
p	237 W m^{-1} K^{-1}	± 2.0%
y	0.200 cm	± 3.0%

Fig. 1.2

(a) Determine the SI base units of p.

SI base units of p = …… [2]

(b) Using the values given in Fig. 1.2,

(i) determine the value of q, to three significant figures.

q = …… W [2]

(ii) determine the percentage uncertainty of q.

percentage uncertainty of q = ……% [2]

(c) Use your answer in **(b)** to determine the actual uncertainty in the value of q.

Hence give a statement of q, with its uncertainty, to an appropriate number of significant figures.

q = ……± ……W [2]