A heat engine does a work of 250 J and has an efficiency of 25%. What is

(a) The heat extracted from the hot reservoir

(b) The heat exhausted into the cold reservoir

Given:

Work done by the heat engine: W =250 J

Efficiency of the heat engine: e = 25% = 0.25

Determine:

(a) The heat extracted from the hot reservoir: Q_H

Use Formula:

$$e = W / Q_H \quad \text{----------(1)}$$

Rearranging (1) and substituting for e and W in (1):

$$\mathbf{Q_H = W / e = 250 / 0.25 = 1000\ J}$$

(b) The heat exhausted into the cold reservoir: Q_C

Use formula:

$$W = Q_H - Q_C \quad \text{----------(2)}$$

Rearranging (2) and substituting for Q_H and W in (2):

$$\mathbf{Q_C = Q_H - W = 1000 - 250 = 750\ J}$$