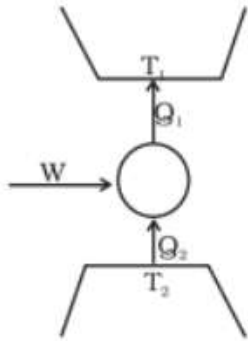


7. Consider a heat engine as shown in Fig. Q_1 and Q_2 are heat added to heat bath T_1 and heat taken from T_2 in one cycle of the engine. W is the mechanical work done on the engine. If $W > 0$, then possibilities are:



- a. $Q_1 > Q_2 > 0$
- b. $Q_2 > Q_1 > 0$
- c. $Q_2 < Q_1 < 0$
- d. $Q_1 < 0, Q_2 > 0$

Sol. From the above diagram, we get that $W = Q_1 - Q_2$

it is given that $W > 0$

$$\therefore Q_1 - Q_2 > 0$$

Thus, there arises two cases –

- a. when both Q_1 & Q_2 are positive
 $\Rightarrow Q_1 > Q_2 > 0$
- b. when both Q_1 & Q_2 are negative
 $\Rightarrow Q_1 < Q_2 < 0$

option (a, c) is correct.