A heat pump is used to heat up a house in winter. The temperature inside the house is 22° C and outside of the house is -15° C. Find the maximum possible coefficient of performance of the heat pump.

Given:

Temperature inside the house: $T_H = 22^\circ C = 295 K$

Temperature inside the house: $T_C = -15^\circ C = 258 K$

To determine:

The maximum possible coefficient of performance of the heat pump COP_{max}

Use formula:

$$COP_{max} = T_H / (T_H - T_C) \text{ ----------(1)}$$

Substituting for T_H and T_C in (1):

$$\mathbf{COP_{max} = 295 / (295 - 258) = 7.9}$$