

Chapter 3

Exercises

3.1 An airplane under design has the following features:

Weight of payload + crew = 26000 N

Estimated fuel fraction (W_f/W_O) = 0.387

Empty weight fraction (W_e/W_O) = $0.837 W_O^{-0.7}$; where, W_O is in Newtons.

Obtain the gross weight (W_O) of the airplane.

[Answer: $W_O = 107,810$ N]

3.2 The empty weight fraction (W_e/W_O) is expressed as AW_O^c . A look at the values of 'c' shows that it is negative for all types airplanes i.e. if empty weight goes up the empty weight fraction decreases or the gross weight goes up by a larger amount. Explain this.

(Hint: Consider what happens to the fuel required when the empty weight goes up).