

Remarks: See § 8.1, pages 543 till 557

Answers:

$$a) w(x) = \frac{6Flx^2}{Ebh^3}$$

$$b) w(l) = \frac{6Fl^3}{Ebh^3}$$

$$\varphi(l) = -\frac{12Fl^2}{Ebh^3}$$

Values for the case of prismatic beam:

$$w(l) = \frac{Fl^3}{3EI}$$

$$\varphi(l) = -\frac{6Fl^2}{Ebh^3}$$

Explanation:

Maple Worksheet:

> #Define Moment

M:=F*(x-l);

$$M := F(x - l)$$

> #Define second moment of inertia

Izz:=1/12*b*(1-x/l)*h^3;

$$I_{zz} := \frac{1}{12} b \left(1 - \frac{x}{l} \right) h^3$$

> #Define equation

eq1:= diff(diff(w(x),x),x)=-M/E/Izz;

$$eq1 := \frac{d^2}{dx^2} w(x) = -\frac{12 F (x - l)}{E b \left(1 - \frac{x}{l} \right) h^3}$$

> #Solve equation with boundary conditions

dsolve({eq1, w(0)=0, D(w)(0)=0});

$$w(x) = \frac{6 F l x^2}{E b h^3}$$