

A 40 lb rigid structure consists of 60 in. uniform beam resting on simple supports with a 12 in square uniform block attached to the right hand end as shown in

Fig. 2. Both the beam and the block weigh 20 pounds. The structure is enclosed in a rocket fairing. During launch the packet is subjected to vertical acceleration of  $4.8g$ .

(a) Calculate the reaction forces at the supports

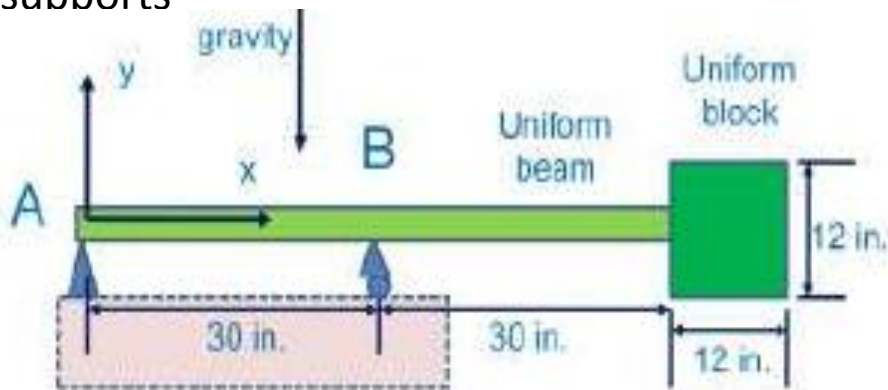


Figure 2:

An airplane weighing 5000 lb lands and develops the force as shown in Fig. 3.

An object on the airplane weighs 5 lb when the airplane is at rest. Find the apparent weight of the object in  $x$  and  $z$  directions.

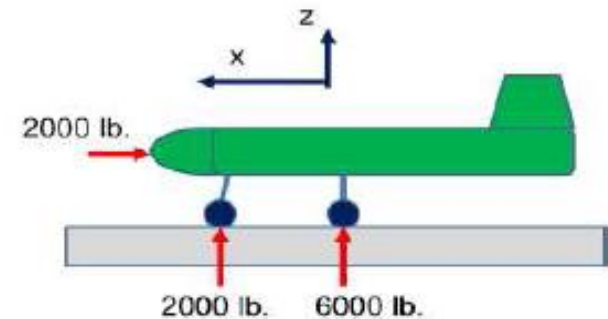


Figure 3:

Show that the lightest cantilever beam of length  $L$  and square cross-section (the area is a free variable) that will not deflect by more than  $\delta$  under a concentrated end load  $F$  is that made of material with the largest value of  $E^{1/2}/\rho$

If the beam has to support the force without yielding show that we need a material with maximum  $\sigma_y^{2/3}/\rho$