

Assignment Preview

[Close this window](#)

Course: Physics 401, Summer 1 2004

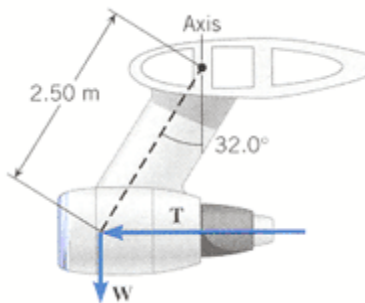
Dates:

Available: Sat Jun 12 2004 03:55 PM EDT

Due: Mon Jun 21 2004 11:59 PM EDT

Homework 8

1. CJ6 9.P.006. [296106] The drawing shows a jet engine suspended beneath the wing of an airplane. The weight \mathbf{W} of the engine is 9100 N and acts as shown in the drawing. In flight the engine produces a thrust \mathbf{T} of 52900 N that is parallel to the ground. The rotational axis in the drawing is perpendicular to the plane of the paper. With respect to this axis, find the magnitude of the torque due to each of the following forces.



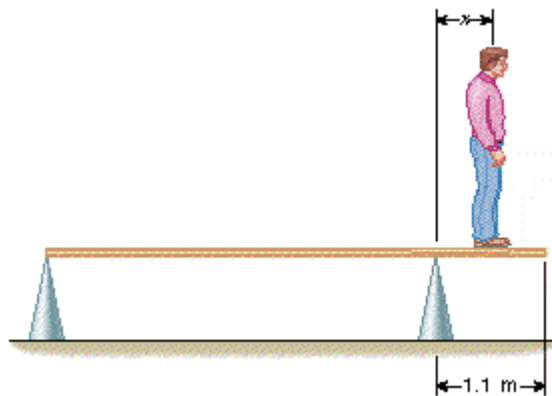
(a) the weight

[12100] N · m

(b) the thrust

[1.12e+05] N · m

A uniform plank of length 4.4 m and weight 233 N rests horizontally on two supports, with 1.1 m of the plank hanging over the right support (see the drawing). To what distance x can a person who weighs 444 N walk on the overhanging part of the plank before it just begins to tip?



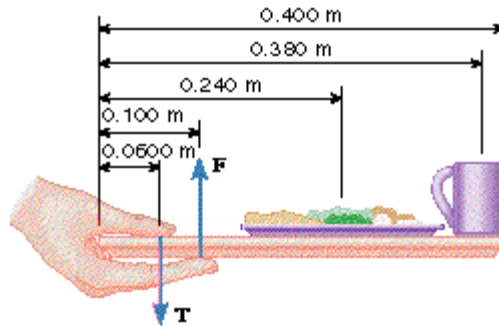
[0.577] m

3. CJ6 9.P.016. [239634] A lunch tray is being held in one hand, as the drawing illustrates. The mass of the tray itself is 0.120 kg, and its center of gravity is located at its geometrical center. On the tray is a 1.00 kg plate of food and a 0.255 kg cup of coffee. Obtain the force \mathbf{T} exerted by the thumb and the force \mathbf{F} exerted by the four fingers. Both

forces act perpendicular to the tray, which is being held parallel to the ground.

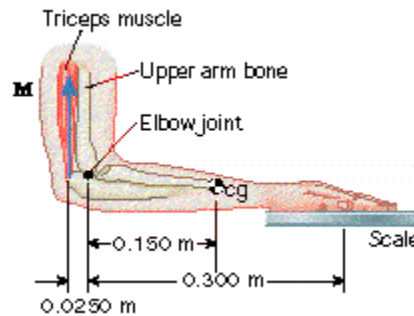
$T =$ $[54.7] \text{ N (downward)}$

$F =$ $[68.2] \text{ N (upward)}$



4. CJ6 9.P.018. [239636] In an isometric exercise a person places a hand on a scale and pushes vertically downward, keeping the forearm horizontal. This is possible because the triceps muscle applies an upward force M perpendicular to the arm, as the drawing indicates. The forearm weighs 24.0 N and has a center of gravity as indicated. The scale registers 130 N. Determine the magnitude of M .

$[1420] \text{ N}$



5. CJ6 9.P.030. [296104] A ceiling fan is turned on and a net torque of $1.5 \text{ N} \cdot \text{m}$ is applied to the blades. The blades have a total moment of inertia of $0.21 \text{ kg} \cdot \text{m}^2$. What is the angular acceleration of the blades?

$[7.14] \text{ rad/s}^2$

6. CJ6 9.P.034. [296105] A CD has a mass of 17 g and a radius of 6.0 cm. When inserted into a player, the CD starts from rest and accelerates to an angular velocity of 17 rad/s in 0.68 s. Assuming the CD is a uniform solid disk, determine the net torque acting on it.

$[0.000765] \text{ N} \cdot \text{m}$

7. CJ6 9.P.045. [239644] A flywheel is a solid disk that rotates about an axis that is perpendicular to the disk at its center. Rotating flywheels provide a means for storing energy in the form of rotational kinetic energy and are being considered as a possible alternative to batteries in electric cars. The gasoline burned in a 340 mile trip in a typical midsize car produces about $1.2 \times 10^9 \text{ J}$ of energy. How fast would a 10 kg flywheel with a radius of 0.38 m have to rotate in order to store this much energy? Give your answer in rev/min.

$[5.51e+05] \text{ rev/min}$

