

一、填充題(10%)

1. The unit of mass in US customary is slug, which is defined as: _____(1)_____
2. Work and energy have the same the unit of Joule, which is defined as: _____(2)_____
3. Work of the force is defined as: _____(3)_____
4. Potential energy is given by: _____(4)_____
5. Mechanical efficiency is defined as: _____(5)_____

二、說明題: (15%)

1. Newton's 2nd law:
2. Theorem of Pappus-Guldinus:
3. A couple:

三、專業英文: (25%)

Translate the following sentence into Chinese:

1. A self-locking screw is one that requires a positive torque to lower the load; an overhauling screw is one that has low enough friction to enable the load to lower itself; that ism a negative external lowering torque must be maintained to keep the load from lowering. (15%)
2. Springs used in high-speed machinery must have natural frequencies of vibration well in excess of the frequency of motion they control such as a conventional engine valve spring does. (10%)

(背面仍有題目,請繼續作答)

- 四、(32%) The drawing (Figure 1) represents a bicycle with an 800-N rider applying full weight to one pedal. Treat this as a two-dimensional problem, with all components in the plane of the paper. Draw as free bodies in equilibrium
- The pedal, crank, and pedal sprocket assembly.
 - The rear wheel and sprocket assembly.
 - The front wheel.
 - The entire bicycle and rider assembly.

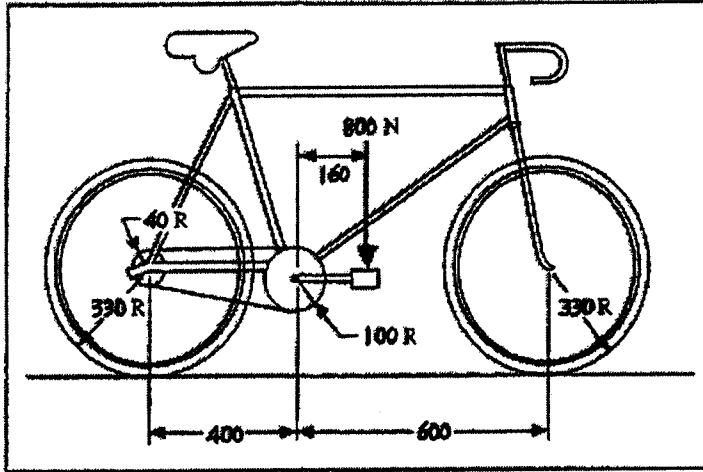


Figure 1: (problem 四)

- 五、(18%) Consider the following dimensions for the short-shoe drum brake of Figure 2: radius of drum = 5 in., shoe width = 2 in., shoe length = 4 in., $c = 10$ in., $b = 6$ in., $a = 1.5$ in., p (contact pressure between shoe and drum) = 100 psi, and f (coefficient of friction) = 0.3. Determine the value of the actuating force F .

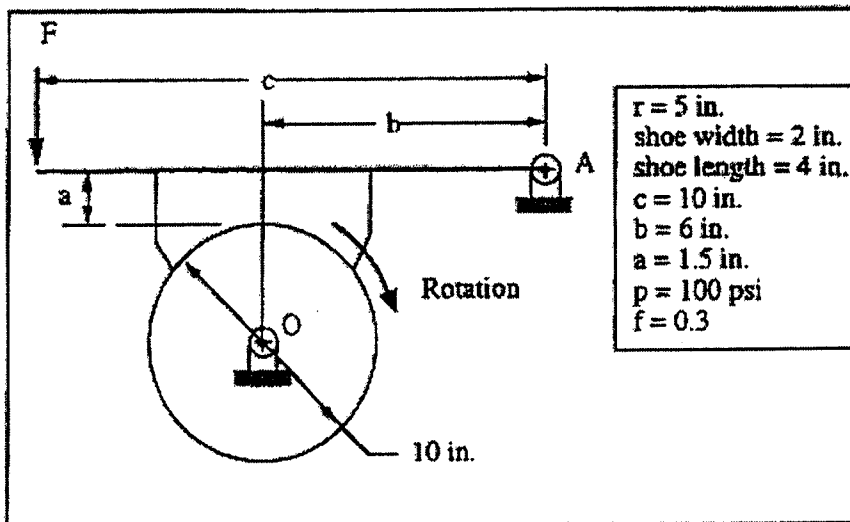


Figure 2 (problem 五)