FE Exam Review

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Chapter 7 Statics - Lecture 1

Chapter 7 Statics - Lecture 1

- Introduction to Statics

- Vector Geometry and Algebra

- Force Systems

- Equilibrium

- Examples

Also in Ch. 7

- Trusses

- Couple-Supporting Members

- Systems with Friction

- Distributed Forces

Introduction to Statics

What is Statics?

- **Statics** is a subset of mechanics focused on loads analysis of rigid bodies in static equilibrium.

- .. fundamental to all disciplines of engineering.

- .. essential in **mechanical engineering** and **design**.

Vector Geometry and Algebra

Geometry is Mathematics!

- vectors are used to describe the geometry of a statics problem
- different mathematical representations of vectors are commonly used
  - Cartesian
  - unit vector notation
  - complex cartesian/complex Polar
- you can perform algebra and arithmetic with vectors

Vector Geometry and Algebra

- Cartesian

- unit vector notation

- complex cartesian/complex polar

Force Systems

- .. focused on loads analysis of rigid bodies

- most ME problems begin with loads analysis

Equilibrium

... in static equilibrium.

- Static equilibrium is the condition of a system at rest or stationary.

- The sum of all forces acting on the body is equal to zero.

- special case of _____

Equilibrium

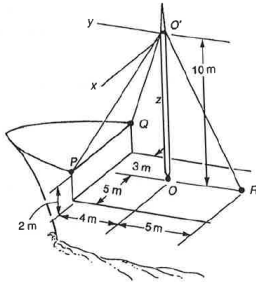**Static vs. Dynamic Equilibrium**

Examples

Example 1:

Exhibit 2

1. Determine the lengths of the guylines O'P and O'Q and the angle between them.

2. Suppose the guy line O'P has a tension of 800N. What is the moment from this force about O?
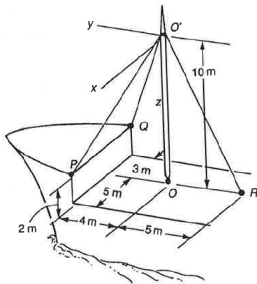
Examples

Example 1 (cont.):

Exhibit 2
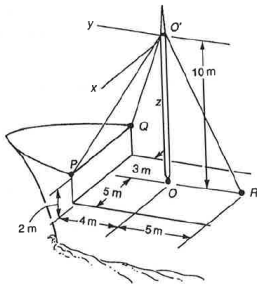
Examples

Example 1 (cont.):
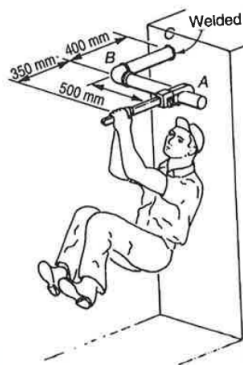

Exhibit 2

Examples

Example 2:

Exhibit 7.13

The plumber in Exhibit 7.13 exerts a vertical downward force of 1 kN on the wrench handle. The moment about C of this force has a magnitude of:

① 500 N-m

② 750 N-m

③ 900 N-m

④ 1250 N-m

Examples

Example 1 (cont.):
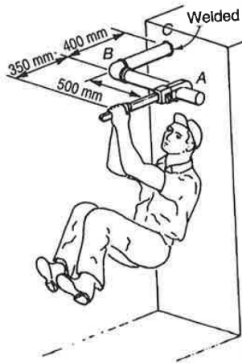

Exhibit 7.13