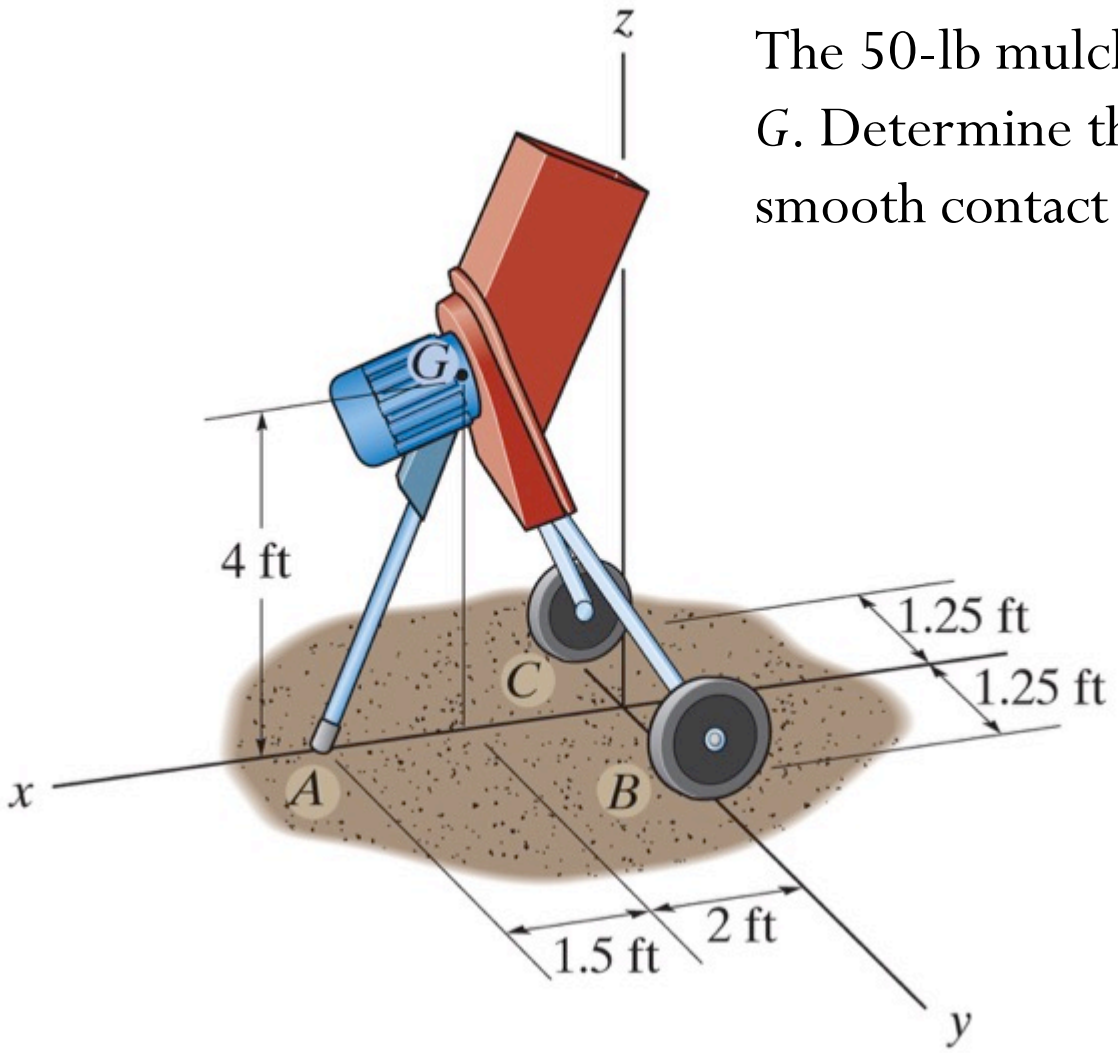
Announcements

- Office Hours:
  - Office hour today (2/20) ends at 3:30pm
- Quiz 3 starts tomorrow (Thursday, Feb. 21)!

- Upcoming deadlines:
- Friday (2/22)
  - Written Assignment
- Tuesday (2/16)
  - PL HW

Objectives

- 3D Support Reactions – Example
- Two-force members
- Structural analysis introduction

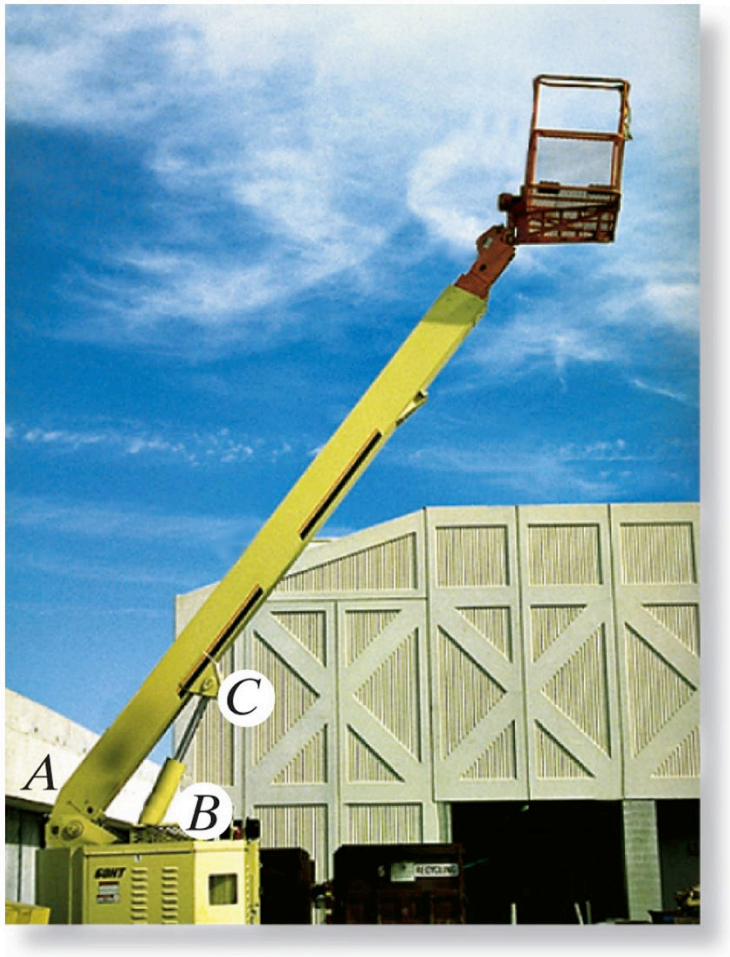


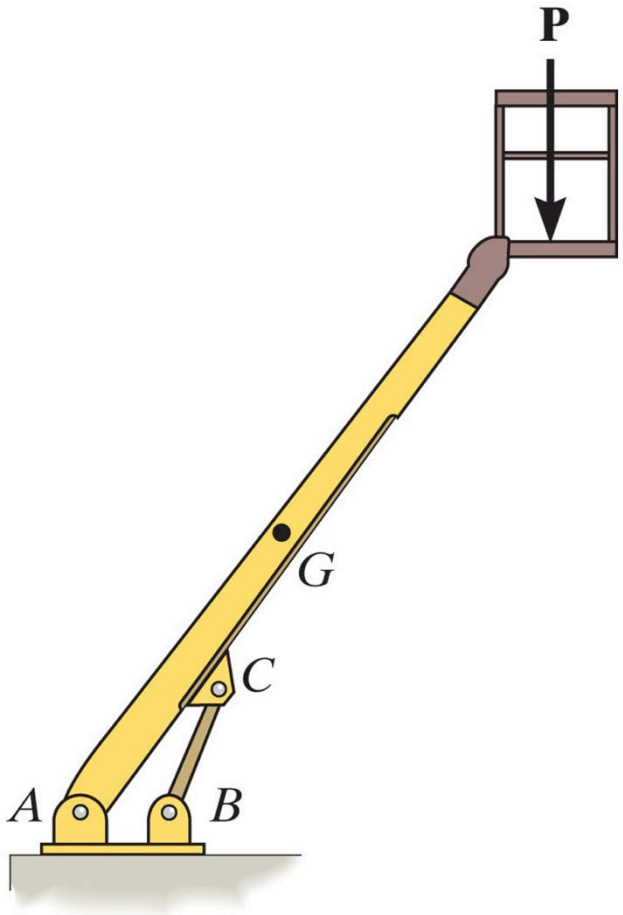
The 50-lb mulching has a center of gravity at *G*. Determine the vertical reactions at the smooth contact point *A*.

Two-force members

In the cases above, members AB can be considered as two-force members, provided that their weight is neglected.

Find the support reactions at *A*, given the force applied at the cage, **P**, is 300 lb.

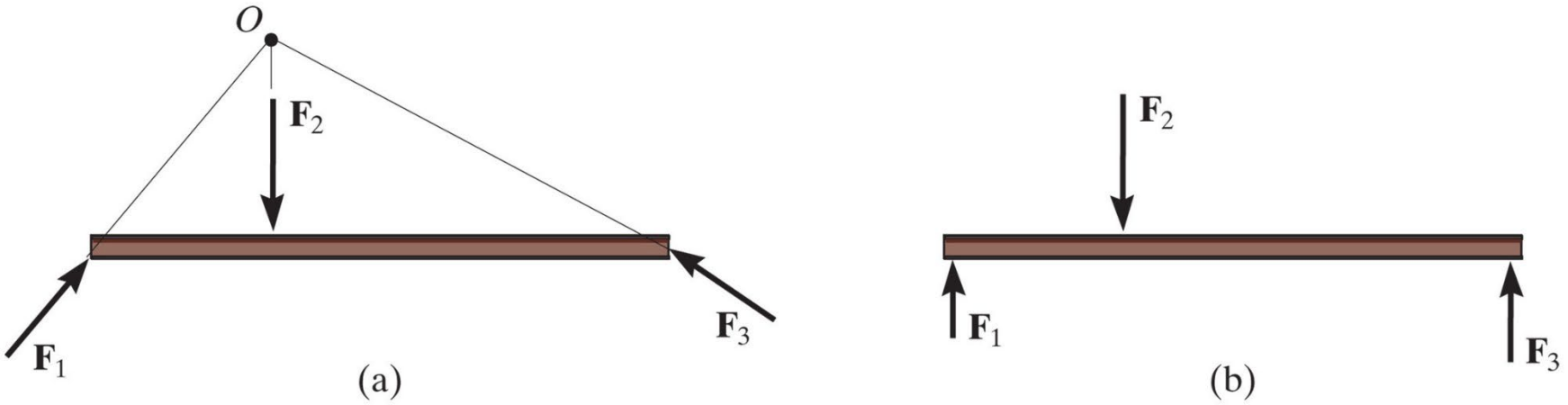




Three-force members

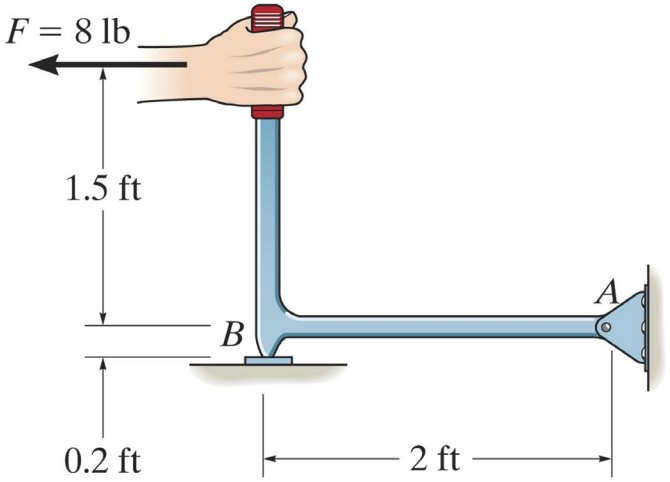
As the name implies, three-force members have forces applied at only three points.

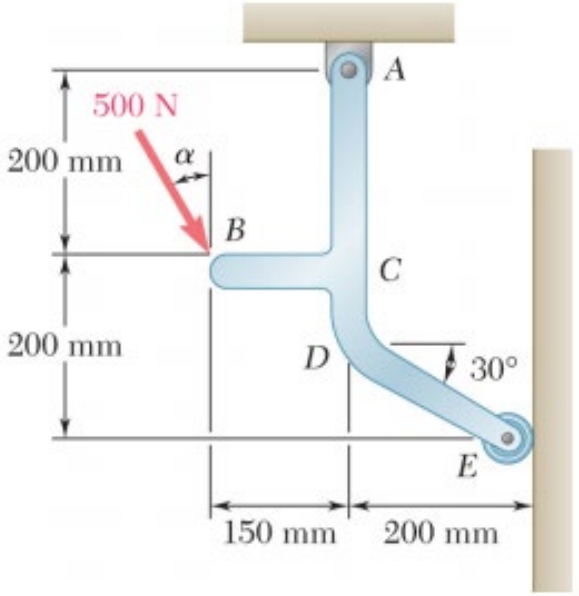
Moment equilibrium can be satisfied only if the three forces are concurrent or parallel force system

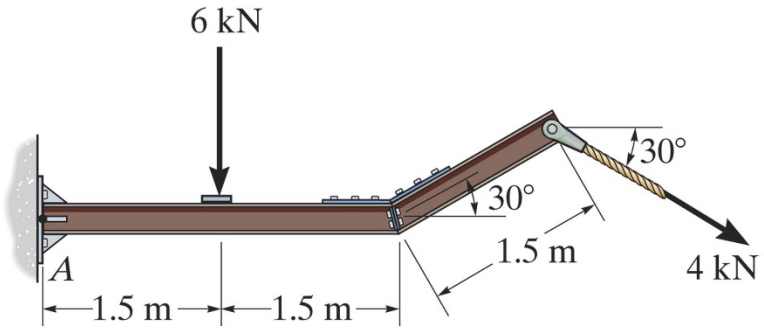


Three-force member

Examples


F = 8 lb
1.5 ft
B
A
0.2 ft
2 ft


A
500 N
200 mm
α
B
C
200 mm
D
30°
E
150 mm
200 mm


6 kN
30°
30°
1.5 m
4 kN
A
1.5 m
1.5 m

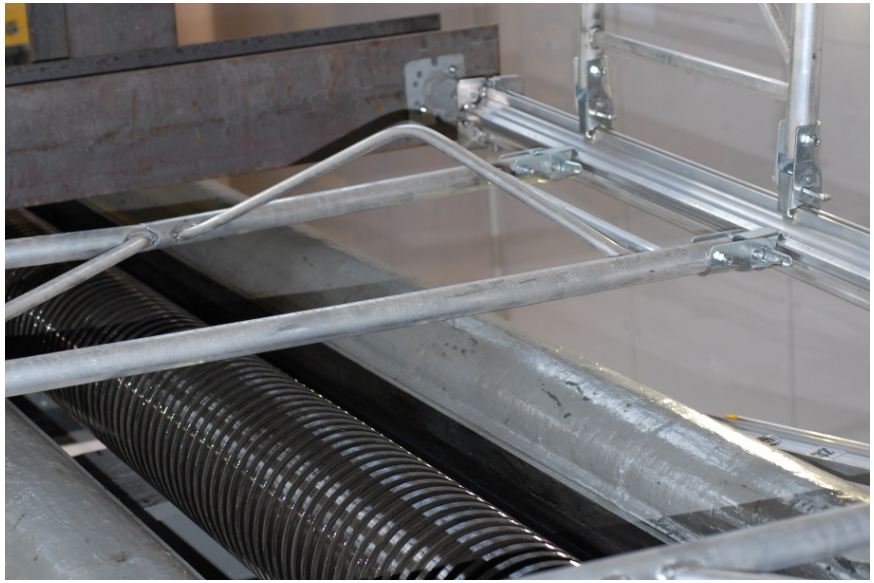
Chapter 6: Structural Analysis

Simple trusses

Trusses are commonly used to support roofs.

A more challenging question is, that for a given load, how can we design the trusses' geometry to minimize cost?

Scaffolding



An understanding of statics is critical for predicting and analyzing possible modes of failure.

Buckling of slender members in compression is always a consideration in structural analysis.

Simple trusses

Truss:

- Structure composed of slender members joined together at end points
- Transmit loads to supports

Assumption of trusses

- Loading applied at joints, with negligible weight. Members joined by smooth pins

Result: <u>all</u> truss members are

and therefore the force acting at the end of each member will be directed along the axis of the member