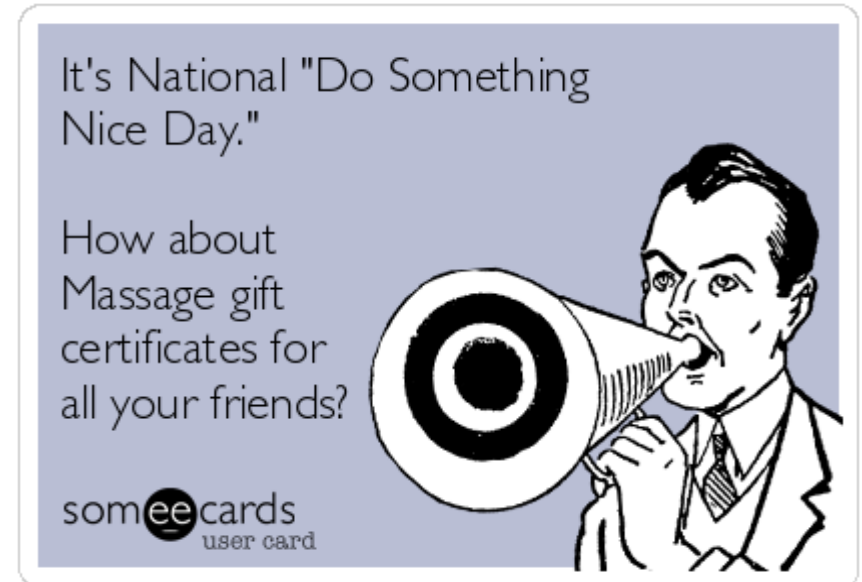# Announcements

- Quiz 3 next week – have you done your PL HW?

❑ Upcoming deadlines:

- Friday (10/5) – Today!
  - Written Assignment
- Tuesday (10/9)
  - PL HW
- Friday (10/12)
  - Written Assignment

It's National "Do Something Nice Day."

How about Massage gift certificates for all your friends?

someecards
user card

Objectives

- 3D rigid body equilibrium example

- Structural analysis – Truss

    - Truss members in tension and compression

    - Method of joints

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

4 ft

1.25 ft

1.25 ft

2 ft

1.5 ft
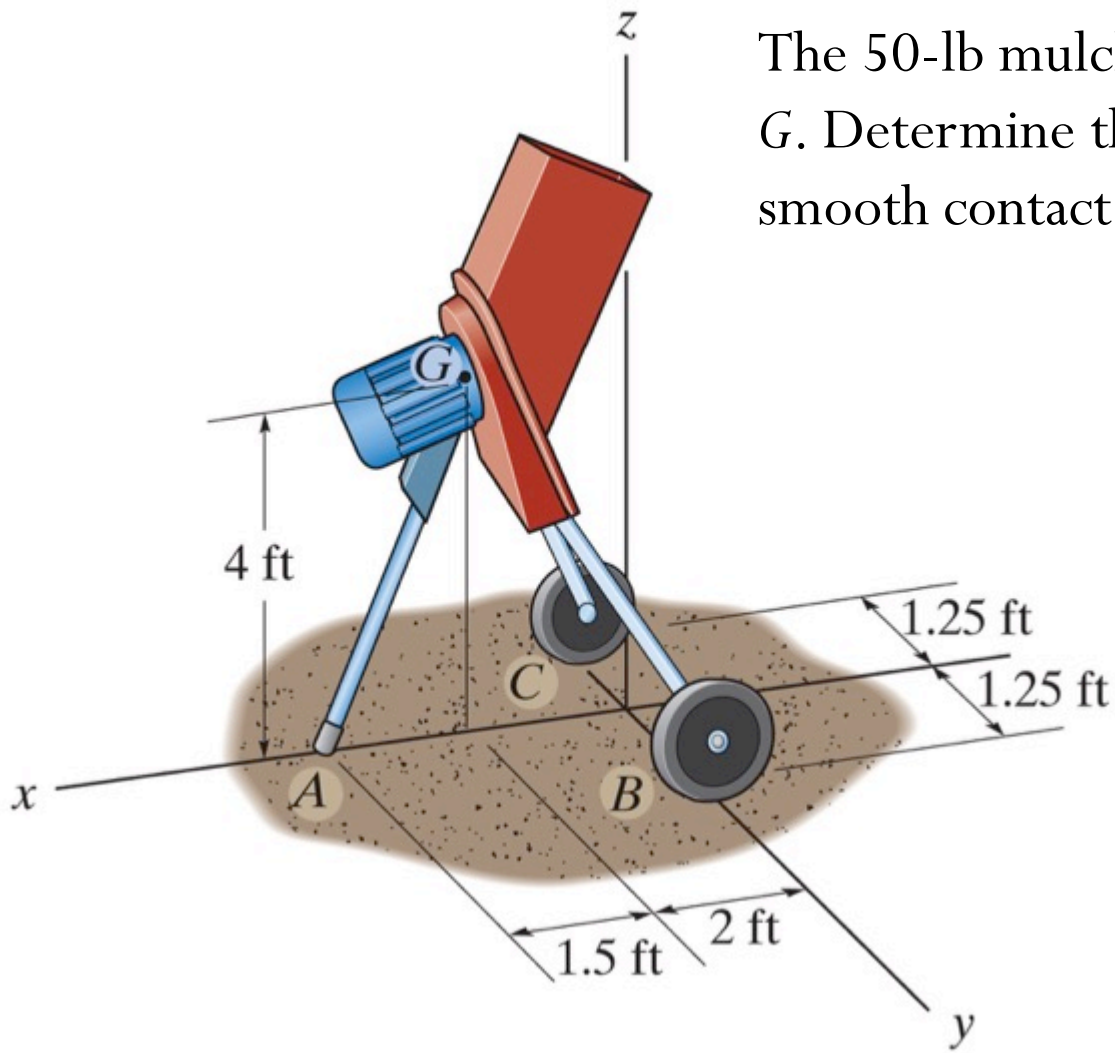
Chapter 6: Structural Analysis

Goals and Objectives

- Determine the forces in members of a truss using the method of joints

- Determine zero-force members

- Determine the forces in members of a truss using the method of sections

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
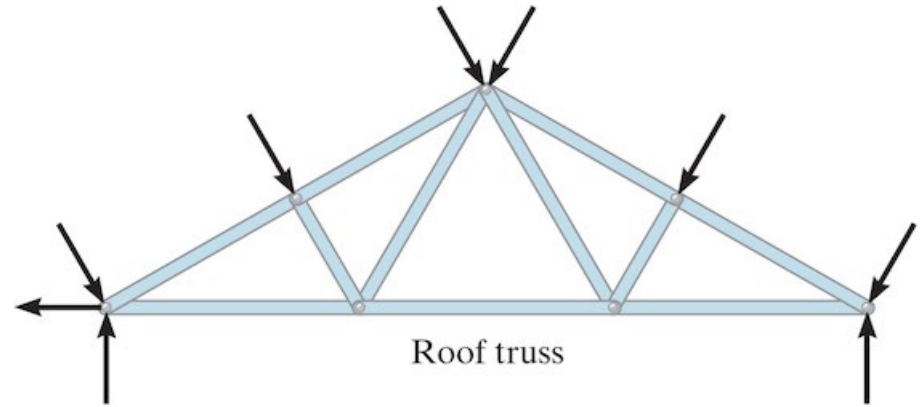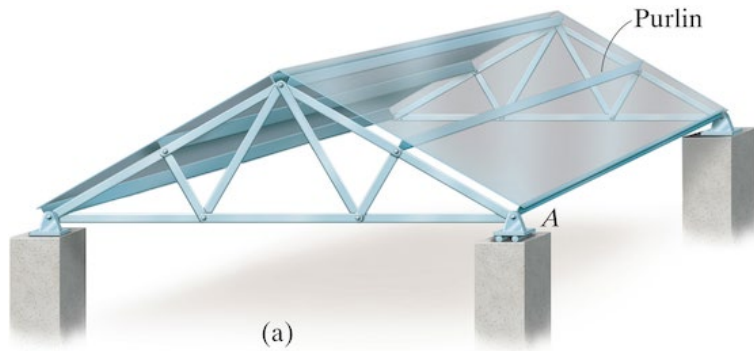- Transmit loads to supports

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
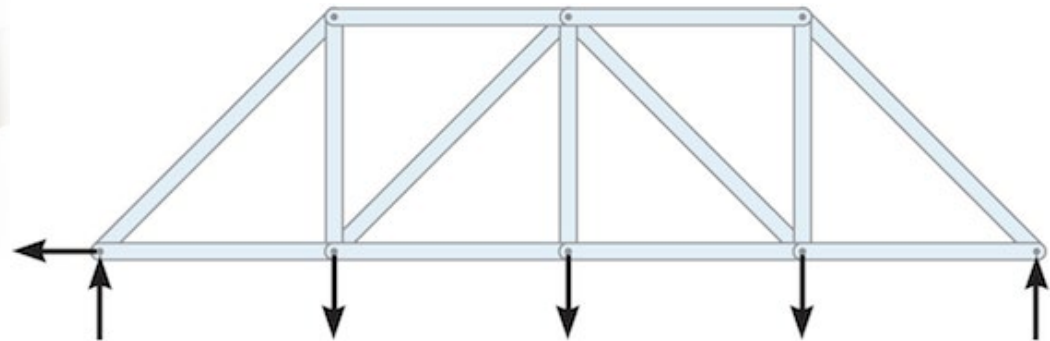

Purlin

(a)

Deck
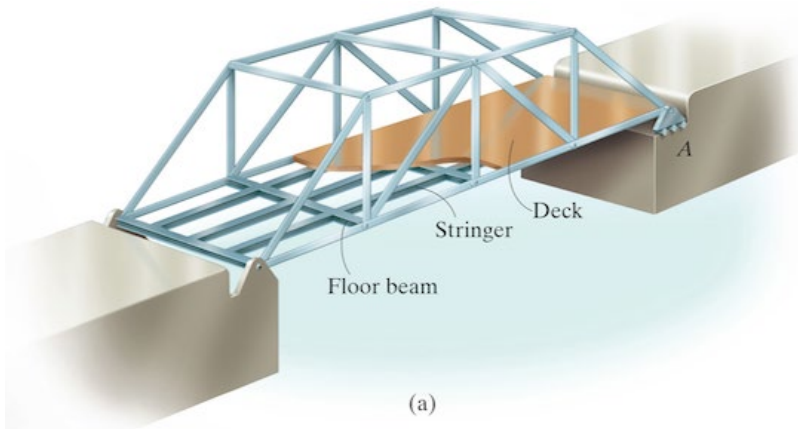Stringer
Floor beam
A
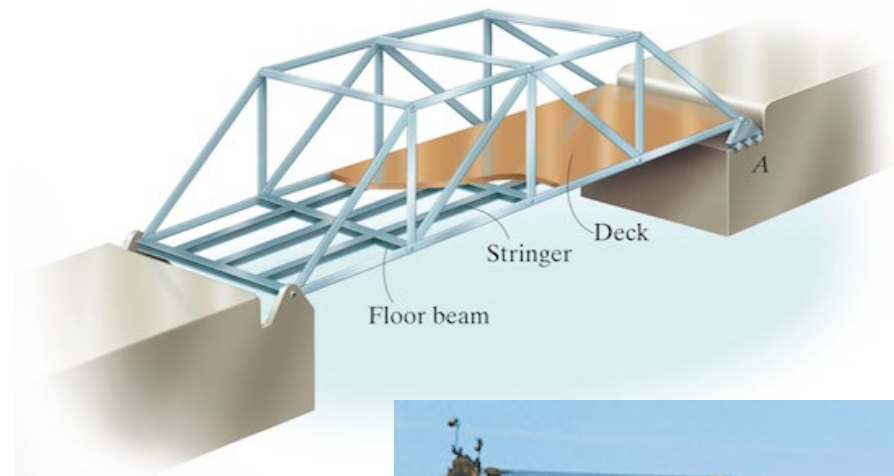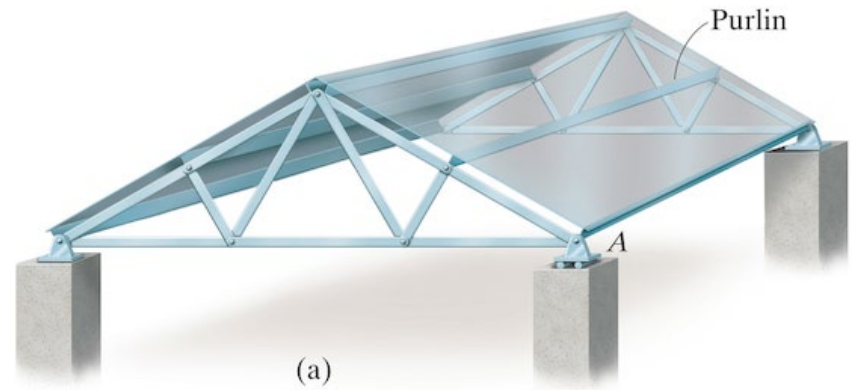
Roof trusses

Load on roof transmitted to purlins, and from purlins to roof trusses at joints.

Bridge trusses

Load on deck transmitted to stringers, and from stringers to floor beams, and from floor beams to bridge trusses at joints.

Truss joints

- Bolting or welding of the ends of the members to a gusset plates or passing a large bolt through each of the members

- Properly aligned gusset plates equivalent to pins (i.e., no moments) from coplanar, concurrent forces

- Simple trusses built from triangular members
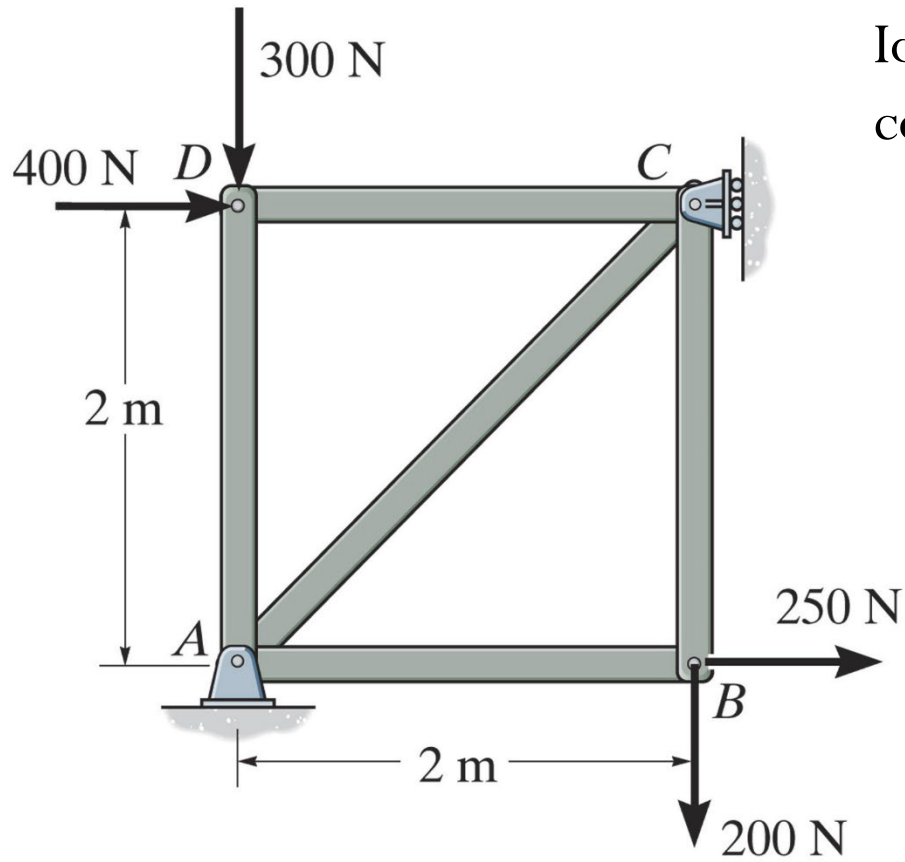

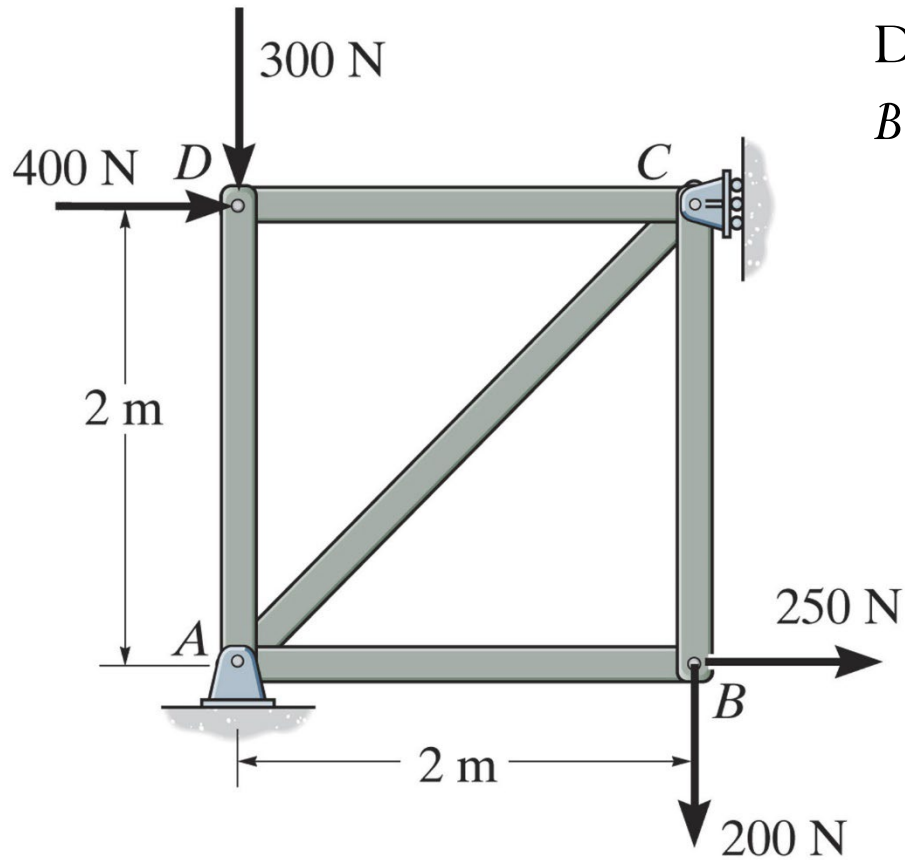Gusset Plate
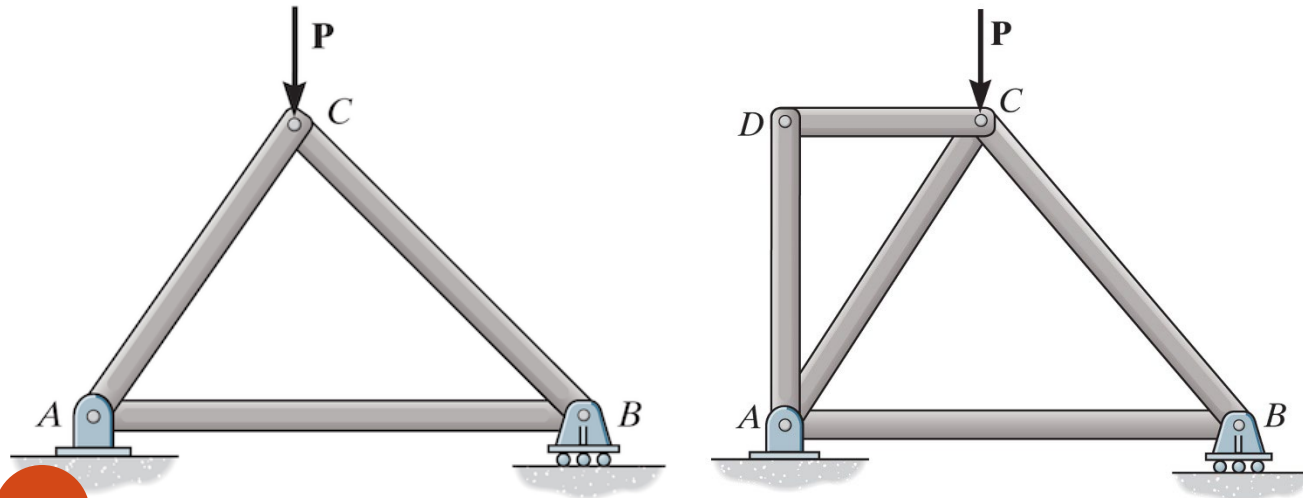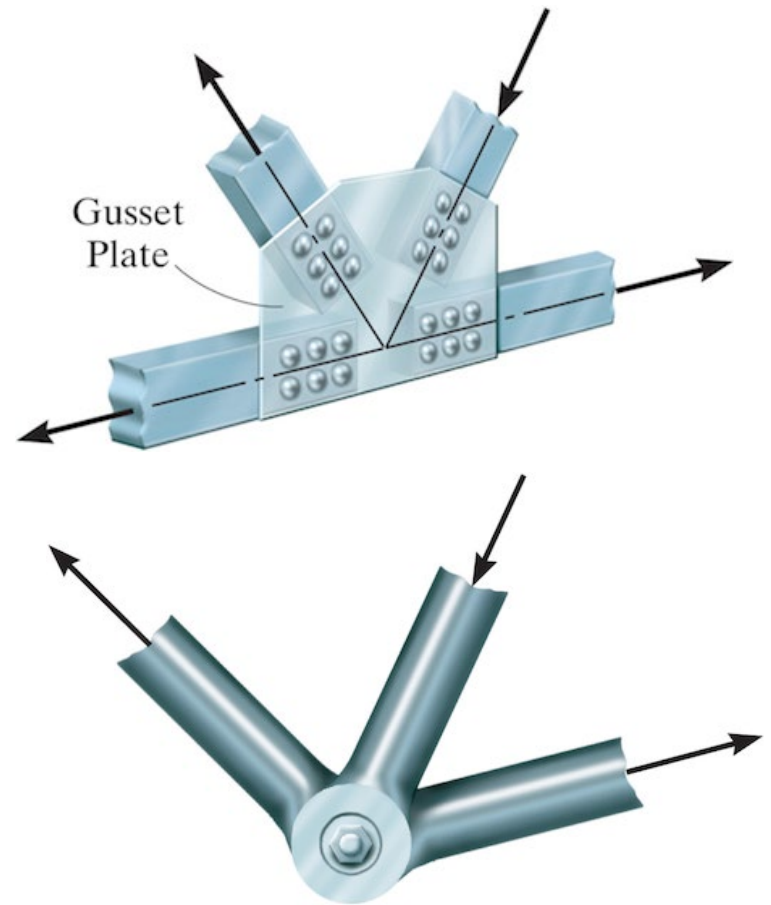
Method of joints

- Truss is in equilibrium ONLY if ALL individual pieces are in equilibrium

- Truss members are two-force members: equilibrium satisfied by equal, opposite, collinear forces
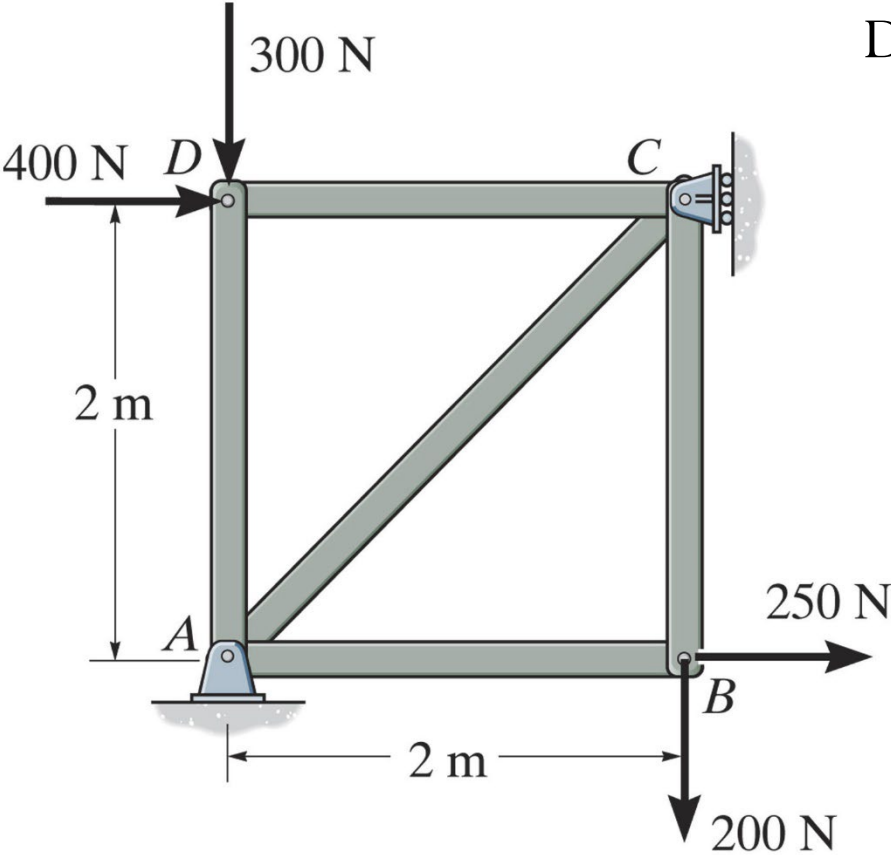
Procedure for analysis:

300 N

400 N D

C
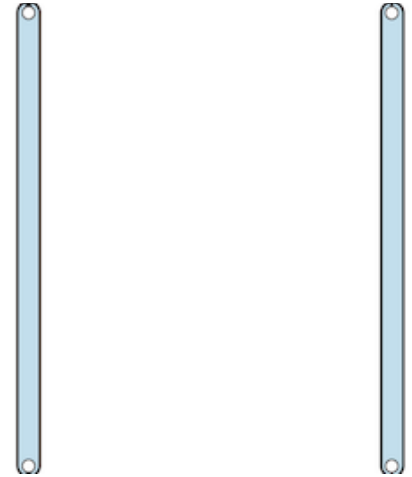
Identify the number of force components acting on pins A and B.

2 m

250 N

A

B

2 m

200 N

Determine whether members *AB* and *BC* are in tension or compression.

Determine the force on members *AC*.

300 N

400 N *D*

C

2 m

250 N

A

B

2 m

200 N

16

600 lb

800 lb

B

C

60°

4 ft

A

D

3 ft

Find the forces in member BD.

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