Tutorial 11 (Part A)
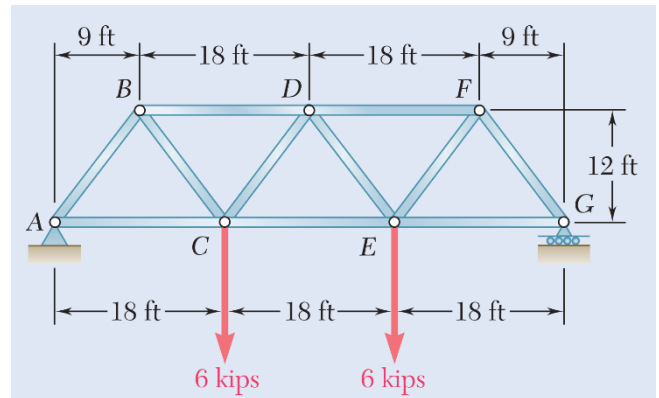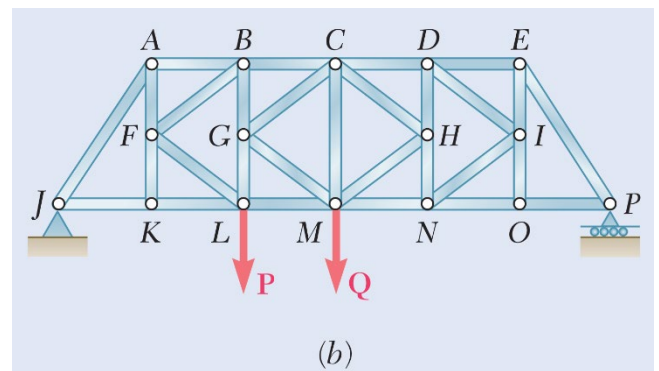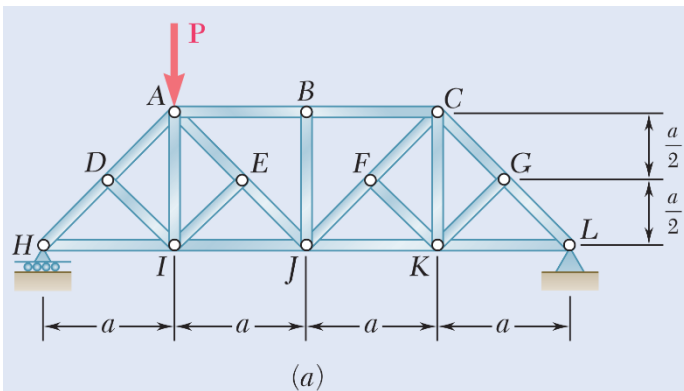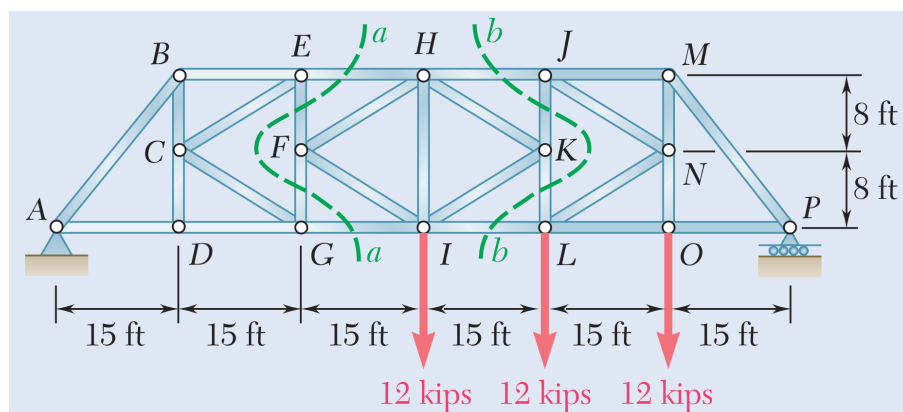
1) Determine the force in each member of the Warren bridge truss shown. State whether each member is in tension or compression

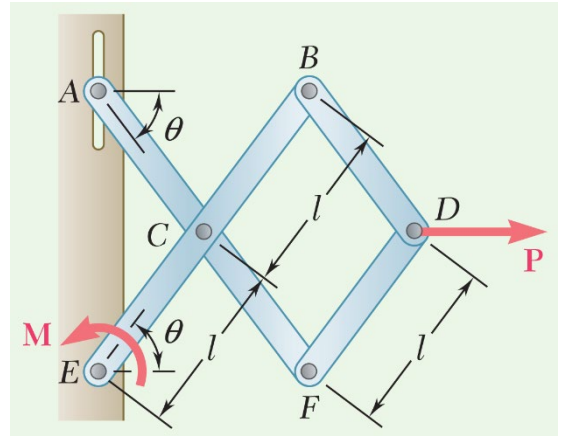

2) For the given loading, determine the zero-force members in each of the two trusses shown

(a)

(b)

3) Determine the force in members EH and GI of the truss shown.
(*Hint*: Use section aa.)

4) Using the method of virtual work, determine the magnitude of the couple **M** required to maintain the equilibrium of the mechanism shown

5) A 10-kg block is attached to the rim of a 300-mm-radius disk as shown. Knowing that spring BC is unstretched when $\theta = 0^o$, determine the position or positions of equilibrium, and state in each case whether the equilibrium is stable or unstable.
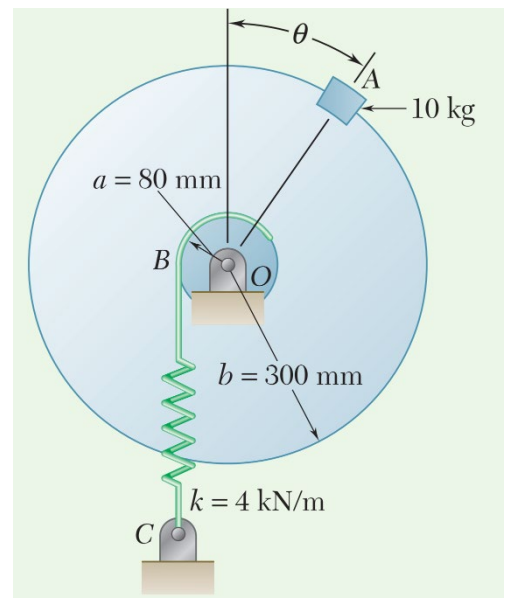
Set 12 B: No submission required

2 kN

2 kN

2 kN

2 kN

1 kN

D

B

F

1.167 m

1 kN

3 m

A

C

E

G

H

|← 4 m →|← 4 m →|← 4 m →|← 4 m →|
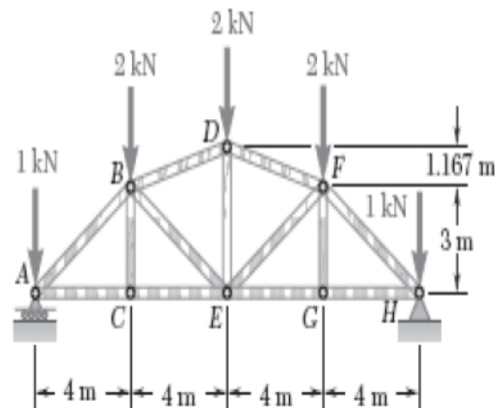
PROBLEM 6.9

Determine the force in each member of the Gambrel roof truss shown. State whether each member is in tension or compression.

$F_{AB} = 5$ kN   C ◀ $F_{CE} = 4$ kN   T ◀ $F_{DE} = 240$ N   T ◀

$F_{AC} = 4$ kN   T ◀

$F_{EF} = 200$ N   C ◀

$F_{DF} = 4$ kN   C ◀ $F_{EG} = 4$ kN   T ◀

$F_{FG} = 0$ ◀

$F_{BD} = 4$ kN   C ◀

$F_{FH} = 5$ kN   C ◀

$F_{GH} = 4$ kN   T ◀

$F_{BE} = 200$ N   C ◀
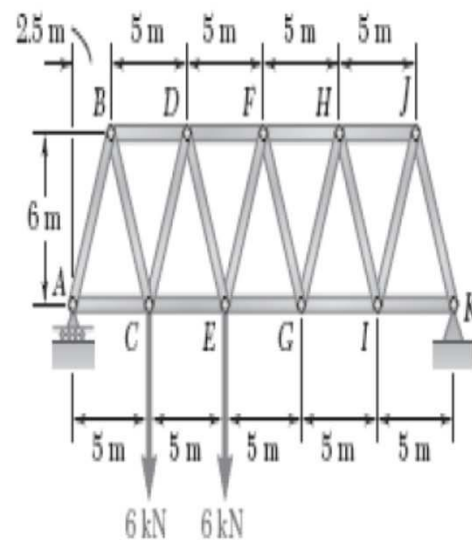
PROBLEM 6.45

A Warren bridge truss is loaded as shown. Determine the force in members CE, DE, and DF.

$F_{DF} = 9$ kN C ◄

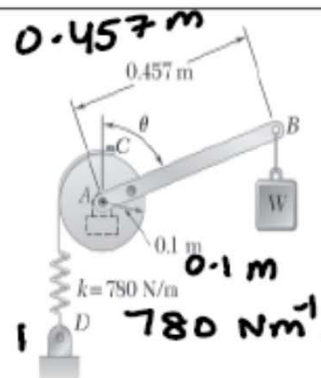$F_{DE} = 2.6$ kN T ◄

$F_{CE} = 8$ kN T ◄
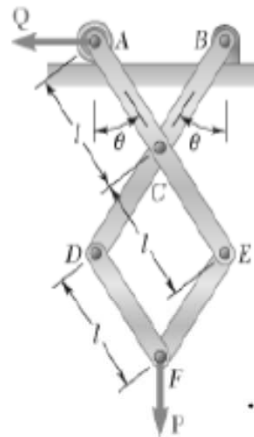
PROBLEM 10.14   Use PVW

The mechanism shown is acted upon by the force P; derive an expression for the magnitude of the force Q required to maintain equilibrium.

$$Q = \frac{3P \tan\theta}{2}$$

Weight of mechanism negligible

0.457 m

PROBLEM 10.76   Use PVW

A block of weight W is hung from member AB as shown. Neglecting the weight of AB and knowing that the spring is unstretched when $\theta = 20°$, determine the value of θ corresponding to equilibrium when $W = 6.6$ N. State whether the equilibrium is stable, unstable, or neutral.

0.1 m

780 Nm⁻¹.

Use PVW. $\theta = 31.6°$ ◀   ∴ Stable ◀