How are structures and machines just like chocolates????

Answer: _______________________________

LESSON 2: STATICS REVIEW I
INTERNAL FORCES AND MOMENTS
Wed 1/25/2017

LESSON OBJECTIVES
1. Name the unknown loading resultants (forces and moments) that may be present at a cut through a planar body or a three-dimensional body.
2. Solve internal resultants (forces and moments) acting within planar machines and structures by taking cuts and applying equilibrium.
3. Solve internal N, V, M for machines or structures when multiple free-body diagrams are needed.
4. Recognize two-force members and use this to simplify problems, knowing that internal shear and moment must be zero in a straight two-force member.

STATIC STRATEGIES FOR INTERNAL N, V, M
1. You can only solve three unknowns on an FBD, so you cannot solve N, V, M unless all other unknowns have been solved, first.
2. You can only solve three unknowns on an FBD, so when multiple free body diagrams are needed, solve the FBD with three unknowns, first.
3. Look for 2FM’s: a 2FM must have the internal forces in the same direction as the member.
4. Show force components on the FBD.
5. Consider alternate x’ or y’ axes, if it makes the math simpler.

IN-CLASS EXAMPLES

1. Problem: Determine the internal unknowns on a cross-section that is midway between A and C.

![Diagram of a beam with loads and dimensions]

2. Problem: P=1kN. Determine N, V, M

![Diagram of a T-shaped member with dimensions]

CLASS TONIGHT -- Room 117: Mechanical testing of steel, aluminum, concrete, and wood in compression and tension. You do not need to prepare anything, in advance. However, this class will be split into two sessions:

- Session 1: 6:30pm to 7:30pm – one-half of the class (refer to sign-up sheet)
- Session 2: 7:30pm to 8:30pm – one-half of the class (refer to sign-up sheet)

HOMEWORK (DUE FRIDAY)
1. Determine the magnitude of internal bending moment that is present at the location of the 60 kip point load and specify whether this moment results in compression on the outside of the arch or on the inside of the arch (see below).

Given: A and B are pinned supports. C is a hinge (pinned connection).
2. Determine the internal N, V, and M (clearly indicate the sign of each) acting on the T-shaped cross section, subjected to the 10-kip load, shown.

3. Determine the internal N, V, and M acting on the cross section of the frame at point G and clearly indicate their signs. Given: the contact surface at E is smooth (i.e., no frictional force). Clearly indicate the signs of each with an icon that illustrates what the force or moment does.