Principles of Engineering Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Unit 2.1 – Statics – Study Guide Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_

Concepts

1.      Engineers create free body diagrams so that they can identify all forces acting upon a given body.

2.      The centroid of a cross-sectional area of a beam and its Moment of Inertia are important considerations for structure design.

3.      Scalar quantities include magnitude, while vectors include magnitude, direction, and sense.

4.      Forces acting at a distance from an axis or point attempt or cause an object to rotate.

5.      In a statically determinate truss, equations of equilibrium can be used to calculate external and internal forces.

Performance Objectives

It is expected that students will:

* Create free body diagrams of objects, identifying all forces acting on the object.
* Mathematically locate the centroid of a rectangle and a triangle.
* Locate the centroid of common beam cross-sectional areas using software.
* Calculate Moment of Inertia for a rectangular shape.
* Differentiate between scalar and vector quantities.
* Identify magnitude, direction, and sense of a vector.
* Calculate the X and Y components given a vector.
* Calculate moment forces given a specified axis.
* Use equations of equilibrium to calculate unknown forces.
* Use the method of joints strategy to determine forces in the members of a statically determinate truss.

Essential Questions

1.      Why is it crucial for designers and engineers to construct accurate free body diagrams of the parts and structures that they design?

2.      Why must designers and engineers calculate forces acting on bodies and structures?

3.      When solving truss forces, why is it important to know that the structure is statically determinate?

Vocabulary

Cable

Centroid

Compression Force

Concurrent Force Systems

Cross-Sectional Area

Direction

Fixed Support

Flange

Free Body Diagram

Gusset

Joint

Magnitude

Member

Method of Joints

Moment

Moment of Inertia

Newton’s First Law

Newton’s Second Law

Newton’s Third Law

Pinned Support

Planar Truss

Resultant Force

Roller Support

Scalar

Sense

Simple Truss

Static Equilibrium

Statically Indeterminate

Structure

Tension Force

Vector Quantity