Unit 3 – Forces, Torque, Materials, and Simple Machines

You should be able to test on the following topics.

1. You should be able to define correctly in your own words:
    a. Torque
    b. Force
    c. Newton's 1st Law
    d. Newton's 2nd Law
    e. Newton's 3rd Law
    f. Momentum
    g. Impulse
    h. Center of mass
    i. Efficiency in terms simple machines
    j. Mechanical Advantage
    k. Difference in IMA vs AMA

2. Should be able to design and test a structure using 3D Modeling

3. Be able to take an idea from concept to design and then 3D print using SCad and other 3D modeling software

4. Build a basswood bridge from a printed design. It will be assessed on:
    a. Accuracy of measurements
    b. Accuracy of joint cuts
    c. Cleanness glue
    d. Overall efficiency

5. You should be able to explain the 6 simple machines and calculate their efficiency and mechanical advantage
    a. Lever
    b. Incline Plane
    c. Wedge
    d. Screw
    e. Wheel and Axle
    f. Pulley

6. You should be able to calculate
    a. Displacement
    b. Speed
    c. Velocity
    d. Acceleration
    e. Force = mass x acceleration
    f. Torque = Force x distance
    g. Momentum = mass x velocity
    h. Impulse = Force x time = Δ Momentum
    i. Calculate

7. You should be able explain
    a. Impact of wood grains on the strength of a structure.
    b. Properties of materials that effect its strength.
    c. Different type of wood joints that can be used and their impact on the structure.
    d. Contraction vs Tension in members
    e. Requirements to create stable structures
    f. Importance of triangles in structural design
    g. Mechanical Energy forms that must be considered with building structures.