**Aerospace Study Guide**

**Lesson 1.1**

1. Concept 1- Different types of early aircraft/inventors/advancements?

**Lesson 1.2**

1. Concept 1-Be able to identify the different parts of an airplane (create a drawing and label).
2. Concept 2-Center of gravity- know to calculate (see activity 1.2.2)
3. Concept 4-Atmospheric Conditions (see activity 1.2.4)- calculate pressure differential, air temperature calculation.
4. Concept 4- Know the layers of the atmosphere and how they impact the aircraft
5. Concept 4- Calculate air density
6. Concept 4- know the different Mach speeds.
7. Concept 5- Know the lift equation how to calculate lift
8. Concept 5- know how the angle of attack effects flight
9. Concept 5- know how to calculate drag
10. Concept 8- Gliders- know how they are able to fly long distance
11. Concept 8- know the differences between, yaw, pitch, and roll.
12. Concept 8- Know the difference between dynamic and static stability.
13. Concept 8- What is dihedral? Know the different types.
14. Concept 8- What is stalling during a flight?

**Lesson 1.3**

1. Concept 3- Know the different tools that are used for navigation (see activity 1.3.1)

**Lesson 2.1**

1. Concept 1- Know the different materials used on an aircraft
2. Concept 2- Moment of inertia principles/ how to calculate.
3. Concept 2- Modulus of elasticity principles/ how to calculate
4. Concept 2- Centroids, centroid location.
5. Concept 4- Know what composites are and their benefits
6. Concept 4- Different types of composites
7. Concept 4- Safety precautions with composites

**Lesson 2.2**

1. Concept 1- Newton’s Law of Motion
2. Concept 3- Types of engines that are used in aircraft.
3. Concept 3- Calculate thrust

**Lesson 2.3**

1. Concepts 1-4- how does flight affect the human body.( look at the PowerPoint: [Introduction to Flight Physiology and Human Factors](mk:@MSITStore:X:\2011%20PLTW%20Curriculum\AE_2011_Teacher_v1_1.chm::/Lessons/Unit_2/L2_3FlightPhysiology.pptx)**)**

**Lesson 3.1**

1. Concept 1- What is a galaxy, star, and the universe.
2. Know the order of the planets and which ones are gracious

**Lesson 3.2**

1. Concept 1- What is orbit and the different types, satellite?
2. Concept 1- Historical figures in orbital mechanics
3. What is eccentricity?
4. What is apogee and perigee
5. What is a semi major axis?
6. What is inclination?
7. What is the difference of potential and kinetic energy?
8. What is gravitational potential energy? How is it calculated?
9. How is kinetic energy calculated?

**Lesson 4.1**

1. Concept 2- Know the different types of fluid movement forms of alternative energy that can be harnessed. (see Beyond Aircraft powerpoint).

**Lesson 4.2**

1. Concept 1,4,5- How have unmanned space craft helped air, ground, maritime, and space environments?