11th Grade Aviation STEM Curriculum Materials – Semester 1

Unit 1 - Aviation Weather Theory
Lesson 1.B.1 Makeup of the Atmosphere

Build a Barometer Activity (per group)
- Empty, clear, 2-liter soda bottle, or equivalently sized clear container
- Food coloring
- Ruler
- Marker (permanent)
- Sticky Tack or “mounting putty”
- Clear plastic tube with a small diameter, approximate length of the bottle
- Tape (clear)
- Scissors or utility knife

Build a Hygrometer Activity (per group)
- Two identical spirit (liquid) thermometers that provide access to the “bulb” at the base of the liquid
- 1-liter bottle or milk carton
- Sturdy string
- J-cloth or equivalent water-absorbent, cotton material
- Electrical tape
- Scissors
Lesson 1.B.2 Atmospheric Circulation and Winds

Convection in Action (per group)
- Wide, heat safe glass container, such as a baking dish
- 8-12 plastic cups used to create a stand for the glass container
- 1 smaller (shorter) plastic cup to use as a candle stand
- Cool water
- 1 small candle
- Matches or lighter
- Metric ruler
- Food coloring
- Eye dropper
- Stopwatch

Uneven Heating (per group)
- 3 sheets (approx. 18–24") of white paper
- Flashlight
- Metric ruler
- Protractor
- Pencil

Coriolis Force Activity (per group)
- Circular paper disk
- Ruler or straight edge
- Pencil
- Push pin
- Cardboard backing

Summative Assessment (per class)
- Globe or world map
- Yarn and tape

Lesson 1.B.3 Clouds and Precipitation

Dew Point and Moisture Activity (per group)
• Cup (metal is ideal, but glass or hard plastic works)
• Cup (any material) of ice-cold water
• Warm water (8 ounces at about 85 °F)
• Syringe (any type)
• Thermometer

Create a Cloud in a Bottle Activity (per group)
• Water
• Transparent plastic bottle with lid
• Matches

Lesson 1.B.5 Thunderstorms
“Make Your Own Lightning” Activity (per group)
• Rubber gloves (one per student)
• Plastic fork
• Aluminum foil
• Wood or plastic cutting board
• Piece of Styrofoam, such as a plate or rubber balloon (inflated)
• Wool cloth (or hair on a student’s head)

Unit 3 - Airport Operations
Lesson 3.A.2 Airport Markings and Signs
Build Your Own Airport Activity
• One gray foam sheet, 12” × 18”
• One black foam sheet, 12” × 18”
• Two pieces white foam board, 20” × 30”
• One roll white craft tape, 1/4” wide
• One roll yellow craft tape, 1/4” wide
• Orange post-it notes
• Toothpick or other craft stick about 2–3” long
• Clear tape
• Three pieces of green felt
• One pack, white 1” numbers
• Ruler
• Tape measure or yard stick
• Scissors
• Exacto knife or box cutter
• Tacky glue
• 17 magnets
• 17 washers

Lesson 3.A.3 Airport Lighting
Finding Airport Lighting Activity (per group)
• Colored adhesive dots (red, green, white, blue, amber/yellow)
• Airport model built in Lesson 3.A.2

Build a Glide Slope Indicator Activity (per group)
• Sheet of paper
• 8 sticky note pads
• Protractor
• 24 inches of string
• Black marker

Lesson 3.A.4 Traffic Patterns
Planning for the Traffic Pattern (per group)
• Satellite Imagery (for example, Google Earth)
• Digital FAA products (https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/)
• AirNav (http://www.airnav.com/airports/)
• SkyVector (https://skyvector.com/)

Identifying Traffic Patterns (per group)
• Pad of sticky notes
• Black marker
• Runway and labels from Student Activity 1

Flight Simulation
• Computer with flight simulation software or flight simulator
• Joystick or yoke
• Optional: Throttle quadrant, rudder pedals, additional monitors
• Masking tape may be used for a non-electronic simulation.
Lesson 3.A.5 Communications
Student Controllers and Student Pilots (per class)
• Large, flat area (parking lot, football field, gymnasium, wide hallway)
• Sidewalk chalk, masking tape, or spray paint
• Measuring tape

Lesson 3.A.6 Air Traffic Control
Marco Polo (per group)
• Narrow-focus flashlight or laser pointer
• Meter stick
• 20 strands of yarn (24”/strand)
• 1 roll of strong tape
• 36” × 36” piece of cardboard, cut into the shape of a mountain

Responding to Traffic Calls (per team)
• Bright colored chalk or tape
• 3 sheets of cardboard or blank paper, 8 ½” × 11”

Lesson 3.A.8 Airport Safety and Pilot Considerations
Warm-Up (per class)
• Table
• Large piece of white paper
• Model airplane
• Classroom props (to be used as “targets” in students identifying traffic)

How Close Can They Follow? (per class)
• Table
• 4 model airplanes, ranging in size

Create Your Own Vortices (per group)
• 1 roll of aluminum foil
• 1 meter stick
• 2 cones (any sturdy material), one 6” tall and the other 12” tall
• 2 model airplanes of different size
• 1 roll of Scotch tape

Unit 4 - Introduction to Aeronautical Charts and Airspace
Lesson 4.A.1 Introduction to Aeronautical Charts

Chart the Globe (per group)
- Beach ball, balloon, pumpkin, or other round object to model a globe
- Markers appropriate for marking the “globe” material
- Tailor’s cloth tape measure, or string and ruler

Chart Symbol Matching (per group)
- 24 index cards, cut in half
- Black marker or other writing utensil

Lesson 4.A.1 Introduction to the National Airspace System

Build Your Own Airspace (per group)
- 1 Foam board: 0.9 in. × 11.8 in. × 17.8 in.
- 1 Foam cutter (https://www.michaels.com/floracraft-cleankut-foam-cutter/10596502.html) or X-Acto knife
- Tracing paper
- Hot glue gun and glue
- 1 sectional chart showing Class B airspace or “Sporty’s Sectional Training Chart: VFR Sectional Chart Segment + Legend”

Unit 5 - Post-Course Exam Review

Lesson 5.A.1 Review or Project
- Sticky Notes