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
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/dafd/search/)
- 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
11th Grade Aviation STEM Curriculum Materials – Semester 2: PILOT

Unit 6 - Navigation: Plotting, Pilotage, and Paperwork

Lesson 6.B.1 Makeup of the Atmosphere
- Sporty’s Sectional Training Chart for each student or pair of students
- Local Sectional Aeronautical Charts for each student or pair of students
- VFR Sectional Plotter with Rotating Azimuth Wheel
- Ruler for each student or pair of students
- Protractor for each student or pair of students

Flight Simulation Activity: Student Activity 7
- Computer with flight simulation software or flight simulator
- Joystick or yoke
- Optional: Throttle quadrant, rudder pedals, additional monitors

Lesson 6.B.2 Which Way to Steer?
- VFR sectional chart (local area, Memphis, or any)
- Aeronautical chart plotter with rotating azimuth wheel
- Box fan and balsa gliders

Solving the Triangle Activity: Student Activity 4 (per student)
- Paper
- Protractor
- Straightedge or ruler

Flight Simulation Activity: Student Activity 6 (per group)
• Computer with flight simulation software or flight simulator
• Joystick or yoke
• Optional: Throttle quadrant, rudder pedals, additional monitors

Wind Correction Diagramming Activity: Student Activity 7 (per group)
• Card stock
• Ruler
• Protractor
• Tape
• Scissors

Lesson 6.B.3 Flight Computers
• VFR sectional aeronautical chart (any area is suitable, but one covering the local area is preferable)
• Aeronautical chart plotter with rotating azimuth wheel
• E6-B manual flight computer

Flight Simulation Activity: Student Activity 3
• Computer with flight simulation software or flight simulator
• Joystick or yoke
• Optional: Throttle quadrant, rudder pedals, additional monitors

Lesson 6.C.1 Plotting Your Course
• VFR sectional aeronautical chart (any area is suitable, but one covering the local area is preferable)
• Plotter
• E6-B manual flight computer

Lesson 6.C.2 Helpful Documents
• E6-B Flight Computer (manual or electronic)
• VFR sectional charts for local area (digital or paper)
• Chart Supplement for local area (digital or paper)
• Plotter

Lesson 6.C.3 VOR and GPS Navigation
• VFR sectional aeronautical chart (any area is suitable, but one covering the local area is preferable)
• Chart Supplement
• Protractor
• Pencil, ruler indicating centimetres
Unit 7 - Aircraft Performance
Lesson 7.A.1 Weight and Balance
  • Calculator
Student Activity 2
  • 5 whiteboards or pieces of chart paper
  • Markers
Lesson 7.A.2 Density Altitude
  • E6-B Flight Computers

Unit 8 - Aeromedical Factors: Am I Safe to Fly?
Lesson 8.B.1 It's Getting Harder to Breathe
  It Depends on Oxygen: Student Activity 1 (per group)
  • Freestanding candle
  • Two large drinking glasses, Mason jars, or similar
  • Matches or lighter
  • Dry ice and insulated gloves; or
  • Baking Soda (2 tablespoons)
  • Vinegar (1 cup)
Lesson 8.B.2 Your Eyes are Deceiving You
  • Quarters
  • Tape
Student Activity 3: Runway Illusions (per group)
  • Camera (cell phone camera okay)
  • Tripod
  • Set of 3 paper runways
  • You may print out the images in the PDF titled 3runwaywidths, or you may create your own.
  • Tape
  • Wedge
Student Activity 4: Runway Illusions Simulator Scenarios
  • Computer with flight simulator software or flight simulator
  • Joystick or yoke
  • Optional: Throttle quadrant, rudder pedals, additional monitors
Student Activity 5: How Do You See It? (per student)
• 10 index cards
• Pens or markers

Lesson 8.B.3 Disorientation and Motion Sickness

Disorientation and Motion Sickness Teaching Aid 1
• Chair with rotating seat, similar to an office chair
• Blindfold or sleeping eye mask
• Ginger candies
• Peppermint candies
• Small paper bags, or immediate access to a trash can

Disorientation and Motion Sickness Teaching Aid 2
• 1 gelatin ring mold or tube cake pan
• 2 metal washers (⅜” diameter hole)
• 1 plastic soft drink straw
• 1 wooden craft stick
• 1 hot glue gun and appropriate glue stick
• 1 paper clip
• 1 utility knife
• 1 “Lazy Susan” turntable
• Water to fill gelatin ring mold

Unit 10 - Private Pilot Projects
Lesson 10.B.1 Career Portfolio Development

Portfolio Materials (for each student who has not already created a portfolio)
• Three-ring binder
• Tabs (as needed per student based on table of contents)
• Plastic or vinyl sheet protectors
• Access to computers, printers, and scanners for the creation of portfolio materials