

To earn the Air-Rangers Discoverer rating, you must complete the requirements listed below. Note: To complete the requirement steps, you will need to obtain (or have access to) the following items.



- *Aviation Fundamentals*, or *Private Pilot Manual*
- Course Plotter
- E6B Computer
- VFR Section chart of your area (possibly a WAC and VFR Terminal chart also)

REQUIREMENTS



1. Earn the Weight and Balance merit:
 - Study the appropriate chapter in *Aviation Fundamentals/Private Pilot Manual* (denoted in the *Air Rangers Handbook*).
 - Answer the eight questions about Weight and Balance listed in the *Air Rangers Handbook*.
2. Earn the Airplane Performance merit:
 - Study the appropriate chapter in *Aviation Fundamentals/Private Pilot Manual* (these are denoted in the *Air Rangers Handbook*).
 - Answer the seven questions about airplane performance listed in the *Air Rangers Handbook*.
3. Earn the Flight Planning merit:
 - Study the appropriate chapters in *Aviation Fundamentals/Private Pilot Manual* (these are denoted in the *Air Rangers Handbook*).
 - Plan a flight of more than 200 miles, including the elements listed in the *Air Rangers Handbook*.
 - Write a report on the topic listed in the *Air Rangers Handbook*.

ELECTIVES

Earn one additional Royal Rangers merit *from another special-interest group* that you have not yet earned.

SPIRIT CHALLENGE

Successfully complete one of the [Spirit Challenge steps](#).

Congratulations on earning your Air-Rangers Discoverer rating! You can now wear the Discoverer pin on your Challengers T-shirt, letter jacket or hat and begin working on your Air Rangers Navigator Rating.

AIR RANGERS MERIT: WEIGHT AND BALANCE

1. Study chapter 8 in the Jeppesen Private Pilot Manual:

a. Airplane Performance, Section B - Weight and Balance.

2. Explain what the "CG" of an aircraft (or any object) is.

3. The wings of any aircraft can lift a limited amount of weight. Name 2 factors which limit the total amount of weight an aircraft can carry.

a. _____

b. _____

4. The aircraft manufacturer publishes the maximum takeoff weight and the empty weight of an aircraft. What is the difference between these two weights called?

5. In aircraft weight and balance calculations, the moment equals weight times arm. Explain what is meant by arm, or moment arm.

6. In aircraft moment arm calculations, balance is achieved around what axis (or attitude) of the aircraft?

7. An aircraft can be safely flown only if the weight and balance fall with the "center of gravity envelope". Describe what the CG envelope is and what the vertical and horizontal units are on a GC envelope graph.

8. Obtain a loading graph or table and CG envelope graph for an aircraft. Calculate the weight and balance of the loaded aircraft with you and 1 of your friends aboard. Plot the CG on the envelope graph and decide if you could safely fly the aircraft, assuming full fuel tanks. (Attach to this worksheet)

9. Explain why loading a plane outside the envelope, either fore or aft, makes the aircraft unsafe and difficult to control.

AIR RANGERS MERIT: AIRPLANE PERFORMANCE

1. Study chapter 8 in the Jeppesen Private Pilot Manual:

Airplane Performance, section A - Predicting Performance.

2. Define the term Density Altitude. List the things that influence density altitude.

3. Describe which aircraft performance characteristics are affected by density altitude, along with the specific nature of the effect.

4. Describe how you would determine density altitude.

5. List the factors that affect takeoff and landing performance.

6. Define the term Crosswind Component. Describe how to determine safe aircraft operation for a given wind and aircraft.

7. Explain, as a pilot, how to avoid wake turbulence created by large aircraft, and why this is best.

8. Explain what factors should be considered when selecting cruise settings.

AIR RANGERS MERIT: FLIGHT PLANNING

1. Study chapter 8 in the Jeppesen Private Pilot Manual:
 - a. Airplane Performance, Section B - Weight and Balance.
2. Study the following chapters in the Jeppesen Private Pilot Manual:
 - a. Chapter 4 - Flight Environment, Section C - Aeronautical Charts.
 - b. Chapter 8 - Airplane Performance, Section C - Flight Computers.
 - c. Chapter 9 - Navigation, Section A - Pilotage and Dead Reckoning.
 - d. Chapter 5 - Communication and Flight Information, Section C - Sources of Flight Information.
3. Study Part V - Integrating Pilot Knowledge and Skills
 - a. Chapter 11 - Flying Cross-Country.
 - b. Chapter 10 - Applying Human Factors.
4. Plan an actual flight over 200 miles in length for yourself and a friend. Include the following elements, assuming your choice of aircraft, an operators manual, weight and balance information, etc. as required. Obtain actual weather information and fill out a flight plan. (Attach worksheets)
 - a. Aircraft Equipment Requirements
 - b. Course Plotting.
 - c. Filing a Flight Plan.
 - d. Fuel Management.
 - e. Landing Site Selection.
 - f. Weather.
 - g. Weight and Balance.
5. Write a report, at least 1 page in length, about 2 weather-related aviation accidents. Include information pertaining to possible or probable causes, inappropriate and/or appropriate pilot action, and prevention possibilities. (Attach to this worksheet)