Aviation

Name _____

Do the following two requirements (1-2):

_____1. Draw a diagram showing the four forces of flight and explain the following terms:

_____a. Stall speed

_____b. Mach number

_____c. Aircraft angles or axes of rotation: Pitch, Yaw and Roll

_____2. Explain Universal Time Coordinated (UTC), also called Zulu Time, and its uses in aviation.

Do one of the following requirements for an Aircraft Category (3-6).

_____3. Airplane - Using a diagram, picture, model, or airplane:

_____a. Identify and explain the following aircraft parts:

_____i. Main structural components: engine nacelle, engine cowling, fuselage, empennage, wings, vertical stabilizer, horizontal stabilizer, wind screen

_____ii. Controls: control yoke or control column, rudder pedals, throttle, flaps, slats, ailerons, elevator, trim tab, rudder

_____iii. Braking devices: ground spoilers, wheel brakes, thrust-reversers

_____b. Explain what V, H and T tail design configurations mean.

_____c. Explain what winglets are used for and why aircraft companies are now adding them to aircraft.

_____d. Describe what effect winglets have on any of the four forces of flight.

_____4. Glider - Using a diagram, picture, model, or glider:

_____a. Identify and explain the following modern sailplane parts:

_____i. Main structural components: fuselage, wings, empennage, horizontal stabilizer, vertical stabilizer, canopy

_____ii. Controls: control column or stick, rudder pedals, airbrakes, ailerons, flaps, elevator, rudder

_____iii. Landing gear: retractable main wheel, tail wheel, skids

_____b. Define aspect ratio, lift-to-drag ratio, and glide ratio. Explain how they are related.

_____c. Explain the benefits of glider training for aircraft pilots.

_____d. Research and report the glide ratios for the following:

_____i. Modern sailplane

_____ii. Hang glider

_____iii. Paraglider

_____iv. Boeing 767 (e.g. Gimli Glider)

_____v. Space Shuttle on approach

_____5. Rotorcraft - Using a diagram, picture, model, or rotorcraft:

_____a. Identify and explain the following helicopter parts:

_____i. Main structures: fuselage, cowling, tail boom, cockpit, landing skid

_____ii. Rotor system: main rotor, tail rotor, swash plate, engine, mast,

_____iii. Flight controls: cyclic, collective, throttle, anti-torque pedals

_____b. Describe Autorotation and explain when it is used.

_____c. List the three main flight controls of a helicopter and what movements they control.

_____d. Explain the purpose of a tail rotor and what rotorcraft movement it is controlling.

_____e. Learn why a CH-47 helicopter has counter rotating blades and why it doesn't need a tail rotor.

_____6. Lighter than Air - Using a diagram, picture, model, or hot air balloon:

_____a. Identify and explain the following hot air balloon parts and:

1. Main structures: Gondola, burners, load tapes, scoop/skirt, mouth/throat

_____ii. Control: turning vents, deflation port, ballast

_____b. Explain how hot air balloons become airborne.

_____c. Describe how the Montgolfier brothers contributed to balloon flight.

_____d. Describe the difference between a balloon and an airship.

Do two of the following Air Traffic Control requirements (7-12)

_____7. Tour an Air Traffic Control Tower and explain their purpose.

_____8. Listen to some live or recorded air traffic control dialog. Describe the type of information exchanged on the ground and in flight.

_____9. Explain the use of the following aircraft devices; cockpit voice recorder (CVR), emergency locator transmitter (ELT), and flight data recorder (FDR).

_____10. Explain what an aircraft N-number is and describe how to register one.

_____11. Look over an aeronautical chart for your area and do the following:

_____a. Identify the various types of airfields/airports, controlled airspace, obstructions, and geographical features.

_____b. Explain the term military operations area (MOA).

_____c. Locate the lines of latitude and longitude.

_____12. Describe or demonstrate how to file a flight plan.

Do five optional requirements in at least two different topics (13-41)

Airplanes

_____13. Explain how both the propeller and jet engines provide thrust for an aircraft. Explain the differences in the operation of piston, turbojet, turboprop, and turbofan engines.

_____14. Research and explain the importance of proper aircraft weight and balance and explain the following:

_____a. What can happen when the center of gravity (CG) is too far forward or aft.

_____b. Maximum takeoff weight (MTOW)

_____c. The consequences of exceeding MTOW

_____d. How ballast is used in aircraft

_____15. Research the specifications for the aircraft listed below. List the length, wingspan, gross weight, max ceiling, max range, max speed, and dates of production of each. Using lines to represent the lengths and wingspans, layout on paper a scaled representation of each.

_____a. Boeing 747-400

_____b. Lockheed P-38

_____c. Douglas DC-3

_____d. Cessna 208

_____e. Wright Flyer

_____16. List the types of landing gear available for each aircraft listed below. Identify which one can land on water with the proper landing gear installed.

_____a. Boeing 747-400

_____b. Lockheed P-38

_____c. Douglas DC-3

_____d. Cessna 208

_____e. Wright Flyer

Aviation Careers

_____17. Research pilot training and describe the following:

_____a. Requirements to become a pilot

_____b. Changes in pilot training due to the introduction of modern flight simulators and flight training software

_____c. What it means for a pilot to be instrument rated

_____18. Describe five career options in aviation.

_____19. Interview someone involved in a profession related to aviation (pilot, flight instructor, air traffic controller, flight attendant, aircraft technician, an engineer in the aerospace industry, etc.) Find out the age when they became interested in aviation. List what education and skills are required for their profession.

_____20. Talk with the operator of a flight school or with a flight instructor about the steps to earning a pilot's license and the different types of aircraft that fly in and out of their facility.

Aviation Fun

_____21. Fly in a commercial or general aviation airplane. Record the date, place, type of airplane and duration of your flight.

_____22. Fly in a glider. Record the date, place, type of airplane and duration of your flight.

_____23. Fly in a rotorcraft. Record the date, place, type of rotorcraft and duration of your flight.

_____24. Fly in a balloon or airship. Record the date, place, balloon or airship type and duration of your flight.

_____25. Plan a commercial air trip of at least 3,000 miles starting from the commercial airport nearest your home. Plan adequate time for layovers and changing planes en route.

_____a. Draw the approximate flight route of this trip on a map.

_____b. Using airline timetables, look up and record all arrivals and departures at the start, all connection points, and the final destination for this trip.

History

_____26. Visit an aviation museum. Record at least five different types of aircraft you see and the unique abilities of each.

_____27. Visit an aviation landmark, such as Kitty Hawk, and record the significance of what happened there, including the date, activities and people involved.

_____28. Read a book on some aspect of aviation history and explain what you learned.

_____29. Read a book about Wilbur and Orville Wright and their experiments to make the first airplane. Explain some key factors that led them to success.

_____30. Create and present a video or presentation to your troop, unit, or other group about the first successful airplane flight including the history, technical challenges, and impact to life.

_____31. Research the Gimli Glider incident. Explain what happened including the aircraft model involved, the unique experiences of the aircrew that aided them, the estimated glide ratio of the aircraft, and the findings, punishments and awards that resulted from the incident.

Learning to Fly

_____32. Take an introductory flying lesson with a certificated flight instructor.

_____33. Pilot a simulated flight in a flight simulator or training device.

_____34. Read the FAA guide: Conducting an Effective Flight Review (see References below) and conduct an XC Flight Plan Review as described on pp. 4-5 of the FAA guide using the checklist provided in Appendix 4 on p. 20.

_____35. Explain the following pilot safety methods:

_____a. PAVE checklist

_____b. IMSAFE checklist

_____c. DECIDE Analytical Decision-Making

_____36. Under supervision, perform a preflight inspection of a typical general aviation airplane, including:

_____a. Check the oil

_____b. Check the lights

_____c. Check fuel quantity

_____d. Check for water in the gasoline

_____e. Clean the windscreen

_____37. Tour a cockpit or using a poster or diagram of a cockpit, identify and explain the functions of the six primary flight instruments: airspeed indicator, artificial horizon, altimeter, turn coordinator, heading indicator, and vertical speed indicator.

Mentoring

_____38. Organize and lead a paper airplane-flying contest for a younger unit. Assist the Trailmen in making their paper airplanes. Possible contests include: longest flight, longest hang time, straightest flight, greatest stunt, and aircraft carrier landing (inside a rectangle marked with tape on the floor).

_____39. Teach aviation basics to a younger unit or patrol including:

_____a. The four forces of flight

_____b. The Wright brothers, the Wright Flyer, and the first successful flight

_____c. Where the Wright Flyer is today

_____40. Organize and lead a paper airplane design and test session for a younger unit. Assist the Trailmen in making and testing a variety of basic and inventive paper airplane configurations such as ring wing, helicopters and basic gliders for aerobatic loops or turns.

_____41. Explain basic aircraft structures to a younger unit. Guide them through drawing their own airplane design. Help them label the following:

_____a. Fuselage, wings, wind screen, and landing gear

_____b. Empennage or tail assembly, vertical and horizontal stabilizers

_____c. Propeller(s) or jet engine(s)

References

FAA Guide: *Conducting an Effective Flight Review*, Revised November 2013. Available at: <www.faa.gov/pilots/training/media/flight_review.pdf>

Trail Badge Mentor Signature **Date**