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A. Complex and High-Performance Endorsements

Pursuing either the **Complex** or **High-Performance** endorsements is achieved by a combination of:

- Ground school teaching
- In flight training and assessment
- Depth of knowledge assessment (these quizzes)

How to use this document:

- This document can be used as a quiz.
- Used to assist in validating the ‘depth of knowledge’ portion required for each endorsement.
- Used as a checklist to ensure topics are covered during training toward each endorsement.

Note: These endorsements are not based on a specified number of hours, or a specific number of flights. It is at the discretion of the Flight Instructor to determine achievement.

Note: This document is not to replace ground school/training but can be an added resource for guiding the growth of knowledge.

Note: Questions are geared towards the typical training aircraft of Cessna (152/172/182..) and Piper (Warrior, Archer, Arrow, ...), non-pressurized, non-turbo.

Note: The document with answers can be provided by your CFI.

B. Complex Endorsement (knowledge questions)

- 1) From an FAA endorsement perspective, when do you need a 'Complex' endorsement?
- 2) If you do NOT have the complex endorsement, can you log PIC and or log 'complex time' when flying as a safety pilot or as the sole manipulator of the controls when not with an instructor?

Landing Gear

- 3) What special considerations should be taken during preflight?

Landing Gear on "Cessna (172RG/182RG)"

- 4) How does the landing gear system work on a Cessna?
- 5) How does the pilot know the gear is fully extended and safe for landing?
- 6) What are the troubleshooting steps when there is no 'Gear Down' indication?
- 7) Where is the emergency gear extension lever located?
- 8) What is the Emergency Gear extension procedure for a Cessna?
- 9) Can the landing gear be extended with a complete loss of hydraulic fluid?
- 10) Can the landing gear be extended with a landing gear pump failure or electrical failure?

Landing Gear on "Piper"

- 11) How does the landing gear system work on a Piper?
- 12) How does the pilot know the gear is fully extended and safe for landing?
- 13) Why on a Piper do you NOT use the "Nav Lights" during the day?
- 14) What are the troubleshooting steps when no 'Gear Down' indication?
- 15) Where is the emergency gear extension lever located?
- 16) What is the Emergency Gear extension procedure for a Piper?
- 17) Can the landing gear be extended with a complete loss of hydraulic fluid?
- 18) Can the landing gear be extended with a landing gear pump failure?

Landing Gear (general)

- 19) What does Vle mean?
- 20) What does Vlo mean?
- 21) What are the best ways to ensure the gear is extended for landing?
- 22) What 2 common ways does the landing gear warning sound come on?
- 23) What is a “Squat switch” and what does it do?
- 24) Why is it a good idea to defer all ‘after landing checklist’ items until fully stopped?
- 25) <extra/bonus>: Draw the landing gear system on the whiteboard.

Adjustable Wing Flaps

- 26) What is the function of the ‘Wing Flaps’?
- 27) What is the main benefit of extending flaps on landing?
- 28) The first (smallest) flap setting will increase what?
- 29) The higher flap settings will increase what?
- 30) Extending full-flaps too early on final approach will have what negative side effect?
- 31) What is a good rule of thumb to consider before extending ‘full flaps’ on landing?

Flaps on a Cessna (152/172/182)

- 32) What type of flaps are on a Cessna?
- 33) How do the flaps operate on a Cessna?
- 34) What are approved flap settings for a ‘normal’ takeoff on a Cessna?
- 35) How do you confirm the flaps have extended to the desired position?
- 36) What do you do if the flaps are not extending?
- 37) What do you do if the flaps are not retracting?

Flaps on a Piper (Warrior/Archer/Arrow)

- 38) What type of flaps are on a Piper Warrior/Archer/Arrow?
- 39) How do the flaps operate on a Piper?
- 40) What are approved flap settings for a ‘normal’ takeoff on a Piper?

Flaps (General)

- 41) What do you do with the flaps on a go-around?
- 42) What happens if you retract the flaps too early or too fast?
- 43) What considerations for Flap setting on gusty/windy landings?
- 44) What does Vfe mean?
- 45) How do you determine the maximum speed to fly with the flaps extended (how do you know when it is safe to extend flaps)?
- 46) What can happen if extending the flaps at too high of an airspeed?
- 47) Why do you use a significant amount of flaps on landing?
- 48) Why do you retract the flaps immediately upon landing for a normal or short field landing?
- 49) On a 'touch and go', why should the flaps be retracted before applying power for takeoff?

Constant Speed Propeller System

- 50) Why is it called a constant speed propeller?
- 51) How does a 'Constant Speed Propeller' system work?
- 52) Why do airplanes have a 'Constant Speed Propeller' system? What is the benefit?
- 53) What occurs when running at a 'lower RPM' on the propeller?
- 54) What are the main components of the constant speed prop system?
- 55) Where is the propeller governor located?
- 56) How is power output from the engine measured?
- 57) Where should the propeller lever be set for take-off?
- 58) Where should the propeller lever be set during departure and climb?
- 59) Where should the propeller lever be set on cruise?
- 60) Can you set the power/propeller to configurations not specified in the POH/AFM?
- 61) What happens if the propeller governor fails, or loss of oil pressure in this system?
- 62) Why do we cycle the propeller at runup as part of the checklist?
- 63) On preflight (before engine start), what are 3 things to check regarding the propeller system?
- 64) What is propeller overspeed and how do you avoid it?

- 65) When increasing power, how do you manipulate the throttle and propellor controls?
- 66) When decreasing power, how do you manipulate the throttle and propellor controls?
- 67) Why should the propeller be set to 'high RPM' before landing?
- 68) What is the best way to incorporate 'Power and Propeller' controls into your flying habits?
- 69) What is the propeller blade angle on engine start though take-off (high or low angle)?
- 70) <extra/bonus>: Draw the landing gear system on the whiteboard.

C. High Performance Endorsement (knowledge questions)

- 71) From an FAA endorsement perspective, when do you need a 'High Performance' endorsement?
- 72) If you do NOT have the High-Performance endorsement, can you log PIC and or log 'HP time' when flying as a safety pilot or as the sole manipulator of the controls when not with an instructor?

Constant Speed Propeller System

<see Constant Speed Propeller System under 'High Performance' section above>

Cowl Flaps

- 73) What are 'Cowl Flaps'?
- 74) Why do most 'High Performance' airplanes have them?
- 75) What 'Cowl Flaps' setting provides more airflow for more cooling?
- 76) What is the best 'feedback' to know if the 'Cowl Flaps' need to be opened or closed further?
- 77) At what temperature and above on the CHT should the cowl flaps be open or 'more open'?
- 78) What actions can be performed if the CHT or oil temperature is too high?
- 79) Where should the 'Cowl Flaps' be set on engine start, taxi, run-up, and departure?
- 80) Where should the 'Cowl Flaps' be set during cruise?
- 81) Where should the 'Cowl Flaps' be set on descents and landing?
- 82) What could happen if the 'Cowl Flaps' were open on a low power extended descent and landing?
- 83) Should you open the 'Cowl Flaps' at any point on final approach to landing.
- 84) Should the 'Cowl Flaps' be open or closed after landing?
- 85) What is the best way to incorporate 'Cowl Flaps' into your flying habits?

High Altitude considerations

- 86) What are the FAA requirements around use of supplemental oxygen?
- 87) How do you determine 'cabin pressure altitude' (in a non-pressurized airplane)?
- 88) Is a can of 'Boost' sufficient to meet the oxygen requirements?
- 89) What can occur without the use of supplemental oxygen at higher altitudes
- 90) Name at least 3 symptoms of hypoxia.

91) If you or your passengers begin to feel any symptoms of hypoxia, what can you do?