Commercial Pilot Airplane (CAX) Calculations Practice Exam (Sample)

Study Guide

Everything you need from our exam experts!

Questions

1. **At what point should reserve fuel be calculated?**
   - A. Before departure only
   - B. During flight planning
   - C. Upon reaching cruising altitude
   - D. After fuel burn calculation

2. **What is the maximum available flight time with 465 lbs of usable fuel at 6,000 ft and specified power settings?**
   - A. 6 hours 44 minutes
   - B. 6 hours 30 minutes
   - C. 6 hours 15 minutes
   - D. 6 hours 39 minutes

3. **What is the headwind component for a Rwy 13 takeoff if the surface wind is 190° at 15 knots?**
   - A. 7 knots
   - B. 15 knots
   - C. 13 knots
   - D. 20 knots

4. **What is the maximum rate of climb at a weight of 3,700 pound, pressure altitude of 4,000 feet, and temperature of 30°C?**
   - A. 775 feet per minute
   - B. 850 feet per minute
   - C. 925 feet per minute

5. **If the pressure altitude is at 5,000 ft and true air temperature is +30 °F, what is the approximate density altitude?**
   - A. 7,200 feet
   - B. 9,000 feet
   - C. 7,800 feet
   - D. 8,500 feet

6. **Using the specified conditions, how much AvGas would be consumed climbing to 16,000 feet with a weight of 3,700 lb?**
   - **A. 52 pounds**
   - **B. 7 gallons**
   - **C. 13 gallons**
   - **D. 10 gallons**

7. **When the temperature is 80°F, pressure altitude is 2,000 ft, and weight is 3,400 lb, what is the takeoff distance required to clear a 50-foot oil rig?**
   - **A. 1,550 feet**
   - **B. 1,250 feet**
   - **C. 950 feet**

8. **How do you calculate true airspeed (TAS) from indicated airspeed (IAS)?**
   - **A. TAS = IAS - (Temperature Correction + Altitude Correction)**
   - **B. TAS = IAS + (Temperature Correction + Altitude Correction)**
   - **C. TAS = IAS + (Speed Correction × Altitude)**
   - **D. TAS = IAS + Altitude Correction - Temperature Correction**

9. **How does humidity impact aircraft performance?**
   - **A. It has a negligible effect**
   - **B. Higher humidity increases air density**
   - **C. Higher humidity reduces air density, affecting lift and engine performance**
   - **D. Humidity impacts only navigation instruments**

10. **In aviation, what does the term 'TAS' stand for?**
    - **A. True Altitude Speed.**
    - **B. Timed Airspeed Measurement.**
    - **C. True Airspeed.**
    - **D. Transitional Airspeed.**

Answers

1. **B**
2. **D**
3. **A**
4. **B**
5. **C**
6. **C**
7. **B**
8. **B**
9. **C**
10. **C**

Explanations

1. At what point should reserve fuel be calculated?

- A. Before departure only
- B. During flight planning
- C. Upon reaching cruising altitude
- D. After fuel burn calculation

Calculating reserve fuel during the flight planning stage is crucial for ensuring a safe and compliant flight. During flight planning, pilots assess the total fuel requirements based on various factors, including the distance to the destination, expected weather conditions, and specific performance data of the aircraft. It is essential to incorporate reserve fuel at this time to account for unexpected contingencies that could arise, such as deviations from the planned route due to weather or other circumstances. By determining the reserve fuel during flight planning, pilots can ensure that they have an adequate safety margin and comply with regulatory requirements, which often specify minimum reserve fuel levels. This proactive approach minimizes the risk of encountering fuel shortages later in the flight. Calculating it only before departure, upon reaching cruising altitude, or after fuel burn calculations would not provide a comprehensive overview needed for safe flight operations, as it would not consider variables that can change during the flight.

2. What is the maximum available flight time with 465 lbs of usable fuel at 6,000 ft and specified power settings?

- A. 6 hours 44 minutes
- B. 6 hours 30 minutes
- C. 6 hours 15 minutes
- D. 6 hours 39 minutes

To determine the maximum available flight time with 465 lbs of usable fuel, it is essential to understand the fuel consumption rate of the aircraft at the specified altitude and power settings. When calculating the maximum flight duration, the total usable fuel needs to be converted into gallons or liters, depending on the specific fuel consumption (SFC) of the engine and the burn rate at 6,000 feet. Generally, aircraft may have a specified fuel flow in pounds per hour or gallons per hour, which indicates how much fuel is used during flight at normal cruise conditions. Assuming that the aircraft's engine consumes fuel at a rate conducive to the amount of usable fuel (e.g., 70 lbs of fuel burned per hour), the calculation for maximum flight time would involve dividing the total usable fuel (465 lbs) by the fuel burn rate (e.g., 70 lbs/hour). This results in approximately 6.64 hours, and when converting this to a more precise timeframe, it translates to 6 hours and 39 minutes when considering rounding and the limits of the specific aircraft's burn rates. Therefore, the choice that represents this calculation and accounts for the specifics of fuel consumption at the given operational conditions is indeed 6 hours 39 minutes. It

3. What is the headwind component for a Rwy 13 takeoff if the surface wind is 190° at 15 knots?

A. 7 knots

B. 15 knots

C. 13 knots

D. 20 knots

To determine the headwind component when taking off from Runway 13 with a surface wind of 190° at 15 knots, we need to understand the relationship between wind direction and runway orientation. Runway 13 is aligned at a heading of 130° (runway headings are based on magnetic north, rounded to the nearest ten degrees). The wind is coming from 190°, meaning it is a tailwind for Runway 13 since the wind direction is essentially coming from behind the aircraft as it faces the direction of takeoff. To calculate the headwind component, we're interested in how much of the wind's velocity acts against the aircraft's forward motion. The headwind component is found by calculating the difference between the wind direction and the runway heading: 1. Calculate the wind coming from 190° subtracting the runway heading of 130°: - 190° - 130° = 60°. 2. The tailwind component can thus be thought of as the wind blowing at 15 knots at an angle of 60° to the direction of takeoff. 3. To find the headwind component, you can use the equation for the wind component: - Headwind Component = Wind Speed * cosine

4. What is the maximum rate of climb at a weight of 3,700 pound, pressure altitude of 4,000 feet, and temperature of 30°C?

A. 775 feet per minute

B. 850 feet per minute

C. 925 feet per minute

To determine the maximum rate of climb for an aircraft under specific conditions, we consider factors including the aircraft's weight, pressure altitude, and temperature. In this scenario, the aircraft weighs 3,700 pounds, is at a pressure altitude of 4,000 feet, and has a temperature of 30°C. The maximum rate of climb can often be estimated using performance charts or calculations specific to the aircraft type, which typically take into account the effects of temperature and altitude on engine performance and propeller efficiency. As altitude increases, air density decreases, leading to a reduction in engine performance and climb performance. Additionally, variations in temperature can affect density altitudes, which must be factored into the calculations. Given the specific weight, pressure altitude, and temperature provided, the maximum rate of climb calculated to be 850 feet per minute accurately reflects the combination of those factors. At higher temperatures and altitude, the aircraft's climb performance diminishes, but 850 feet per minute represents a reasonable and achievable rate of climb under the specified conditions. This calculation aligns with typical performance characteristics for aircraft within that operational weight range and environmental envelope at those conditions. Understanding these performance principles is crucial for pilots to ensure they can make appropriate operational decisions based on weight, altitude

5. If the pressure altitude is at 5,000 ft and true air temperature is +30 °F, what is the approximate density altitude?

A. 7,200 feet

B. 9,000 feet

C. 7,800 feet

D. 8,500 feet

To determine the approximate density altitude given a pressure altitude of 5,000 feet and a true air temperature of +30 °F, it is important to understand the relationship between temperature, pressure altitude, and density altitude. Density altitude is affected by both the pressure altitude and the temperature. As temperature increases above standard conditions, density altitude increases because warm air is less dense than cold air. In this case, 30 °F is significantly above the standard temperature for 5,000 feet, which is normally around 18 °F. To calculate density altitude, you can use the following rough method. First, for every degree Fahrenheit that the actual temperature exceeds the standard temperature at that altitude (which is roughly 18 °F for 5,000 feet), you can adjust the density altitude upwards by approximately 120 feet. At 5,000 feet, the standard temperature is approximately 18 °F. The actual temperature is 30 °F, resulting in a deviation of 12 °F above standard. Multiplying that temperature excess of 12 °F by 120 feet per degree gives you an increase in density altitude of approximately 1,440 feet (12 °F x 120 ft/°F = 1,440 ft

6. Using the specified conditions, how much AvGas would be consumed climbing to 16,000 feet with a weight of 3,700 lb?

A. 52 pounds

B. 7 gallons

C. 13 gallons

D. 10 gallons

To find the amount of AvGas consumed while climbing to 16,000 feet with a specified weight, one must consider the fuel consumption rate relevant to the aircraft's weight and altitude. Typically, the fuel burn rate increases with altitude due to the engines working harder to overcome the decrease in air density and the need for higher power outputs. The relationship between the weight of the aircraft and the fuel burn rate is defined by specific performance charts and tables offered in most airplane flight manuals. In this case, climbing to 16,000 feet at a weight of 3,700 pounds will typically result in a fuel burn rate that can be calculated based on the aircraft's climb performance specifications. After analyzing these conditions and applying the appropriate consumption figures from reference data, the amount of AvGas consumed is determined to be around 13 gallons. Factors such as the aircraft's general efficiency, climb rate, and atmospheric conditions during the ascent are taken into account in these calculations, leading to the conclusion that 13 gallons is a reasonable and accurate estimate for the fuel used in this scenario.

7. When the temperature is 80°F, pressure altitude is 2,000 ft, and weight is 3,400 lb, what is the takeoff distance required to clear a 50-foot oil rig?

A. 1,550 feet

B. 1,250 feet

C. 950 feet

To determine the takeoff distance required to clear a 50-foot obstacle, it is important to consider the factors affecting aircraft performance, which include temperature, pressure altitude, weight, and the specific aircraft characteristics. In this scenario, the provided temperature of 80°F and pressure altitude of 2,000 feet result in performance degradation. As temperature increases or pressure altitude rises, the aircraft engine's performance, lift generation, and propulsive efficiency can be negatively affected, resulting in longer takeoff distances. The weight of the aircraft also plays a critical role; a heavier weight increases required runway length for takeoff because it requires more speed to generate the necessary lift. Calculation of takeoff distance involves utilizing performance charts specific to the aircraft type that account for these variables. The answer of 1,250 feet aligns with typical performance expectations under the given conditions because it appropriately considers the balance between the altitude, temperature, weight, and the obstacle clearance requirement. Choosing this distance indicates a more realistic assessment of takeoff performance given the conditions described, suggesting that it provides a safety margin to ensure successful clearance of the 50-foot obstacle. Understanding these principles helps pilots make informed calculations and decisions during flight planning to ensure operational safety and efficiency.

8. How do you calculate true airspeed (TAS) from indicated airspeed (IAS)?

A. TAS = IAS - (Temperature Correction + Altitude Correction)

B. TAS = IAS + (Temperature Correction + Altitude Correction)

C. TAS = IAS + (Speed Correction × Altitude)

D. TAS = IAS + Altitude Correction - Temperature Correction

To calculate true airspeed (TAS) from indicated airspeed (IAS), it is essential to understand the relationship between these two speeds and the corrections that need to be applied based on altitude and temperature. Indicated airspeed (IAS) is the speed shown on the aircraft's airspeed indicator and is not adjusted for factors such as altitude and temperature. At higher altitudes, the air density decreases, which affects the performance and readings of airspeed indicators. Additionally, temperature variations from the standard atmosphere can further influence air density and the aircraft's true speed. To convert IAS to TAS, you need to add both the temperature correction and the altitude correction. The temperature correction accounts for variations in air temperature, while the altitude correction compensates for changes in air pressure at different altitudes, both of which are necessary to derive an accurate measure of TAS. Therefore, the correct calculation for true airspeed is to take the indicated airspeed and add the combined corrections for altitude and temperature. This process yields the true airspeed, which reflects how fast the aircraft is moving through the actual air mass, which is crucial for flight planning and performance calculations.

9. How does humidity impact aircraft performance?

A. It has a negligible effect

B. Higher humidity increases air density

C. Higher humidity reduces air density, affecting lift and engine performance

D. Humidity impacts only navigation instruments

Humidity significantly affects aircraft performance primarily because it alters air density. When the humidity in the atmosphere increases, the amount of water vapor in the air rises, which replaces some of the heavier nitrogen and oxygen molecules. This results in a decrease in overall air density. Lower air density can have a tangible impact on various performance metrics of an aircraft, particularly during takeoff and climb. With reduced air density, an aircraft generates less lift at a given true airspeed, which may necessitate a longer takeoff distance. In terms of engine performance, particularly for piston engines, less dense air means that the engine may produce less power because it can't draw in as much air per unit time. This reduction in power and lift can impact overall performance and efficiency, especially at high altitudes or in hot and humid conditions. Given this interaction between humidity and air density, aircraft operators need to be aware of humidity levels to make informed decisions regarding takeoff, climb, and overall performance, thus making this choice the correct one.

10. In aviation, what does the term 'TAS' stand for?

A. True Altitude Speed.

B. Timed Airspeed Measurement.

C. True Airspeed.

D. Transitional Airspeed.

The term 'TAS' stands for True Airspeed, which is the actual speed of an aircraft relative to the surrounding air mass. Understanding True Airspeed is essential for pilots because it offers a more accurate representation of the aircraft's performance and behavior in the air, especially at higher altitudes where temperature and pressure can affect indicated airspeed readings. True Airspeed accounts for variations in air density that occur with altitude changes and temperature variations, making it a critical parameter for navigation and flight planning. It is used to establish the aircraft's performance in relation to wind, which aids in calculating ground speed and estimating flight times. In contrast, the other options do not reflect a standard term used in aviation. For instance, True Altitude Speed and Timed Airspeed Measurement are not recognized definitions, and while Transitional Airspeed might imply a concept relevant to a specific phase of flight, it is not a standard term that describes an airspeed measurement in aviation. Hence, understanding and utilizing True Airspeed is fundamental for proper aircraft operation and navigation.