

# Diamond Star DA40 Pre-Solo Written Exam

Name \_\_\_\_\_

## Operating Limitations

1. What type of engine is in the DA40? \_\_\_\_\_
2. What is the maximum takeoff power produced? \_\_\_\_\_
3. What is the specified maximum continuous power? \_\_\_\_\_
4. What are the specified maximum and minimum quantities of oil to be used in the DA40? \_\_\_\_\_
5. What type and grade of oil must be used during the engine's first 50 hours of operation? \_\_\_\_\_
6. What type and grade of oil must be used after the engine's first 50 hours of operation? \_\_\_\_\_
7. What is the DA40's maximum rated takeoff weight? \_\_\_\_\_
8. What is the wingspan of the DA40? (Keep in mind the effect this may have on hangar accommodations.) \_\_\_\_\_

9. Fill in the following:

a. Oil Pressure Normal Range \_\_\_\_\_

b. Oil Pressure Maximum \_\_\_\_\_

c. Oil Pressure Minimum \_\_\_\_\_

d. Oil Temperature Maximum \_\_\_\_\_

e. Cylinder Head Temperature (CHT) Maximum \_\_\_\_\_

f. Fuel Pressure Maximum \_\_\_\_\_

g. Fuel Pressure Minimum \_\_\_\_\_

h. Voltage Maximum \_\_\_\_\_

i. Voltage Minimum \_\_\_\_\_

j. Voltage Normal Range \_\_\_\_\_

10. What is the maximum takeoff weight? \_\_\_\_\_

11. Maximum ramp weight? \_\_\_\_\_

12. Maximum landing weight? \_\_\_\_\_

13. Maximum allowable weight in the baggage compartment? \_\_\_\_\_

14. What is the significance of the utility category for the DA40?

\_\_\_\_\_

15. What are the airplane's center of gravity limits?

Fore: \_\_\_\_\_ Aft: \_\_\_\_\_

16. What is the fuel capacity of the DA40?

Total: \_\_\_\_\_ Useable: \_\_\_\_\_

17. What is the maximum allowable difference between tanks? Why?

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18. What is (are) the approved fuel type(s) for the DA40?

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# Emergency Procedures

Airspeeds for emergency procedures:

	1874 lbs	2205 lbs	2535 lbs
Engine failure after takeoff (flaps T/O)			
Engine failure during cruise (best glide)			
<b>Engine failure on landing (emergency landing)</b>			
Flaps UP			
Flaps T/O			
Flaps LDG			

19. While attempting to start the engine, you notice smoke and flames around the cowl and in front of the aircraft. What do you do?

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20. In cruise at 7,000 feet, you engine begins to run very roughly. What do you do?

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21. On a normal cockpit check at altitude, you observe that your oil pressure indicator is reading 24 PSI. What do you do?

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22. You are cruising at altitude when you notice a strange smell and observe smoke originating from under the instrument panel. What do you do?

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23. What is the procedure for an over-voltage indication?

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24. If, during an emergency landing, the A/C ended up upside down on its roof, how would you evacuate the aircraft?

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## Normal Operating Procedures

Airspeeds for normal operation at 2535 lbs:

V <sub>so</sub>		V <sub>s</sub>	
V <sub>y</sub>		V <sub>x</sub>	
V <sub>r</sub>		V <sub>no (Vc)</sub>	
V <sub>fe</sub>	T/O:	V <sub>ne</sub>	
	LDG:		
Approach 2407 lbs	T/O:	V <sub>a</sub>	
	LDG:		

## Performance and Weight and Balance

You and two friends have decided to go white water rafting on the Ottawa River for a weekend and want to fly down in the DA40 Diamond Star. Based on the following conditions, answer the following questions using the DA40 performance charts and weight and balance information.

<b>Trip Stats: London (CYXU) to Ottawa (CYOW)</b>	
Magnetic Track	080 degrees Magnetic
Distance	280 nm
Altimeter Settings	30.04 "Hg
Cruising Altitude	7000 feet
Temperature at Altitude	+18° C
Magnetic Variation	12° West
London (CYXU) Elevation	912' ASL
London Airport Temperature	+30°C
Ottawa (CYOW) Elevation	374' ASL
<b>Winds En Route: CYXU to CYOW</b>	
Winds at CYXU	130° Magnetic @ 15 knots
Winds at 7000 feet	110° True @ 25 knots
Winds at CYOW	100° Magnetic @ 12 knots

25. What will be your take-off distance over a 50' obstacle at CYXU (Runway 15)?

\_\_\_\_\_

26. What is the Density Altitude at 7000 feet? \_\_\_\_\_

27. What will be your rate of climb to 7000 feet? \_\_\_\_\_

28. What is the recommended Power Setting for Best Power at 65%?

\_\_\_\_\_ "Hg \_\_\_\_\_ RPM

29. What will be your TAS and GS at 7000 feet? \_\_\_\_\_

30. How long will it take to get to CYOW? \_\_\_\_\_

31. How much fuel do you need to take (including day VFR reserve) for this trip?

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32. Complete the Weight and Balance below.

Is the aircraft within Weight and C of G tolerances?                      Yes              No

Are you able to complete the trip?    Yes              No

<b>Weight and Balance Information: CYXU to CYOW</b>	
Aircraft Empty Weight	1711 lbs
Aircraft Empty Moment	164771.4 lb-in
Oil Quantity	6 Quarts
Pilot	185 lbs
Passenger 1	175 lbs
Passenger 2	160 lbs
Baggage	125 lbs

33. What will be your Landing Distance over a 50' Obstacle at CYOW (Runway 14)?

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<b>Your DA 40</b>		<b>CALCULATION OF LOADING CONDITION</b>
<b>Mass {lb}</b>	<b>Moment {in.lb}</b>	
		1. Empty mass (from Mass and Balance Report)
		2. Oil not added Lever arm: 1.00 m (39.4 in)
		3. Front seats Lever arm: 2.30 m(90.6 in)
		4. Rear seats Lever arm: 3.25 m (128.0 in)
		5. Baggage Lever arm: 3.65 m (143.7 in)
		6. Total mass and total moment with empty fuel tanks (Total of 1.-5.)
		7. On-board usable fuel (0.72 kg/liter) (6.01 lb/US gal) Lever arm: 2.63 m (103.5 in)
		8. Total mass and total moment with full fuel tanks (Total 6. plus 7.)



## Description of the Airplane and its Systems

34. How do you operate the alternate air supply? \_\_\_\_\_

\_\_\_\_\_

35. The air intakes on the front cowl of the DA40 supply air for six items. They are:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

36. How many fuel tanks are there in the DA40? \_\_\_\_\_

37. How many compartments does each tank have? \_\_\_\_\_

38. How much fuel does each tank hold? \_\_\_\_\_

39. How many fuel pumps are there in the DA40? \_\_\_\_\_

40. What is the specific purpose of each pump? \_\_\_\_\_

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41. How many fuel vents are there, and where are they located?

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42. What quantity will the electric fuel gauges indicate if the airplane is fully fueled?

Explain why this occurs.

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43. The DA40 has a \_\_\_\_\_ volt DC system power by a \_\_\_\_\_ ampere alternator.

44. Explain how the governor controls the pitch of the propeller.

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45. How does the loss of engine oil pressure affect the pitch of the propeller and why?

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46. How should the front panels of the G1000 be cleaned and why?

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