

1. **D.** None of the trip is conducted at night. Medical expires 10/31/2012 (61.23). Referencing the logbook, you completed your commercial checkride on 8/27/2011 (61.56).
2. **A.** ELT expired October 31, 2011 (91.207). A 100 hour not required (91.409). Transponder is current – expires October 31, 2012 (91.413).
3. **C.** 61.23
4. **D.** 91.107
5. **B.** Reference attached weight and balance information.
6. **C.** Referencing KRHI A/FD, Class E 1200Z-0400Z Mon-Fri. Departing at 1255Z.
7. **A.** 91.155
8. **B.** Reference attached takeoff/landing distance calculations.
9. **B.** AIM 7-4-6 and AC 91-36D
10. **B.** Reference attached leg profile information.
11. **D.** Departure is at 6:55 am. FAR 1.1 defines *night* as the time between the end of evening civil twilight and the beginning of morning civil twilight (approx. 6:30 am).
12. **D.** Reference attached takeoff/landing distance calculations.
13. **C.** Reference attached leg profile information. Also note: Iron Co is on Central Time and Hancock is on Eastern Time.
14. **D.** Time zone. Reference “VFR Aeronautical Charts” document page 21.
15. **A.** The center of gravity at the beginning of leg 2 is 146.06. The fuel arm is 154.9. Reference attached weight and balance calculations.
16. **C.** Per the NOTAM, runway 7/25 is closed and 13/31 is closed except 15 min prior permission on 122.7. Referencing the attached performance data for leg 2, 15 minutes prior to landing is approximately 45.9 nm from KCMX.
17. **D.** Reference attached leg profile calculation.
18. **C.** AIM 2-1-2b. PAPI is visible from about 5 miles during the day.
19. **B.** Per NOTAMS, runway 7/25 is closed. Therefore runway 13 is the most suitable runway referencing the current winds. Per the KCMX A/FD, the threshold crossing height (TCH) is 44’.
20. **A.** Per the KCMX A/FD, there are S4 services available on the field, however in the airport remarks, it is noted that *airframe and power plant repairs available Apr 15 thru Nov 15*. The current date is November 18.
21. **A.** Reference attached weight and balance information.
22. **D.** AIM 2-3-3 table 2-3-2. 150’ = 12 stripes.
23. **D.** Reference attached leg profile information. Note: *Climb Gradient Chart* is in “Feet per Nautical Mile”. Correct rate of climb is 844 FPNM. Converted is 1267 FPM.
24. **C.** Per the Area Forecast, the ridge will be over LS (Lake Superior) by 18Z.
25. **D.** Per the airspace boundaries on the sectional, the airspace overlying Iron Co is Class G from the surface to 14,500’.
26. **A.** Lookout Tower. Reference “VFR Aeronautical Charts” document page 15.
27. **B.** Reference attached leg profile information.
28. **A.** Aviation Weather Services, AC 00-45G section 7.1.6. “Significant wind information if the surface wind is sustained at 20 knots or greater and/or gusts are greater than or equal to 25 knots.
29. **C.** Reference attached takeoff/landing distance calculations.
30. **D.** 61.15
31. **D.** 91.417
32. **A and D.** NTSB 830.5
33. **A.** Aviation Weather Services, Advisory Circular 00-45G section 3.1.2 Table 3.1. “Wind direction changes by 45 degrees or more in less than 15 minutes and the wind speed is 10 knots or more throughout the wind shift.”
34. **A.** 91.144 and AIM 7-2-2

35. **C.** AIM 3-5-2. MTRs that include one or more segments above 1,500' AGL shall be identified by three number characters.
36. **B.** Reference attached weight and balance calculations
37. **D.** 4.5nm on Leg 1 = 1:23. See below for Legs 2 and 3. 4.5nm on Leg 4 = 3:00.
38. **B.** Reference question 2. ELT is past due. Also you flew the aircraft damaged on legs 3 and 4. Reference question 20.
39. **B.** Reference attached Leg Profile calculations.
40. **A.** Reference attached Leg Profile calculations.

2012 Nationals SCAN Answer Key/Explanations
LEG 1 KRHI - 50D

T/O Climb Gradient	
3400 lbs	785.6 fpm
3203 lbs	868.9 fpm
2900 lbs	990.8 fpm

Climb Fuel Flow	
P.A.	Fuel
1000'	26.2 gph
1904'	25.2 gph
2000'	25.1 gph

868.9 fpm = **1303 fpm**

Climb

Wx: Wind calm, 6 C, 29.64"

T: 2:58
 F: 1.2 g
 D: 4.4 nm
 TAS (IAS): 90 kts
 GS: 90 kts

TC: 066
 VAR: 3 W
 MC: 069
 MH: 069

Cruise

Cruise: 5,500' WIND: 247/37 kts -2 C

PA: 5,780'

TC: 066
 VAR: 3 W
 MC: 069
 MH: 069

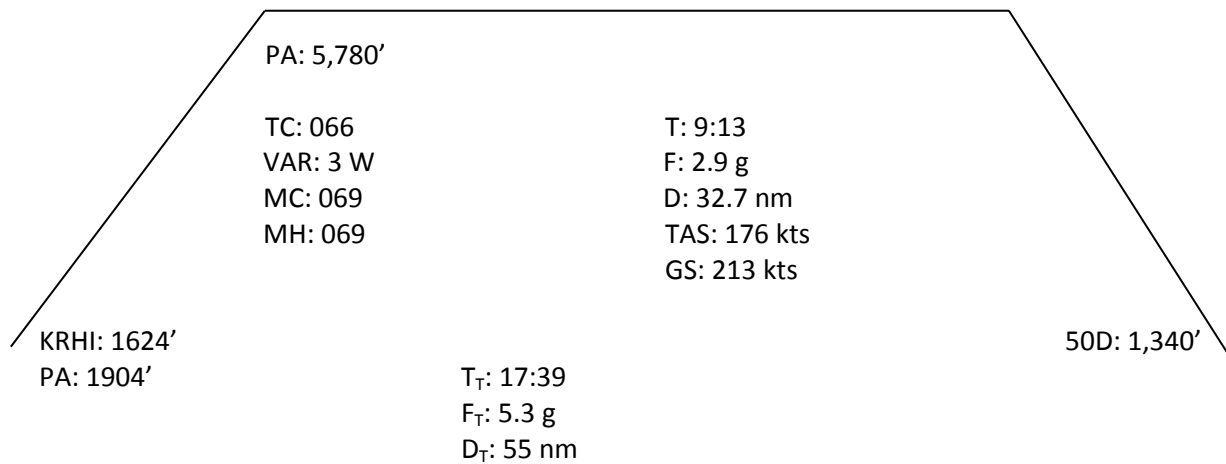
T: 9:13
 F: 2.9 g
 D: 32.7 nm
 TAS: 176 kts
 GS: 213 kts

Descent

Wx: 180/12, 1 C, 29.67"

T: 5:28
 F: 1.2 g
 D: 17.9 nm
 TAS: 191 kts
 GS: 196 kts

TC: 066
 VAR: 3 W
 MC: 069
 MH: 072



Depart: 06:55:00L (1255z)
 Arrive: 07:12:39L (1312z)

2012 Nationals SCAN Answer Key/Explanations
LEG 2
50D - KCMX

Climb Fuel Flow		T/O Climb Gradient	
PA	Fuel Flow	3400 lbs	812 fpm
1000'	26.2 gph	812 fpm = 1218 fpm	
1590'	25.6 gph		
2000'	25.1 gph		

Climb

Wx: Calm, 1 C, 29.67"

T: 4:14

F: 1.8g

D: 6.3nm

TAS: 90 kts

GS: 90 kts

TC: 352

VAR: 4W

MC: 356

MH: 356

Cruise

WIND: 272/36 -9 C

T: 14:15

F: 4.4 g

D: 39.4 nm

TAS: 178 kts

GS: 168 kts

Descent

Wx: 200/09, 1C, 29.60"

T: 7:06

F: 1.5g

D: 23.8nm

TAS: 193 kts

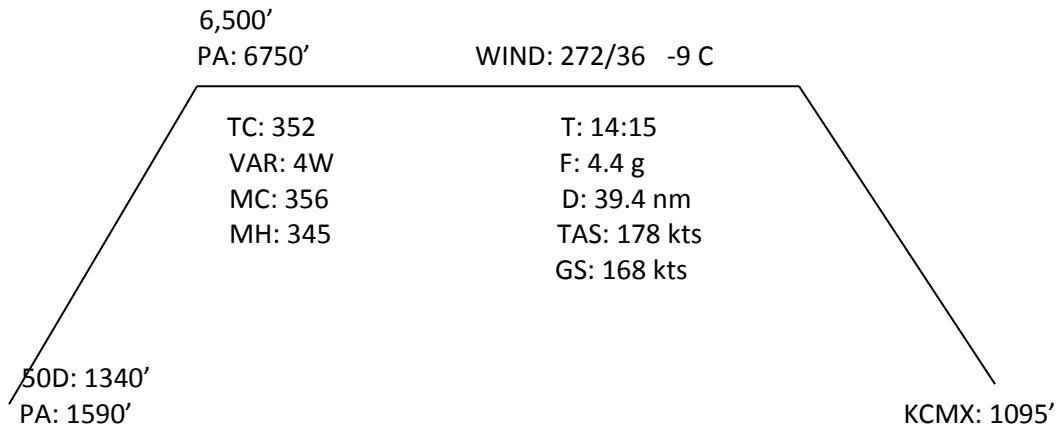
GS: 201 kts

TC: 352

VAR: 4W

MC: 356

MH: 355



T_T: 25:24

F_T: 7.7 g

D_T: 70 nm

Depart: 07:42:39L (1342z)

Arrive: 09:08:14L (1408z)

2012 Nationals SCAN Answer Key/Explanations
LEG 3
KCMX – 50D

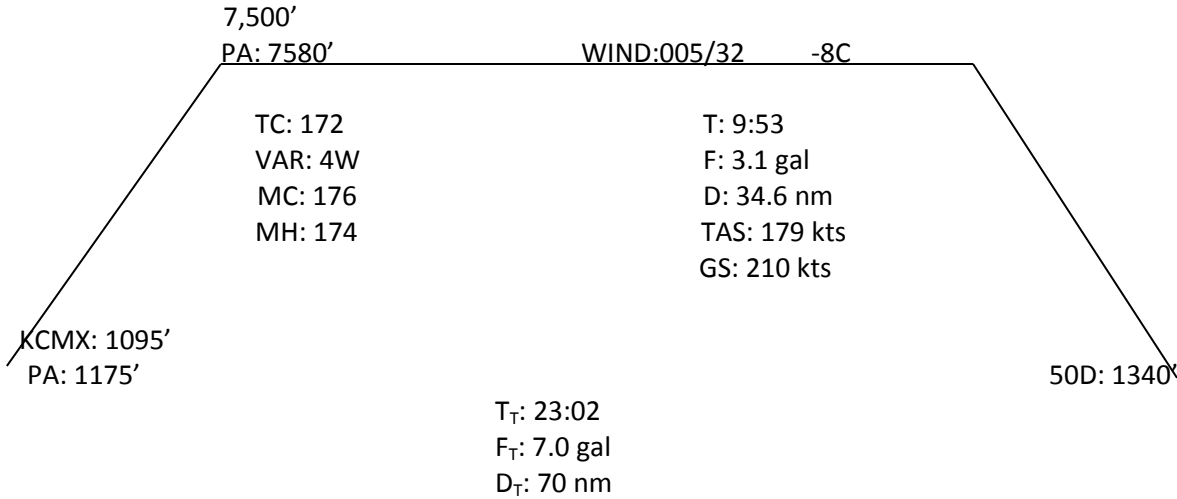
Climb Fuel Flow		T/O Climb Gradient	
PA	Fuel Flow	2900 lbs	1037.3 fpm
1000'	26.2 gph	3353.8 lbs	844.4 fpm
1175'	26.0 gph	3400 lbs	824.8 fpm
2000'	25.1 gph	844.4 fpm = 1267 fpm	

Climb

Wx: 330/09 5C 29.84
 T: 5:03
 F: 2.2 gal
 D: 7.6nm
 TAS: 90 kts
 GS: 90 kts

TC: 172
 VAR: 4W
 MC: 176
 MH: 176

Cruise



Descent

Wx: 360/12 6C 29.87
 T: 8:06
 F: 1.7 gal
 D: 27.8 nm
 TAS: 194 kts
 GS: 206 kts

TC: 172
 VAR: 4W
 MC: 176
 MH: 176

Depart: 14:05:00L (1905z)
 Arrive: 13:28:02L (1928z)

2012 Nationals SCAN Answer Key/Explanations

LEG 4

50D – KRHI

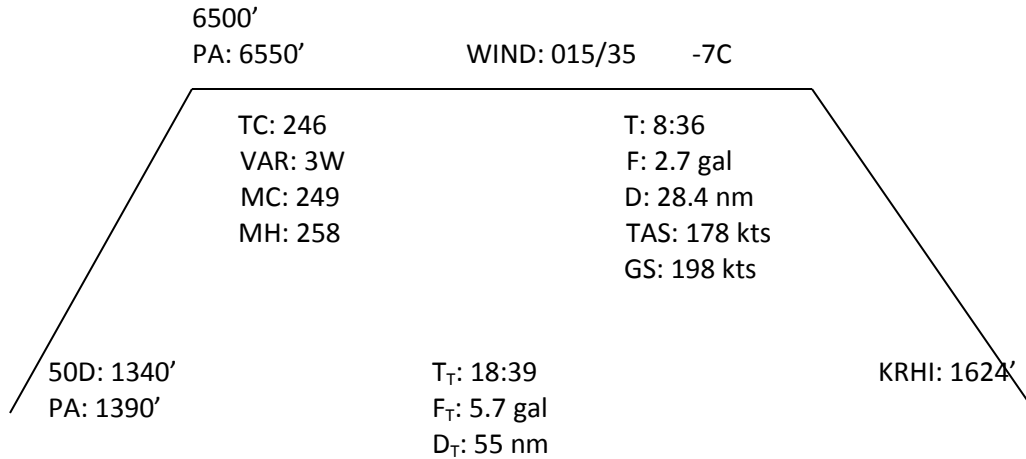
Climb Fuel Flow		T/O Climb Gradient	
PA	Fuel Flow	2900 lbs	1021.4 fpm
1000'	26.2 gph	3083.4 lbs	985.7 fpm
1390'	25.8 gph	3400 lbs	811.4 fpm
2000'	25.1 gph	985.7 fpm = 1479 fpm	

Climb

Wx: 360/12 6C 29.87
 T: 3:38
 F: 1.6 gal
 D: 5.4 nm
 TAS: 90 kts
 GS: 90 kts

TC: 246
 VAR: 3W
 MC: 249
 MH: 249

Cruise



Descent

Wx: 360/12 6C 29.84
 T: 6:25
 F: 1.4 gal
 D: 21.2 nm
 TAS: 193 kts
 GS: 198 kts

TC: 246
 VAR: 3W
 MC: 249
 MH: 252

Depart: 13:48:02L (1947z)

Arrive: 14:06:41L (2006z)

TRIP TOTALS

T: 1:24:44

F: 25.7 gal

D: 250 nm

Weight and Balance

Leg 1	Weight	Arm	Moment
BEW	2343.75		325805.9
P & FP	348	143.5	49938
FUEL	432 (72g)	154.9	66917
BAGS	79	208	16432
TOTAL	3203	143.34	459092

Leg 2	Weight	Arm	Moment
BEW	2343.75		325805.9
P & FP	348	143.5	49938
RP	186	180	33480
FUEL	399.6 (66.6g)	154.9	61898
BAGS	122	208	25376
TOTAL	3399	146.06	496497

Leg 3	Weight	Arm	Moment
BEW	2343.75		325805.9
P & FP	348	143.5	49938
RP	186	180	33480
FUEL	353.4 (58.9g)	154.9	54741
BAGS	122	208	25376
TOTAL	3353	145.93	489341.6

Leg 4	Weight	Arm	Moment
BEW	2343.75		325805.9
P & FP	348	143.5	49938
FUEL	312 (52g)	154.9	48329
BAGS	79	208	16432
TOTAL	3083	142.89	440505

Landing	Weight	Arm	Moment
BEW	2343.75		325805.9
P & FP	348	143.5	49938
FUEL	277.8 (46.3g)	154.9	43124
BAGS	79	208	16432
TOTAL	3048	142.76	435300

Takeoff and Landing Calculations**KRHI T/O GROUND ROLL (Leg 1)**

3203 lbs

Wx: 180/12 6C 29.64 Runway 15

10 kt headwind component

PA: 1904'

2900 lbs	771.4'
3203 lbs	1006.6'
3400 lbs	1159.6'

1006.6 – 8.3% HW = **923.1'****50D T/O 50' OBSTACLE (Leg 2)**

3400 lbs

Wx: 180/12 1C 29.67 Runway 20 Dry Grass

11 kt Headwind component

PA: 1590'

GND Roll: $1038.6' - 9.2\% \text{ HW} = 943' + 20\% \text{ Dry Grass} = 1131.6'$ 50' OBS: $1679.6' - 9.2\% \text{ HW} = 1525.1' + (1525.1 - 943) = \mathbf{1713.7'}$ **50D LANDING DISTANCE GROUND ROLL (Leg 3)**

Wx: 360/12 6C 29.87 Runway 2 Dry Grass

11 kt headwind component

PA: 1390'

1163.1 – 8.5% HW = 1064.2' + 20% dry grass = **1277.04'**