Appendix A

Weather Knowledge Challenge – Form A

The Weather Knowledge Challenge

Section I

1. Gender: ☐ Male ☐ Female 2. Age: _____

3. For what category(ies) of aircraft do you hold a certificate(s)? (Please check **all** that apply)

☐ Airplane ☐ Rotorcraft ☐ Glider ☐ Lighter-than-air

4. What certificate(s)/rating(s) do you currently hold? (Please check **all** that apply)

☐ Student Pilot ☐ Recreational Pilot ☐ Private Pilot ☐ Instrument ☐ Commercial

☐ ATP ☐ CFI ☐ CFII ☐ MEI ☐ SEL ☐ MEL ☐ SES ☐ MES ☐ A & P

5. How many total hours of flying do you currently have? _____ hours

6. How many hours have you flown in the past six (6) months? _____ hours

7. When did you pass your checkride/practical test for your most recently obtained certificate/rating? _____ month/year

8. What is your most recently obtained certificate/rating? _____

9. In which state(s) (or province(s) or country(ies) if you do not live in the USA) do you do most of your flying? _____

10. What is your postal zip code? _____

11. Which of the following geographical features describe the areas in which you do most of your flying (please check **all** that apply):

☐ plains ☐ hills (elev. up to 1000 ft.) ☐ low mountains (elev. between 1000 ft. and 4000 ft.)

☐ high mountains (elev. greater than 4000 ft.) ☐ coastal regions ☐ islands/large bodies of water

12. By circling a number, please rate your **level of mastery** of the following weather-related categories.

1 = Very Poor **2** = Poor **3** = Fair **4** = Good **5** = Excellent

I. **Causes of Weather and Weather Patterns** (atmospheric circulation, fronts, unstable air, temperature inversions, clouds, fog, dewpoint, etc.)	**1**	**2**	**3**	**4**	**5**
II. **Weather Hazards** (thunderstorms, turbulence, crosswind, restrictions to visibility, icing, frost, wind shear, etc.)	**1**	**2**	**3**	**4**	**5**
III. **Weather Services** (FSS, Flight Watch/EFAS, METARs, TAFs, ASOS/ AWOS, Weather radar and charts, PIREPs, SIGMETs, etc.)	**1**	**2**	**3**	**4**	**5**
IV. **Weather Regulations** (VFR weather minimums, weather minimums by type of airspace, etc.)	**1**	**2**	**3**	**4**	**5**
V. **Weather Interpretation** (predicting wx conditions, decoding & interpreting weather information, applying wx information in flight planning, etc.)	**1**	**2**	**3**	**4**	**5**
VI. **Weather-Related Decision Making** (avoiding hazardous wx, practical and psychological factors in decision making, making a go/no go decision, etc.)	**1**	**2**	**3**	**4**	**5**

Section II

Please circle the letter that represents the best answer to the following questions. **Assume that you are flying a single engine plane with fixed prop and fixed landing gear (e.g., Cessna 172) and that you are flying VFR for all questions.**

1) What clouds are associated with a temperature inversion?
   (a) Cumulus
   (b) Cumulonimbus
   (c) Stratus
   (d) Altocumulus

2) What is the definition of relative humidity?
   (a) The ratio of the mass of water vapor to the volume of air
   (b) The ratio of the mass of water vapor to the total mass of air
   (c) The ratio of water vapor content to water vapor capacity
   (d) The ratio of the mass of water vapor to the mass of dry air

3) When flying low across a flat plain, you are suddenly jolted by turbulence. What is the most likely cause?
   (a) fast rising thermals.
   (b) strong mountain waves
   (c) large wake turbulence

(d) mechanical turbulence due to your own propwash reflecting from the ground.

4) You are flying south and parallel to the Rocky Mountains, which are to the west of you, when you suddenly encounter a rotor. Which of the following can you expect your aircraft to experience?
(a) A pitch up
(b) A roll to the left
(c) A roll to the right
(d) A pitch down

5) A METAR includes this wind information: 03008KT. What is the wind direction and speed?
(a) Winds from 300 deg true north and 8 knots
(b) Winds from 30 deg magnetic north and 8 knots
(c) Winds from 300 deg magnetic north and 8 knots
(d) Winds from 30 deg true north and 8 knots

6) Which of the following represents Marginal VFR conditions?
(a) visibility 1-3 statute miles, ceiling 1000 to 3000 ft.
(b) visibility 3-5 statute miles, ceiling 1000 to 3000 ft.
(c) visibility 3-5 statute miles, ceiling 3000 to 5000 ft.
(d) visibility 1-3 statute miles, ceiling 3000 to 5000 ft.

7) It is 10:00 a.m. local time and you are flying in class G airspace at 2,500 ft. AGL (which is 8,000 ft. MSL). You notice that conditions are changing from "severe clear" to scattered clouds and somewhat lowered visibility. How far, horizontally must you stay away from clouds and what must your visibility remain in order to stay VFR?
(a) cloud clearance: 2000 ft.; visibility, 1 statute mile
(b) cloud clearance: 1 statute mile; visibility, 3 statute miles
(c) cloud clearance: 1 statute mile; visibility, 5 statute miles
(d) cloud clearance: 2000 ft.; visibility, 3 statute miles

8) Using the following table, what is the wind direction and speed at 8,000 ft over BLH ?

FDUW04 KWBC 161443
DATA BASED ON 161200Z
VALID 170000Z FOR USE 2100-0600Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000
BLH	2314	2311+23	2605+17	2808+11	2911-08	3016-20	311936

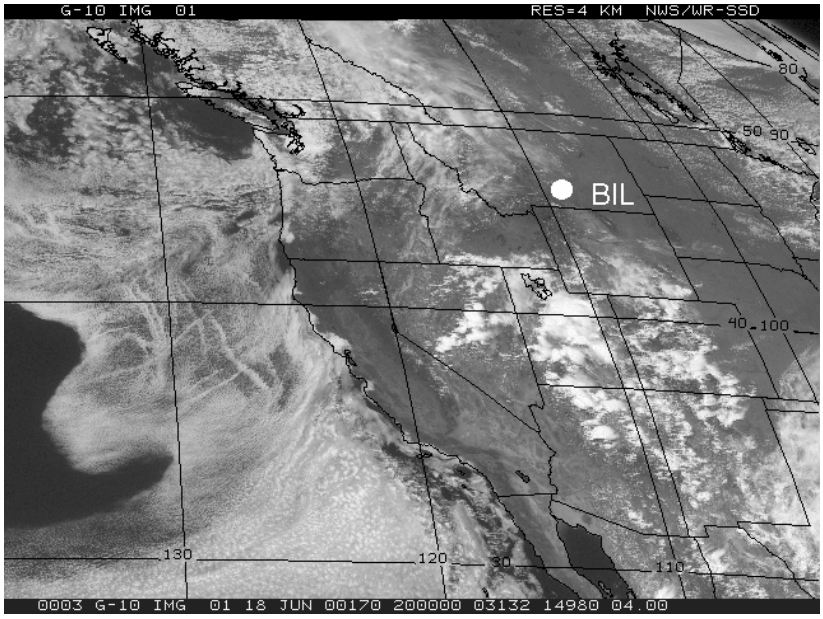
(a) 270 deg, 10 kts
(b) 230 deg, 6 kts
(c) 240 deg, 10 kts
(d) 250 deg, 7 kts

9) It is July and you are at an airport near Phoenix, Arizona. Current observations indicate an unstable atmosphere, low humidity and virga. What weather conditions can you expect to follow?
(a) lightning and thunder due to a large thunderstorm
(b) clearing as the low humidity will dry up the atmosphere and stabilize it
(c) ground fog as the virga introduces moisture at the surface
(d) stratus as the stationary front passes through

10) Surface temperature is 30 degF at your departing airport and weather reports indicate a freezing level at 5,000 ft. Additionally, you notice ice pellets on the ground while walking out to your Cessna 172. You:
(a) climb through 5,000 ft. at a faster airspeed than normal
(b) do not alter your normal climbout profile and speed as you climb through 5,000 ft.
(c) climb through 5,000 ft. at a slower airspeed than normal
(d) cancel the flight until another time

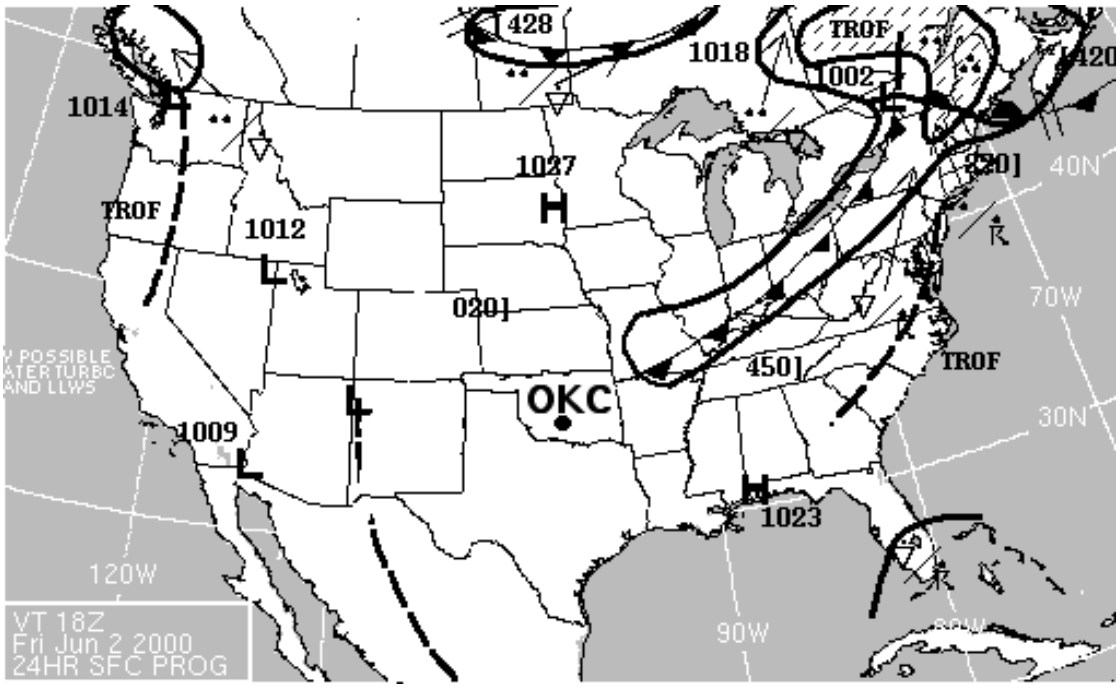
11) The truncated current observations at Billings, MT (BIL) are shown below. The visible satellite image for the same time is also shown. Cirrus clouds are reported in the area. You want to depart Billings for a local flight. Given the choices listed, what do you decide to do?

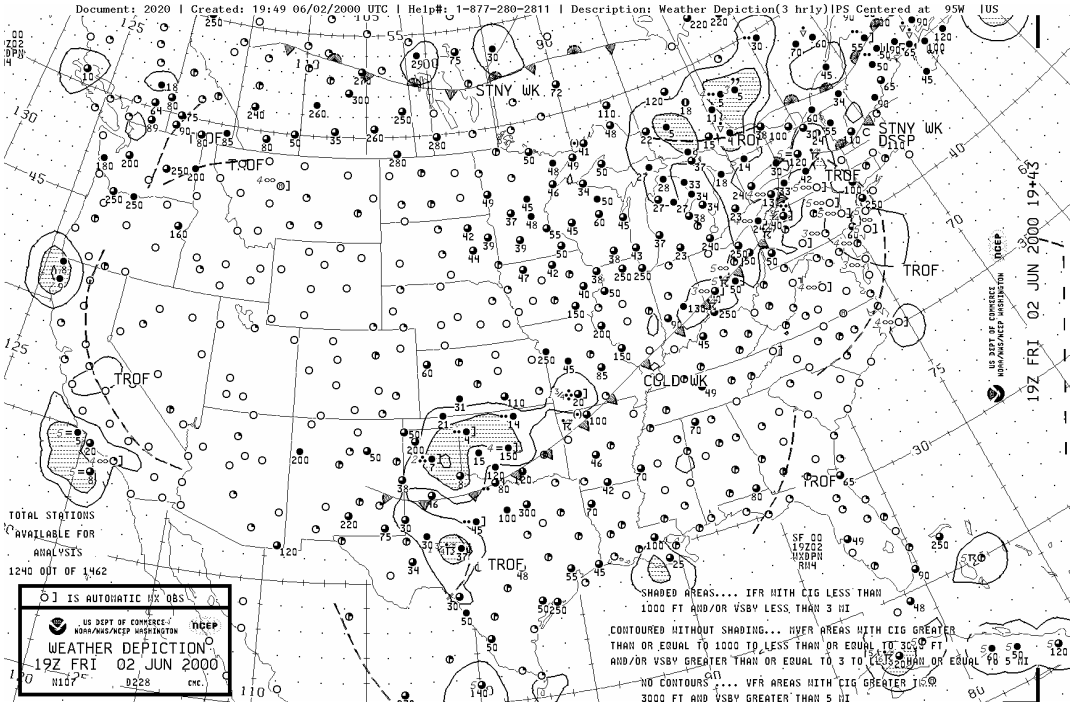
SFC:	27008KT	40degF
1000ft	27009KT	37degF
2000ft	26010KT	46degF
3000ft	26012KT	35degF
4000ft	25015KT	30degF



(a) Delay takeoff as it appears a storm accompanied by a cold front is passing through the area.
(b) Takeoff but watch for icing as you pass through 2000 ft.
(c) Takeoff but be prepared for a slight degradation in aircraft climb performance between 1000 ft. to 2000 ft.
(d) Wait for a few hours until the clouds clear away.

12) You are flying a small single engine aircraft (e.g., Cessna 172). It is 1900Z and you have a flight scheduled to takeoff from the Dallas area at 1930Z to land at an airport in the Oklahoma City area. Using the following weather charts, what do you decide to do?

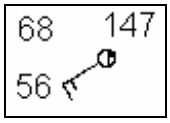




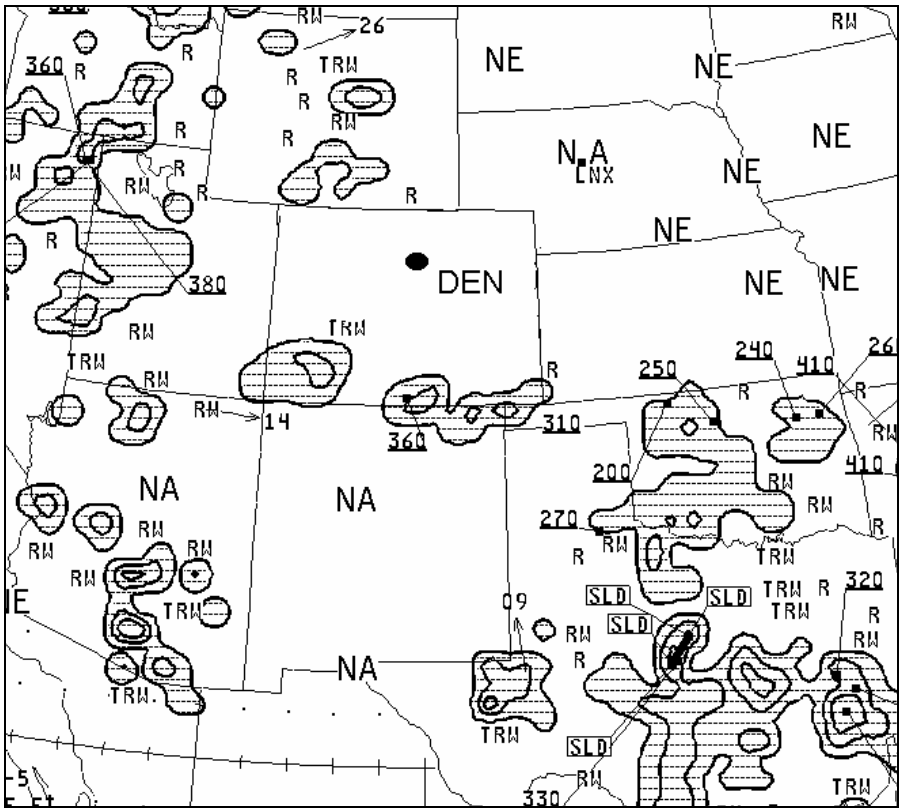
(a) Fly east and circle around to approach the Oklahoma City area from the north.
(b) Secure the aircraft for approaching bad weather and delay your flight.
(c) Wait an hour and see if the weather improves.
(d) Takeoff towards Oklahoma City because the weather depiction chart is in error.

13) A FD and surface observation for Denver, CO are shown below. A national radar summary is also shown. Based on this information, what is the most likely weather hazard that you will encounter while climbing through 10,000 ft from the Denver area ?

FT	3000	6000	9000	12000	18000	24000	30000
DEN			2321-04	2535-09	2337-18	2445-33	235846



Surface Observation



(a) Turbulence near thunderstorms
(b) Low level wind shear
(c) Mountain wave turbulence
(d) Low visibility due to overcast skies

14) Please rate how well you think you performed on this Weather Knowledge Challenge
   (a) superior
   (b) above average
   (c) average
   (d) below average
   (e) very poor

If you have any comments that you wish to make regarding the Weather Knowledge Challenge that you just completed, this study, or the general topics of pilot weather knowledge and training, please feel free to write them here.

Thank you very much for your assistance! Don't forget to complete a raffle ticket!

If you would like to receive the overall results of the study, please self addresses a mailing label available from one of the research assistants. If you would like to receive information about how you alone scored on this test, please tell the research assistant when you turn in this measure.

Thanks again for your help!

Appendix B

Weather Knowledge Challenge – Form B

The Weather Knowledge Challenge

Section I

1. Gender: ☐ Male ☐ Female 2. Age: _____

3. For what category(ies) of aircraft do you hold a certificate(s)? (Please check **all** that apply)

☐ Airplane ☐ Rotorcraft ☐ Glider ☐ Lighter-than-air

4. What certificate(s)/rating(s) do you currently hold? (Please check **all** that apply)

☐ Student Pilot ☐ Recreational Pilot ☐ Private Pilot ☐ Instrument ☐ Commercial

☐ ATP ☐ CFI ☐ CFII ☐ MEI ☐ SEL ☐ MEL ☐ SES ☐ MES ☐ A & P

5. How many total hours of flying do you currently have? _____ hours

6. How many hours have you flown in the past six (6) months? _____ hours

7. When did you pass your checkride/practical test for your most recently obtained certificate/rating? _____ month/year

8. What is your most recently obtained certificate/rating? _____

9. In which state(s) (or province(s) or country(ies) if you do not live in the USA) do you do most of your flying? _____

10. What is your postal zip code? _____

11. Which of the following geographical features describe the areas in which you do most of your flying (please check **all** that apply):

☐ plains ☐ hills (elev. up to 1000 ft.) ☐ low mountains (elev. between 1000 ft. and 4000 ft.)

☐ high mountains (elev. greater than 4000 ft.) ☐ coastal regions ☐ islands/large bodies of water

12. By circling a number, please rate your **level of mastery** of the following weather-related categories.

1 = Very Poor **2** = Poor **3** = Fair **4** = Good **5** = Excellent

I. **Causes of Weather and Weather Patterns** (atmospheric circulation, fronts, unstable air, temperature inversions, clouds, fog, dewpoint, etc.)	**1**	**2**	**3**	**4**	**5**
II. **Weather Hazards** (thunderstorms, turbulence, crosswind, restrictions to visibility, icing, frost, wind shear, etc.)	**1**	**2**	**3**	**4**	**5**
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VI. **Weather-Related Decision Making** (avoiding hazardous wx, practical and psychological factors in decision making, making a go/no go decision, etc.)	**1**	**2**	**3**	**4**	**5**

Section II

Please circle the letter that represents the best answer to the following questions. **Assume that you are flying a single engine plane with fixed prop and fixed landing gear (e.g., Cessna 172) and that you are flying VFR for all questions.**

3) For the same water content, which area will have thicker fog?
   (a) middle of the ocean
   (b) large cities
   (c) forested areas
   (d) small remote islands

4) What is a cause of atmospheric instability?
   (a) nighttime cooling at the earth's surface
   (b) cold air advection at the earth's surface
   (c) warm air advection at high altitudes
   (d) daytime heating of the earth's surface

3) What is the primary cause of structural icing?
   (a) subzero hail droplets dissipating on the aircraft
   (b) freezing of water droplets as the aircraft passes through a cloud
   (c) low pressure over the top of the wing resulting in condensation
   (d) a low adiabatic cooling rate of water in a cloud

4) What is the frequency of Flight Watch (EFAS) ?
   (a) 122.8 MHz
   (b) 122.0 MHz
   (c) 132.0 MHz
   (d) 121.5 MHz

5) What is the coverage of a TAF?
   (a) Within 5 NM of the issuing airport
   (b) Within 15 NM of the issuing airport
   (c) Within 50 NM of the issuing airport
   (d) Within the airspace controlled by the ARTCC of the issuing airport

6) It is 1:00 p.m. local time and you are flying at 12,500 ft. MSL in controlled airspace. What are your visibility and cloud clearance requirements?
   (a) visibility: 5 statute miles; cloud clearance: 1,000 ft. below, 1000 ft. above, 1 statute mile horizontal
   (b) visibility: 3 statute miles; cloud clearance: 1,000 ft. below, 500 ft. above, 2000 ft. horizontal
   (c) visibility: 3 statute miles; cloud clearance: 500 ft. below, 1000 ft. above, 2000 ft. horizontal
   (d) visibility: 1 statute mile; cloud clearance: 500 ft. below, 1000 ft. above, 2000 ft. horizontal

7) It is early afternoon and you are landing at a controlled airport in quickly deteriorating weather conditions. You ask for and are granted a Special VFR clearance. This means that:
   (a) you are going to fly a special (non-instrument and non-standard VFR) approach and that you must be a current instrument rated pilot.
   (b) you must remain clear of clouds, have a RVR (runway visual range) of at least 2400 ft., that you must be a current instrument rated pilot, but that you will not be flying an instrument approach.
   (c) you must remain clear of clouds, have a visibility of at least one statute mile, that you don't necessarily have to be a current instrument rated pilot, and that you will not be flying an instrument approach.
   (d) you must have a ceiling of at least 800 ft., have a visibility of at least 2 statute miles, that you don't necessarily have to be a current instrument rated pilot, but that you will be flying a special type of instrument approach.

8) The observations at your airport report southeasterly winds, falling sea level pressure and gradual lowering of the ceiling. Cirrus, cirrostratus, and altostratus clouds are reported in the area. What weather conditions can you expect to follow ?
   (a) clear skies as the cold front passes through
   (b) fog and continuous precipitation as the warm front passes through
   (c) rain and high winds as the stationary front passes through
   (d) snow and sleet as the vigorous cold front passes through

9) Take-off and en route weather are VFR with the environment becoming more unstable at your destination at your ETA. Towering cumulus are also reported to be developing about your destination. The weather briefing ends with "VFR flight is not recommended." There are several good alternate airfields along the route of flight and beyond your destination. You decide to:
   (a) Go without filing a flight plan.
   (b) File VFR to an airport short of your destination, land and let any weather pass over
   (c) Delay your departure until the "VFR flight is not recommended" statement is removed from the forecast
   (d) File VFR to your destination because the "VFR flight is not recommended" advisory is in error.

10) Your next and final destination is 50 miles toward the west. A cold front has moved through and is now 30 miles to the east of your current location. Weather radar detects a 'hook echo' indicating a tornado is developing along this front. You only have 2 hours left until you have to return this aircraft so you decide to:
   (a) Continue to wait with the aircraft until the hook echo disappears
   (b) Fly the aircraft west towards your destination
   (c) Fly the aircraft northeast for safety
   (d) Leave the aircraft and call your flying club to tell them you will not make your return time.

11) The truncated current observations at Billings, MT (BIL) are shown below. The visible satellite image for the same time is also shown. Cirrus clouds are reported in the area. You want to depart Billings for a local flight. Given the choices listed, what do you decide to do?

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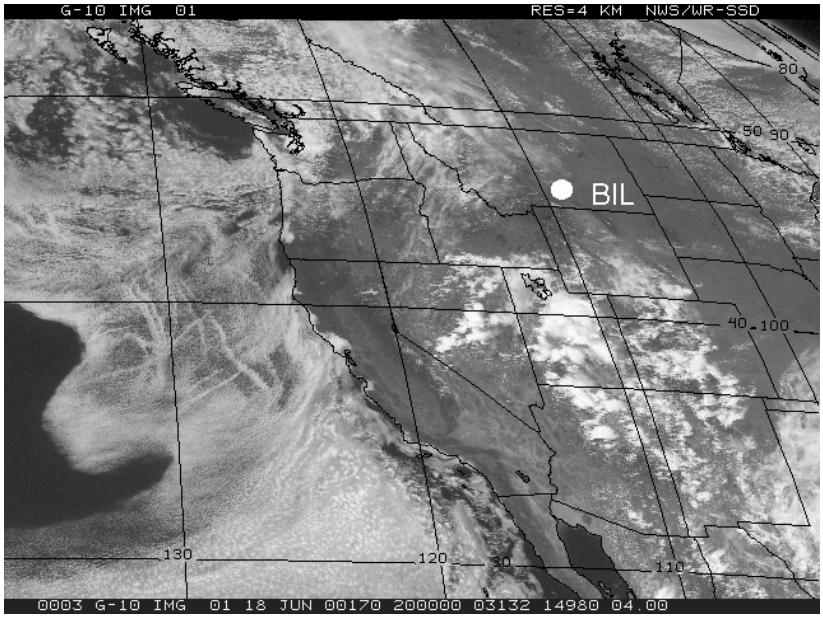

(e) Takeoff but be prepared for a slight degradation in aircraft climb performance between 1000 ft. to 2000 ft.
(f) Takeoff but watch for icing as you pass through 2000 ft.
(g) Delay takeoff as it appears a storm accompanied by a cold front is passing through the area.
(h) Wait for a few hours until the clouds clear away.

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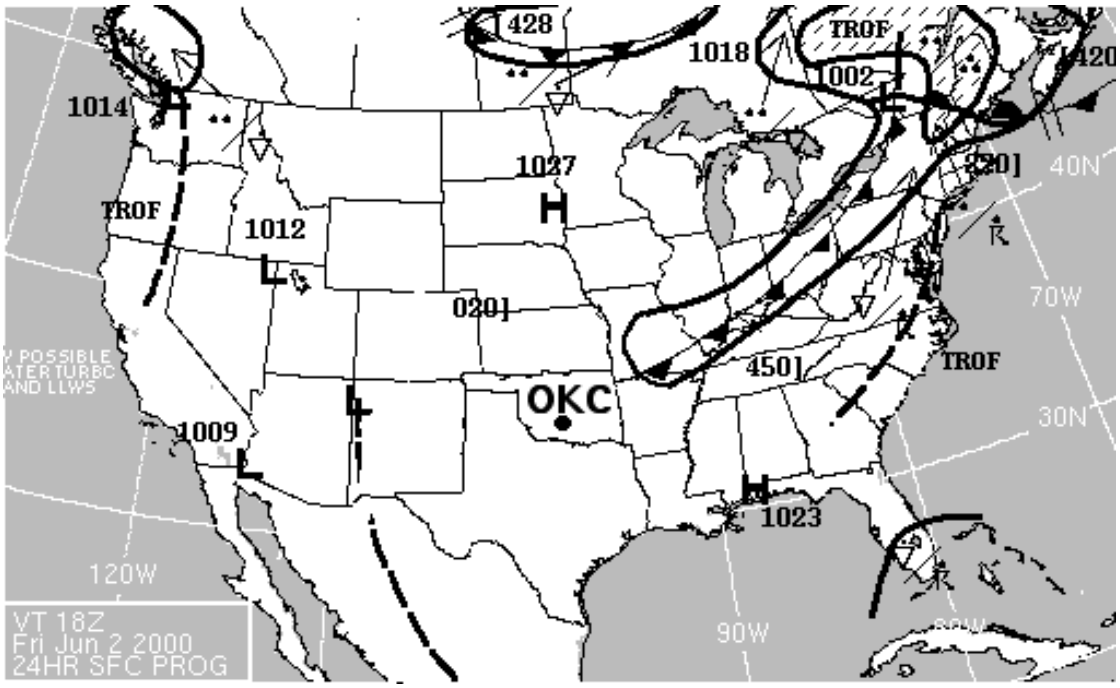

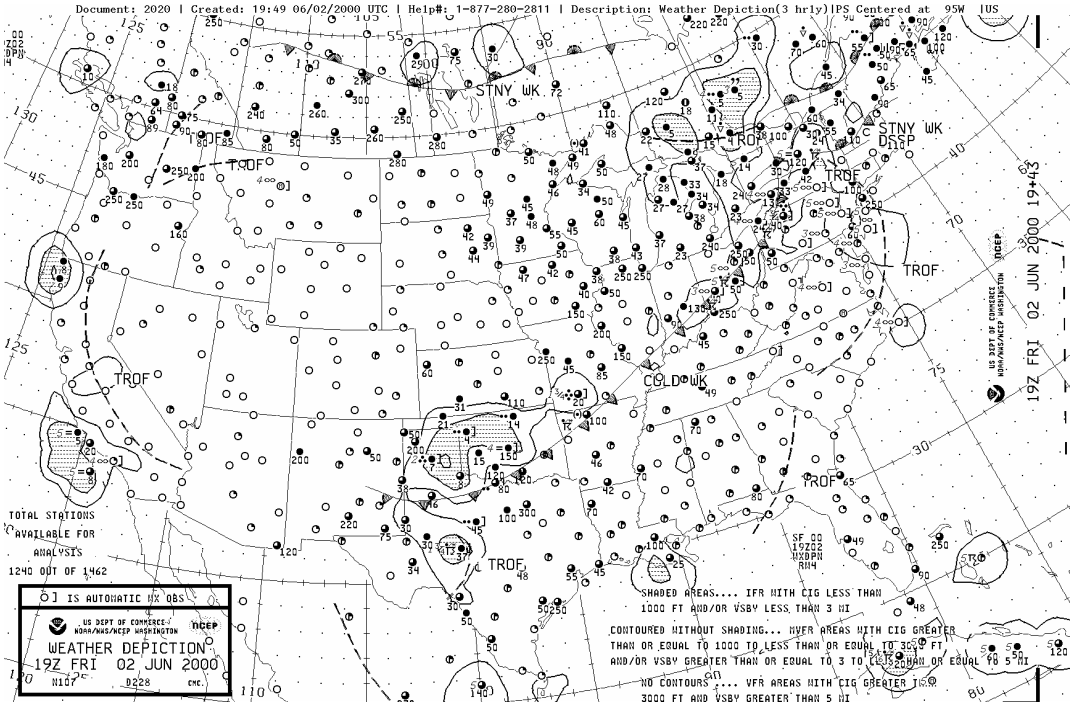

(e) Fly east and circle around to approach the Oklahoma City area from the north.
(f) Secure the aircraft for approaching bad weather and delay your flight.
(g) Wait an hour and see if the weather improves.
(h) Takeoff towards Oklahoma City because the weather depiction chart is in error.

13) A FD and surface observation for Denver, CO are shown below. A national radar summary is also shown. Based on this information, what is the most likely weather hazard that you will encounter while climbing through 10,000 ft from the Denver area ?

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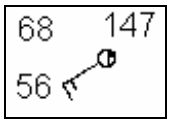
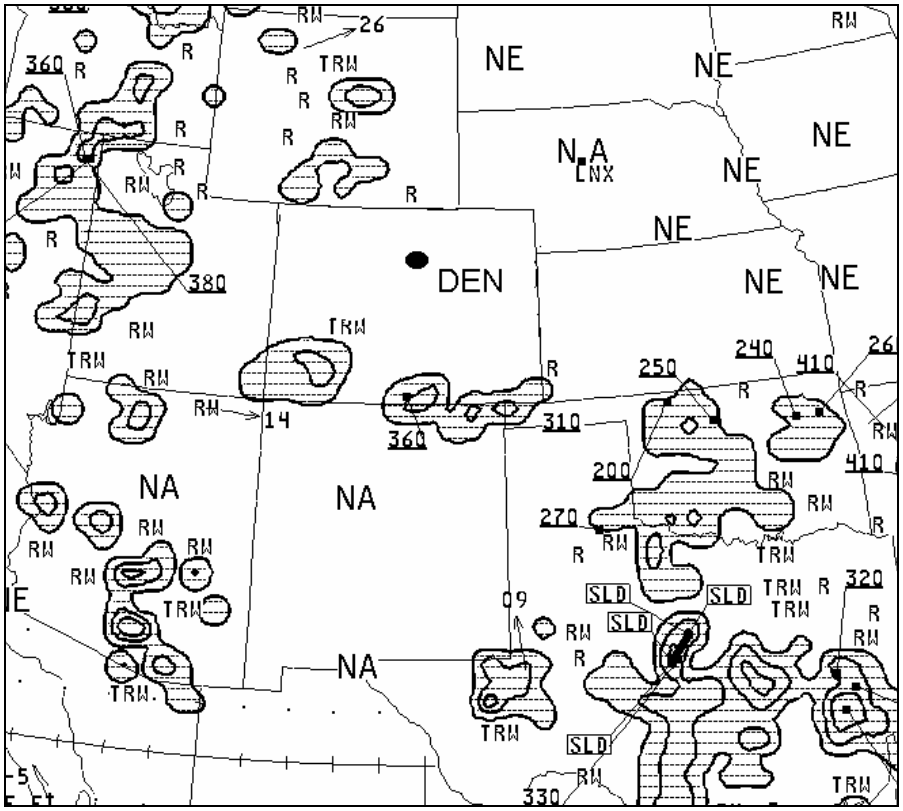


Surface Observation



(e) Turbulence near thunderstorms
(f) Low level wind shear
(g) Mountain wave turbulence
(h) Low visibility due to overcast skies

14) Please rate how well you think you performed on this Weather Knowledge Challenge.
   (a) superior
   (b) above average
   (c) average
   (d) below average
   (e) very poor

If you have any comments that you wish to make regarding the Weather Knowledge Challenge that you just completed, this study, or the general topics of pilot weather knowledge and training, please feel free to write them here.

Thank you very much for your assistance! Don't forget to complete a raffle ticket!

If you would like to receive the overall results of the study, please self addresses a mailing label available from one of the research assistants. If you would like to receive information about how you alone scored on this test, please tell the research assistant when you turn in this measure.

Thanks again for your help!

Appendix C

Weather Knowledge Challenge – Form C

The Weather Knowledge Challenge

Section I

1. Gender: ☐ Male ☐ Female 2. Age: _____

3. For what category(ies) of aircraft do you hold a certificate(s)? (Please check **all** that apply)

☐ Airplane ☐ Rotorcraft ☐ Glider ☐ Lighter-than-air

4. What certificate(s)/rating(s) do you currently hold? (Please check **all** that apply)

☐ Student Pilot ☐ Recreational Pilot ☐ Private Pilot ☐ Instrument ☐ Commercial

☐ ATP ☐ CFI ☐ CFII ☐ MEI ☐ SEL ☐ MEL ☐ SES ☐ MES ☐ A & P

5. How many total hours of flying do you currently have? _____ hours

6. How many hours have you flown in the past six (6) months? _____ hours

7. When did you pass your checkride/practical test for your most recently obtained certificate/rating? _____ month/year

8. What is your most recently obtained certificate/rating? _____

9. In which state(s) (or province(s) or country(ies) if you do not live in the USA) do you do most of your flying? _____

10. What is your postal zip code? _____

11. Which of the following geographical features describe the areas in which you do most of your flying (please check **all** that apply):

☐ plains ☐ hills (elev. up to 1000 ft.) ☐ low mountains (elev. between 1000 ft. and 4000 ft.)

☐ high mountains (elev. greater than 4000 ft.) ☐ coastal regions ☐ islands/large bodies of water

12. By circling a number, please rate your **level of mastery** of the following weather-related categories.

1 = Very Poor **2** = Poor **3** = Fair **4** = Good **5** = Excellent

I. **Causes of Weather and Weather Patterns** (atmospheric circulation, fronts, unstable air, temperature inversions, clouds, fog, dewpoint, etc.)	**1**	**2**	**3**	**4**	**5**
II. **Weather Hazards** (thunderstorms, turbulence, crosswind, restrictions to visibility, icing, frost, wind shear, etc.)	**1**	**2**	**3**	**4**	**5**
III. **Weather Services** (FSS, Flight Watch/EFAS, METARs, TAFs, ASOS/ AWOS, Weather radar and charts, PIREPs, SIGMETs, etc.)	**1**	**2**	**3**	**4**	**5**
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V. **Weather Interpretation** (predicting wx conditions, decoding & interpreting weather information, applying wx information in flight planning, etc.)	**1**	**2**	**3**	**4**	**5**
VI. **Weather-Related Decision Making** (avoiding hazardous wx, practical and psychological factors in decision making, making a go/no go decision, etc.)	**1**	**2**	**3**	**4**	**5**

Section II

Please circle the letter that represents the best answer to the following questions. **Assume that you are flying a single engine plane with fixed prop and fixed landing gear (e.g., Cessna 172) and that you are flying VFR for all questions.**

5) What kind of winds can you expect in the Northern Hemisphere as you are flying toward the center of low pressure?
   (a) left crosswind
   (b) right crosswind
   (c) headwind
   (d) tailwind

2) With which type of cloud is hail most likely associated?
   (a) Nimbostratus
   (b) Cumulonimbus
   (c) Stratus
   (d) Altocumulus

3) When flying through a microburst near the ground, what can you expect to happen to an aircraft ?
   (a) a sudden increase in airspeed followed by a sudden decrease in airspeed
   (b) a sudden decrease in airspeed followed by a sudden increase in airspeed
   (c) a sudden increase in airspeed throughout the microburst
   (d) a sudden decrease in airspeed throughout the microburst

4) What audience are AIRMETS directed to?
   (a) small single engine aircraft
   (b) large multi-engine aircraft
   (c) commercial aircraft
   (d) all aircraft

5) What information is typically shown on a weather depiction chart?
   (a) wind and direction
   (b) thunderstorm potential by region
   (c) ceiling and visibility
   (d) altitude of thunderstorm tops and movement

6) What do the VFR cloud clearance and visibility requirements depend upon?
   (a) time of day and weather
   (b) aircraft type and cloud type
   (c) type of airspace and altitude
   (d) altitude and cloud type

7) Using the TAF for DFW, what is the earliest that you would expect thunderstorms to reach DFW ?

Terminal Aerodrome Forecast (TAF)

02 Jun 2000 - 20:12:11 UTC

DFW - Dallas/Fort Worth International Airport, Dallas-Fort Worth, Texas

```
KDFW 021735Z 021818 17010KT P6SM SCT050 BKN100
     FM2300 14006KT P6SM SCT050 BKN100
     FM0200 13006KT P6SM BKN050 BKN100 PROB30 0612 5SM -TSRA
      OVC035CB
     FM1200 16008KT P6SM BKN035 OVC080 PROB40 1218 3SM TSRA
      OVC020CB=
```

   (a) 10am CDT, 6/2/00
   (b) 9pm CDT, 6/2/00
   (c) 1am, CDT, 6/3/00
   (d) 6am CDT, 6/3/00

8) The following is a series of METARs from an airport. Using this information, which statement best describes what conditions to expect at 0600Z ?

100300Z	28008KT	10SM	CLR	13/8
100400Z	27005KT	10SM	CLR	11/8
100500Z	26003KT	10SM	CLR	10/8

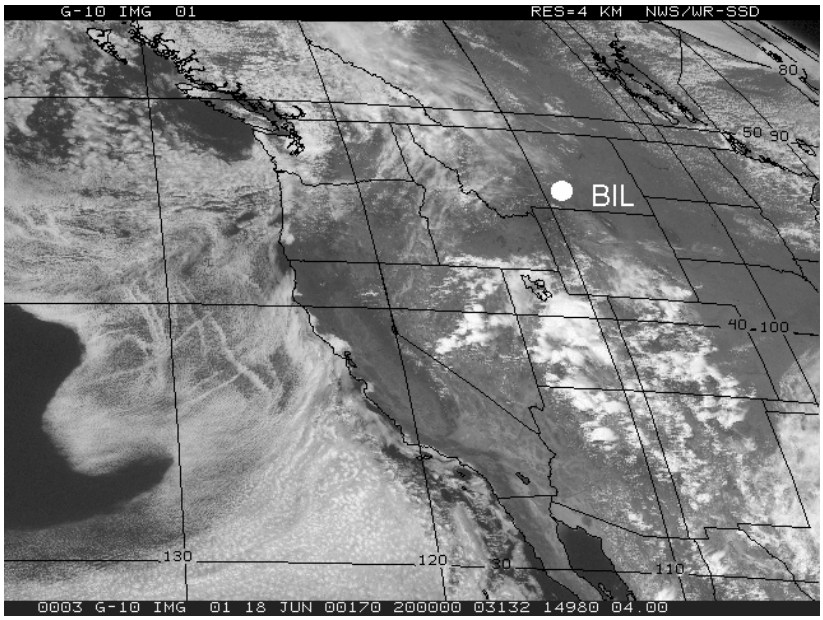
   (a) The winds will ensure continued clear skies
   (b) The reducing dewpoint and temperature spread suggest rain will develop
   (c) The winds suggest a low level wind shear condition will develop
   (d) The reducing dewpoint and temperature spread suggests fog will form

9) You have been cruising at 8,500 ft. for four hours and are preparing to do a fairly steep en route descent directly onto short final at the Smallville Airport. Weather en route was a -10 degC but the warm sun made the flight most comfortable. Smallville weather is 21 degC, dew point of 11 degC and calm winds. You decide to
   (a) Expedite the descent to give as much time on final approach as possible.
   (b) Make sure the carburetor heat and window defrosters are on and set at high.
   (c) Slow the descent rate to allow the airframe to warm before landing.
   (d) Slow the descent rate to reduce cold shocking the engine.

10) You are scheduled to be at another airport that is 120 miles to the north. A thunderstorm is 50 miles away from your destination airport and is approaching it at 25 knots from the northwest. It is also growing in size and intensity. You plan to fly at 120 knots. You decide to:
   (a) Takeoff and circle around the thunderstorm and approach your airport behind it.
   (b) Wait with the airplane until the weather passes, then fly into your next airport.
   (c) Fly the airplane anywhere away from the path of the storm
   (d) Leave the airplane and wait out the storm.

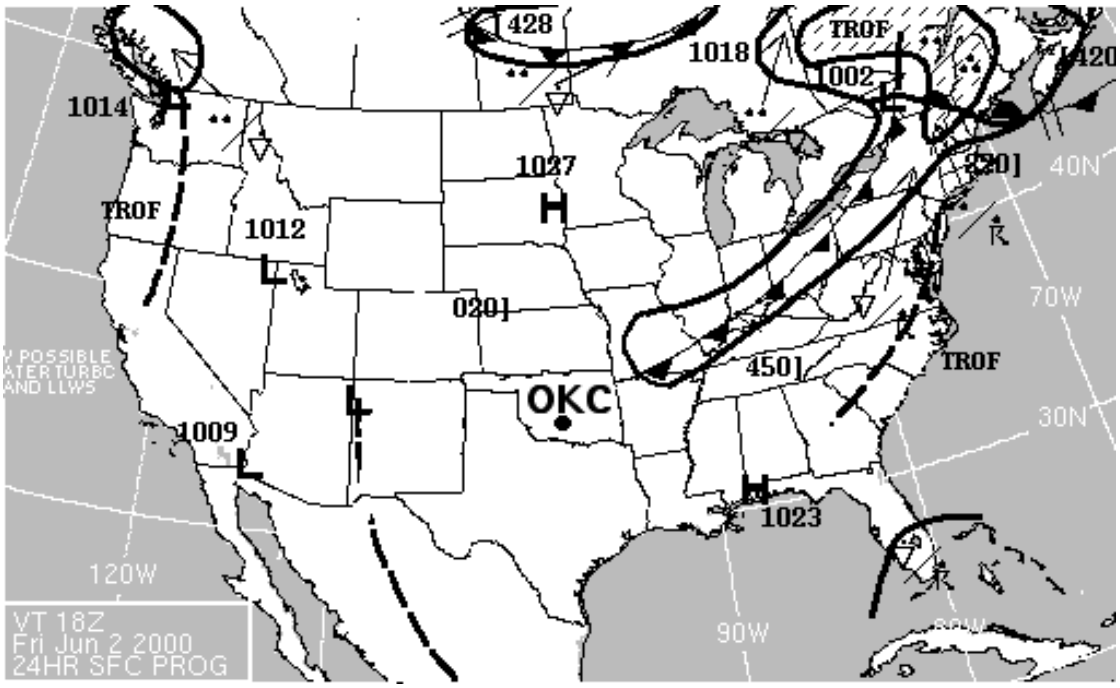
11) The truncated current observations at Billings, MT (BIL) are shown below. The visible satellite image for the same time is also shown. Cirrus clouds are reported in the area. You want to depart Billings for a local flight. Given the choices listed, what do you decide to do?

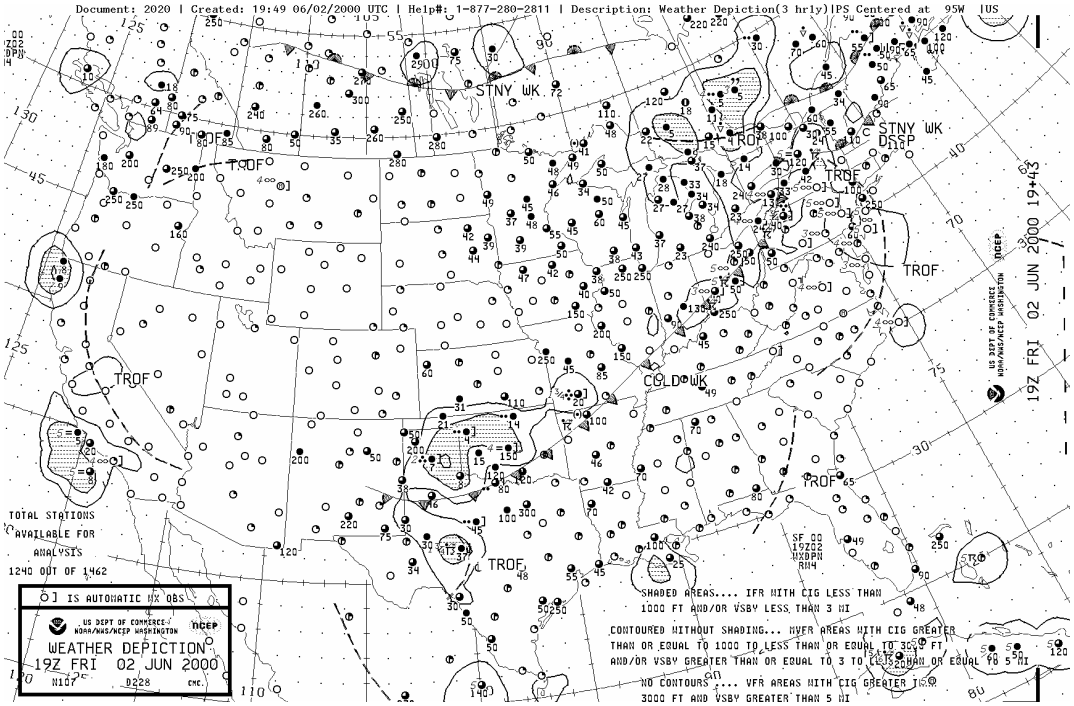
SFC:	27008KT	40degF
1000ft	27009KT	37degF
2000ft	26010KT	46degF
3000ft	26012KT	35degF
4000ft	25015KT	30degF



   (i) Takeoff but be prepared for a slight degradation in aircraft climb performance between 1000 ft. to 2000 ft.
   (j) Takeoff but watch for icing as you pass through 2000 ft.
   (k) Delay takeoff as it appears a storm accompanied by a cold front is passing through the area.
   (l) Wait for a few hours until the clouds clear away.

12) You are flying a small single engine aircraft (e.g., Cessna 172). It is 1900Z and you have a flight scheduled to takeoff from the Dallas area at 1930Z to land at an airport in the Oklahoma City area. Using the following weather charts, what do you decide to do?

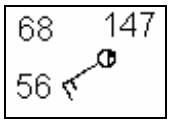




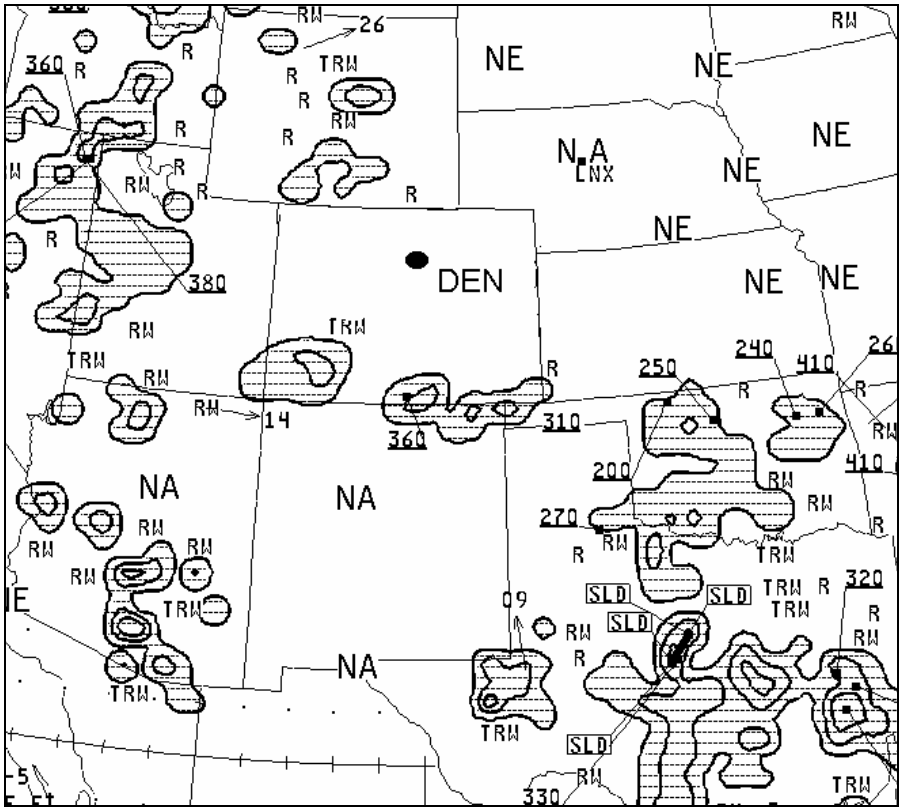
(i) Fly east and circle around to approach the Oklahoma City area from the north.
(b) Wait an hour and see if the weather improves.
(c) Secure the aircraft for approaching bad weather and delay your flight.
(d) Takeoff towards Oklahoma City because the weather depiction chart is in error.

13) A FD and surface observation for Denver, CO are shown below. A national radar summary is also shown. Based on this information, what is the most likely weather hazard that you will encounter while climbing through 10,000 ft from the Denver area ?

FT	3000	6000	9000	12000	18000	24000	30000
DEN			2321-04	2535-09	2337-18	2445-33	235846



Surface Observation



(i) Turbulence near thunderstorms
(j) Mountain wave turbulence
(k) Low level wind shear
(l) Low visibility due to overcast skies

14) Please rate how well you think you performed on this Weather Knowledge Challenge.
   (a) superior
   (b) above average
   (c) average
   (d) below average
   (e) very poor

If you have any comments that you wish to make regarding the Weather Knowledge Challenge that you just completed, this study, or the general topics of pilot weather knowledge and training, please feel free to write them here.

Thank you very much for your assistance! Don't forget to complete a raffle ticket!

If you would like to receive the overall results of the study, please self addresses a mailing label available from one of the research assistants. If you would like to receive information about how you alone scored on this test, please tell the research assistant when you turn in this measure.

Thanks again for your help!

Appendix D

Weather Knowledge Challenge Tables

Table 1

Participant Pilot Demographic Statistics Compared to FAA Pilot Demographic Statistics [1]

Category/Certificate/Rating	**Participant Pilots** [2]		FAA Estimates [3]	
	%	n	%	n
Pilots - Total	100.0	1077	100.0	625,581
Airplane	92.4	995	82.3	515,015
Rotorcraft	3.7	40	4.4	27,361
Glider	5.1	55	3.1	19,368
Lighter-than-air	.8	9	-	*
Student Pilot	6.7	72	14.9	93,064
Recreational Pilot	.1	1	.1	340
Private Pilot	53.6	577	40.2	251,561
Commercial Pilot	26.0	280	19.5	121,858
Airline Transport Pilot	9.9	107	22.6	141,596
Instrument Rating	42.0	452	49.9	311,944
Certified Flight Instructors [4]	19.6	211	12.9	80,981

[1] Pilots are categorized by highest certificate they hold. For example, if a pilot holds both a private and a commercial certificate, he is categorized as a commercial pilot.
[2] Participants who resided or did most of their flying outside of the Unites States, Puerto Rico, Virgin Islands, and Guam are not included.
[3] FAA Estimated Active Airmen Certificates Held in 2000 except for Glider Pilots (Estimated Active Glider Pilots in 1998). Obtained from http://api.hq.faa.gov/airmen/toc.htm.
[4] Includes Certified Flight Instructors (CFI), Certified Flight Instructors-Instrument (CFII), and Multiengine Instructors (MEI)
* Lighter-than-air type ratings are no longer being awarded by the FAA.

Table 2

Overall Performance on the Weather Knowledge Test [1]

Group	%	n	Mean Number Correct (out of 13)	Standard Deviation
All Participants	100.0	1005	8.54	2.07
Form A	31.8	320	8.42	2.04
Form B	34.4	346	8.56	1.99
Form C	33.7	339	8.64	2.18
Male	89.8	902	8.60 [a]	2.05
Female	10.0	100	8.06 [b]	2.24
VFR only Recreational, Private and Commercial Pilots	44.8	450	7.70 [a]	1.99
Instrument Rated Pilots	31.0	312	8.93 [b]	1.90
Instructors (CFIs, CFIIs, MEIs) [2]	13.6	137	9.50 [b, c]	1.88
Airline Transport Pilots [2]	10.5	106	9.70 [b, c]	1.69
20 – 260 Total Hours of Experience	25.1	252	7.91 [a]	1.97
261 – 650 Total Hours of Experience	25.9	260	8.31 [a, c]	2.05
651 – 2000 Total Hours of Experience	25.4	255	8.66 [b, c]	2.07
2001 – 33000 Total Hours of Experience	23.6	237	9.32 [b]	1.95
0 – 20 Hours During Last Six Months	30.4	306	7.76 [a]	1.99
21- 40 Hours During Last Six Months	20.4	205	8.28 [b]	1.97
41-80 Hours During Last Six Months	25.8	259	8.79 [c]	1.91
81-1004 Hours During Last Six Months	23.1	232	9.51 [d]	1.99
Fly over Plains [3]	53.2	535	8.63	2.12
Fly over Hills (elev. < 1000 ft.) [3]	47.2	474	8.61	2.02
Fly over Low Mountains (elev. 1000-4000 ft.) [3]	30.4	306	8.71	1.95
Fly over High Mountains (elev. > 4000 ft.) [3]	15.9	160	8.91	2.12
Fly over Coastal Regions [3]	31.3	315	8.81	2.04
Fly over Islands/Large Bodies of Water [3]	17.5	176	8.86	1.98

[1] Does not include Student Pilots, Non-US Pilots, and one A & P who did not also have a pilot certificate

[2] ATPs who also hold instrument and/or instructor ratings are categorized only as ATPs. Instructors must hold instrument ratings but are categorized here only as instructors.

[3] Geographical regions where pilots indicated they fly the most. Participants were instructed to "check all that applied" so these geographic region categories are not mutually exclusive. Thus, no analyses were performed to determine if significant differences between them existed.

[a, b, c, d] Subgroups with in each category with different superscripts differ by at least $p < .05$

Table 3a

Gender by Total Hours of Experience by Level of Formal Training Effects on Test Performance

Variable	df	Mean Square	F	Sig.
Gender	1	.874	.238	.626
Total Hours Logged	3	.943	.256	.875
Level of Training	3	33.489	9.104	.000
Gender by Total Hours	3	1.838	.500	.683
Gender by Level of Training	3	3.141	.854	.465
Total Hours by Level of Training	7	2.459	. 669	.699
Gender by Total Hours by Level of Training	5	.630	.171	.973
Error	975	3.678	-	-

Table 3b

Gender by Recent Hours of Experience by Level of Formal Training Effects on Test Performance

Variable	df	Mean Square	F	Sig.
Gender	1	.319	.089	.765
Recent Hours Logged within Last six months	3	5.625	1.580	.193
Level of Training	3	31.536	8.857	.000
Gender by Recent Hours	3	1.524	.428	.733
Gender by Level of Training	3	6.039	1.696	.166
Recent Hours by Level of Training	9	3.908	1.097	.362
Gender by Recent Hours by Level of Training	7	2.825	.793	.593
Error	969	3.561	-	-

Table 4

Weather Category [1] Mean Proportion Correct for Various Participant Groups

Group	Proportion Correct					
	Causes of Weather	Weather Hazards [2]	Weather Services	Weather Regs.	Weather Interpret.	Decision Making
All Participants[3]	.64	.83	.51	.61	.55	.77
Male	.65	.83	.51	.62	.55	.77
Female	.59	.80	.49	.57	.55	.71
VFR Only Recreational, Private & Commercial Pilots	.56	.76	.42	.54	.46	.77
Instrument Rated Pilots	.68	.87	.56	.64	.58	.76
Instructors (CFIs, CFIIs, MEIs) [4]	.73	.90	.63	.76	.68	.79
Airline Transport Pilots [4]	.77	.92	.60	.67	.68	.74
20 – 260 Total Hours of Experience	.58	.78	.47	.56	.54	.72
261 – 650 Total Hours of Experience	.63	.81	.49	.59	.51	.78
651 – 2000 Total Hours of Experience	.63	.84	.54	.63	.52	.78
2001 – 33000 Total Hours of Experience	.73	.89	.54	.68	.64	.79
0 – 20 Hours During Last Six Months	.57	.76	.41	.54	.48	.68
21- 40 Hours During Last Six Months	.61	.80	.50	.61	.48	.76
41-80 Hours During Last Six Months	.68	.85	.54	.61	.57	.77
81-1004 Hours During Last Six Months	.71	.92	.63	.70	.67	.76

[1] Weather Categories: Basic Causes of Weather, Weather Hazards, Weather Services, Weather Regulations, Weather Interpretation, Weather-Related Decision Making

[2] Analyses included only four questions in this category (as opposed to five in each of the others) because one question (A4) was dropped.

[3] Does not include Student Pilots, Non-US Pilots, and one A & P who did not also have a pilot certificate

[4] ATPs who also hold instrument and/or instructor ratings are categorized only as ATPs. Instructors must hold instrument ratings but are categorized here only as instructors.

Table 5

Frequencies of Answers Selected for Each Question

Form & Question Number	Category[1]	Answer Choices[2] Answer a % (n)	Answer b % (n)	Answer c % (n)	Answer d % (n)	Missing % (n)
A1	I	11.9 (38)	15.9 (51)	**63.4 (203)**	6.9 (22)	.6 (6)
A2	I	16.3 (52)	8.4 (27)	**68.8 (220)**	5.6 (18)	.9 (3)
A3	II	**95.9 (307)**	.9 (3)	1.9 (6)	.9 (3)	.3 (1)
A4	II	dropped				
A5	III	8.1 (26)	41.9 (134)	5.0 (16)	**43.4 (139)**	1.6 (5)
A6	IV	45.9 (147)	**44.7 (143)**	5.3 (17)	3.4 (11)	.6 (2)
A7	IV	**40.0 (128)**	23.1 (74)	5.0 (16)	30.9 (99)	.9 (3)
A8	V	1.9 (6)	5.3 (17)	16.9 (54)	**73.4 (235)**	2.5 (8)
A9	V	**33.8 (108)**	34.1 (109)	17.8 (57)	12.2 (39)	2.2 (7)
A10	VI	6.3 (20)	6.6 (21)	1.9 (6)	**84.1 (269)**	1.3 (4)
A11[3]	VII	19.1 (61)	16.9 (54)	**51.3 (164)**	10.9 (35)	1.9 (6)
A12[3]	VII	3.4 (11)	**44.1 (141)**	**49.4 (158)**	.6 (2)	2.5 (8)

[1] Categories: I = Causes of Weather, II = Weather Hazards, III = Weather Services, IV = Weather Regulations, V = Weather Interpretation, VI = Weather-Related Decision Making, VII = Questions that integrated material across several of the other categories.

[2] Correct answers for each question are bolded. Some questions have two correct answers.

[3] Questions 11, 12, and 13 are the same on all three test forms.

Continued

Table 5, Continued

Frequencies of Answers Selected for Each Question

Form & Question Number	Category[1]	Answer Choices[2] Answer a %	(n)	Answer b %	(n)	Answer c %	(n)	Answer d %	(n)	Missing %	(n)
A13[3]	VII	21.6	(69)	19.1	(61)	**49.4**	**(158)**	8.8	(28)	1.3	(4)
B1	I	14.7	(51)	**28.9**	**(100)**	39.0	(135)	15.6	(54)	.3	(1)
B2	I	2.6	(9)	4.6	(16)	3.5	(12)	**88.4**	**(306)**	.9	(3)
B3	II	3.2	(11)	**85.0**	**(294)**	2.9	(10)	8.1	(28)	.9	(3)
B4	III	6.4	(22)	**86.1**	**(298)**	1.7	(6)	4.6	(16)	1.2	(4)
B5	III	**41.6**	**(144)**	24.0	(83)	16.5	(57)	16.2	(56)	1.7	(6)
B6	IV	**49.1**	**(170)**	13.9	(48)	31.8	(110)	4.9	(17)	.3	(1)
B7	IV	2.6	(9)	8.4	(29)	**86.1**	**(298)**	2.3	(8)	.6	(2)
B8	V	14.5	(50)	**65.3**	**(226)**	15.6	(54)	3.8	(13)	.9	(3)
B9	VI	2.3	(8)	**41.6**	**(144)**	**53.5**	**(185)**	2.3	(8)	.3	(1)
B10	VI	15.3	(53)	**36.7**	**(127)**	3.5	(12)	43.1	(149)	1.4	(5)
B11[3]	VII	**52.0**	**(180)**	11.6	(40)	24.0	(83)	11.0	(38)	1.4	(5)

[1] Categories: I = Causes of Weather, II = Weather Hazards, III = Weather Services, IV = Weather Regulations, V = Weather Interpretation, VI = Weather-Related Decision Making, VII = Questions that integrated material across several of the other categories.
[2] Correct answers for each question are bolded. Some questions have two correct answers.
[3] Questions 11, 12, and 13 are the same on all three test forms.

Continued

Table 5, Continued

Frequencies of Answers Selected for Each Question

Form & Question Number	Category[1]	Answer Choices[2] Answer a % (n)	Answer b % (n)	Answer c % (n)	Answer d % (n)	Missing % (n)
B12[3]	VII	2.3 (8)	**52.6 (182)**	**42.8 (148)**	.9 (3)	1.4 (5)
B13[3]	VII	19.7 (68)	23.4 (81)	**46.0 (159)**	7.8 (27)	.3 (1)
C1	I	**72.0 (244)**	17.4 (59)	5.3 (18)	4.1 (14)	1.2 (4)
C2	II	8.0 (27)	**87.6 (297)**	.3 (1)	3.8 (13)	.3 (1)
C3	II	**64.3 (218)**	18.9 (64)	3.5 (12)	12.7 (43)	.6 (2)
C4	III	**37.5 (127)**	.6 (2)	.6 (2)	60.2 (204)	1.2 (4)
C5	III	29.5 (100)	12.4 (42)	**45.7 (155)**	9.7 (33)	2.7 (9)
C6	IV	6.2 (21)	0 (0)	**83.5 (283)**	10.0 (34)	.3 (1)
C7	V	4.4 (15)	38.9 (132)	**31.9 (108)**	19.8 (67)	5.0 (17)
C8	V	20.4 (69)	3.8 (13)	3.5 (12)	**69.3 (235)**	2.9 (10)
C9	VI	5.3 (18)	**45.1 (153)**	11.5 (39)	**35.7 (121)**	2.4 (8)
C10	VI	4.7 (16)	**45.1 (153)**	6.8 (23)	**42.8 (145)**	.6 (2)

[1] Categories: I = Causes of Weather, II = Weather Hazards, III = Weather Services, IV = Weather Regulations, V = Weather Interpretation, VI = Weather-Related Decision Making, VII = Questions that integrated material across several of the other categories.
[2] Correct answers for each question are bolded. Some questions have two correct answers.
[3] Questions 11, 12, and 13 are the same on all three test forms.

Continued

Table 5, Continued

Frequencies of Answers Selected for Each Question

Form & Question Number	Category[1]	Answer Choices[2] Answer a %	(n)	Answer b %	(n)	Answer c %	(n)	Answer d %	(n)	Missing %	(n)
C11[3]	VII	**56.3**	**(191)**	15.9	(54)	19.8	(67)	6.5	(22)	1.5	(5)
C12[3]	VII	2.4	(8)	**50.4**	**(171)**	**44.5**	**(151)**	.9	(3)	1.8	(6)
C13[3]	VII	19.5	(66)	**51.9**	**(176)**	18.9	(64)	7.7	(26)	2.1	(7)

[1] Categories: I = Causes of Weather, II = Weather Hazards, III = Weather Services, IV = Weather Regulations, V = Weather Interpretation, VI = Weather-Related Decision Making, VII = Questions that integrated material across several of the other categories.
[2] Correct answers for each question are bolded. Some questions have two correct answers.
[3] Questions 11, 12, and 13 are the same on all three test forms.

Table 6

III. Percent Correct for Each Item by Type of Certification or Rating

Form & Question Number	Category[1]	Type of Certification or Rating [2, 3]: VFR Only Private or Commercial %	(n)	Instrument Rating %	(n)	Instructor (CFI, CFII, or MEI) %	(n)	Airline Transport Pilot %	(n)	Chi-Square
A1	I	49.3 [a]	(70)	60.6 [a]	(57)	86.0 [b]	(43)	97.1 [b]	(33)	40.11 ***
A2	I	59.2 [a]	(84)	75.5 [b]	(71)	78.0	(39)	76.5	(26)	11.03 *
A3	II	95.8	(136)	96.8	(91)	96.0	(48)	94.1	(32)	.48
A4	II	dropped								
A5	III	38.7 [a]	(55)	41.5	(39)	62.0 [b]	(31)	41.2	(14)	8.51 *
A6	IV	32.4 [a]	(46)	47.9 [a]	(45)	74.0 [b]	(37)	44.1 [a]	(15)	26.45 ***
A7	IV	33.1	(47)	40.4	(38)	50.0	(25)	52.9	(18)	7.28
A8	V	64.1 [a]	(91)	74.5	(70)	90.0 [b]	(45)	85.3 [b]	(29)	15.90 ***
A9	V	24.6 [a, b]	(35)	29.8 [b, c]	(28)	54.0 [d]	(27)	52.9 [c, d]	(18)	20.69 ***

[1] Categories: I = Causes of Weather, II = Weather Hazards, III = Weather Services, IV = Weather Regulations, V = Weather Interpretation, VI = Weather-Related Decision Making, VII = Questions that integrated material across several of the other categories

[2] Does not include Student Pilots, Non-US Pilots, and one A & P who did not also have a pilot certificate

[3] Participants were instructed to "check all that applied" so these geographic region categories are not mutually exclusive. Thus, no analyses were performed to determine if significant differences between them existed.

[4] Questions 11, 12, and 13 are the same on all three test forms.

[5] Post Hoc Analyses failed to reveal any significant differences between the four groups.

* $p < .05$

** $p < .01$

*** $p \leq .001$

[a, b, c, d] Each question entry with different superscripts differs by at least $p < .05$

Continued

Table 6, Continued

IV. Percent Correct for Each Item by Type of Certification or Rating

Form & Question Number	Category[1]	Type of Certification or Rating [2, 3] VFR Only Private or Commercial %	(n)	Instrument Rating %	(n)	Instructor (CFI, CFII, or MEI) %	(n)	Airline Transport Pilot %	(n)	Chi-Square
A10	VI	83.8	(119)	84.0	(79)	88.0	(44)	79.4	(27)	1.14
A11[4]	VII	39.4 [a]	(56)	63.8 [b]	(60)	56.0	(28)	58.8	(20)	15.12 **
A12[4]	VII	93.7	(133)	92.6	(87)	90.0	(45)	100.0	(34)	3.48
A13[4]	VII	44.4	(63)	50.0	(47)	50.0	(25)	67.6	(23)	5.99
B1	I	24.5	(37)	34.5	(39)	27.1	(13)	33.3	(11)	3.54
B2	I	86.7	(130)	89.4	(101)	91.7	(44)	93.9	(31)	2.01
B3	II	74.8 [a]	(113)	92.0 [b]	(104)	91.7 [b]	(44)	97.1 [b]	(33)	22.14 ***
B4	III	76.8 [a]	(116)	93.8 [b]	(106)	89.6	(43)	97.1 [b]	(33)	20.40 ***
B5	III	33.1[a]	(50)	42.5	(48)	54.2 [b]	(26)	58.8 [b]	(20)	11.78 **

[1] Categories: I = Causes of Weather, II = Weather Hazards, III = Weather Services, IV = Weather Regulations, V = Weather Interpretation, VI = Weather-Related Decision Making, VII = Questions that integrated material across several of the other categories

[2] Does not include Student Pilots, Non-US Pilots, and one A & P who did not also have a pilot certificate

[3] Participants were instructed to "check all that applied" so these geographic region categories are not mutually exclusive. Thus, no analyses were performed to determine if significant differences between them existed.

[4] Questions 11, 12, and 13 are the same on all three test forms.

[5] Post Hoc Analyses failed to reveal any significant differences between the four groups.

* $p < .05$

** $p < .01$

*** $p \leq .001$

[a, b, c, d] Each question entry with different superscripts differs by at least $p < .05$

Continued

Table 6, Continued

V. Percent Correct for Each Item by Type of Certification or Rating

Form & Question Number	Category[1]	Type of Certification or Rating [2, 3] VFR Only Private or Commercial %	(n)	Instrument Rating %	(n)	Instructor (CFI, CFII, or MEI) %	(n)	Airline Transport Pilot %	(n)	Chi-Square
B6	IV	40.4 [a]	(61)	47.8 [a]	(54)	79.2 [b]	(38)	50.0 [a]	(17)	22.03 ***
B7	IV	84.1	(127)	86.7	(98)	85.4	(41)	94.1	(32)	2.39
B8	V	57.0	(86)	70.8	(80)	70.8	(34)	76.5	(26)	8.67 * [5]
B9	VI	98.0	(148)	92.9	(105)	91.7	(44)	94.1	(32)	5.17
B10	VI	29.1	(44)	43.4	(49)	47.9	(23)	32.4	(11)	8.75 * [5]
B11 [4]	VII	42.4 [a]	(64)	54.9	(62)	62.5	(30)	70.6 [b]	(24)	12.79 **
B12 [4]	VII	96.0	(145)	94.7	(107)	97.9	(47)	91.2	(31)	2.33
B13 [4]	VII	40.4 [a]	(61)	51.3	(58)	38.3	(18)	64.7 [b]	(22)	9.11 *
C1	I	60.5 [a]	(95)	79.0 [b]	(83)	82.1 [b]	(32)	89.5 [b]	(34)	20.57 ***

[1] Categories: I = Causes of Weather, II = Weather Hazards, III = Weather Services, IV = Weather Regulations, V = Weather Interpretation, VI = Weather-Related Decision Making, VII = Questions that integrated material across several of the other categories

[2] Does not include Student Pilots, Non-US Pilots, and one A & P who did not also have a pilot certificate

[3] Participants were instructed to "check all that applied" so these geographic region categories are not mutually exclusive. Thus, no analyses were performed to determine if significant differences between them existed.

[4] Questions 11, 12, and 13 are the same on all three test forms.

[5] Post Hoc Analyses failed to reveal any significant differences between the four groups.

* $p < .05$

** $p < .01$

*** $p \leq .001$

[a, b, c, d] Each question entry with different superscripts differs by at least $p < .05$

Continued

Table 6, Continued

VI. Percent Correct for Each Item by Type of Certification or Rating

Form & Question Number	Category[1]	Type of Certification or Rating [2, 3]: VFR Only Private or Commercial %	(n)	Instrument Rating %	(n)	Instructor (CFI, CFII, or MEI) %	(n)	Airline Transport Pilot %	(n)	Chi-Square
C2	II	81.5 [a]	(128)	91.4	(96)	89.7	(35)	100.0 [b]	(38)	12.30 **
C3	II	53.5 [a]	(84)	68.6	(72)	79.5 [b]	(31)	81.6 [b]	(31)	17.67 **
C4	III	28.0 [a]	(44)	46.7 [b]	(49)	43.6	(17)	44.7	(17)	11.25 *
C5	III	31.2 [a]	(49)	54.3 [b]	(57)	64.1 [b]	(25)	63.2 [b]	(24)	26.39 ***
C6	IV	73.9 [a]	(116)	90.5 [b]	(95)	94.9 [b]	(37)	92.1 [b]	(35)	19.93 ***
C7	V	29.3	(46)	32.4	(34)	30.8	(12)	42.1	(16)	2.35
C8	V	54.1 [a]	(85)	78.1 [b]	(82)	89.7 [b]	(35)	86.8 [b]	(33)	33.95 ***
C9	VI	79.0	(124)	80.0	(84)	84.6	(33)	86.8	(33)	1.64
C10	VI	93.6	(147)	83.8	(88)	82.1	(32)	81.6	(31)	9.19 * [5]

[1] Categories: I = Causes of Weather, II = Weather Hazards, III = Weather Services, IV = Weather Regulations, V = Weather Interpretation, VI = Weather-Related Decision Making, VII = Questions that integrated material across several of the other categories

[2] Does not include Student Pilots, Non-US Pilots, and one A & P who did not also have a pilot certificate

[3] Participants were instructed to "check all that applied" so these geographic region categories are not mutually exclusive. Thus, no analyses were performed to determine if significant differences between them existed.

[4] Questions 11, 12, and 13 are the same on all three test forms.

[5] Post Hoc Analyses failed to reveal any significant differences between the four groups.

* $p < .05$

** $p < .01$

*** $p \leq .001$

[a, b, c, d] Each question entry with different superscripts differs by at least $p < .05$

Continued

Table 6, Continued

VII. Percent Correct for Each Item by Type of Certification or Rating

Form & Question Number	Category[1]	Type of Certification or Rating [2, 3]: VFR Only Private or Commercial %	(n)	Instrument Rating %	(n)	Instructor (CFI, CFII, or MEI) %	(n)	Airline Transport Pilot %	(n)	Chi-Square
C11 [4]	VII	41.4 [a]	(65)	68.6 [b]	(72)	66.7 [b]	(26)	73.7 [b]	(28)	26.97 ***
C12 [4]	VII	95.5	(150)	93.3	(98)	94.9	(37)	97.4	(37)	1.16
C13 [4]	VII	47.1	(74)	56.2	(59)	46.2	(18)	65.8	(25)	5.66
All Item 11s	VII	41.1 [a]	(185)	62.2 [b]	(194)	61.3 [b]	(84)	67.9 [b]	(72)	49.38 ***
All Item 12s	VII	95.1	(428)	93.6	(292)	94.2	(129)	96.2	(102)	1.46
All Item 13s	VII	44.0 [a]	(198)	52.6	(164)	44.9 [a]	(61)	66.0 [b]	(70)	19.33 ***

[1] Categories: I = Causes of Weather, II = Weather Hazards, III = Weather Services, IV = Weather Regulations, V = Weather Interpretation, VI = Weather-Related Decision Making, VII = Questions that integrated material across several of the other categories

[2] Does not include Student Pilots, Non-US Pilots, and one A & P who did not also have a pilot certificate

[3] Participants were instructed to "check all that applied" so these geographic region categories are not mutually exclusive. Thus, no analyses were performed to determine if significant differences between them existed.

[4] Questions 11, 12, and 13 are the same on all three test forms.

[5] Post Hoc Analyses failed to reveal any significant differences between the four groups.

* $p < .05$

** $p < .01$

*** $p \leq .001$

[a, b, c, d] Each question entry with different superscripts differs by at least $p < .05$

Table 7

VIII. Percent Correct for Each Item by Geographic Region where Participants Fly Most Often

Form & Question Number	Category[1]	Geographic Regions [2, 3] Plains % (n)	Hills (elev<1000 ft) % (n)	Low Mountains (elev. 1000 - 4000 ft.) % (n)	High Mountains (elev>4000 ft) % (n)	Coastal Regions % (n)	Islands/ Large Bodies of Water % (n)
A1	I	65.2 (101)	62.0 (101)	66.0 (62)	81.5 (44)	73.0 (73)	68.4 (39)
A2	I	67.7 (105)	66.3 (108)	71.3 (67)	77.8 (42)	73.0 (73)	73.7 (42)
A3	II	96.1 (149)	93.9 (153)	95.7 (90)	96.3 (52)	97.0 (97)	94.7 (54)
A4	II	dropped					
A5	III	47.1 (73)	43.6 (71)	46.8 (44)	38.9 (21)	50.0 (50)	47.4 (27)
A6	IV	47.1 (73)	44.2 (72)	43.6 (41)	40.7 (22)	51.0 (51)	57.9 (33)
A7	IV	38.7 (60)	35.0 (57)	37.2 (35)	50.0 (27)	48.0 (48)	36.8 (21)
A8	V	75.5 (117)	74.2 (121)	68.1 (64)	66.7 (36)	76.0 (76)	78.9 (45)
A9	V	29.0 (45)	29.4 (48)	41.5 (39)	53.7 (29)	42.0 (42)	42.1 (24)
A10	VI	85.8 (133)	85.3 (139)	85.1 (80)	74.1 (40)	82.0 (82)	78.9 (45)

[1] Categories: I = Causes of Weather, II = Weather Hazards, III = Weather Services, IV = Weather Regulations, V = Weather Interpretation, VI = Weather-Related Decision Making, VII = Questions that integrated material across several of the other categories.
[2] Does not include Student Pilots, Non-US Pilots, and one A & P who did not also have a pilot certificate
[3] Participants were instructed to "check all that applied" so these geographic region categories are not mutually exclusive. Thus, no analyses were performed to determine if significant differences between them existed.
[4] Questions 11, 12, and 13 are the same on all three test forms.

Continued

Table 7, Continued

IX. Percent Correct for Each Item by Geographic Region where Participants Fly Most Often

Form & Question Number	Category[1]	Geographic Regions [2, 3] Plains %	(n)	Hills (elev<1000 ft) %	(n)	Low Mountains (elev. 1000 - 4000 ft.) %	(n)	High Mountains (elev>4000 ft) %	(n)	Coastal Regions %	(n)	Islands/ Large Bodies of Water %	(n)
A11 [4]	VII	49.7	(77)	49.7	(81)	45.7	(43)	57.4	(31)	47.0	(47)	52.6	(30)
A12 [4]	VII	94.2	(146)	93.9	(153)	92.6	(87)	90.7	(49)	90.0	(90)	93.0	(53)
A13 [4]	VII	52.9	(82)	54.0	(88)	58.5	(55)	68.5	(37)	50.0	(50)	56.1	(32)
B1	I	26.2	(51)	29.8	(45)	33.9	(37)	34.7	(17)	30.6	(33)	25.4	(15)
B2	I	89.7	(175)	86.8	(131)	94.5	(103)	87.5	(42)	89.8	(97)	93.2	(55)
B3	II	83.2	(163)	86.1	(130)	89.9	(98)	90.0	(45)	90.8	(99)	93.2	(55)
B4	III	88.8	(174)	87.4	(132)	87.2	(95)	92.0	(46)	85.3	(93)	89.8	(53)
B5	III	47.4	(93)	40.4	(61)	39.4	(43)	46.0	(23)	43.1	(47)	49.2	(29)
B6	IV	53.1	(104)	50.3	(76)	51.4	(56)	46.0	(23)	56.0	(61)	49.2	(29)
B7	IV	89.8	(176)	86.1	(130)	84.4	(92)	86.0	(43)	86.4	(94)	86.4	(51)

[1] Categories: I = Causes of Weather, II = Weather Hazards, III = Weather Services, IV = Weather Regulations, V = Weather Interpretation, VI = Weather-Related Decision Making, VII = Questions that integrated material across several of the other categories.
[2] Does not include Student Pilots, Non-US Pilots, and one A & P who did not also have a pilot certificate
[3] Participants were instructed to "check all that applied" so these geographic region categories are not mutually exclusive. Thus, no analyses were performed to determine if significant differences between them existed.
[4] Questions 11, 12, and 13 are the same on all three test forms.

Continued

Table 7, Continued

X. Percent Correct for Each Item by Geographic Region where Participants Fly Most Often

Form & Question Number	Category[1]	Geographic Regions [2, 3] Plains %	(n)	Hills (elev<1000 ft) %	(n)	Low Mountains (elev. 1000 - 4000 ft.) %	(n)	High Mountains (elev>4000 ft) %	(n)	Coastal Regions %	(n)	Islands/ Large Bodies of Water %	(n)
B8	V	65.8	(129)	66.2	(100)	67.9	(74)	54.0	(27)	70.6	(77)	69.5	(41)
B9	VI	95.9	(188)	96.7	(146)	92.7	(101)	94.0	(47)	93.6	(102)	94.9	(56)
B10	VI	37.8	(74)	37.7	(57)	39.4	(43)	50.0	(25)	46.8	(51)	42.4	(25)
B11 [4]	VII	53.6	(105)	52.3	(79)	53.2	(58)	60.0	(30)	61.5	(67)	59.3	(35)
B12 [4]	VII	97.4	(191)	96.7	(146)	91.7	(100)	90.0	(45)	93.6	(102)	94.9	(56)
B13 [4]	VII	44.9	(88)	46.0	(69)	55.0	(60)	62.0	(31)	49.5	(54)	49.2	(29)
C1	I	74.5	(193)	77.5	(124)	74.8	(77)	73.2	(41)	70.8	(75)	81.7	(49)
C2	II	87.5	(161)	91.3	(146)	87.4	(90)	87.5	(49)	89.6	(95)	91.7	(55)
C3	II	66.3	(122)	66.9	(107)	63.1	(65)	71.4	(40)	66.0	(70)	65.0	(39)
C4	III	39.1	(72)	34.4	(55)	34.0	(35)	35.7	(20)	34.0	(36)	30.0	(18)

[1] Categories: I = Causes of Weather, II = Weather Hazards, III = Weather Services, IV = Weather Regulations, V = Weather Interpretation, VI = Weather-Related Decision Making, VII = Questions that integrated material across several of the other categories.
[2] Does not include Student Pilots, Non-US Pilots, and one A & P who did not also have a pilot certificate
[3] Participants were instructed to "check all that applied" so these geographic region categories are not mutually exclusive. Thus, no analyses were performed to determine if significant differences between them existed.
[4] Questions 11, 12, and 13 are the same on all three test forms.

Continued

Table 7, Continued

XI. Percent Correct for Each Item by Geographic Region where Participants Fly Most Often

Form & Category[1] Geographic Regions [2, 3]

Question Number		Plains		Hills (elev<1000 ft)		Low Mountains (elev. 1000 - 4000 ft.)		High Mountains (elev>4000 ft)		Coastal Regions		Islands/ Large Bodies of Water	
		%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)
C5	III	44.6	(82)	47.5	(76)	44.7	(46)	50.0	(28)	43.4	(46)	50.0	(30)
C6	IV	81.5	(150)	90.6	(145)	86.4	(89)	85.7	(48)	88.7	(94)	91.7	(55)
C7	V	31.0	(57)	32.5	(52)	31.1	(32)	30.4	(17)	31.1	(33)	33.3	(20)
C8	V	71.7	(132)	73.8	(118)	70.9	(73)	75.0	(42)	70.8	(75)	78.3	(47)
C9	VI	79.3	(146)	80.0	(128)	80.6	(83)	85.7	(48)	82.1	(87)	75.0	(45)
C10	VI	87.5	(161)	83.8	(134)	89.3	(92)	80.4	(45)	86.8	(92)	85.0	(51)
C11 [4]	VII	53.3	(98)	58.8	(94)	59.2	(61)	57.1	(32)	54.7	(58)	58.3	(35)
C12 [4]	VII	97.3	(179)	96.3	(154)	96.1	(99)	89.3	(50)	92.5	(98)	95.0	(57)
C13 [4]	VII	50.5	(93)	55.6	(89)	61.2	(63)	66.1	(37)	57.5	(61)	46.7	(28)

[1] Categories: I = Causes of Weather, II = Weather Hazards, III = Weather Services, IV = Weather Regulations, V = Weather Interpretation, VI = Weather-Related Decision Making, VII = Questions that integrated material across several of the other categories.

[2] Does not include Student Pilots, Non-US Pilots, and one A & P who did not also have a pilot certificate

[3] Participants were instructed to "check all that applied" so these geographic region categories are not mutually exclusive. Thus, no analyses were performed to determine if significant differences between them existed.

[4] Questions 11, 12, and 13 are the same on all three test forms.

Appendix E

Weather Knowledge Challenge Participant Comments

Weather Knowledge Challenge Participant Comments

A19 - Put weather study up on the web!

A44 - Each flight was VFR, but repeated questions involved icing. Before I fly you get much more info. from FSS then this.

A122 - Thanks for the opportunity would like to know general results (published?)

A124 - I need to hit the books again.

A126 - It took much longer than I expected. I ran out of time and had to rush.

A139 - No comments. My lack of knowledge reflects lack of practice. More frequent flights will ↑ weather knowledge.

A149 - This is great → questions were very challenging. This is the way we need to teach weather!

A161 - Please provide what the correct answer and why. Also, please provide a web site I can go to better educate myself on weather and the GA pilot. Thanks.

A164 - More complete scenarios.

A198 - Excellent - good review.

A200 - Like to have the ave. score compared to mine. Thanks.

A231 - Going home to brush up on wx.

A259 - Tough test!

A279 - Add 16,000 hr Flight Engineer time. FE-TJ.

A306 - If you have my zip - you identify me!!!

A312 - I think that more current & user-friendly training materials would be helpful to train pilots to interpret the weather.

A329 - Who the hell is making up the questions? How about using the same language we use. In question 2, relative humidity is the amount of moisture in the air compared with the amount it can hold. We don't have to try to show how smart we are - just understand what we are talking about.

A356 - This is a great idea. It can help GA pilots feel human, vulnerable and point them back to studying even if they feel they did okay.

B12 - Thank you for the opportunity to take this test. It is a service and an eye opener.

B23 - I think this is a great tool to alert pilots to how much they don't know about wx, especially if they don't fly in it often.

B59 - Question #11 does not seem clear to me. Also I would look at more data on questions 11, 12, and 13 then is given. As for #11, I see the inversion and westerly winds I changed my answer to C as there are not clouds around BIL. I don't think its clear that there is a cold front and I would look at much more data. For a local flight near the airport I would just depart with these conditions but I would get more info.

B66 - Some questions did not provide enough info.

B93 - I fly IFR Part 121 - we never "no-go"

B94 - Good test!

B107 - I don't understand the relationship between (highs & lows) and (cold fronts & warm fronts). I've been trying to learn about this.

B110 - I think that the U.S. thinking they were forced to adapt the French dictated METAR format is a grave mistake. We all related temperatures, for example to degrees Fahrenheit. The Fahrenheit scale is much more precise than the Centigrade scale for aviation use, i.e. there are 212-32 or 170 degrees between freezing and boiling on the F scale and only 100 points between freezing and boiling on the C scale. Also, mist vs. fog is confusing. It is hard for us old dogs to remember all the new, unnecessary tricks.

B116 - Continue to make all weather sources available to most & all pilots.

B127 - Question #9 is poorly developed. With 37 years in the FAA, I can tell you that briefers all too often use VNR to CYA! I retired as an ARBA Manager in an AFSS and the problem is still growing. Give pilots facts, not decisions.

B141 - For question 10 thru 13 don't include enough information, i.e. no TAS or AREA forecast. How is current wx vs. forecast for this time, & other factors that go into flight planning. Also, for a lot of things I'd file!

B178 - I am an ATC center operator. These are good questions. I did not know several!

B179 - Not generally a VFR pilot, single engine piston.

B188 - This test is difficult. It has good questions that are very taxing.

B196 - As a helicopter pilot I rarely fly long distances or high - so I realized my skills and knowledge of some of this were rusty at best. I do spend a lot of time looking at local weather and making judgments on go/no-go.

B219 - Most of my flying is clear weather. Florida pleasure flying. If it doesn't look good outside, I don't go.

B241 - The FAA must improve and simplify the process for pilots to obtain weather information. Problem - too many weather charts and too much interpretation required - use plain English. Need consolidated wx charts - 2 types: current wx and forecast. Both show - wind (surface - 18,000), clouds/ceiling; turbulence; icing level and precipitation. Keep existing wx charts if more detailed info. is required.

B271 - (* not in comments section, but comments for question #12, "E. Fly toward ok C until weather looks bad then stop and wait for improvement")

B286 - A good test. I need to refresh my knowledge. Will be interested to see my test results.

B291 - (* not in comments section, but comments for question #12, "None. Need to know more- icing? Thunderstorms?)

B315 - Indicate where Dallas is on the wx chart, question 12.

B319 - Some figures are too small to interpret (cloud coverage figure)

B327 - Excellent exam…I've not been active for two years. So I'm not sure how I expected to do.

B328 - Very good situation oriented questions!

B342 - I'm primarily an IFR pilot who uses military wx services.

B347 - I'll be reading the weather book again!

B355 - Interesting!

B360 - Need to review weather reading charts.

B383 - More fundamental education needed with beginning aviation.

B396 - I fly VFR only and use briefer in AFSS and English weather(?). Don't have much opportunity or need to use weather charts.

B401 - I am conservative & not in a hurry any question in a 172 - we just don't fly - delays can be very interesting, people, places, etc.

B408 - Some questions & situations seem as if they lack information crucial in quality decision making.

C10 - I would make choices different than your choices #10 in particular.

C16 - Most of my weather decisions are made using computer information. For example on question 10 I would look at radar summary from a DTN or Intellicast.l The more information the better.

C21 - Going to have to bone up!

C56 - Thanks for the reminder to refresh weather data understanding.

C61 - I need to get a book on weather and learn to read weather systems better. Difficult to learn on own. A program would make it easier.

C72 - Good test to judge how much I need to get back into books. Thanx

C73 - #12 You didn't say VFR or IFR, I would have gone IFR. #7 Good thing I live in the Central time zone. I have trouble converting z to local. Of course everyone does, that's why you asked the question. :)

C94 - Drove all night to get here. Can't think well...

C121 - Q:10 Wouldn't you arrive an hour before the storm?

C129 - Weather charts are sometimes confusing to decipher ??? information on it.

C140 - I never look at the actual charts, so reading them is unusual.

C142 - I use Standard English based weather briefings. Some of these short-hands I have forgotten.

C146 - We need to get away from putting weather information in code and start using English. For pilots who fly cross-country very little its hard to depict and interpret weather info.

C187 - Written test for private ticket is too easy to memorize.

C189 - I don't think decoding wx test is really necessary. In most real world situations pilots have a decoder or key in their possession. Also, for questions regarding the use of limited data (11, 12, 13) reaching a FSS briefer would give more clues to the actual weather. Anytime you would have access to these charts, you would necessarily have access to a phone line.

C212 - Let's make weather for pilots safer!

C213 - Not very realistic because, with the look of person-to-person FSS's, we never see these charts! In the real world, we get briefings over the phone, see satellite and radar images on the web or commercial services and get current weather from ATIS, ASOS or AWOS. Most of the symbology is outdated, and most abbreviations are no longer necessary.

C215 - With the ability of modern digital communications - I don't understand why FAA continues to use the arcane coded TAF's & METAR's

C217 - Just a suggestion or question: Is the FAA planning on simplifying the available wx data due to the Internet? It seems to me that the Internet weather services are so helpful and are an excellent additional tool to use for information gathering. Is the FAA using or contributing to this communication tool? Thank you for being in Oshkosh! This test/survey helps me stay aware of my knowledge level.

C232 - One way to improve GA pilots weather knowledge is to make plain language weather easier to obtain, and graphical weather representations easier to read. It is hard to remember all the symbols and acronyms that are geared toward meteorologists, because most of us do not deal with aviation weather symbols and terminology as often.

C244 - Make plain language weather reports!!!

C311 - This shows me I need to re-educate myself on weather reports and chart interpretation. Thank you.

C316 - I prefer clear language rather than code for weather briefing. It is easier to understand, and I wouldn't ignore or miss something, due to forgetting the code order.

C324 - This is an area that is over looked in Part 61 training programs.

C387 - Actually on question 10, if I read it correctly, I'd arrive an hour before the storm with it being ~25 miles away and I could beat @ hasty retreat back to where I came from if the storm moved faster than anticipated. Assuming this is not ???

C402 - I usually rely on a good preflight wx briefing for a go/no-go decision

C405 - You should use English to give reports not encrypted.