EARTH SCIENCE
Mt. Washington, NH, in January

NAME_____

Period _____

On January 20, 2008, the northeastern United States was hit with blast of cold air that was drawn down from Canada behind a low pressure system that had moved eastward across the area the night before. The picture below was snapped by Earth Science teacher Heather Renyck early that afternoon. It is a view of Mt. Washington, at 6288 feet the highest point in New Hampshire and home of the "world's worst weather."

Photo © 2008 by Heather Renyck, White Mountains Regional HS, Whitefield, NH

Ms. Renyck took the photo near Whitefield, NH (about 1000 feet above sea level), where weather instruments under perfectly clear skies recorded a temperature of -12° C and a relative humidity of 40%.

Use the charts on the following page, and your knowledge of Earth Science, to answer the following questions:

1. What was the approximate dewpoint temperature of the air in Whitefield in the early afternoon of January 20, 2008?

_____

Explain how you arrived at that answer (you can mark and label the charts, and refer to those marks in your answer):

_____

_____

The wind was blowing steadily from the west (from Whitefield toward Mt. Washington), and so air that was over Whitefield soon was being pushed up over Mt. Washington.

2. What happens to the temperature of rising air?_____ and why?_____

_____

3. Describe the visibility an observer at the top of Mt. Washington would have been experiencing at the time the photograph was made:

_____

What is obscuring the observer's view? _____

Dewpoint Temperatures (°C)

Dry-Bulb Temperature (°C)	Difference Between Wet-Bulb and Dry-Bulb Temperatures (C°)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
−20	−20	−33														
−18	−18	−28														
−16	−16	−24														
−14	−14	−21	−36													
−12	−12	−18	−28													
−10	−10	−14	−22													
−8	−8	−12	−18	−29												
−6	−6	−10	−14	−22												
−4	−4	−7	−12	−17	−29											
−2	−2	−5	−8	−13	−20											
0	0	−3	−6	−9	−15	−24										
2	2	−1	−3	−6	−11	−17										
4	4	1	−1	−4	−7	−11	−19									
6	6	4	1	−1	−4	−7	−13	−21								
8	8	6	3	1	−2	−5	−9	−14								
10	10	8	6	4	1	−2	−5	−9	−14	−28						
12	12	10	8	6	4	1	−2	−5	−9	−16						
14	14	12	11	9	6	4	1	−2	−5	−10	−17					
16	16	14	13	11	9	7	4	1	−1	−6	−10	−17				
18	18	16	15	13	11	9	7	4	2	−2	−5	−10	−19			
20	20	19	17	15	14	12	10	7	4	2	−2	−5	−10	−19		
22	22	21	19	17	16	14	12	10	8	5	3	−1	−5	−10	−19	
24	24	23	21	20	18	16	14	12	10	8	6	2	−1	−5	−10	−18
26	26	25	23	22	20	18	17	15	13	11	9	6	3	0	−4	−9
28	28	27	25	24	22	21	19	17	16	14	11	9	7	4	1	−3
30	30	29	27	26	24	23	21	19	18	16	14	12	10	8	5	1

Relative Humidity (%)

Dry-Bulb Temperature (°C)	Difference Between Wet-Bulb and Dry-Bulb Temperatures (C°)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
−20	100	28														
−18	100	40														
−16	100	48														
−14	100	55	11													
−12	100	61	23													
−10	100	66	33													
−8	100	71	41	13												
−6	100	73	48	20												
−4	100	77	54	32	11											
−2	100	79	58	37	20	1										
0	100	81	63	45	28	11										
2	100	83	67	51	36	20	6									
4	100	85	70	56	42	27	14									
6	100	86	72	59	46	35	22	10								
8	100	87	74	62	51	39	28	17	6							
10	100	88	76	65	54	43	33	24	13	4						
12	100	88	78	67	57	48	38	28	19	10	2					
14	100	89	79	69	60	50	41	33	25	16	8	1				
16	100	90	80	71	62	54	45	37	29	21	14	7	1			
18	100	91	81	72	64	56	48	40	33	26	19	12	6			
20	100	91	82	74	66	58	51	44	36	30	23	17	11	5		
22	100	92	83	75	68	60	53	46	40	33	27	21	15	10	4	
24	100	92	84	76	69	62	55	49	42	36	30	25	20	14	9	4
26	100	92	85	77	70	64	57	51	45	39	34	28	23	18	13	9
28	100	93	86	78	71	65	59	53	47	42	36	31	26	21	17	12
30	100	93	86	79	72	66	61	55	49	44	39	34	29	25	20	16

4. What could the maximum (warmest) temperature have been on the summit of Mt. Washington at the time the photograph was made? If you are stuck, see the hints at the bottom of this page

_____°C _____°F

Once again, explain how you arrived at your answer:

_____

_____

_____

_____

_____

5. You can check your answers with archived weather records for Mt. Washington, NH. Go to: www.wunderground.com and enter "Mt. Washington, NH" in the search box. Hit enter and scroll down to "Detailed History and Climate." Set the date to January 20, 2008, click "Go", and check the conditions on the summit at around noon or 1 PM that day.

How did you do? Were you close?

Thanks, Ms. Renyck!

Hints for Question 4: What was the relative humidity at the summit of Mt. Washington? (how do you know?)
What was the dewpoint at the summit of Mt. Washington? (how do you know?)