

Name \_\_\_\_\_

Score \_\_\_\_\_

EXERCISE 2 a  
ZULU TIME AND DISTANCE

**Time**

Many of the weather charts and maps that you will be using in this course will require an understanding various types of time and distances. Time presented on analysis charts is the time of observation. This time is not the time of transmission or reception of the chart or published map. It is earlier time than the transmission, reception, or publication of the weather map. The time presented on analysis and prognosis charts such as the **etagram** and **skew-T diagram** is the **valid time ( VT )**. Valid time is subsequent to the time the chart is transmitted or received. The following notation was recorded on an Eta analysis chart for Billings, Montana:

Eta analysis for 1800z 31 Aug 09

The chart is an **Etagram ( Eta )** analysis chart for 1800 hr Zulu ( 18Z ) for August 31, 2009. The time here is military time, so 18Z is 6 hr past noon or 6:00 p.m. The Z stands for Zulu, a code word. **Zulu** time is an arbitrarily chosen value for time and represents the time of midnight on the Greenwich meridian. Remember that the Greenwich meridian is also the prime meridian, represented by zero degrees longitude. Zulu time is equal to **Greenwich Mean Time ( GMT )**, **Universal Time ( UT )**, and **Greenwich Civil Time ( GCT )**.

The **Mountain Standard Time Zone ( MST )** is 7 hr behind Zulu time. Thus one must subtract 7 hr from the 18Z time the VT time for Billings, Montana. Subtracting the 7 hr from the 18Z time yields a time of 11:00 a.m. MST.

Below is a conversion chart for Zulu time:

GMT to standard time	Standard time to GMT time
GMT -5 = Eastern	Eastern +5 = GMT
GMT -6 = Central	Central +6 = GMT
GMT -7 = Mountain	Mountain +7 = GMT
GMT -8 = Pacific	Pacific +8 = GMT
GMT -9 = Yukon	Yukon +9 = GMT
GMT -10 = Alaskan	Alaskan +10 = GMT
GMT -11 = Bering	Bering + 11= GMT
Subtract one less hour for daylight saving time.	Add one less hour for daylight saving time

Convert the following:

16Z to \_\_\_\_\_ Eastern

5:00 A.M. Alaskan. to \_\_\_\_\_ GMT

1800 GMT to \_\_\_\_\_ Zulu

9:00 A.M. Pacific to \_\_\_\_\_ UT

12:00 Noon Eastern to \_\_\_\_\_ GMT

1:00 A. M. Bering to \_\_\_\_\_ GCT

8:00 P.M. Pacific to \_\_\_\_\_ Eastern

2:00 P.M. Central to \_\_\_\_\_ Bering

## **Distances**

The distances on weather maps and charts may be expressed in a number of ways or units. These units are Nautical Miles, Statute Miles, and Kilometers. Listed below are some conversion factors that can be used to convert values between nautical, statute miles, and Kilometers.

1 nautical mile = 6076.1 feet  
1.151 statute miles  
1852 meters  
1.852 kilometers

1 statute mile = 5,280 feet  
0.869 nautical miles  
1609.4 meters  
1.609 kilometers

1 kilometer = 3,280.65 feet  
0.54 nautical miles  
0.62 statute miles  
1,000 meters

Convert the following:

302 nautical miles to \_\_\_\_\_ statute miles

80 statute miles to \_\_\_\_\_ nautical miles

840 Statute miles to \_\_\_\_\_ kilometers

1500 kilometers to \_\_\_\_\_ statute miles

### **Speed**

Occasionally, you will be required to convert speeds or velocities in some of the lab exercises presented in this course. The following are some conversion factors:

$$1 \text{ meter / sec} = 2.23694 \text{ mi / hr} = 1.943 \text{ knots}$$

$$1 \text{ mile / hr} = 0.44704 \text{ meters/ sec} = 0.868311 \text{ knots}$$

$$1 \text{ knot} = 1.15155 \text{ miles / hr} = 0.514791 \text{ meters / sec}$$