Comparable Interface

Define a class `ClockTime` that stores information about time of day using a standard clock. Each ClockTime object keeps track of hours, minutes, and a String to indicate "am" or "pm". It has the following public methods:

`ClockTime(hours, minutes, amPm)`	constructs a ClockTime with given hours, minutes and amPm setting
`getHours()`	returns the hour
`getMinutes()`	returns the minutes
`getAmPm()`	returns the am/pm setting
`toString()`	returns a String representation of the time

Assume that the values passed to your constructor are legal. In particular, hours will be between 1 and 12 inclusive, minutes will be between 0 and 59 inclusive, and the am/pm parameter will be either the String "am" or the String "pm". These values should be returned by the various "get" methods.

The toString method should return a String composed of the hours followed by a colon followed by the minutes (2 digits) followed by a space followed by the am/pm String. For example, given these declarations:

```
ClockTime time1 = new ClockTime(8, 31, "am");
ClockTime time2 = new ClockTime(12, 7, "pm");
```

time1.toString() should return "8:31 am". time2.toString() should return "12:07 pm". You must exactly reproduce the format of these examples.

Your class should implement the Comparable<E> interface. The earliest time is 12:00 am and the latest time is 11:59 pm. In between, the time increases as it would in a standard clock. Keep in mind that 12:59 am is followed by 1:00 am, that 11:59 am is followed by 12:00 pm, and that 12:59 pm is followed by 1:00 pm.

See below, with earliest time in the upper left corner, latest time in the lower right corner and traversing each row from left to right.

12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM
6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM
12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM
6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM

See next three pages for ClockMain.java code and associated output.

```
import java.util.*;

public class ClockMain {
   public static void main(String[] args) {
      ArrayList<ClockTime> times = new ArrayList<ClockTime>();

      times.add(new ClockTime(12, 00, "AM"));

      times.add(new ClockTime(12, 59, "AM"));
      times.add(new ClockTime(1, 00, "AM"));

      times.add(new ClockTime(11, 59, "AM"));
      times.add(new ClockTime(12, 00, "PM"));

      times.add(new ClockTime(12, 59, "PM"));
      times.add(new ClockTime(1, 00, "PM"));

      times.add(new ClockTime(11, 59, "PM"));

      for (int i = 0; i < times.size(); i++) {
         System.out.println("index: " + i + ", time: " + times.get(i));
      }
      System.out.println();

      for (ClockTime time1 : times) {
         for (ClockTime time2 : times) {
            System.out.print(time1 + " compared to " + time2 + " is: ");
            System.out.println(time1.compareTo(time2));
         }
         System.out.println();
      }

   }
}
```

```
----jGRASP exec: java ClockMain
index: 0, time: 12:00 AM
index: 1, time: 12:59 AM
index: 2, time: 1:00 AM
index: 3, time: 11:59 AM
index: 4, time: 12:00 PM
index: 5, time: 12:59 PM
index: 6, time: 1:00 PM
index: 7, time: 11:59 PM

12:00 AM compared to 12:00 AM is: 0
12:00 AM compared to 12:59 AM is: -59
12:00 AM compared to 1:00 AM is: -1
12:00 AM compared to 11:59 AM is: -11
12:00 AM compared to 12:00 PM is: -15
12:00 AM compared to 12:59 PM is: -15
12:00 AM compared to 1:00 PM is: -15
12:00 AM compared to 11:59 PM is: -15

12:59 AM compared to 12:00 AM is: 59
12:59 AM compared to 12:59 AM is: 0
12:59 AM compared to 1:00 AM is: -1
12:59 AM compared to 11:59 AM is: -11
12:59 AM compared to 12:00 PM is: -15
12:59 AM compared to 12:59 PM is: -15
12:59 AM compared to 1:00 PM is: -15
12:59 AM compared to 11:59 PM is: -15

1:00 AM compared to 12:00 AM is: 1
1:00 AM compared to 12:59 AM is: 1
1:00 AM compared to 1:00 AM is: 0
1:00 AM compared to 11:59 AM is: -10
1:00 AM compared to 12:00 PM is: -15
1:00 AM compared to 12:59 PM is: -15
1:00 AM compared to 1:00 PM is: -15
1:00 AM compared to 11:59 PM is: -15

11:59 AM compared to 12:00 AM is: 11
11:59 AM compared to 12:59 AM is: 11
11:59 AM compared to 1:00 AM is: 10
11:59 AM compared to 11:59 AM is: 0
11:59 AM compared to 12:00 PM is: -15
11:59 AM compared to 12:59 PM is: -15
11:59 AM compared to 1:00 PM is: -15
11:59 AM compared to 11:59 PM is: -15

12:00 PM compared to 12:00 AM is: 15
12:00 PM compared to 12:59 AM is: 15
12:00 PM compared to 1:00 AM is: 15
12:00 PM compared to 11:59 AM is: 15
12:00 PM compared to 12:00 PM is: 0
12:00 PM compared to 12:59 PM is: -59
```

```
12:00 PM compared to 1:00 PM is: -1
12:00 PM compared to 11:59 PM is: -11

12:59 PM compared to 12:00 AM is: 15
12:59 PM compared to 12:59 AM is: 15
12:59 PM compared to 1:00 AM is: 15
12:59 PM compared to 11:59 AM is: 15
12:59 PM compared to 12:00 PM is: 59
12:59 PM compared to 12:59 PM is: 0
12:59 PM compared to 1:00 PM is: -1
12:59 PM compared to 11:59 PM is: -11

1:00 PM compared to 12:00 AM is: 15
1:00 PM compared to 12:59 AM is: 15
1:00 PM compared to 1:00 AM is: 15
1:00 PM compared to 11:59 AM is: 15
1:00 PM compared to 12:00 PM is: 1
1:00 PM compared to 12:59 PM is: 1
1:00 PM compared to 1:00 PM is: 0
1:00 PM compared to 11:59 PM is: -10

11:59 PM compared to 12:00 AM is: 15
11:59 PM compared to 12:59 AM is: 15
11:59 PM compared to 1:00 AM is: 15
11:59 PM compared to 11:59 AM is: 15
11:59 PM compared to 12:00 PM is: 11
11:59 PM compared to 12:59 PM is: 11
11:59 PM compared to 1:00 PM is: 10
11:59 PM compared to 11:59 PM is: 0
```