AP CS 2019-2020 Semester 1 Final

You must write everything on this final from scratch, using only the information contained in your brain. You may not use your own old code or get help from other people (including Stack Overflow).

1. Write the interface `K` which represents something that moves and burns calories. It contains the `int burnRate(int pace)` and `int gone(int pace, int miles)` methods.
2. Write an abstract class `L` that implements the `K` interface.
   - An instance variable to store the `int` amount of energy.
   - A constructor that takes in the amount of energy and remembers it.
   - The `burnRate` method is not specified in this class.
   - The `gone` method should compute how much energy is going to be used by finding the product of pace, miles, and the `burnRate` at that pace. If that amount is greater than the amout of energy the object has, return -1. Otherwise return that amount of energy.
3. Write a concrete class `LL` that is a subclass of `L`.
   - Instance variables `int weight` and `int maxpace`.
   - Constructor takes in weight, maximum pace, and calories of energy that the object has.
   - The `burnRate` method returns 0 if the requested pace is greater than `maxpace`, otherwise returns `weight/10`.
4. Make a class `P` unrelated to the above.

```
public class P {
    private int x, y;
    private String s;
    public P(int xx, int yy, String ss) {
        x=xx; y=yy; s=ss;
    }
    public String name() {
        return s;
    }
    public int xy() {
        // give the product of x and y as an answer
```

```
        // you write
    }
    public void delta(int dx, int dy) {
        // increase x by dx and y by dy.
        // you write
    }
}
```

5. Write a class `Q` with `P` as a superclass.

    - `Q` also contains an instance variable `int step`
    - The constructor for `Q` takes in two numbers, `w` and the step. It uses `w` to compute both x (five more than w) and y (five less than w).
    - The `delta` method is modified so that it will only change `x` and `y` if the change of x is less than 3 (not in absolute value, to make it easy), and also the change in y is less than 5.
    - `Q` contains methods `void stepX()` and `void stepY()` that change `x` and `y` (respectively) by the `step`.