2008 Paper 10 Question 2

Foundations of Programming

(a) Outline the use of `enum` in Java programs and explain any similarities to and any differences from a Java class. [6 marks]

The following fragment of code shows an early attempt to write and test a Java program to simulate the paper-scissors-stone game. In the method `main()` each of the identifiers `a` and `b` is assigned one of the items, paper, scissors or stone and the `printf()` method then says whether the first beats, draws with or loses against the second. [The rule is that paper beats stone, scissors beat paper and stone beats scissors.]

```
public class Game
 { public static void main(String[] args)
    { Item a = allocateItem();
      Item b = allocateItem();
      int res = a.versus(b);
      System.out.printf("%s %s %s%n", a, res>0 ? "beats" :
                                         res==0 ? "draws with" :
                                                   "loses against", b);
    }

    private static Item allocateItem()
    { ...
    }
 }

enum Item
 { PAPER...
```

The three possibilities `PAPER`, `SCISSORS` and `STONE` are declared in `enum Item` along with a constructor, the method `versus()` and any necessary additional data fields.

(b) Using the method `Math.random()` or otherwise, provide a body for the method `allocateItem()` such that the method returns an `Item PAPER`, `SCISSORS` or `STONE` equiprobably. [6 marks]

(c) Complete the `enum Item` so that the statements in the method `main()` operate as intended. [8 marks]