public class Nim {
    private int numPiles;
    private int[] board;

    public Nim( int[] board ) {
        numPiles = board.length;
        this.board = new int[numPiles];
        this.board = board;
    }

    public static void main( String[] args ) {
        int[] myBoard = {1, 3, 5, 7};
        Nim n = new Nim( myBoard );
        myBoard[1] = 10;
        System.out.println( n.board[1] );
    }
}
1) Draw the memory model for the code

**Review problem:** Classes, objects and scope

```java
public class Nim {

    private int numPiles;
    private int[] board;

    public Nim( int[] board ) {
        numPiles = board.length;
        this.board = new int[numPiles];
        this.board = board;
        for (int i=0; i<board.length; i++)
            this.board[i] = board[i];
    }

    public static void main( String[] args ) {
        int[] myBoard = {1, 3, 5, 7};
        Nim n = new Nim( myBoard );
        myBoard[1] = 10;
        System.out.println( n.board[1] );
    }
}
```

2) **Rewrite the constructor** so that the change to myBoard in main does not change the board stored in the Nim object

This is just one option! The key is to make this.board refer to a different array than myBoard in main. With this new code, we are making a copy! so operations on myBoard do not affect to this.board.
public class Student {
    int numGrades;
    char[] grades;

    public Student( char[] grades ) {
        numGrades = grades.length;
        grades = grades;
    }

    public static void main( String[] args ) {
        char[] myGrades = {'B', 'B', 'C'};
        Student s = new Student( myGrades );
        myGrades[1] = 'A';
        System.out.println( s.grades[1] );
    }
}

What is printed by the this code?
A. ‘A’
B. ‘B’
C. ‘C’
D. Nothing, there is an exception in the constructor
E. Nothing, there is an exception in main (that does NOT occur in the constructor)
public class Student {
    int numGrades;
    char[] grades;

    public Student( char[] grades ) {
        numGrades = grades.length;
        grades = grades;
    }

    public static void main( String[] args ) {
        char[] myGrades = {'B', 'B', 'C'};
        Student s = new Student( myGrades );
        myGrades[1] = 'A';
        System.out.println( s.grades[1] );
    }
}
public class Student {
    int numGrades;
    char[] grades;

    public Student( char[] grades ) {
        numGrades = grades.length;
        this.grades = new char[this.numGrades];
        this.grades = grades;
    }

    public static void main( String[] args ) {
        char[] myGrades = {'B', 'B', 'C'};
        Student s = new Student( myGrades );
        myGrades[1] = 'A';
        System.out.println( s.grades[1] );
    }
}

What is printed by the this code?
A. ‘A’
B. ‘B’
C. ‘C’
D. Nothing, there is an exception in the constructor
E. Nothing, there is an exception in main (that does NOT occur in the constructor)
public class Student {
    int numGrades;
    char[] grades;

    public Student( char[] grades ) {
        numGrades = grades.length;
        this.grades = new char[this.numGrades];
        this.grades = grades;
    }

    public static void main( String[] args ) {
        char[] myGrades = {'B', 'B', 'C'};
        Student s = new Student( myGrades );
        myGrades[1] = 'A';
        System.out.println( s.grades[1] );
    }
}

"Quiz" question 2
public class Student {
    int numGrades;
    char[] grades;

    public Student( char[] theGrades, int nGrades ) {
        numGrades = nGrades;
        grades = theGrades;
    }
    public static void main( String[] args ) {
        char[] myGrades = {'B', 'B', 'C'};
        int nGrades = 4;
        Student s = new Student( myGrades, nGrades );
        nGrades = 3;
        System.out.println( s.numGrades );
    }
}

What is printed by the this code?
A. 0
B. 3
C. 4
D. Nothing, there is an exception in the constructor
E. Nothing, there is an exception in main (that does NOT occur in the constructor)
public class Student {
    int numGrades;
    char[] grades;

    public Student( char[] theGrades, int nGrades ) {
        numGrades = nGrades;
        grades = theGrades;
    }

    public static void main( String[] args ) {
        char[] myGrades = {'B', 'B', 'C'};
        int nGrades = 4;
        Student s = new Student( myGrades, nGrades );
        nGrades = 3;
        System.out.println( s.numGrades );
    }
}