Question 1: Telephone Number

a) The idea of my solution.

First we initialize important constants (length of inpurt word and the error String message) and String variable word and reading first input in it with uppercase method to check all letters (even small). Then we check with extra method isCorrect is the word has 7 alphabetic letters or not. If it is not, we print error message and reading while isCorrect will return true. Then in the loop "for" we use "switch" statement to print correspondent digits to the chars.

b) Source code

```
package uebung3.question1;

import io.Input;

/**
 * @author Andrii Dzhyrma
 */
public class TelephoneNumber {
	// Length of the input word
	private static final int WORD_LENGTH = 7;
	// Error message for a wrong input word
	private static final String WRONG_SIZE_INPUT_ERROR = "Input word should
contain only 7 alphabet characters. Try again:";

	// Method which checks input word for correctness
	private static boolean isCorrect(String word) {
		if (word.length() != 7)
			return false;
		for (int i = 0; i < WORD_LENGTH; i++)
			if(word.charAt(i) < 'A' || word.charAt(i) > 'Z')
				return false;
		return true;
	}

	/**
	 * @param args
	 *            - no arguments will evaluate
	 */
	public static void main(String[] args) {
		// Reading input string until it size will be equal to WORD_LENGTH
		String word = Input.readString().toUpperCase();
		while (!isCorrect(word)) {
			System.out.println(WRONG_SIZE_INPUT_ERROR);
			word = Input.readString().toUpperCase();
		}

		// In the loop checking with switch all characters and printing
corresponding digit
		for (int i = 0; i < WORD_LENGTH; i++) {
			switch (word.charAt(i)) {
			case 'A': case 'B': case 'C':
				System.out.print(2);
				break;
			case 'D': case 'E': case 'F':
				System.out.print(3);
				break;
			case 'G': case 'H': case 'I':
				System.out.print(4);
```

```
                        break;
                    case 'J': case 'K': case 'L':
                        System.out.print(5);
                        break;
                    case 'M': case 'N': case 'O':
                        System.out.print(6);
                        break;
                    case 'P': case 'Q': case 'R': case 'S':
                        System.out.print(7);
                        break;
                    case 'T': case 'U': case 'V':
                        System.out.print(8);
                        break;
                    case 'W': case 'X': case 'Y': case 'Z':
                        System.out.print(9);
                        break;
                    default:
                        break;
                    }
                }
            }
        }
```

c) Test plan

Aim	Input	Expected output	Program output
Common case	BBCNEWS	Input: BBCNEWS Output: 2226397	Input: BBCNEWS Output: 2226397
Common case	PROGRAM	Input: PROGRAM Output: 7764726	Input: PROGRAM Output: 7764726
Common case	DZHYRMA	Input: DZHYRMA Output: 3949762	Input: DZHYRMA Output: 3949762
Common case	AABBCCD	Input: AABBCCD Output: 2222223	Input: AABBCCD Output: 2222223
Not enough letters	A	Input: A Input word should contain only 7 alphabet characters. Try again:	Input: A Input word should contain only 7 alphabet characters. Try again:
Too much letters	ABCDEFGHJ	Input: ABCDEFGHJ Input word should contain only 7 alphabet characters. Try again:	Input: ABCDEFGHJ Input word should contain only 7 alphabet characters. Try again:
Not upper case letters	dzhyrma	Input: dzhyrma Output: 3949762	Input: dzhyrma Output: 3949762
Incorrect letters or some different sign	1234567	Input: 1234567 Input word should contain only 7 alphabet characters. Try again:	Input: 1234567 Input word should contain only 7 alphabet characters. Try again:
Empty string	“”	Input: Input word should contain only 7 alphabet characters. Try again:	Input: Input word should contain only 7 alphabet characters. Try again:

Question 2: Triangle's Perimeter

a) The idea of my solution.

First we initialize all important constants as minimum and maximum value for coordinates, their names as chars, String values for printing some input or output information and repeat key String for continue the program. Then we print description text to user and start "do" loop for reading and calculating coordinates and perimeter. We initialize square array with three elements of arrays of two elements (three coordinates with x and y). In nested for loop we read coordinate and check it for correctness. If coordinate is not correct we will read it while correct. Then we initializing double variable perimeter and assign calculations of it. Then we print the result, ask user to continue and in the "do-while" condition check is the read string equals to repeat key String.

b) Source code

```
package uebung3.question2;

import io.Input;

/**
 * @author Andrii Dzhyrma
 */
public class TrianglesPerimeter {
	// Left range of input coordinate
	private static final int MINIMUM_COORDINATE = 1;
	// Right range of input coordinate
	private static final int MAXIMUM_COORDINATE = 40;
	// Constant array with the names of coordinate axis
	private static final char[] COORDINATE_NAMES = { 'x', 'y' };
	// Constant string with description of the program
	private static final String PROGRAM_DESCRIPTION_STRING = "This program
calculates the perimeter of a Triangle.";
	// Constant requesting for coordinate string
	private static final String COORDINATE_REQUEST_FORMAT_STRING = "Please enter
the %c-coordinate of point%d: ";
	// Error message for input coordinate being out of range
	private static final String INVALID_COORDINATE_RANGE_ERROR_STRING =
"Coordinate should be in range [%d, %d]!%n";
	// Result format string
	private static final String OUTPUT_FORMAT_STRING = "The perimeter of a
Triangle with point1 (%d, %d), point2 (%d, %d) and point3 (%d, %d)%nis %f%n%nWould
you like to repeat the program? (Enter 1 for yes): ";
	// Command for repeating the program
	private static final String REPEAT_STRING = "1";

	/**
	 * @param args
	 *            - no arguments will evaluate
	 */
	public static void main(String[] args) {
		// Printing out the description
		System.out.println(PROGRAM_DESCRIPTION_STRING);

		// Do-While loop with checking command to be equal REPEAT_STRING
constant
		do {
			// Extra line break
			System.out.println();
```

```
                    // Initializing array with 3 point and 2 coordinates for each
                    int[][] coordinates = new int[3][2];
                    // Using For loop to read all the coordinates
                    for (int i = 0; i < coordinates.length; i++)
                          for (int j = 0; j < coordinates[i].length; j++) {
                                System.out.printf(COORDINATE_REQUEST_FORMAT_STRING,
COORDINATE_NAMES[j], i + 1);
                                coordinates[i][j] = Input.readInt();
                                // While coordinate is out of range, asking to input
it again
                                while (coordinates[i][j] < MINIMUM_COORDINATE ||
coordinates[i][j] > MAXIMUM_COORDINATE) {

      System.out.printf(INVALID_COORDINATE_RANGE_ERROR_STRING, MINIMUM_COORDINATE,
MAXIMUM_COORDINATE);

      System.out.printf(COORDINATE_REQUEST_FORMAT_STRING, COORDINATE_NAMES[j], i +
1);
                                      coordinates[i][j] = Input.readInt();
                                }
                          }

                    // Calculating the perimeter of our triangle
                    double perimeter = Math.sqrt(Math.pow(coordinates[0][0] -
coordinates[1][0], 2) + Math.pow(coordinates[0][1] - coordinates[1][1], 2))
                                + Math.sqrt(Math.pow(coordinates[1][0] -
coordinates[2][0], 2) + Math.pow(coordinates[1][1] - coordinates[2][1], 2))
                                + Math.sqrt(Math.pow(coordinates[2][0] -
coordinates[0][0], 2) + Math.pow(coordinates[2][1] - coordinates[0][1], 2));

                    // Printing out the result
                    System.out.printf(OUTPUT_FORMAT_STRING, coordinates[0][0],
coordinates[0][1], coordinates[1][0], coordinates[1][1], coordinates[2][0],
                                coordinates[2][1], perimeter);
            } while (Input.readString().equals(REPEAT_STRING));
      }
}
```

c) Test plan

Aim	Input	Expected output	Program output
Common case	5,5,6,7,8,5	**Display the information and perimeter (8,064495), ask use if he want to calculate for another one.**	This program calculates the perimeter of a Triangle. Please enter the x-coordinate of point1: 5 Please enter the y-coordinate of point1: 5 Please enter the x-coordinate of point2: 6 Please enter the y-coordinate of point2: 7 Please enter the x-coordinate of point3: 8 Please enter the y-coordinate of point3: 5 The perimeter of a Triangle with point1 (5, 5), point2 (6, 7) and point3 (8, 5) is 8.064495

			Would you like to repeat the program? (Enter 1 for yes):
Common case	1,5,7,9,10,4 Enter 1 to continue	**Display the information and perimeter (22,097440), ask use if he want to calculate for another one. After input "1", again start program for one more triangle.**	This program calculates the perimeter of a Triangle. Please enter the x-coordinate of point1: 1 Please enter the y-coordinate of point1: 5 Please enter the x-coordinate of point2: 7 Please enter the y-coordinate of point2: 9 Please enter the x-coordinate of point3: 10 Please enter the y-coordinate of point3: 4 The perimeter of a Triangle with point1 (1, 5), point2 (7, 9) and point3 (10, 4) is 22.097440 Would you like to repeat the program? (Enter 1 for yes): 1 Please enter the x-coordinate of point1:
Common case	1,2,3,4,5,6 Enter 2 not to continue	**Display the information and perimeter (11,313708), ask use if he want to calculate for another one. After input "2" do not continue the program**	This program calculates the perimeter of a Triangle. Please enter the x-coordinate of point1: 1 Please enter the y-coordinate of point1: 2 Please enter the x-coordinate of point2: 3 Please enter the y-coordinate of point2: 4 Please enter the x-coordinate of point3: 5 Please enter the y-coordinate of point3: 6 The perimeter of a Triangle with point1 (1, 2), point2 (3, 4) and point3 (5, 6) is 11.313708 Would you like to repeat the program? (Enter 1 for yes): 2
Incorreect input (not integer)	f	**Output an error**	This program calculates the perimeter of a Triangle. Please enter the x-coordinate of point1: f Not a valid int, please try again:
One of the coordinate is less than 0	5,-2,5,6,7,8	**Output an error and ask user to re-try**	This program calculates the perimeter of a Triangle. Please enter the x-coordinate of point1: 5

			Please enter the y-coordinate of point1: -2 Coordinate should be in range [1, 40]! Please enter the y-coordinate of point1: 5 Please enter the x-coordinate of point2: 6 Please enter the y-coordinate of point2: 7 Please enter the x-coordinate of point3: 8 Please enter the y-coordinate of point3:
One of the coordinate is more than 40	5,8,44,89,1,4	**Output an error and ask user to re-try**	This program calculates the perimeter of a Triangle. Please enter the x-coordinate of point1: 5 Please enter the y-coordinate of point1: 8 Please enter the x-coordinate of point2: 44 Coordinate should be in range [1, 40]! Please enter the x-coordinate of point2: 89 Coordinate should be in range [1, 40]! Please enter the x-coordinate of point2: 1 Please enter the y-coordinate of point2: 4 Please enter the x-coordinate of point3:
Coordinate on the border of possible diapason	1,40,2,5,4,7	**Display the information and perimeter (70.978793), ask use if he want to calculate for another one.**	This program calculates the perimeter of a Triangle. Please enter the x-coordinate of point1: 1 Please enter the y-coordinate of point1: 40 Please enter the x-coordinate of point2: 2 Please enter the y-coordinate of point2: 5 Please enter the x-coordinate of point3: 4 Please enter the y-coordinate of point3: 7 The perimeter of a Triangle with point1 (1, 40), point2 (2, 5) and point3 (4, 7) is 70.978793 Would you like to repeat the program? (Enter 1 for yes):
Calculation more than one triangles perimeter in one session	1,5,7,8,7,4 1 5,8,9,3,5,1 3	**Display the information and perimeter (16.790966), ask use if he want to calculate for another one. After**	This program calculates the perimeter of a Triangle. Please enter the x-coordinate of point1: 1 Please enter the y-coordinate of point1: 5

		input “1” read for the user’s input, Display the information and perimeter (17.875260), ask use if he want to calculate for another one. After input “2” do not continue the program.	Please enter the x-coordinate of point2: 7 Please enter the y-coordinate of point2: 8 Please enter the x-coordinate of point3: 7 Please enter the y-coordinate of point3: 4 The perimeter of a Triangle with point1 (1, 5), point2 (7, 8) and point3 (7, 4) is 16.790966 Would you like to repeat the program? (Enter 1 for yes): 1 Please enter the x-coordinate of point1: 5 Please enter the y-coordinate of point1: 8 Please enter the x-coordinate of point2: 9 Please enter the y-coordinate of point2: 3 Please enter the x-coordinate of point3: 5 Please enter the y-coordinate of point3: 1 The perimeter of a Triangle with point1 (5, 8), point2 (9, 3) and point3 (5, 1) is 17.875260 Would you like to repeat the program? (Enter 1 for yes): 3