In main() we get a string from the user, create a Reverser object with this string as an argument to the constructor, call this object's doRev() method, and display the return value, which is the reversed string. Here's some sample interaction with the program:

```
Enter a string: part
Reversed: trap
Enter a string:
```

Efficiency of Stacks

Items can be both pushed and popped from the stack implemented in the StackX class in constant O(1) time. That is, the time is not dependent on how many items are in the stack, and is therefore very quick. No comparisons or moves are necessary.

Stack Quiz

1- What is the basic difference between a stack and a queue?

2- Scientific applications for the stack are --------------- ,and -------------?

3- Assume that numbers 10, 22, 33, 48, 11 are pushed on a stack, two numbers are popped, then numbers 18, 444 are pushed on the stack, and three numbers are popped. What remains on the stack?

4- Write the complexity or big O of stack?

5-- For the class Stack, write method displayStackStartingAtBottom() that displays the content of the stack starting from the element on the bottom. What is the running time of the algorithm?

Queue Quiz

1-What is the output of the following tester program for MyQueue and MyStack?

```
MyQueue
q;
MyStack
s;
q = new
MyQueue(); s =
new MyStack();
s.push(new Integer(5));
s.push(new Integer(6));
s.push(new Integer(7));
System.out.print(s.pop())
;
q.enqueue(s.pop());
q.enqueue(new Integer(5));
q.enqueue(new Integer(6));
System.out.print(q.dequeue());
s.push(q.dequeue());
System.out.print(s.pop());
System.out.print(s.pop());
```

2-A queue is implemented using an array. When inserting and removing elements in the queue does a particular item moves from lower to higher indices or from higher to lower?

3-Write the complexity of big O of queue, and priority Queue?

4-If numbers 10, 22, 33, 48, 11 are inserted in a queue, two numbers are removed, then numbers 18, 444 are inserted in the queue, and three numbers are removed. What remains in the queue? Write the numbers starting with the number at the front of the queue?

5- Assume that class Queue is a queue of integers. Write method findMin() for the class Queue that returns minimal element of the queue.

6-A queue is implemented using an array. When inserting and removing elements in the queue does a particular item moves from lower to higher indices or from higher to lower?

Stack & Queue Quiz

1, 6. A queue is implemented using an array. When inserting or removing item does a particular item move from higher to lower indexes or from lower to higher ?

No elements are moved, however

- **→ to insert, we move the rear from lower to higher**
- **→ to delete, we move the front from lower to higher**

2. Write the Big O for the queue, Priority Queue.

Big O for the Queue

- **Enqueue ⇒ O (1)**
- **Dequeue ⇒ O (1)**
- **Peek⇒ O (1)**
- **Search ⇒ O (N) ==> worst**
- **Search ⇒ O (N/2) ==> average**

Big O for the Priority Queue

- **Enqueue ⇒ O (N/2 + N/2) ==> search + moving**
- **Dequeue ⇒ O (1)**
- **Peek⇒ O (1)**
- **Search ⇒ O (N) ==> worst**
- **Search ⇒ O (N/2) ==> average**

3. Show the numbers left in a queue after performing the following:

→ insert 10, 22, 33, 48, 11

Queue (Front to End) ==> 10, 22, 33, 48, 11

→ remove TWO numbers

Queue (Front to End) ==> 33, 48, 11

→ insert 18, 444

Queue (Front to End) ==> 33, 48, 11, 18, 444

→ remove THREE numbers

Queue (Front to End) ==> 18, 444

4. Assume that the class Queue is a class of integers. Write a method findMin() that returns the minimal element in the queue.

```
void findMin() {
        int min = myQueue[front];
        for (int i = front; i < num_items; i++) {
            if (min > myQueue[i])
                min = myQueue[i];

        }

          if (rear < front) {      // some elements were removed


            for (int i = 0; i < rear; i++) {
                if (min > myQueue[i])
                    min = myQueue[i];
            }
        }

        System.out.println("Minimum is " + min);
}
```