Queues and PQueues

What is a Queue?

A queue is a group of items all of the same type where items are added to the back of the queue and removed from the front.

The first item added would be the first item removed. Queues work in a FIFO manner.

What is a Queue?

In England, when you are to stand in a line, they tell you to go get in the queue.

What is a Queue?

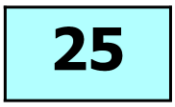
An empty integer queue.

```
Queue<Integer> queue;
queue = new LinkedList<Integer>();
```

queue will only store integer values.

What is a Queue?

```
queue.add(25);
```



add adds an item to the queue.

enqueue is a very common name given to the operation of adding items to a queue.

What is a Queue?

queue.add(14);

add adds an item to the queue.

25	14

What is a Queue?

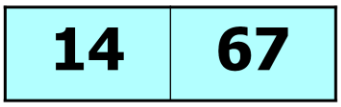
queue.add(67);

add adds an item to the queue.

25	14	67

What is a Queue?

queue.remove();



remove removes an item from the queue.

dequeue is a very common name given to the operation of removing items from a queue.

What is a Queue?

remove removes an item from the queue.

```
queue.remove();
```

67

What is a Queue?

queue.add(99);

add adds an item to the queue.

67	99

Java Queue Interface

The Queue interface was designed to allow the use of a queue in java.

The LinkedList class implements the Queue interface.

If you need a queue, just make a Queue reference to a LinkedList.

Queue Methods

Linked List as a Queue
frequently used methods

Name	Use
add(x)	adds item x to the queue
remove()	removes and returns front item
peek()	returns the front item with no remove
size()	returns the # of items in the queue
isEmpty()	checks to see if the queue is empty

```
import java.util.Queue;
```


```
Queue<Integer> queue;
queue = new LinkedList<Integer>();

queue.add(11);
queue.add(10);
queue.add(7);
out.println(queue);
```

OUTPUT

[11, 10, 7]

remove

```
Queue<Integer> queue;
queue = new LinkedList<Integer>();

queue.add(11);
queue.add(10);
queue.add(7);
out.println(queue.remove());
out.println(queue);
```

OUTPUT

```
11
[10, 7]
```

Open queueadd.java queueremove.java


```
Queue<Integer> queue;
queue = new LinkedList<Integer>();
queue.add(11);
queue.add(7);
out.println(queue);
out.println(queue.peek());
queue.remove();
out.println(queue.peek());
queue.remove();
out.println(queue);
```

OUTPUT

```
[11, 7]
11
7
[]
```

Open queuepeek.java

Queue Code

```
Queue<Integer> queue;
queue = new LinkedList<Integer>();
queue.add(11);
queue.add(10);
queue.add(7);

while(!queue.isEmpty())
{
  out.println(queue.remove());
}
```

OUTPUT

```
11
10
 7
```

Open queueisempty.java

A PriorityQueue is a queue structure that organizes the data inside by the natural ordering or by some specified criteria.

The Java PriorityQueue is a min heap as it removes the smallest items first.

The Java PriorityQueue stores Comparables.

PQ Methods

PriorityQueue

frequently used methods

Name	Use
add(x)	adds item x to the pQueue
remove()	removes and returns min priority item
peek()	returns the min item with no remove
size()	returns the # of items in the pQueue
isEmpty()	checks to see if the pQueue is empty


```
PriorityQueue<Integer> pQueue;
pQueue = new PriorityQueue<Integer>();

pQueue.add(11);
pQueue.add(10);
pQueue.add(7);
out.println(pQueue);
```

OUTPUT

[7, 11, 10]

remove

```
PriorityQueue<Integer> pQueue;
pQueue = new PriorityQueue<Integer>();

pQueue.add(11);
pQueue.add(10);
pQueue.add(7);
out.println(pQueue);
out.println(pQueue.remove());
out.println(pQueue);
```

OUTPUT

```
[7, 11, 10]
7
[10, 11]
```

Open pqadd.java pqremove.java

isEmpty

```
PriorityQueue<Integer> pQueue;
pQueue = new PriorityQueue<Integer>();

pQueue.add(11);
pQueue.add(10);
pQueue.add(7);

while(!pQueue.isEmpty())
{
  out.println(pQueue.remove());
}
```

OUTPUT

```
7
10
11
```

Open pqueueisempty.java

Start work on the Labs