

## Week 6 Creating and Using Objects



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## This Week

Lecture: Creating and using objects &  
Case study: catch me if you can

*Java Genesis:*

–Ch7: Objects and classes

Lab Assessment 5

Quick Quiz for Chapter 6

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```
import genesis.*;
public class GoWalking {
    public static void main (String [ ] args) {
        int posn = 0;
        while (true) {
            Transcript.print(posn+" ");
            Delay.milliseconds(500);
            if (Math.random() > 0.5) posn = posn + 1;
            else posn = posn - 1;
        }
    }
}
```

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```
public class Walker {
    private int posn; // instance variable
    public Walker ( ) { // constructor methods
        posn = 0;
    }
    public Walker (int x) {
        posn = x;
    }
    public void move ( ) {
        if (Math.random() > 0.5) posn = posn+1;
        else posn = posn - 1;
    }
    public String toString ( ) {
        return posn+" ";
    }
    public int getPosn ( ) {
        return posn;
    }
}
```

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```
import genesis.*;
public class GoWalkingAgain {
    public static void main (String [ ] args) {
        Walker phantom = new Walker(-2);
        Walker devil = new Walker(2);
        Transcript.println(phantom+" "+devil);
        while
        (phantom.getPosn( ) != devil.getPosn( ) ) {
            Delay.milliseconds(50);
            phantom.move();
            devil.move();
            Transcript.println(phantom+" "+devil);
        }
    }
}
```

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## Problem Catching Kangaroos

Kangaroos are placed at position 0 and hop around the circuit below. If they land on position 7 they are captured and can no longer hop.

1	2	3	4	5	6
0					7
13	12	11	10	9	8

6

1	2	3	4	5	6
0					7
13	12	11	10	9	8

- At each stage a kangaroo not at 7 hops a random distance of 1, 2, ..., 6 positions clockwise around the circuit.
- A kangaroo at position 7 cannot hop.

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## The class Kangaroo

- three instance variables: integers **numHops** and **posn**, and boolean **caught**
- one (default) constructor method that sets **posn** to 0, **numHops** to 0 and **caught** to **false**.
- four instance methods:
  - **hop()** (kangaroo hops) and **toString()**
  - getter methods **isCaught()** to return **caught** and **getNumHops()** to return **numHops**

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```
public class Kangaroo {
    // instance variables
    private int numHops;
    private boolean caught;
    private int posn;

    // constructor
    public Kangaroo ( ) {
        numHops = 0;
        caught = false;
        posn = 0;
    }

    public int getNumHops ( ) {
        return numHops;
    }

    public boolean isCaught ( ) {
        return caught;
    }
}
```

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```
public void hop ( ) {
    if (!caught) {
        numHops++;
        int rand = (int)(6*Math.random())+1;
        posn = (posn + rand)%14;
        if (posn == 7) caught = true;
    }
}

public String toString ( ) {
    String s = "number of hops: "+numHops+"\t";
    s = s+posn+"\t";
    if (caught) s = s+"caught";
    else s = s+"free";
    return s;
}
}
```

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```
import genesis.*;

public class TestKangaroo {

    public static void main (String [ ] args) {
        Kangaroo skippy = new Kangaroo ( );
        Transcript.println(skippy);
        while (!skippy.isCaught ( )) {
            skippy.hop ( );
            Transcript.println(skippy);
        }
    }
}
```

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## The class KangarooPopulation

- instance variables: integers **numCaught** and **numHopAll**, and array **kangas** of **Kangaroo** objects
- constructor method that sets the values of **numCaught** and **numHopAll** to 0 and initialises the array **kangas**
- four instance methods:
  - getter methods **getNumCaught()** and **getNumHopAll()**
  - **allHop()** whereby all free kangaroos **hop**
  - **toString()** to return information about the population

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```

public class KangarooPopulation {

    // instance variables
    private Kangaroo [ ] kangas;
    private int numCaught;
    private int numHopAll;

    // constructor
    public KangarooPopulation (int numKangas) {
        kangas = new Kangaroo [numKangas];
        numCaught = 0;
        for (int i=0; i<kangas.length; i++) {
            kangas[i] = new Kangaroo();
        }
        numHopAll = 0;
    }

    public int getNumCaught ( ) {
        return numCaught;
    }
}

```

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```

    public int getNumHopAll ( ) {
        return numHopAll;
    }

    public void allHop ( ) {
        if (numCaught < kangas.length) {
            numHopAll++;
            for (int i=0; i<kangas.length; i++)
                if (!kangas[i].isCaught( )) {
                    kangas[i].hop( );
                    if (kangas[i].isCaught( )) numCaught++;
                }
        }
    }

    public String toString ( ) {
        return "number times all hopped: "+numHopAll
            +"\nnumber caught: "+numCaught;
    }
}

```

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```

import genesis.*;

public class TestKangarooPopulation {

    public static void main (String [ ] args) {
        int popSize =
            DialogBox.requestInt("population size:");
        KangarooPopulation k =
            new KangarooPopulation(popSize);
        Transcript.println(k);
        while (k.getNumCaught( ) < popSize) {
            k.allHop( );
            Transcript.println(k);
        }
    }
}

```

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```

import genesis.*;

public class CatchMeIfYouCan {

    public static void main (String [ ] args) {
        int popSize =
            DialogBox.requestInt("population size");
        KangarooPopulation k =
            new KangarooPopulation(popSize);
        while (k.getNumCaught( ) < 100) k.allHop( );
        Transcript.println(k.getNumHopAll( ));
    }
}

```

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