

2004 Paper 1 Question 9

Programming in Java

Implement a videogame called JavaConk, a computerised version of the game of conkers. Two round conkers should be displayed on the screen. One conker is controlled by the computer, and constantly travels around the screen, bouncing off the sides if necessary. The other conker is controlled by the player, using the mouse. If the two collide, and if the sum of kinetic energies is less than a threshold set for this game, the computer conker will rebound at a new velocity determined by the collision speed. If the kinetic energy is larger than the threshold, one of the two will be smashed. The conker that will smash is determined by chance, but with probability weighted so that the one travelling more slowly is proportionally more likely to smash.

The classes `BasicGame`, `Ball`, and `OutOfBoundsException` have already been coded. Relevant method signatures for these classes (and standard library class `MouseEvent`) are as follows:

```
class Ball
    public Ball(int diameter, int xPos, int yPos, String colour)
    public int getX()
    public int getY()
    public void moveTo(int x, int y) throws OutOfBoundsException
    public boolean collidesWith(Ball other)
    public void smash()
    protected void draw()

abstract class BasicGame implements MouseMotionListener
    public void mouseMoved(MouseEvent e)

class OutOfBoundsException extends Exception
    public boolean overHorizontalBoundary()
    public int getXboundary()
    public int getYboundary()

class MouseEvent extends Event
    public int getX()
    public int getY()
```

Provide all necessary code to implement the required behaviour.

[Hint: Kinetic Energy $E_K = \frac{1}{2}mv^2$.]

[20 marks]