Exercise: Identifying classes and methods

What classes are used in main?
Exercise: Identifying classes and methods

What classes are used in main?

GraphWin
Target
Point
Exercise: Identifying classes and methods

```python
def main():
    print("Press escape to exit")
    numTargets = 2 #int(input("Enter a number of targets: "))
    win = GraphWin("Target Practice", 600, 600)
    win.setBackground("white")

    target1 = Target(Point(100,500))
    target1.draw(win)

    target2 = Target(Point(500,500))
    target2.draw(win)

    targets = createTargets(win, numTargets)

    numHit = 0
    key = win.checkKey()
    while key != "Escape":
        if key is not None:
            numHit += checkHitTargets(targets, key)
        moveTargets(targets)
        update(30)
        key = win.checkKey()

    print("You hit %d targets!" % numHit)
```

What methods are called in main?
Exercise: Identifying classes and methods

What methods are called in main?
- setBackground
- draw
- checkKey
Exercise: Identifying classes and methods

What functions are called in main?

def main():
    print("Press escape to exit")
    numTargets = 2 #int(input("Enter a number of targets: "))
    win = GraphWin("Target Practice", 600, 600)
    win.setBackground("white")
    target1 = Target(Point(100,500))
    target1.draw(win)
    target2 = Target(Point(500,500))
    target2.draw(win)
    targets = createTargets(win, numTargets)
    numHit = 0
    key = win.checkKey()
    while key != "Escape":
        if key is not None:
            numHit += checkHitTargets(targets, key)
            moveTargets(targets)
            update(30)
            key = win.checkKey()
    print("You hit %d targets!" % numHit)
main()
Exercise: Identifying classes and methods

def main():
    print("Press escape to exit")
    numTargets = 2  # Int[Input("Enter a number of targets: ")]
    win = GraphWin("Target Practice", 600, 600)
    win.setBackground("white")

    target1 = Target(Point(100,500))
    target1.draw(win)

    target2 = Target(Point(500,500))
    target2.draw(win)

    targets = [createTargets(win, numTargets)]

    numHit = 0
    key = win.checkKey()
    while key != "Escape":
        if key is not None:
            numHit += checkHitTargets(targets, key)
            moveTargets(targets)
            update(30)
            key = win.checkKey()

    print("You hit %d targets!" % numHit)

main()
Exercise: Identifying classes and methods

What type does the variable win have?
Exercise: Identifying classes and methods

What type does the variable win have?

GraphWin

NOTE: Yes, it is an object, but its type is its class!
Exercise - method scope

```
def __init__(self, center):
    """
    Constructor. Initializes a target with the given center
    Create three concentric circles with a character in the middle. Save the
    created shapes using member variables (perhaps a list). Compute a random
    upwards speed for the target between 1 and 5 units per second. Save the
    speed in a member variable
    Hint: Use random.choice(string.ascii_lowercase) to choose a random letter
    Param self (Target): the object this function is called on
    Param center (Point): the center of the target
    Implicit return (Target): an instance of class Target
    """
    self.shapes = [Circle(center, 50), Circle(center, 40), Circle(center, 30)]
    self.shapes[0].setFill("magenta")
    self.shapes[1].setFill("green")
    self.shapes[2].setFill("magenta")

# 1. what variables are in scope here?
letter = random.choice(string.ascii_lowercase)
self.text = Text(center, letter)
self.vely = 0 # TODO: Compute a random speed and save in a member variable

# 2. what variables are in scope here?
```

What variables are in scope on line 23?
Exercise - method scope

What variables are in scope on line 23?
- `self`
- `center`
- `self.shapes`
Exercise - method scope

What variables are in scope on line 27?
Exercise - method scope

What variables are in scope on line 27?

self
center
self.shapes
letter
self.text
self.vely
Exercise - method scope

```python
def draw(self, win):
    """
    Calls draw(win) on the shapes of the target
    Param self (Target): the object this function is called on
    Param win (GraphWin): the window the draw to
    Returns: none
    """
    # what variables are in scope here?
    for shape in self.shapes:
        shape.draw(win)
    self.text.draw(win)
```

What variables are in scope on line 36?
Exercise - method scope

What variables are in scope on line 36?

self

win

self.shapes

self.text

self.vely
Visualizing classes on the heap

Idea:
Classes allow us to organize our programs.
Analogy: A fridge has shelves & drawers.
- Inside the drawers, you have egg cartons, jars, boxes
  - Inside the egg carton, you have eggs
  - Inside the jars, you might have pickles, jam, etc.

If we didn't have classes, what would we need to do in our programs?
What are some advantages of classes over LOFs?

e.g. how would we implement movingTargets.py? many function parameters? LOLs?