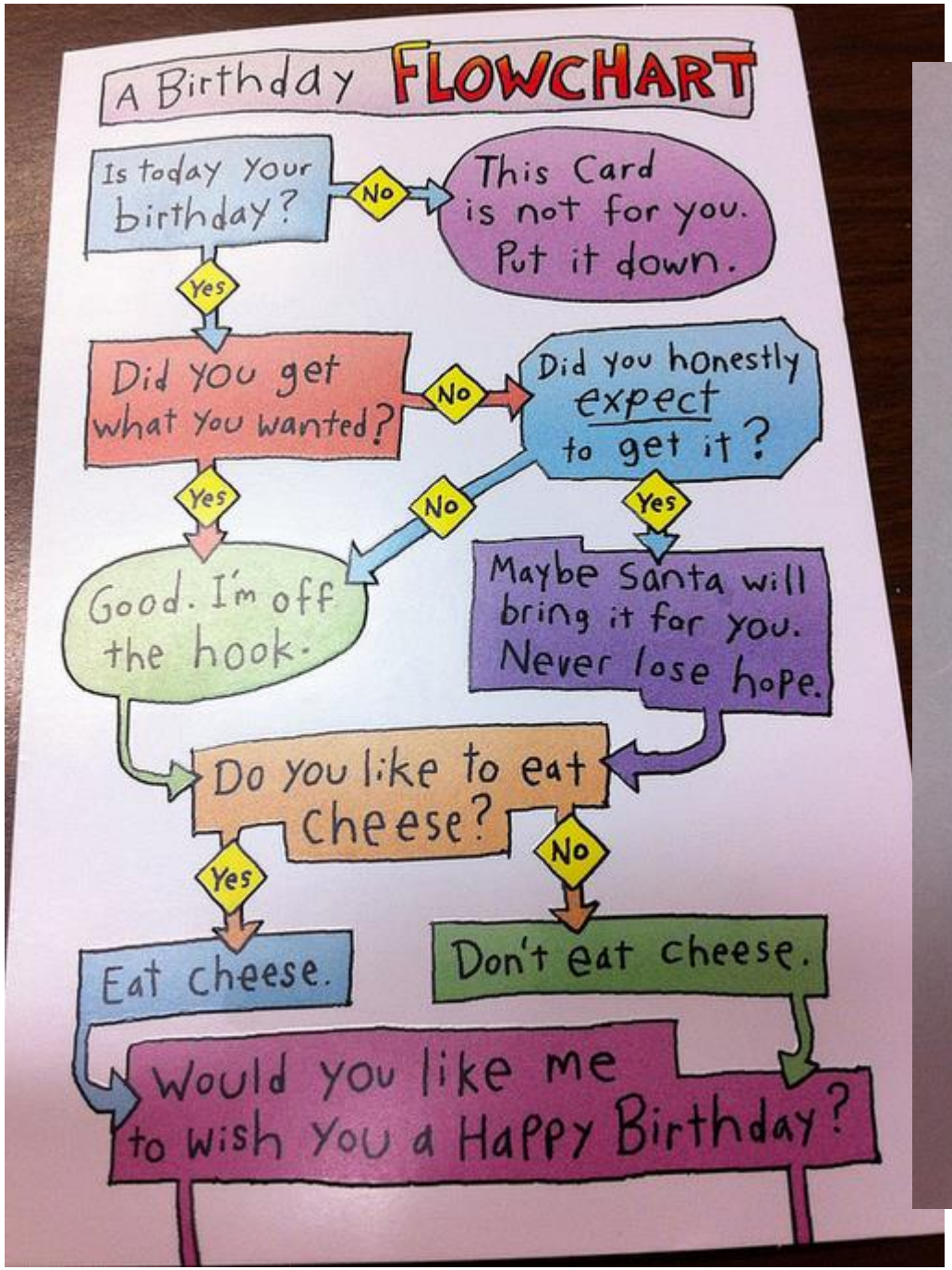
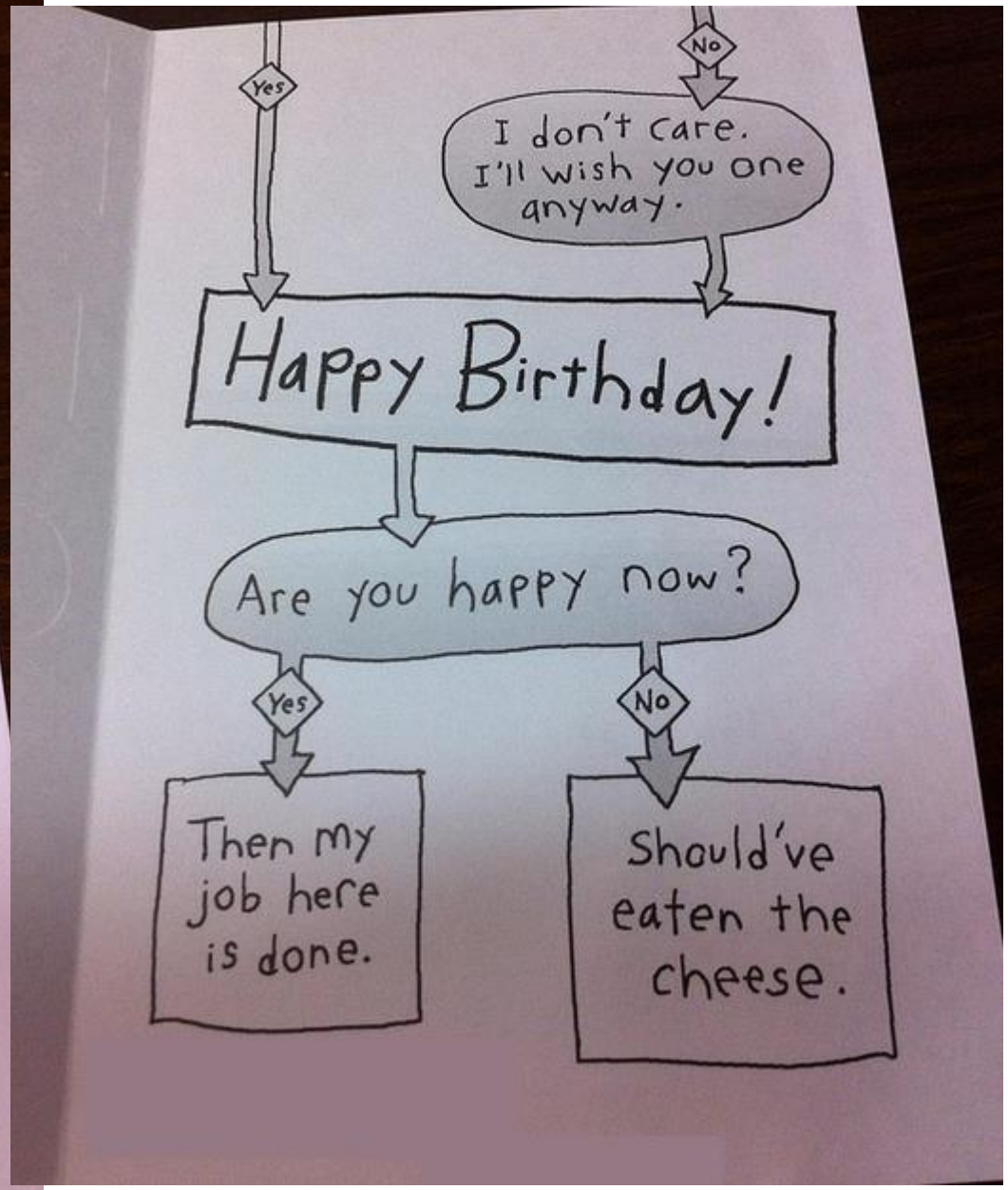
Flowcharts

Graphically representing the path of the program

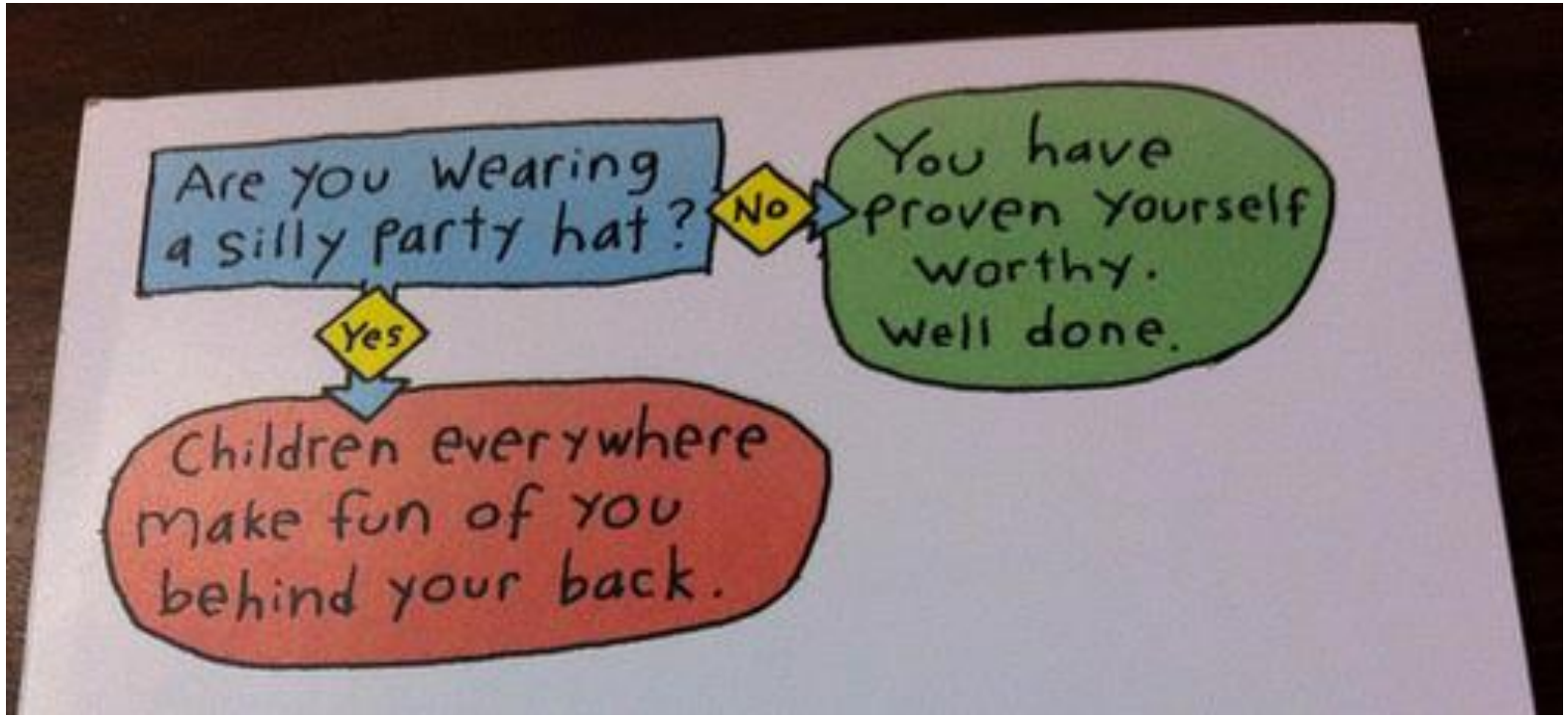
You’ve maybe seen some of the joke flowcharts.

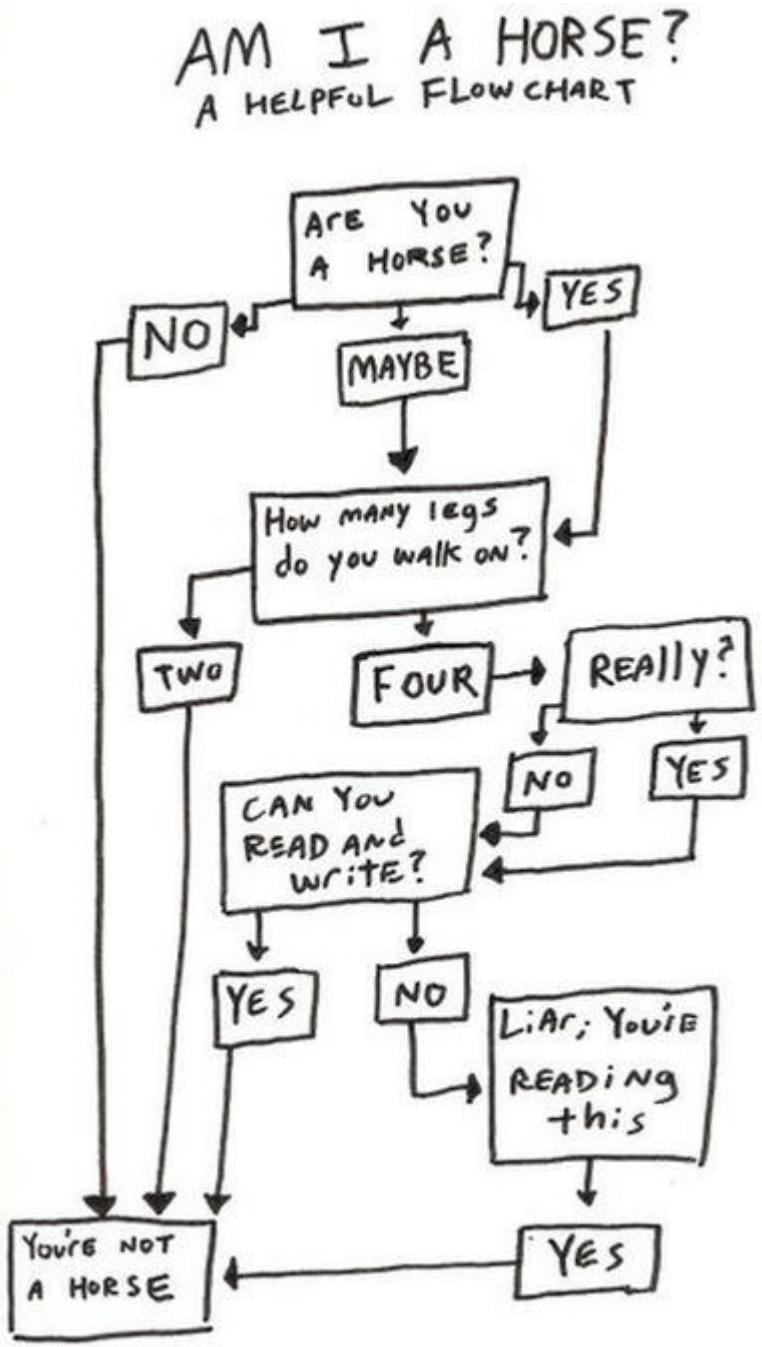
The Birthday Card that I got my sister.





On the back:


Are you wearing a silly party hat?
No
You have proven yourself worthy. Well done.
Yes
Children everywhere make fun of you behind your back.

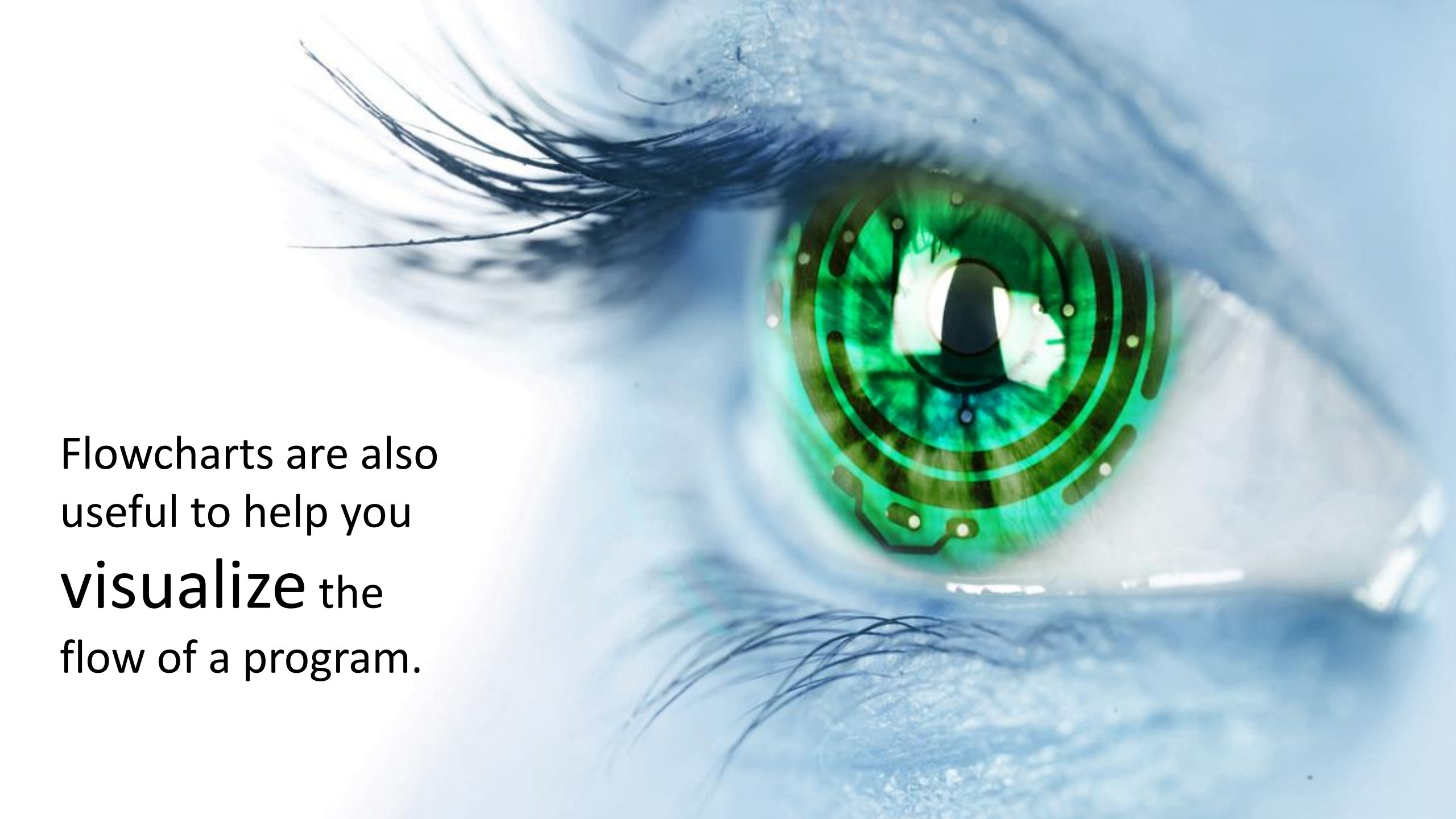

AM I A HORSE?
A HELPFUL FLOWCHART
ARE YOU A HORSE?
NO
MAYBE
YES
HOW MANY LEGS DO YOU WALK ON?
TWO
FOUR
REALLY?
NO
YES
CAN YOU READ AND WRITE?
YES
NO
LIAR; YOU'RE READING THIS
YES
YOU'RE NOT A HORSE


My Cat's Decision-Making Tree.
Is that for me?
Yes.
No.
I don't want it.
That's for me.

That’s not what we are making.

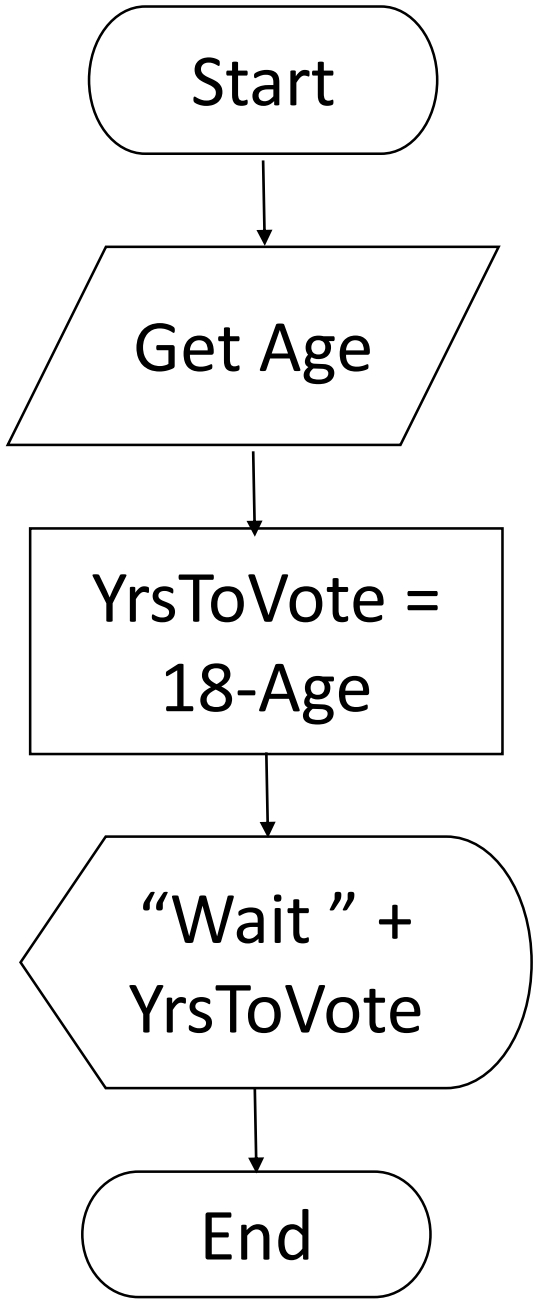
Flowcharts are part of the program

process.

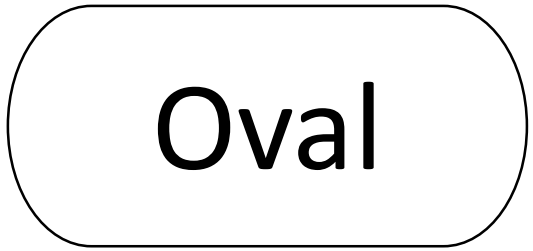


Flowcharts are also useful to help you visualize the flow of a program.

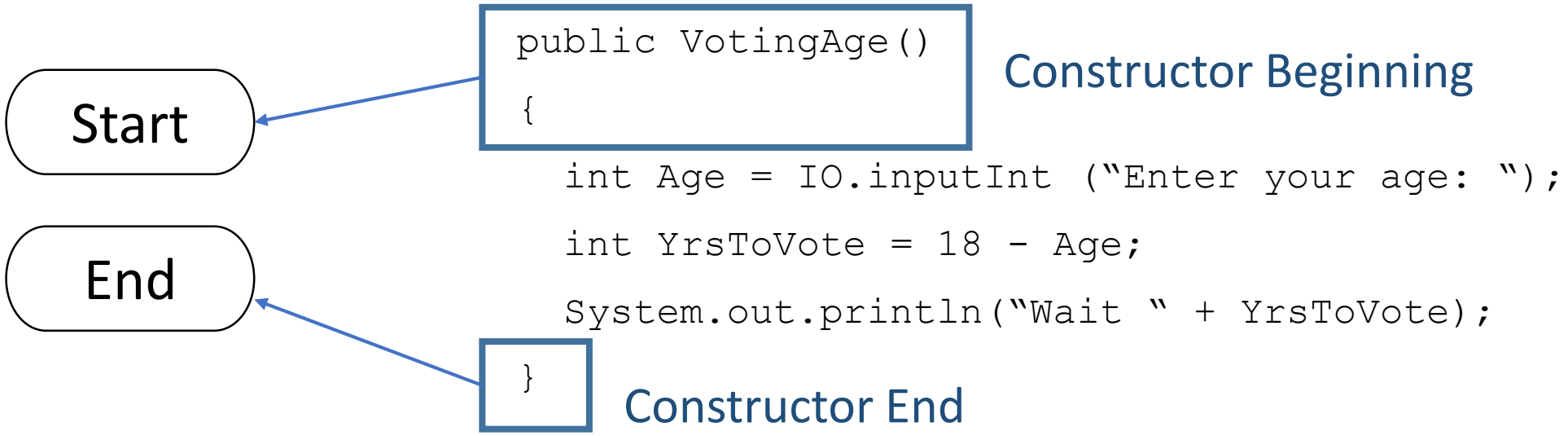
An example:




```
public VotingAge()
{
   int Age = IO.inputInt (“Enter your age: “);
   int YrsToVote = 18 - Age;
   System.out.println(“Wait “ + YrsToVote);
}
```



Terminal



- One Start and One End for each program. No more, no less.
- Only holds “Start” and “End”
- Only one arrow comes out of the Start. No arrows for End.

Input

IO lines

```
public VotingAge()
{
  int Age = IO.inputInt ("Enter your age: ");
  int YrsToVote = 18 - Age;
  System.out.println("Wait " + YrsToVote);
}
```

- Used for IO lines.
- Only write “Get” + variable name
- Don’t write the prompt (question)
- Only one arrow comes out of it.

Rectangle

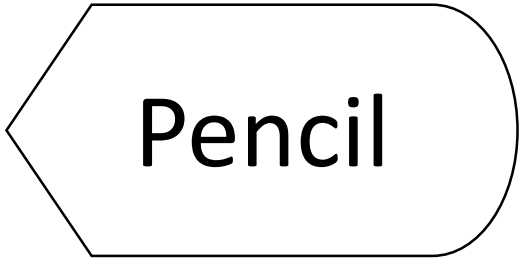
Processing

YrsToVote = 18-Age

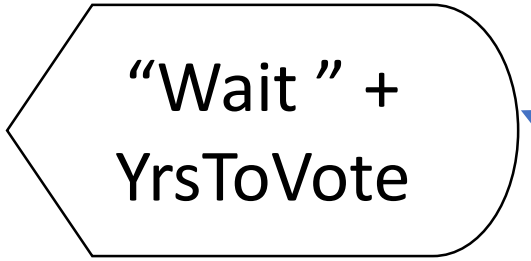
```
public VotingAge()
{
  int Age = IO.inputInt ("Enter your age: ");
  int YrsToVote = 18 - Age;
  System.out.println("Wait " + YrsToVote);
}
```

Math lines

- Used for Math Lines.
- Leave out the variable type, but write everything else
- Only one arrow comes out of it.



Output

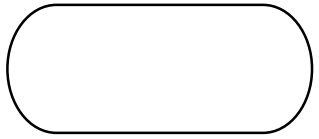



```
public VotingAge()
{
   int Age = IO.inputInt (“Enter your age: “);
   int YrsToVote = 18 - Age;
   System.out.println(“Wait “ + YrsToVote);
}
```

System.out lines

- Used for System.out.println lines.
- Leave out the System.out.println(); but write everything else
- Only one arrow comes out of it.

Flowchart Summary

Shape	Formal: informal
	Terminal: start, end
	Input: IO keyboard input
	Process: calculations
	Output: System.out

Rules

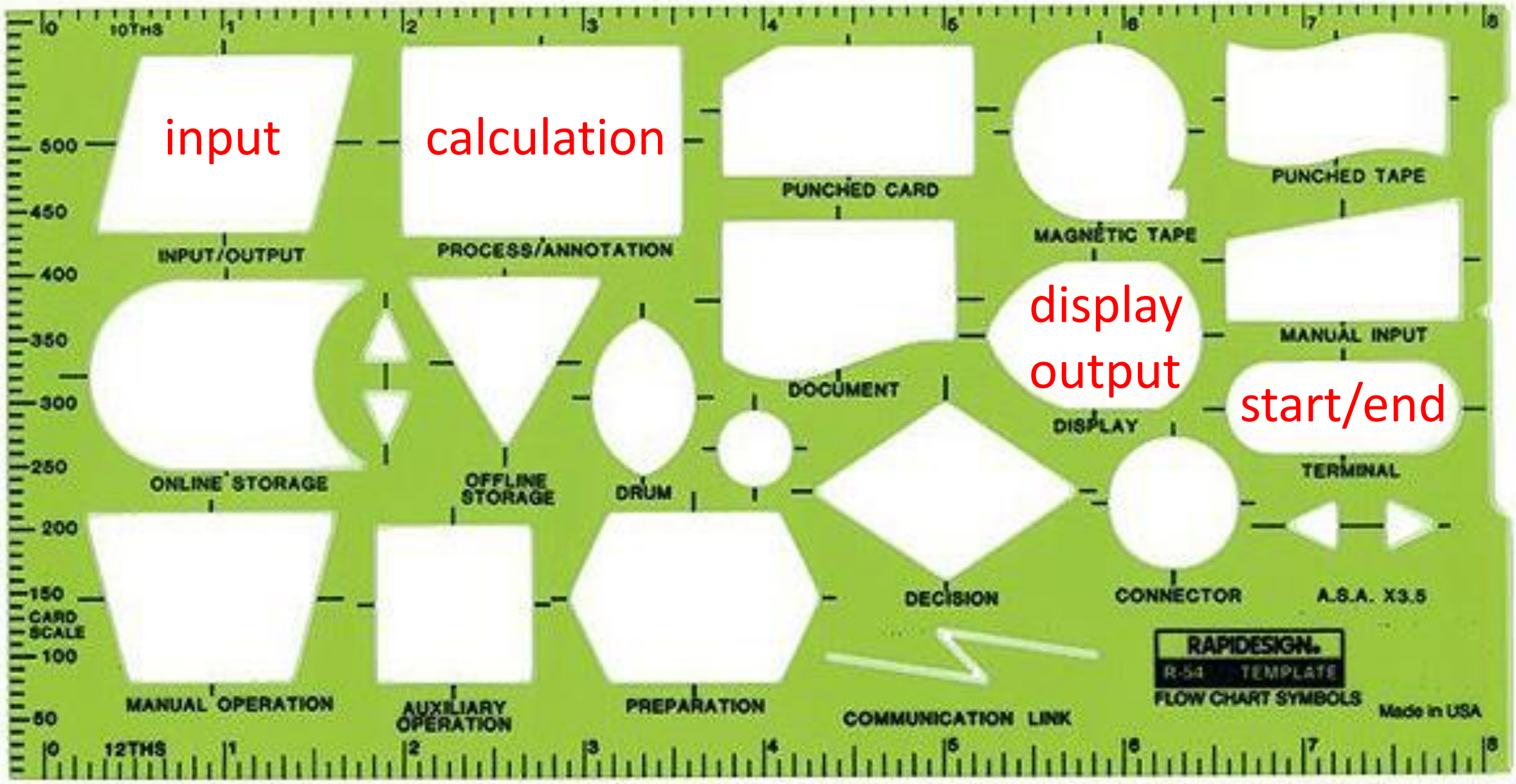
There is only one start and one end.

Arrows connect the pieces.

Flow is up to down or left to right.

Lines do not cross.

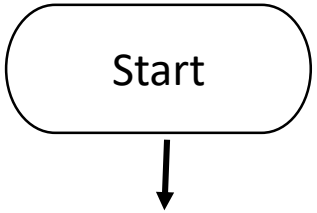
No shape can have more than 1 arrow come out of it.


input
calculation
PUNCHED CARD
PUNCHED TAPE
INPUT/OUTPUT
PROCESS/ANNOTATION
MAGNETIC TAPE
display
output
MANUAL INPUT
DOCUMENT
start/end
DISPLAY
ONLINE STORAGE
OFFLINE STORAGE
DRUM
TERMINAL
DECISION
CONNECTOR
A.S.A. X3.5
MANUAL OPERATION
AUXILIARY OPERATION
PREPARATION
COMMUNICATION LINK
RAPIDESIGN
R-54 TEMPLATE
FLOW CHART SYMBOLS
Made in USA
10THS
12THS
CARD SCALE

Make a flowchart for this code:

```
public Mark() {
1   int mark = IO.inputInt("What was your test mark? ");
2   int total = IO.inputInt("What was the test total? ");
3   int per = mark*100/total;
4   System.out.println("That was "+per+"%");
5   System.out.println("Good job!");
}
```

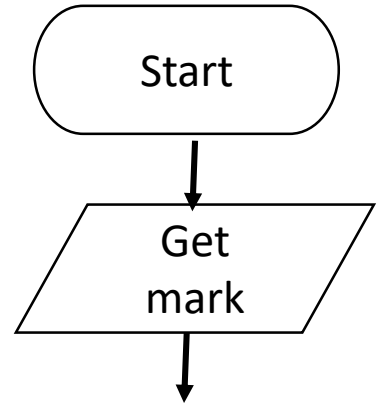
Make a flowchart for this code:



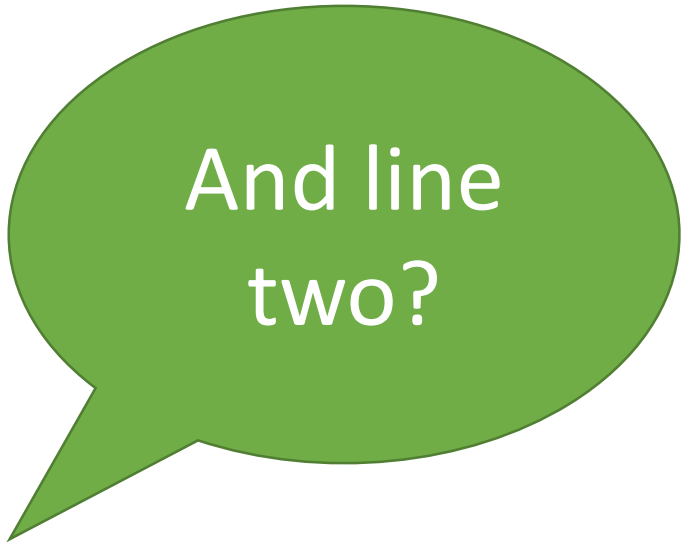

```
public Mark() {
1   int mark = IO.inputInt("What was your test mark? ");
2   int total = IO.inputInt("What was the test total? ");
3   int per = mark*100/total;
4   System.out.println("That was "+per+"%");
5   System.out.println("Good job!");
}
```

What shape works for the next line?

Make a flowchart for this code:

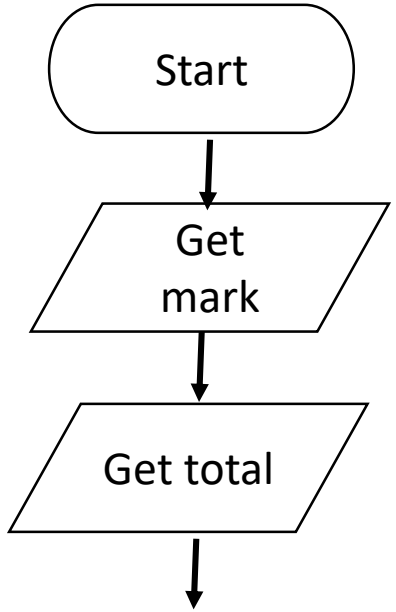



```
public Mark() {
1   int mark = IO.inputInt("What was your test mark? ");
2   int total = IO.inputInt("What was the test total? ");
3   int per = mark*100/total;
4   System.out.println("That was "+per+"%");
5   System.out.println("Good job!");
}
```



Make a flowchart for this code:

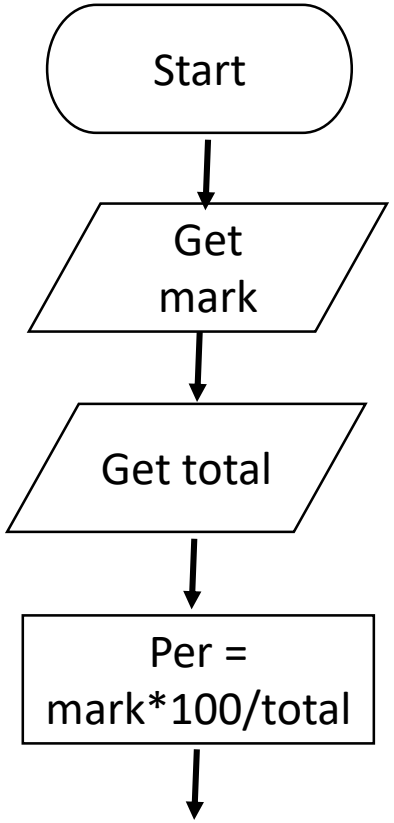
```
public Mark() {
1   int mark = IO.inputInt("What was your test mark? ");
2   int total = IO.inputInt("What was the test total? ");
3   int per = mark*100/total;
4   System.out.println("That was "+per+"%");
5   System.out.println("Good job!");
}
```



What happens inbetween line 2 & 3?

Make a flowchart for this code:

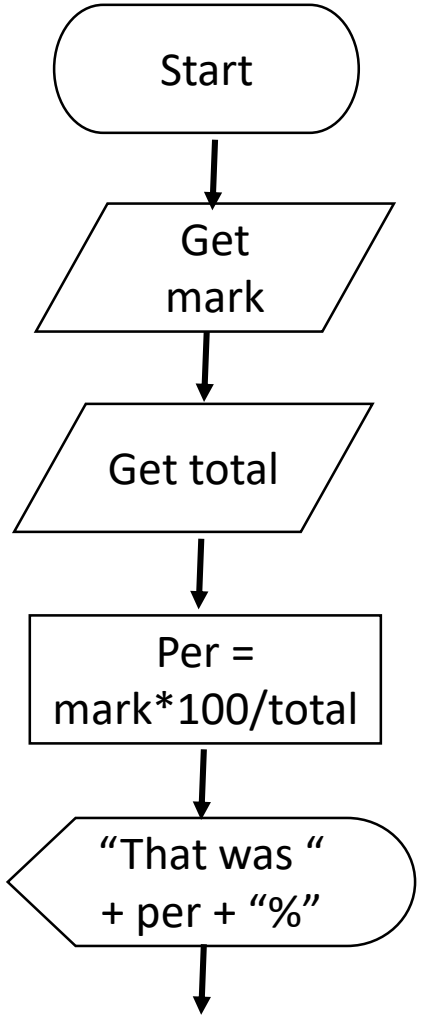
```
public Mark() {
1   int mark = IO.inputInt("What was your test mark? ");
2   int total = IO.inputInt("What was the test total? ");
3   int per = mark*100/total;
4   System.out.println("That was "+per+"%");
5   System.out.println("Good job!");
}
```



What shape is needed for line 3?

Make a flowchart for this code:

```
public Mark() {
1   int mark = IO.inputInt("What was your test mark? ");
2   int total = IO.inputInt("What was the test total? ");
3   int per = mark*100/total;
4   System.out.println("That was "+per+"%");
5   System.out.println("Good job!");
}
```

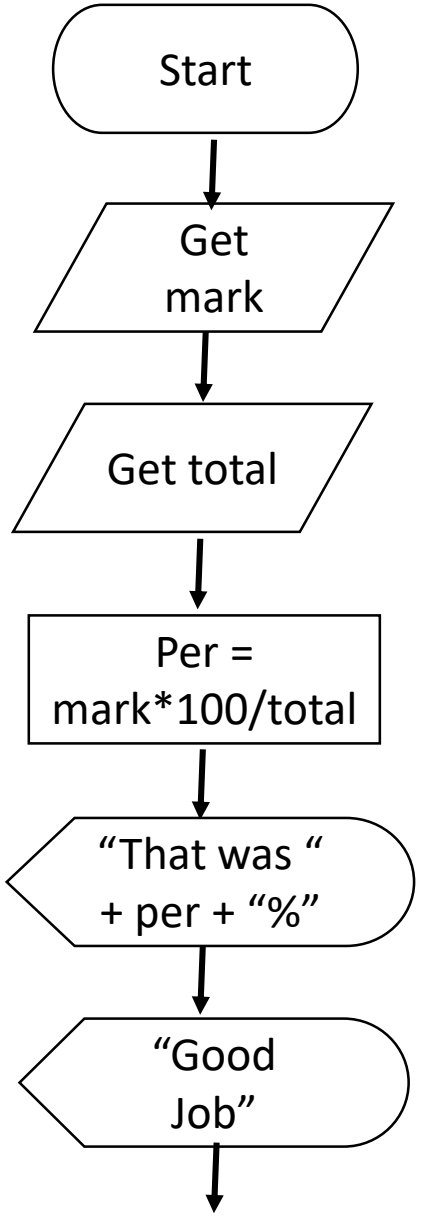


What shape for line 4?

Make a flowchart for this code:

```
public Mark() {
1   int mark = IO.inputInt("What was your test mark? ");
2   int total = IO.inputInt("What was the test total? ");
3   int per = mark*100/total;
4   System.out.println("That was "+per+"%");
5   System.out.println("Good job!");
}
```

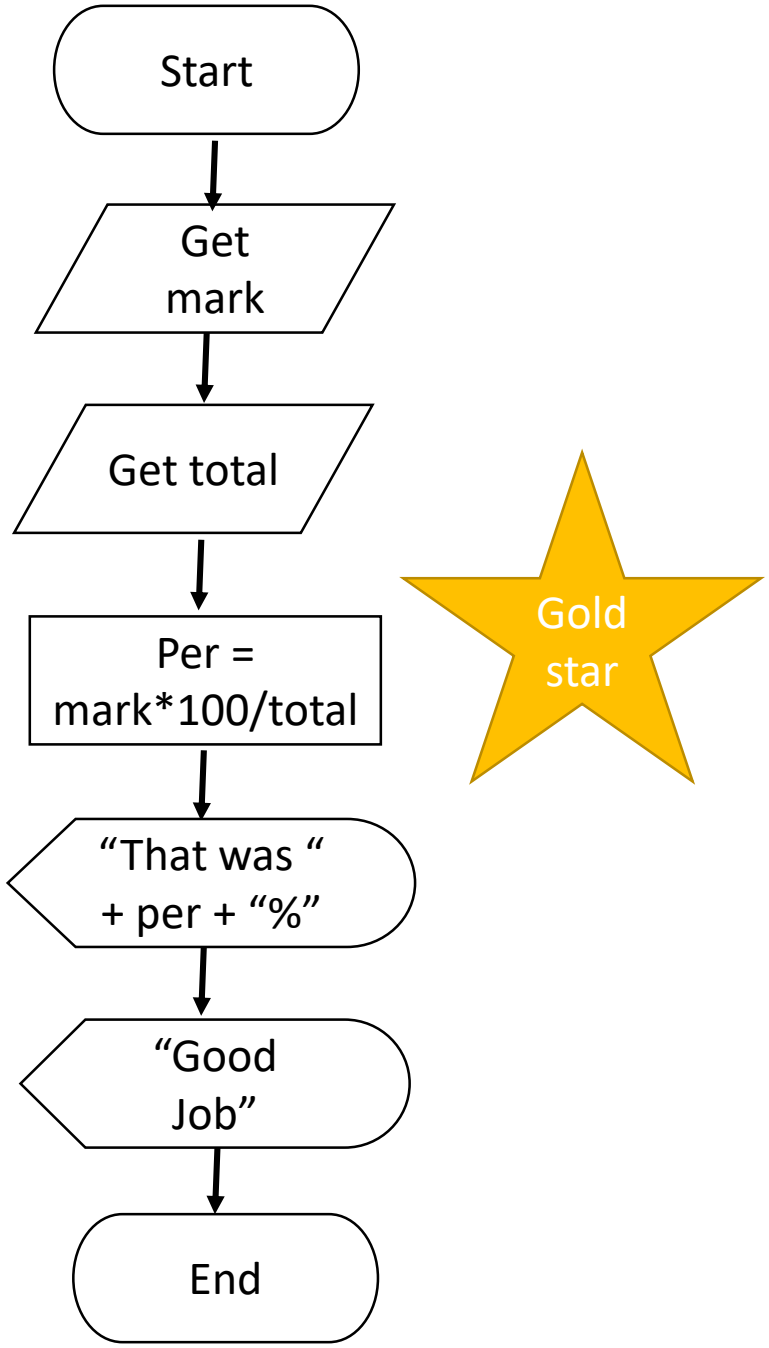
How does it end?



Make a flowchart for this code:

```
public Mark() {
1   int mark = IO.inputInt("What was your test mark? ");
2   int total = IO.inputInt("What was the test total? ");
3   int per = mark*100/total;
4   System.out.println("That was "+per+"%");
5   System.out.println("Good job!");
}
```

That's all.



Let’s try another.

Make a flowchart for this output:

Cylinder Surface Area and Volume

Height: 4.2
Radius: 3.4

The surface area is 99.04
The volume is 152.5317

Make a flowchart for this output:

Cylinder Surface Area and Volume

Height: 4.2
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The surface area is 99.04
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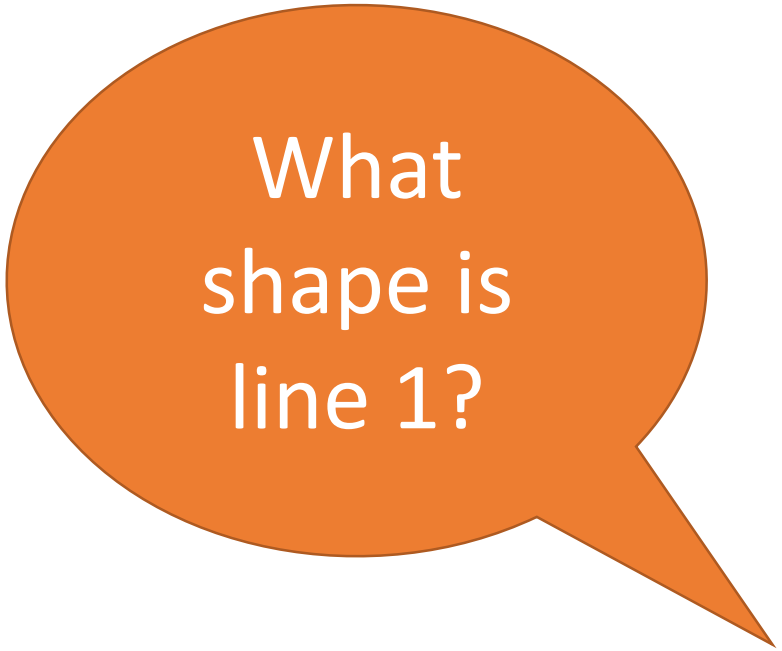
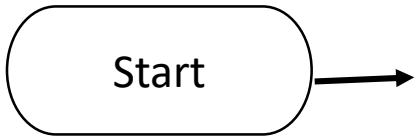




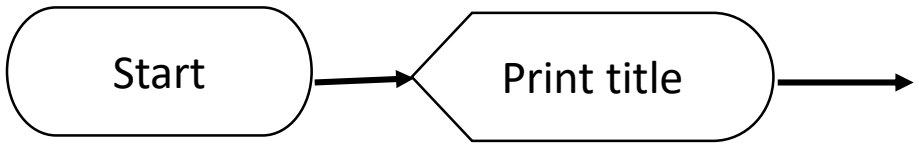
Make a flowchart for this output:

Cylinder Surface Area and Volume

Height: 4.2
Radius: 3.4

The surface area is 99.04
The volume is 152.5317

What shape are the next 2 lines? (2&3)



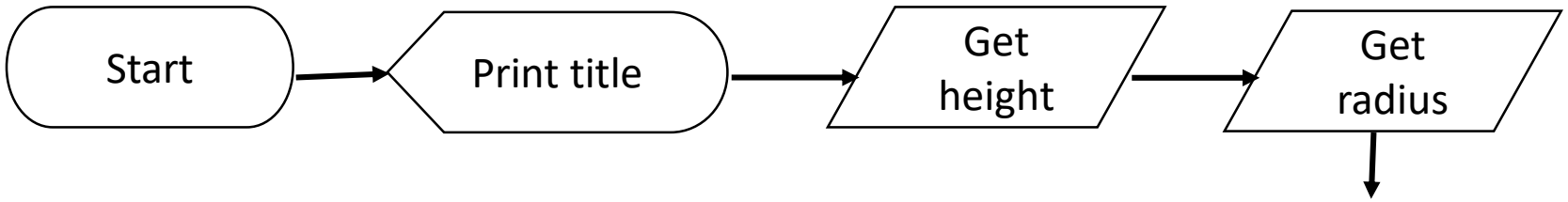
Make a flowchart for this output:

Cylinder Surface Area and Volume

Height: 4.2
Radius: 3.4

The surface area is 99.04
The volume is 152.5317

What about the last two lines?



Make a flowchart for this output:

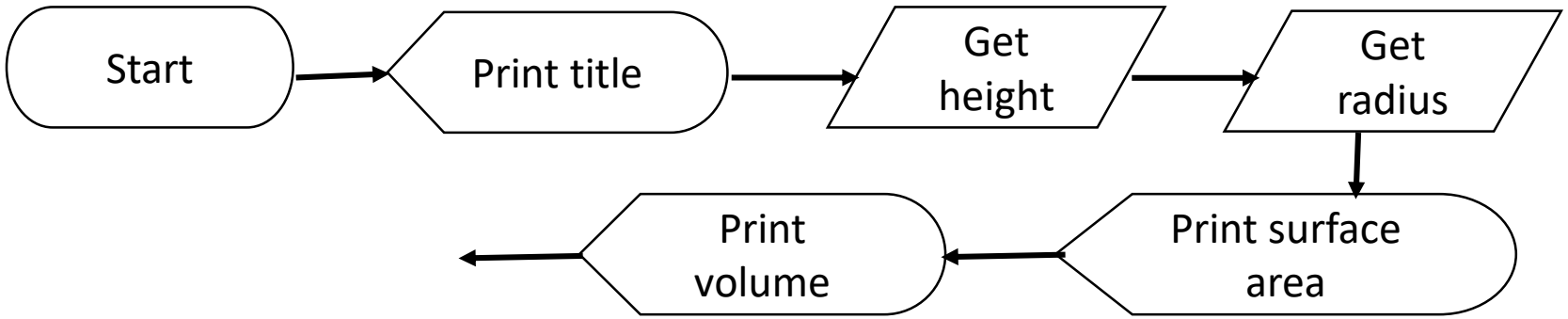
Cylinder Surface Area and Volume

Height: 4.2
Radius: 3.4

The surface area is 99.04
The volume is 152.5317

Hey! Where did those two numbers come from?

Oh yeah. We missed a step.

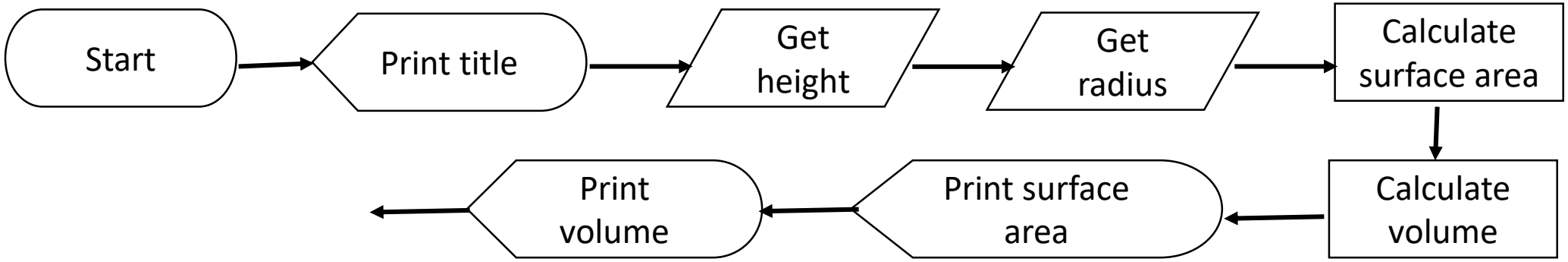


Make a flowchart for this output:

Cylinder Surface Area and Volume

Height: 4.2
Radius: 3.4

The surface area is 99.04
The volume is 152.5317



Make a flowchart for this output:

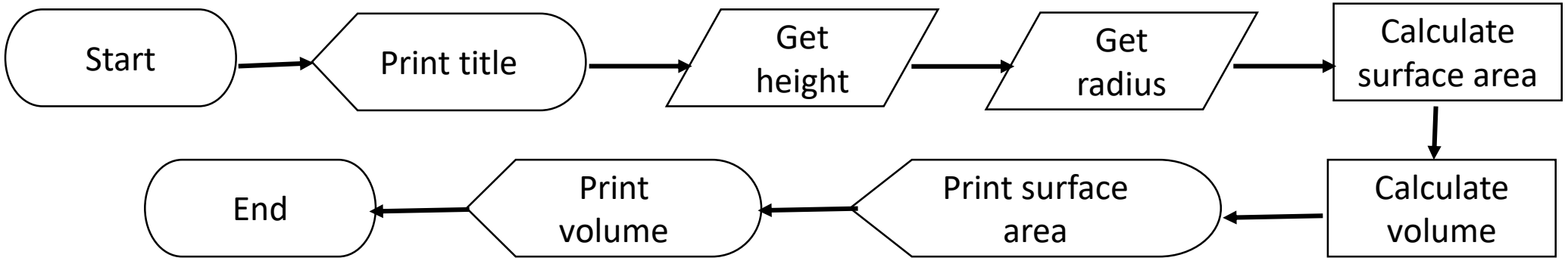
Cylinder Surface Area and Volume

Height: 4.2
Radius: 3.4

The surface area is 99.04
The volume is 152.5317

That's all.

Gold star



Very Important Side note:
https://www.youtube.com/watch?v=VOXYMRcWbF8

```
public class flowchart {
  public static void main(String args[]) {
    new flowchart();
  }
  public flowchart() {
    double a = IO.inputDouble("What is a?");
    double b = IO.inputDouble("What is b?");
    double c = IO.inputDouble("What is c?");
    double pos = (-b+(Math.sqrt(b*b-4*a*c)))/2*a;
    double neg = (-b-(Math.sqrt(b*b-4*a*c)))/2*a;
    System.out.println("The roots are "+pos+", "+neg);
 }
}
```

First, let's classify the code!

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```
public class flowchart {
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    System.out.println("The roots are "+pos+", "+neg);
 }
}
```

Start with what shape?

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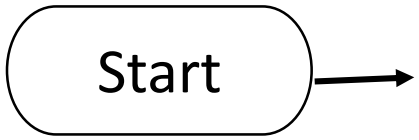
 }
}
```

What goes in the parallelogram?



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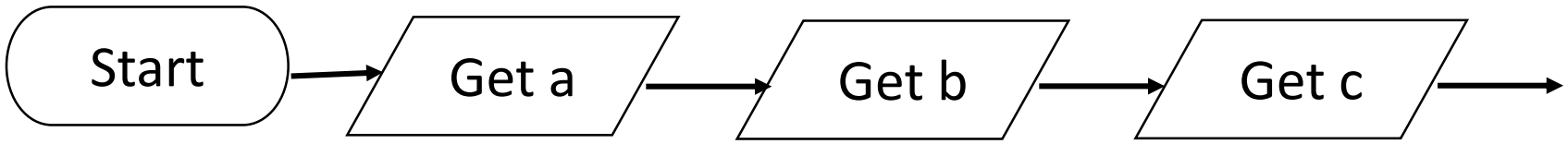
 }
}
```



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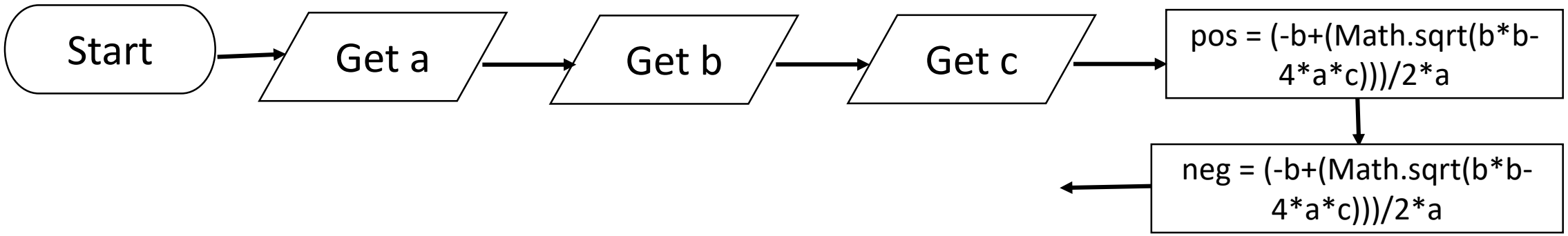

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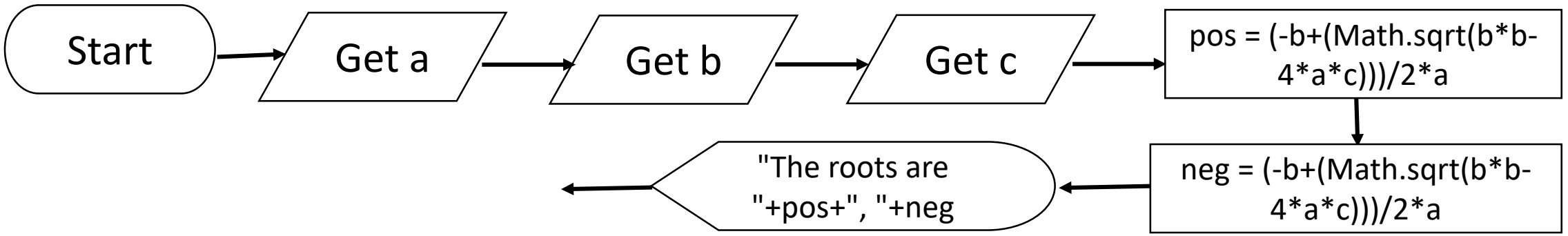

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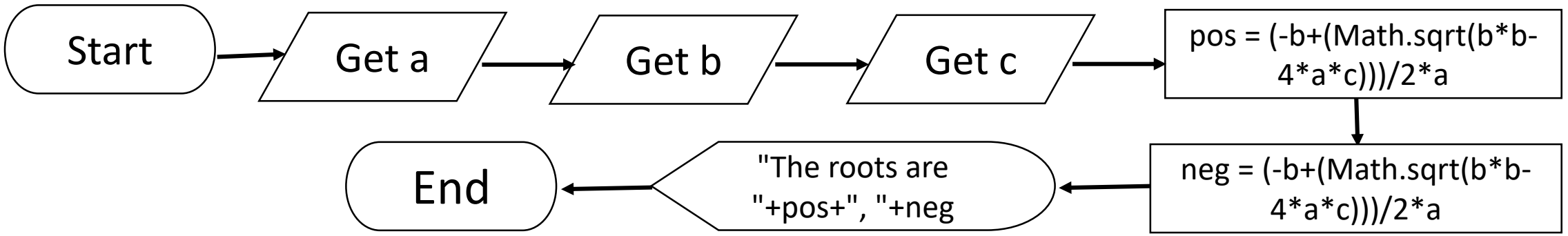
    double neg = (-b-(Math.sqrt(b*b-4*a*c)))/2*a;
    System.out.println("The roots are "+pos+", "+neg);
 }
}
```

How do we end?



Flowcharts

- Diagrams that trace how a computer FLOWS through a piece of code.
- Used to plan out a program before you code.
- Also used to understand a program because it represents it visually.

Flowchart Rules

There is only one start and one end.

Arrows connect the pieces.

Flow is up to down or left to right.

Lines do not cross.

The only shape with can have 2 lines come out of it is a diamond.

No shape can have more than 2 lines come out of it.

Start

End

The ONLY thing it can hold.

One of each per flow chart.


```
int n = IO.inputInt("Number? ");
```

From IO,input lines

ONLY write
“Get” + variable name

SA = 6 * a * a

Calculate surface area

```
int SA = 6 * a * a;
```

Math calculations

Leave the variable type off, put in the calculation

Giant

“The total is “+n

```
System.out.println("Giant");
System.out.println("The total is "+n);
```

System.out.println statements

Just include what is in the brackets.