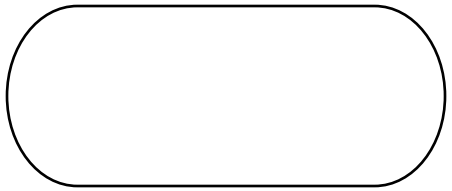
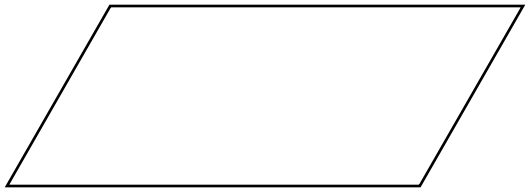
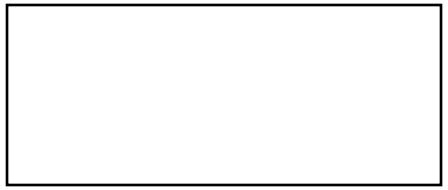
Flowcharts with Decisions

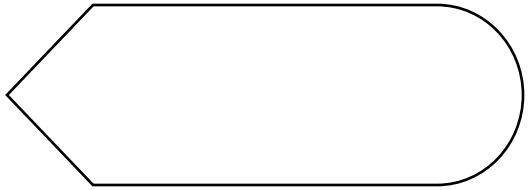
Diamonds and Branches make an appearance

What do each of these flowchart shapes represent?

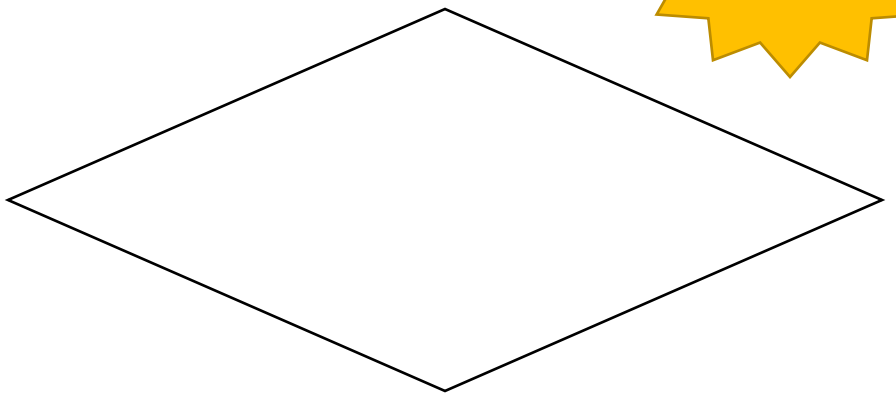






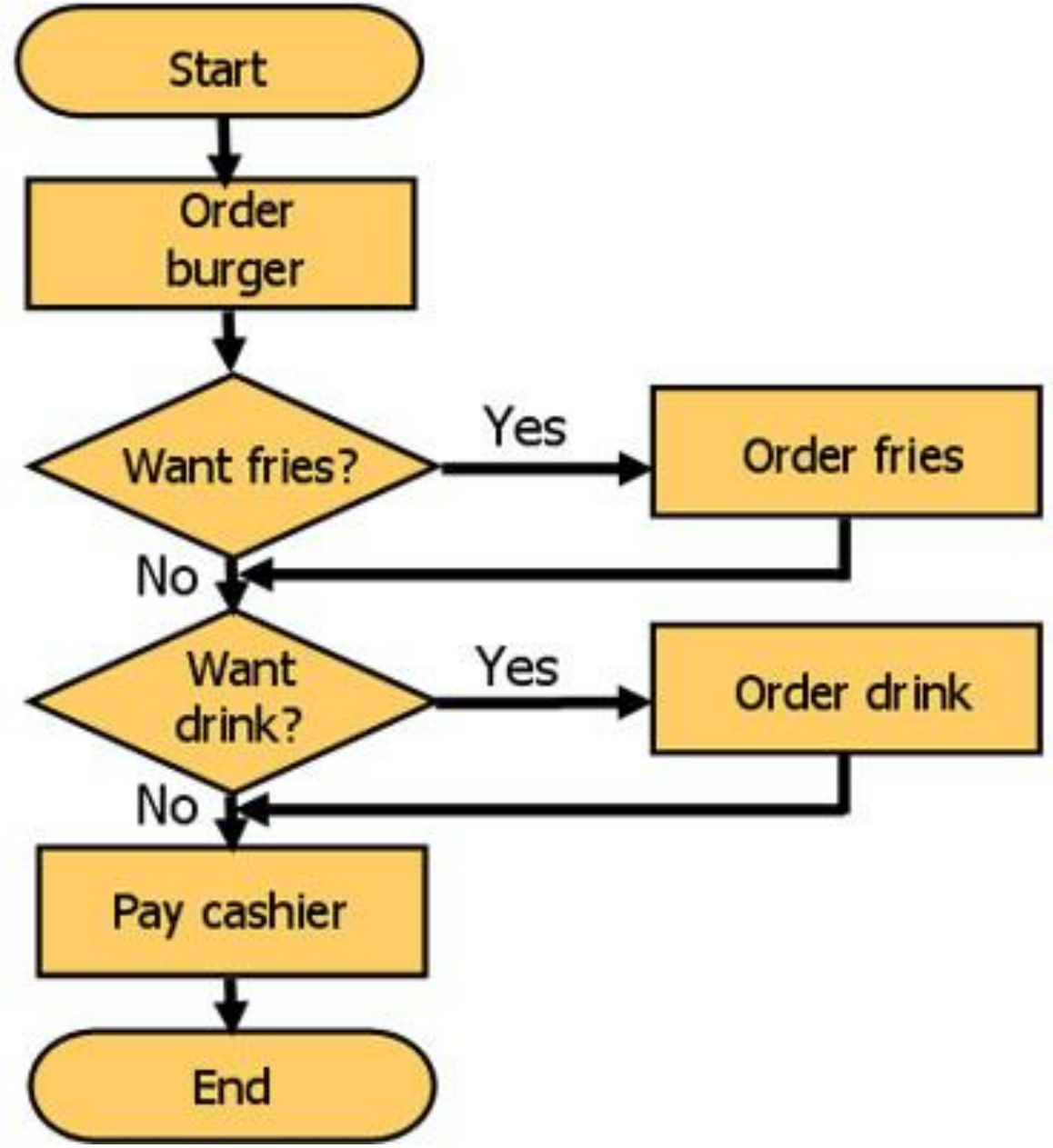


new

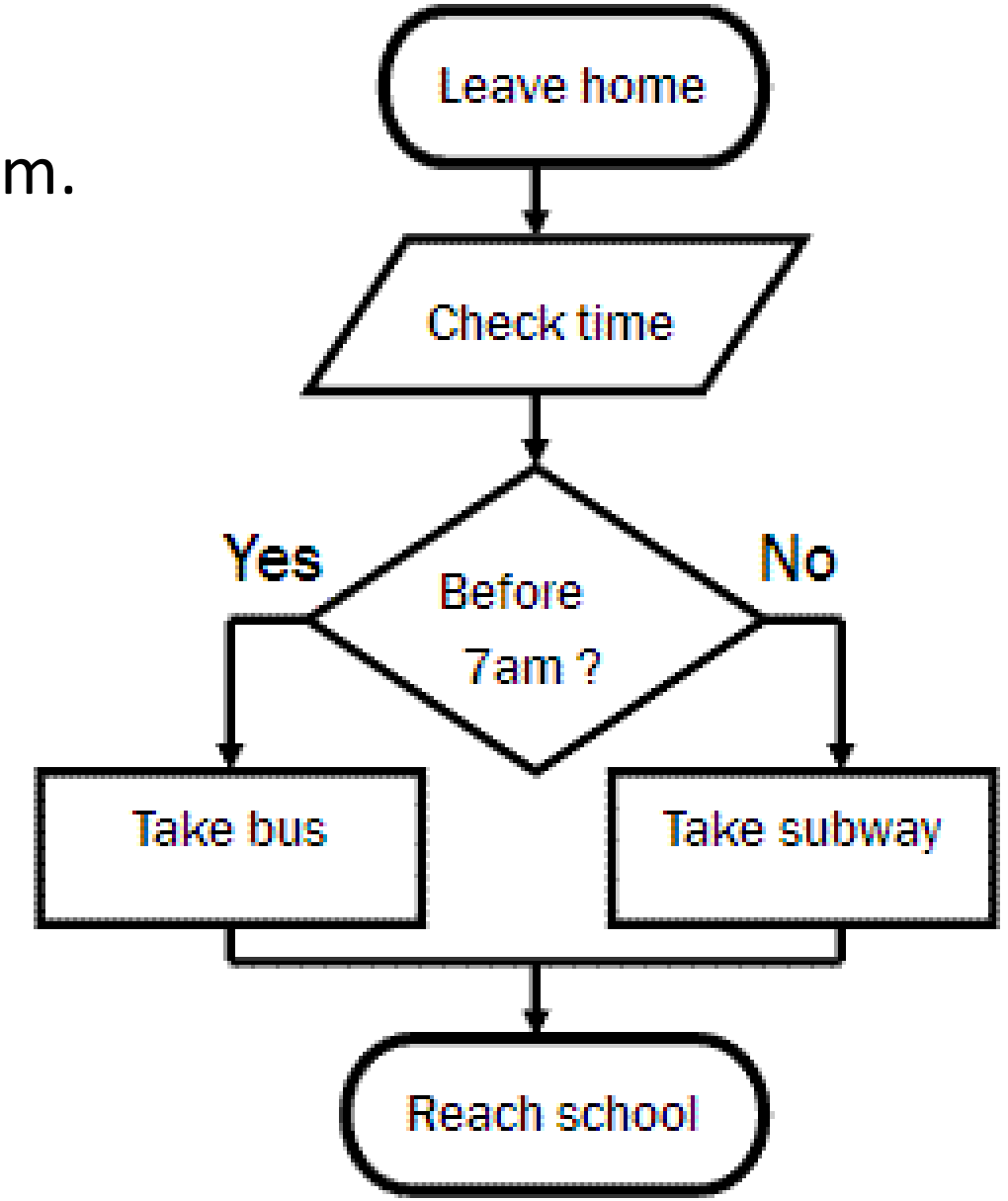


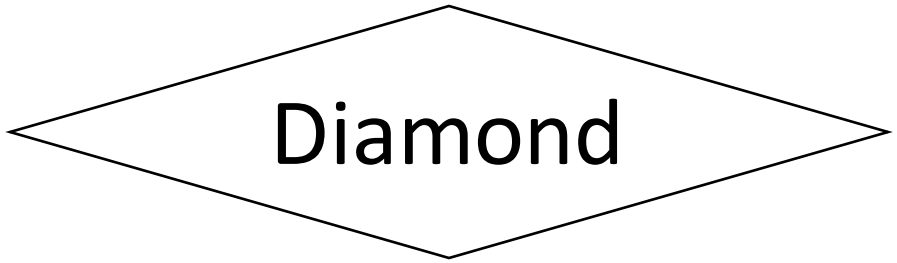
Today, we have a new shape.

Diamonds allow choice and decisions, sort of like this informal diagram.

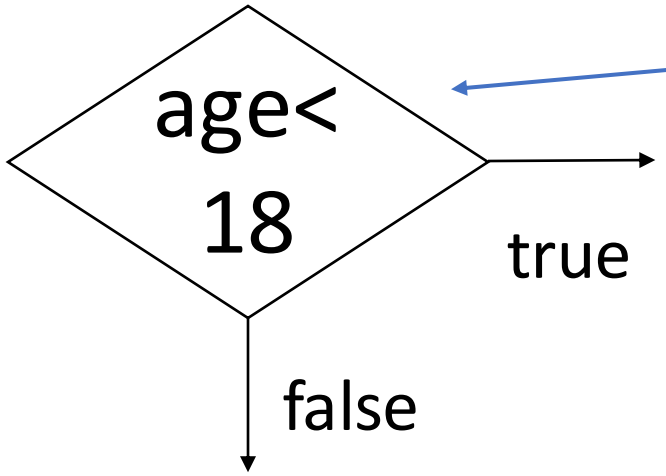


Two lines come out of them.
No more, no less.





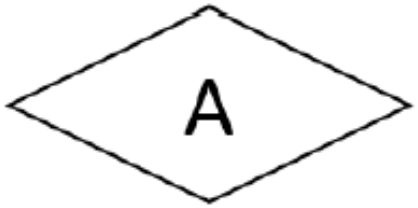
Boolean Expression

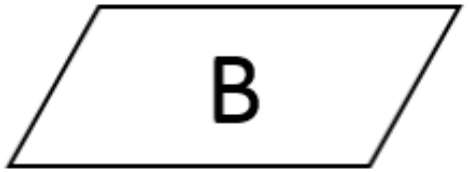



```
int Age = IO.inputInt ("Enter your age: ");
if(Age< 18){
  int YrsToVote = 18 - Age;
  System.out.println("Wait " + YrsToVote);
}
```

- Used for Boolean Expressions.
- Exactly 2 arrows come out of them. One is labelled true and one is labelled false.

1. What is each flow chart shape used for?



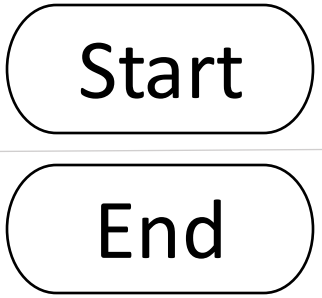


Boolean Expression	Input	Output	Terminal	Process
- just write in the Boolean expression. - don't write the if or the else.	- for IO input lines. - just write GET and the variable name	- for System.out. println lines - just write what is in brackets ()	- holds Start or End - only 1 of each	- for math lines - leave off the variable type, eg int, double

Flowchart Summary

Terminal

```
public Farmer() {
}
```

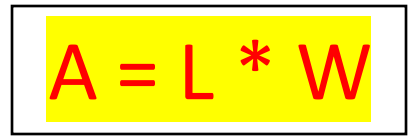


Input

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

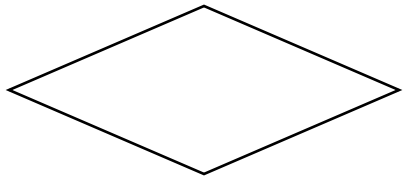
Process

```
double A = L * W;
```



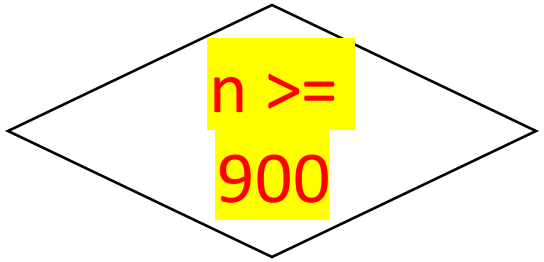
Output

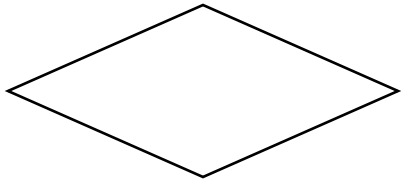
```
System.out.println("Hi"+n);
```



Boolean Expressions

```
if (n >= 900)
```



Shape	Formal: informal
	Terminal: start, end
	Input/Output: IO keyboard input
	Process: calculations
	Display: output
	Decision: Boolean expression

new

Rules

There is only one start and one end.

Arrows connect the pieces.

Flow is up to down or left to right.

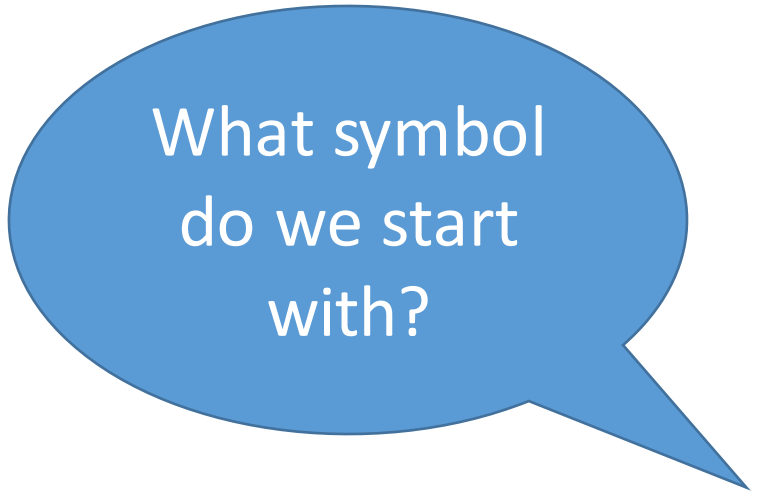
Lines do not cross.

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.

An Example.

```
char ans = IO.inputChar ("T/F: 110 in binary is 6> ");
if (ans == 't' || ans == 'T')
    System.out.println ("Correct!");
else
    System.out.println ("Wrong.");
```



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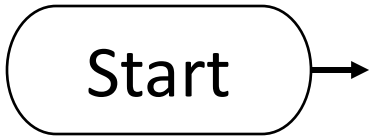
```

How should we handle this line?



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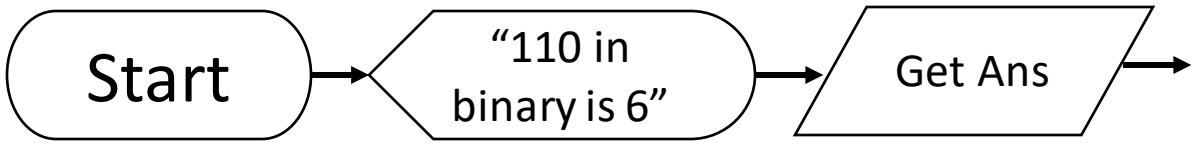

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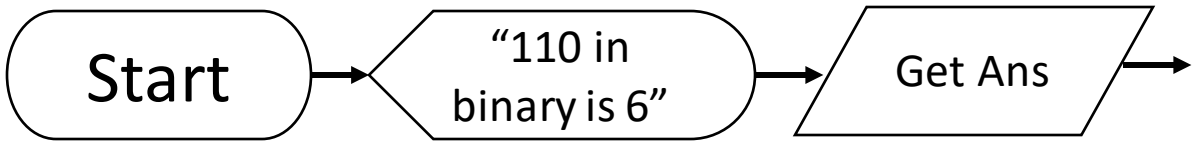
How about this line?



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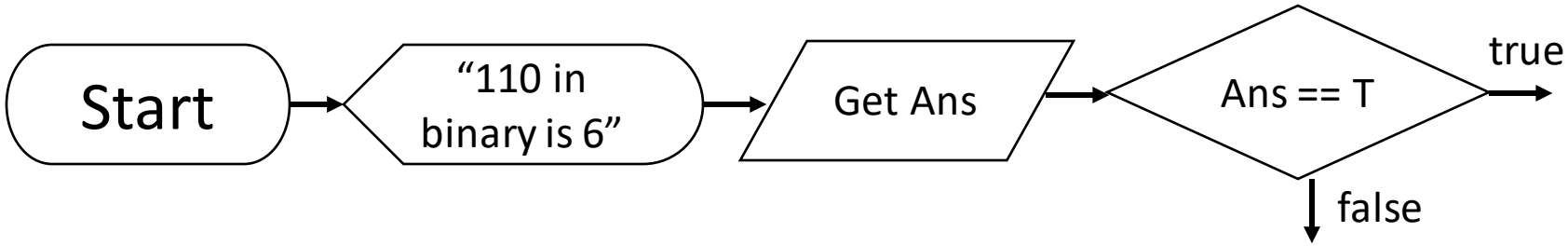

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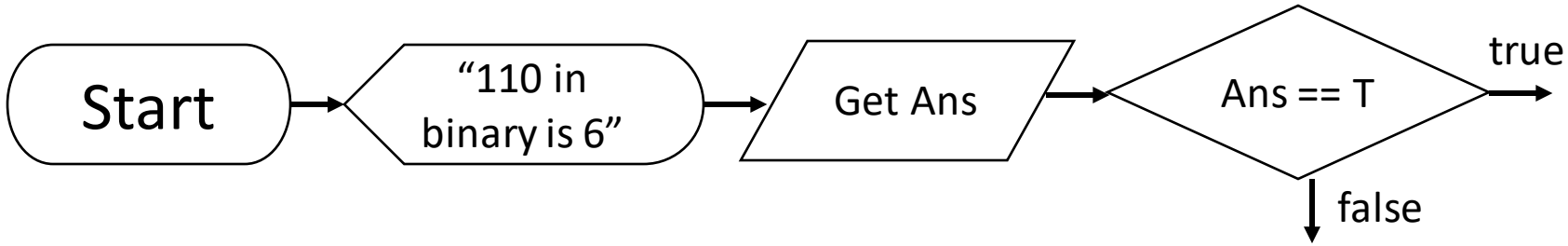
What shape is needed here?



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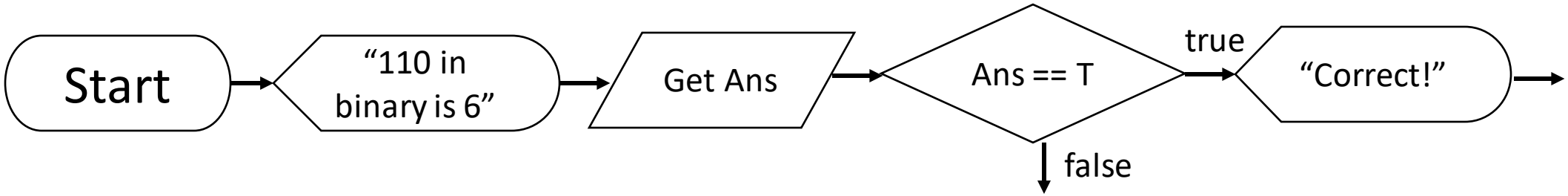

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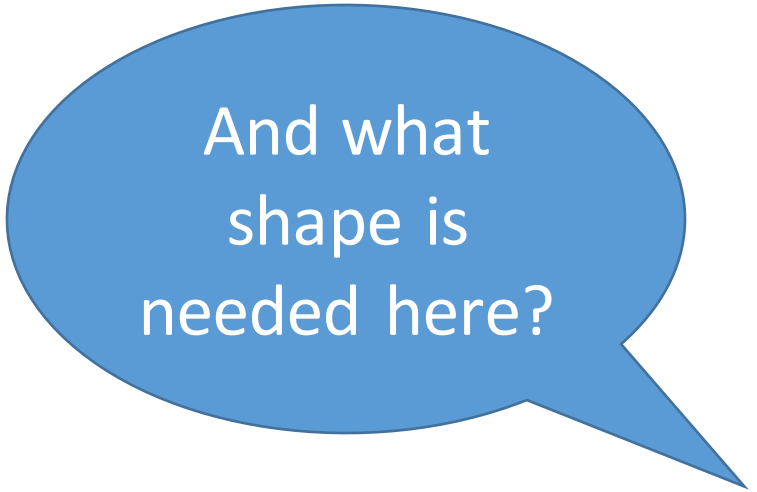

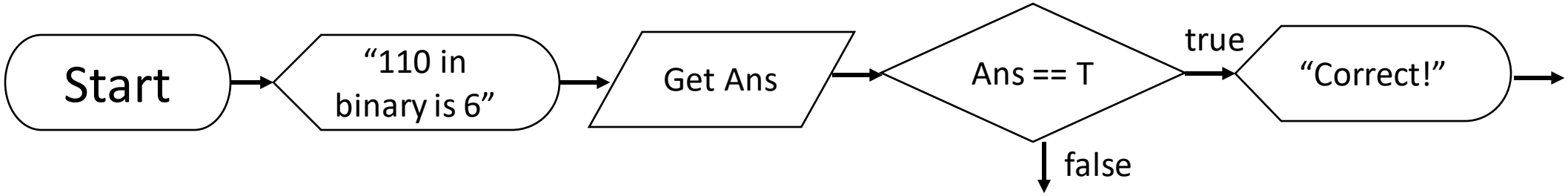

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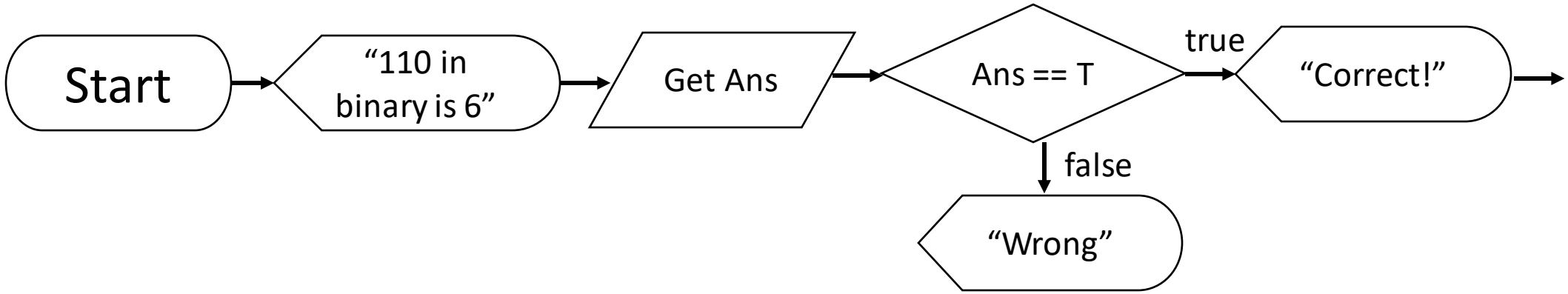
How do we end it?



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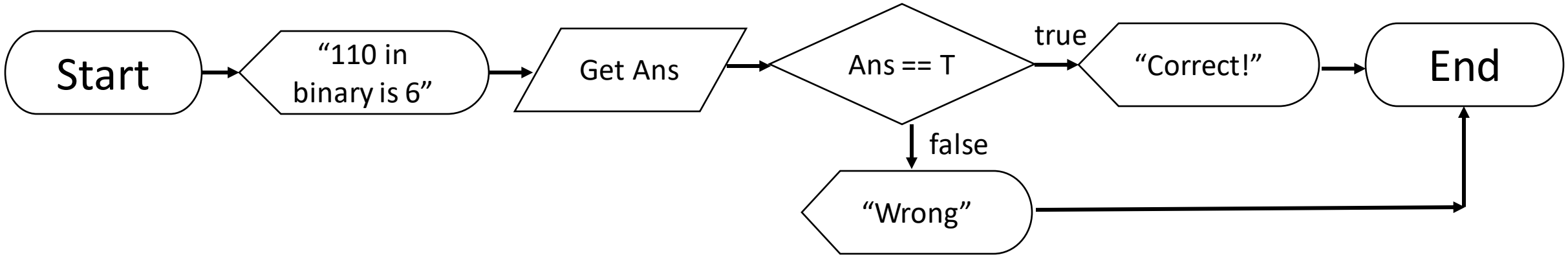
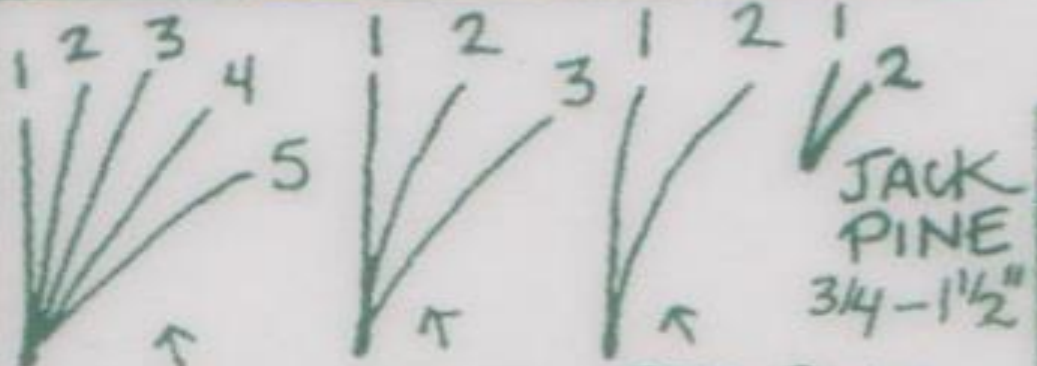


CONIFEROUS (Trees with needles)

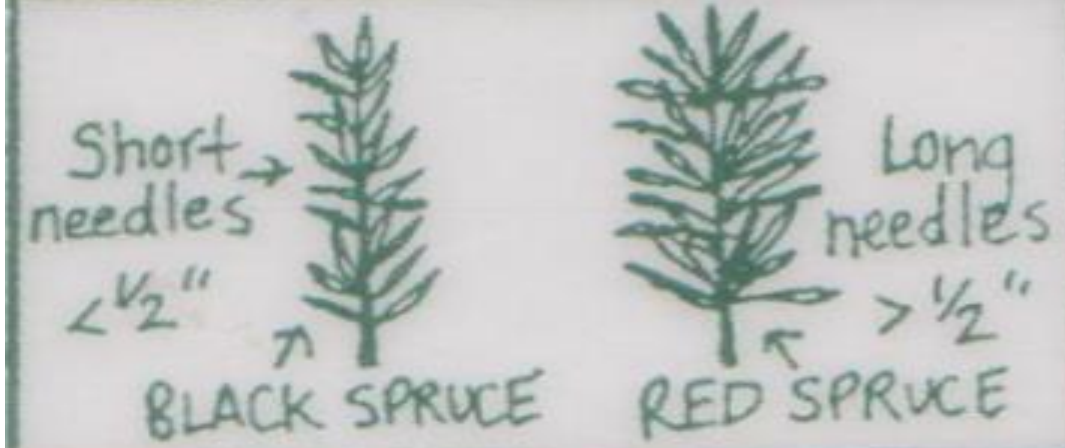
NEEDLES IN CLUSTERS



Many needles per cluster ← TAMARACK

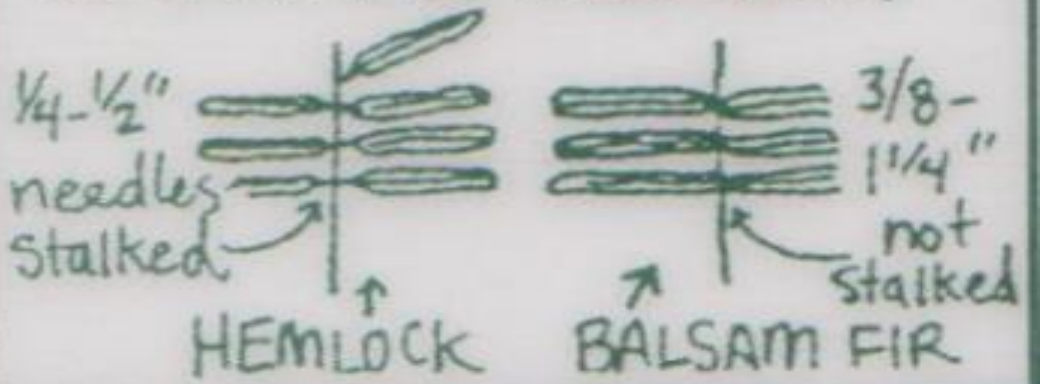
SCALE LIKE NEEDLES

SQUARE, SHARP NEEDLES



FLAT, BLUNT NEEDLES

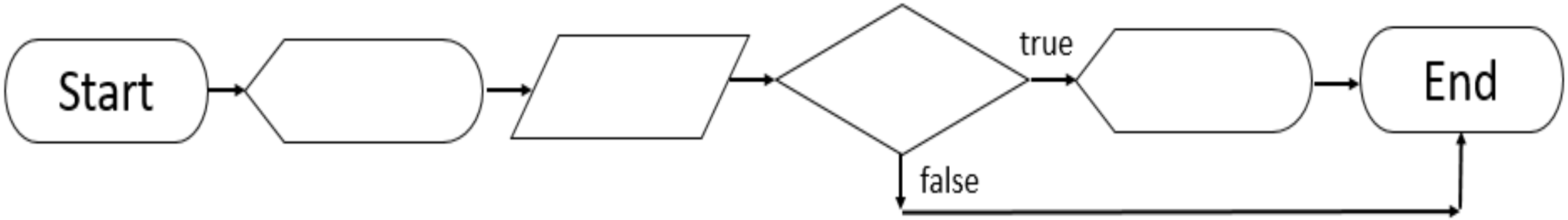
(2 white lines underneath)



Matching

Write the line number in the flow chart shape

```
1  System.out.println ("Tree Classification");
2  char needles = IO.inputChar ("Needles? (y/n) ");
3  if (needles == 'y')
4      System.out.println ("Coniferous");
```



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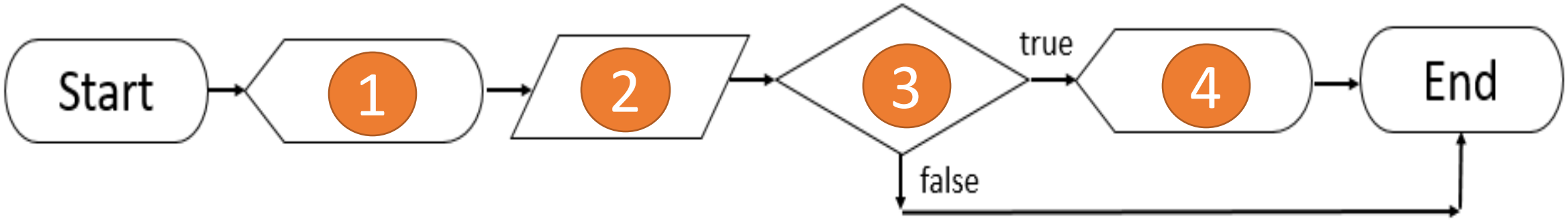
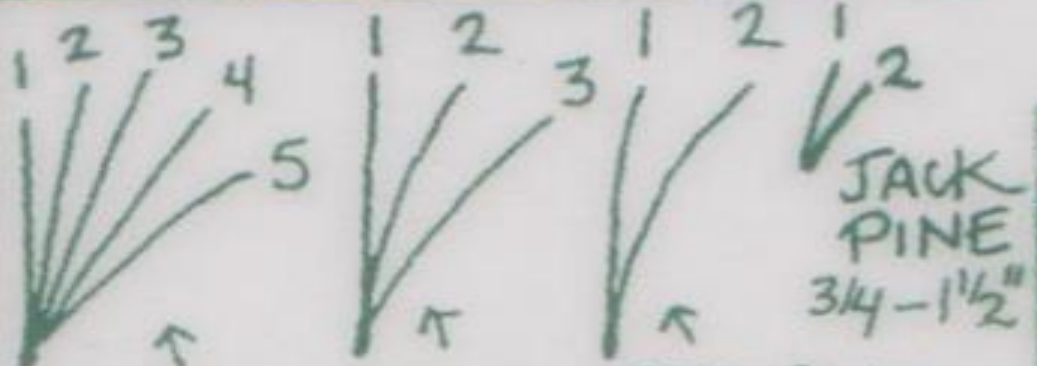


CONIFEROUS (Trees with needles)

NEEDLES IN CLUSTERS



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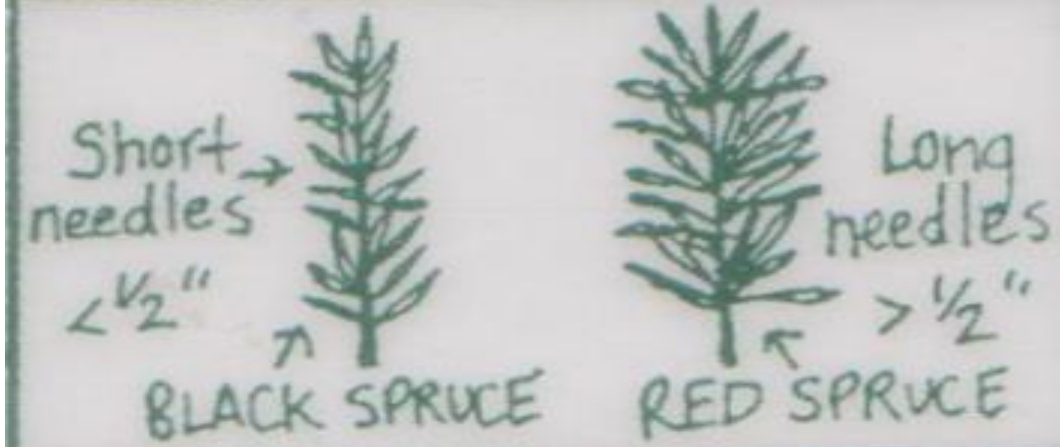
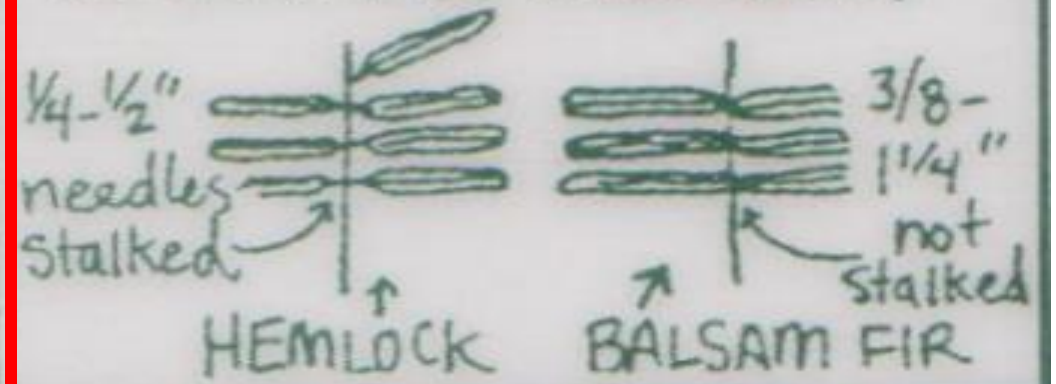
SCALELIKE NEEDLES

SQUARE, SHARP NEEDLES



FLAT, BLUNT NEEDLES

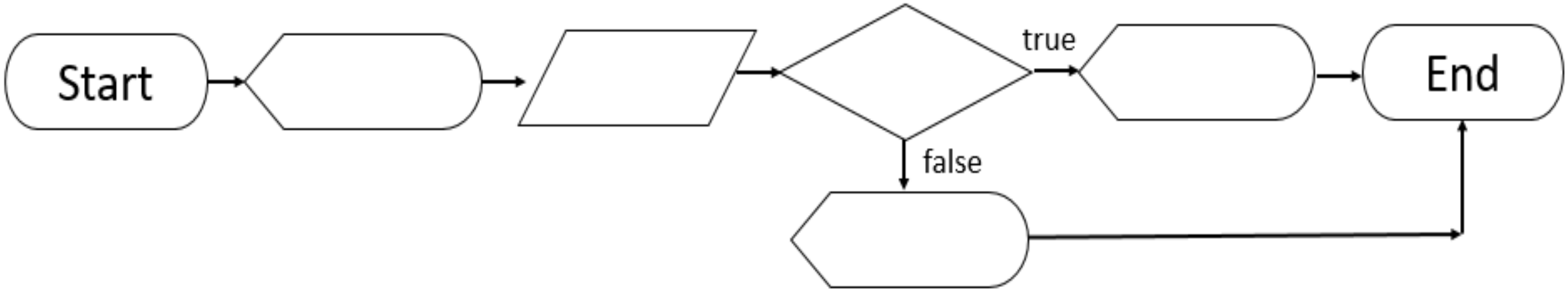
(2 white lines underneath)



Matching

Write the line number in the flow chart shape

```
1   System.out.println ("Square Sharp Needles");
2   char length = IO.inputChar ("Short Needles? (y/n) ");
3   if (length == 'y')
4       System.out.println ("Black Spruce");
5   else
6       System.out.println ("Red Spruce");
```



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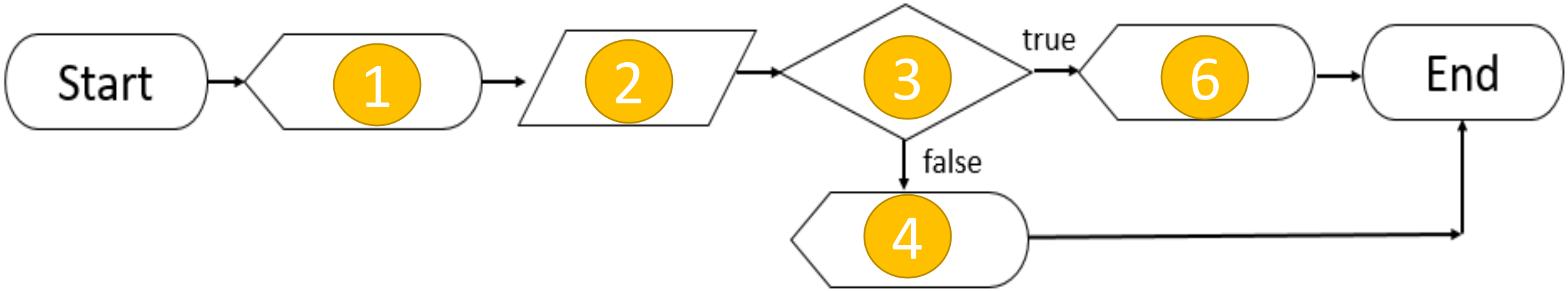

If, then else example…
Lots of Boolean expressions!

```
System.out.println ("T R U F F L E S");
System.out.println ("(c) caramel");
System.out.println ("(r) orange flavoured");
System.out.println ("(d) dark chocolate");
System.out.println ("(m) milk chocolate");
char type = IO.inputChar ("What type of truffle would you like? (c/r/d/m)    ");
if (type == 'm')
    System.out.println("$0.95");
else if (type == 'd')
    System.out.println("$0.85");
else if (type == 'r')
    System.out.println("$0.65");
else
    System.out.println("$0.45");
```

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System.out.println ("T R U F F L E S");
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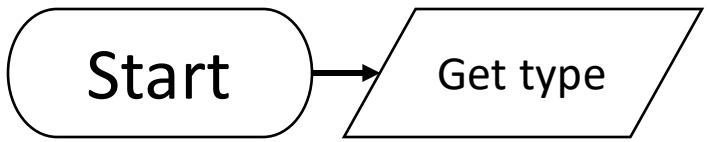

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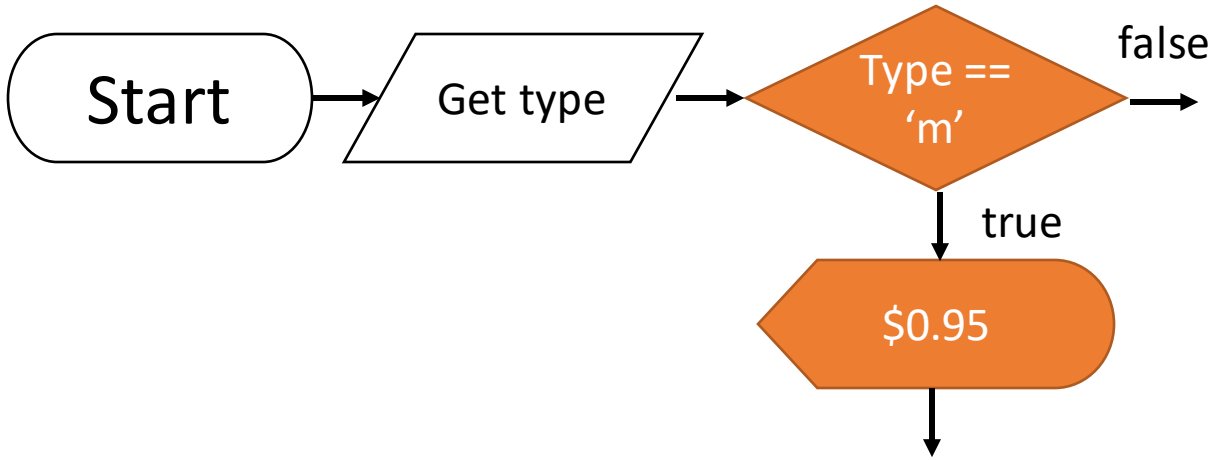

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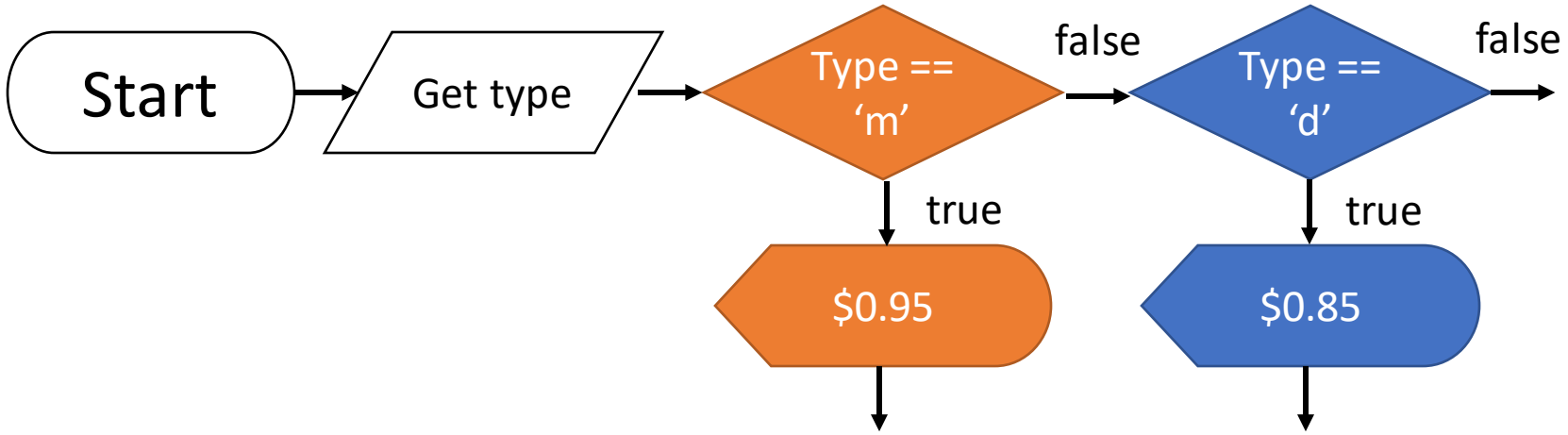
Draw in the next shapes.



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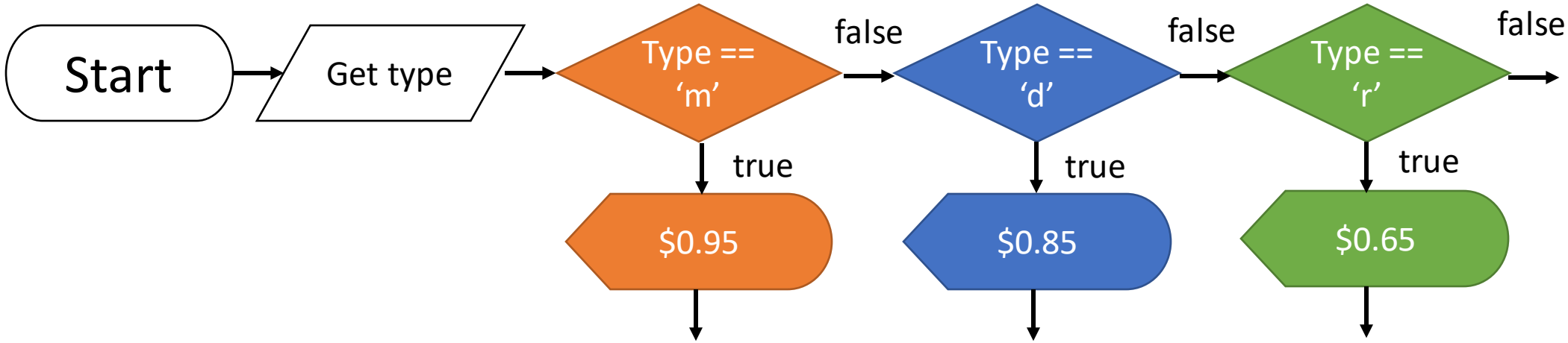

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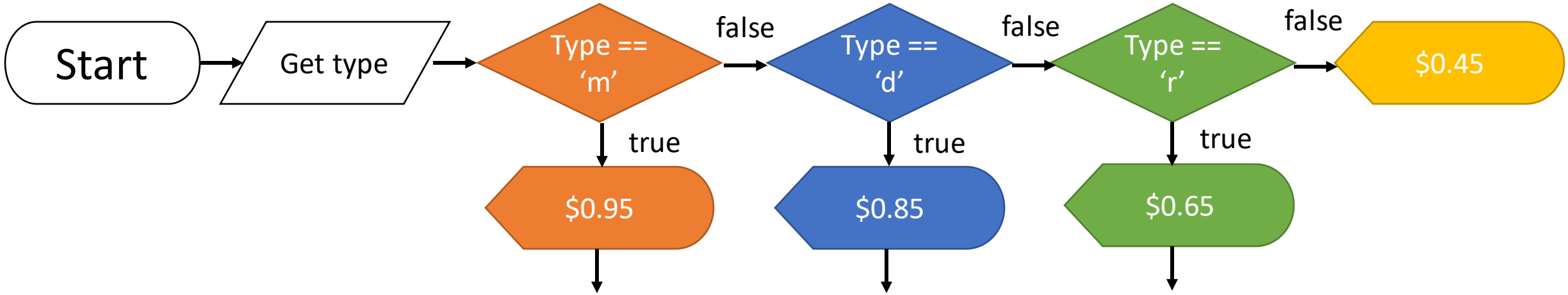
System.out.println ("(c) caramel");
System.out.println ("(r) orange flavoured");
System.out.println ("(d) dark chocolate");
System.out.println ("(m) milk chocolate");
char type = IO.inputChar ("What type of truffle would you like? (c/r/d/m)    ");
if (type == 'm')
    System.out.println("$0.95");
else if (type == 'd')
    System.out.println("$0.85");
else if (type == 'r')
    System.out.println("$0.65");
else
    System.out.println("$0.45");
```

Finish it off.



```
System.out.println ("T R U F F L E S");
System.out.println ("(c) caramel");
System.out.println ("(r) orange flavoured");
System.out.println ("(d) dark chocolate");
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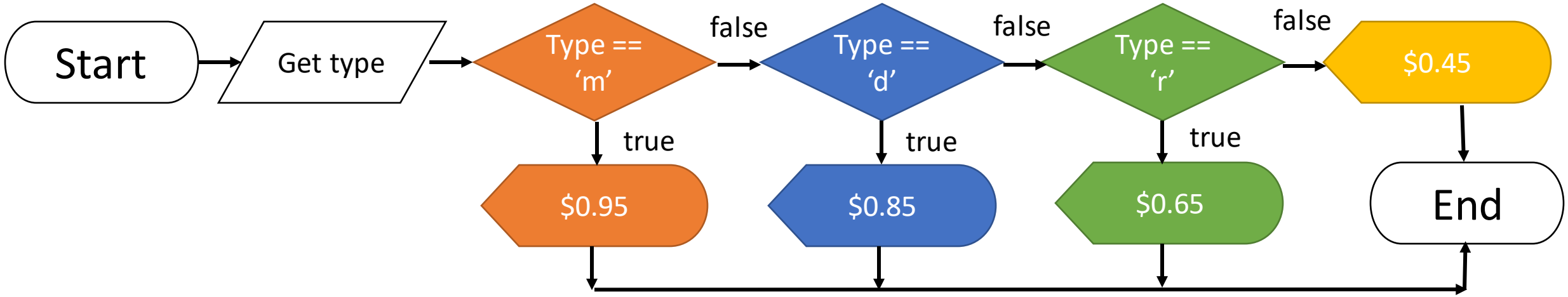
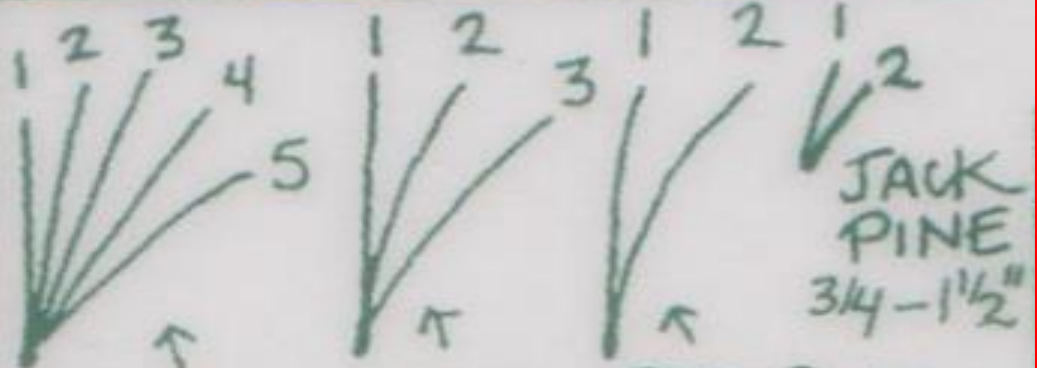


CONIFEROUS (Trees with needles)

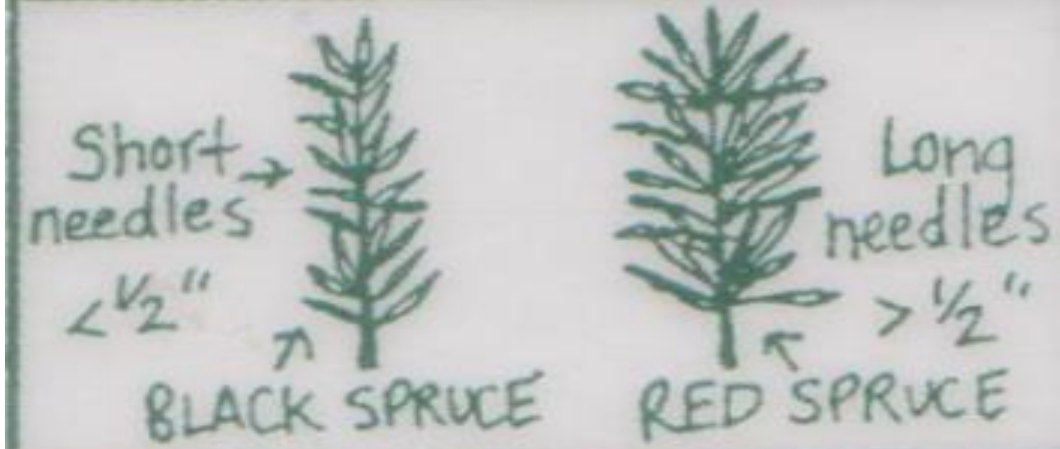
NEEDLES IN CLUSTERS



Many needles per cluster → TAMARACK

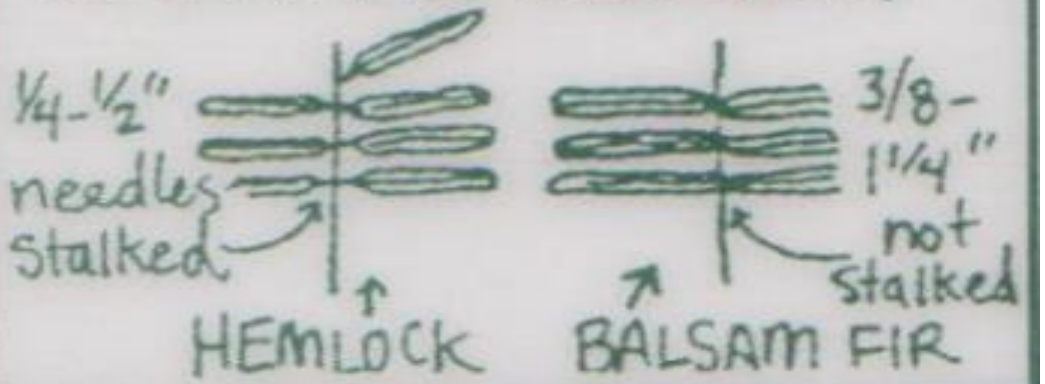
SCALELIKE NEEDLES

SQUARE, SHARP NEEDLES



FLAT, BLUNT NEEDLES

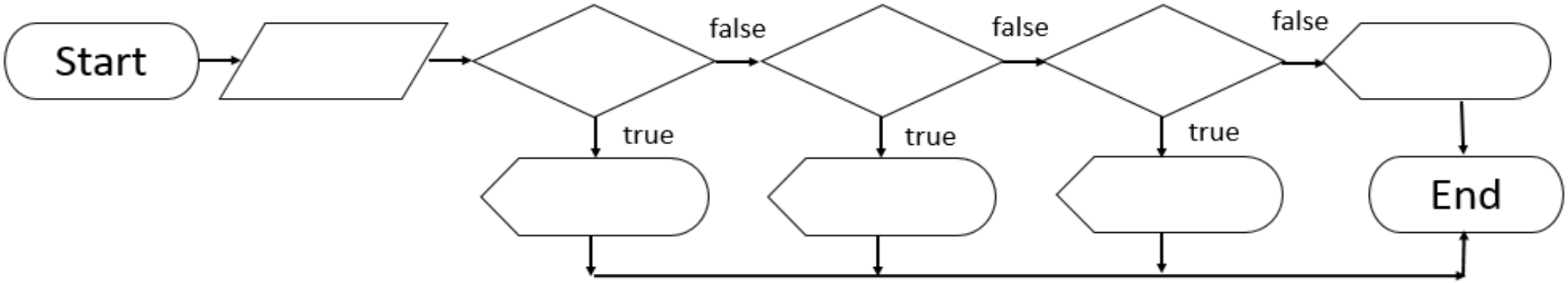
(2 white lines underneath)



Matching

Write the line number in the flow chart shape

```
1  int num = IO.inputInt ("# Needles? ");
2  if (num == 5)
3      System.out.println ("White Pine");
4  else if (num == 3)
5      System.out.println ("Pitch Pine");
6  else if (num == 2)
7      System.out.println ("Red Pine");
8  else
9      System.out.println ("Tamarack");
```



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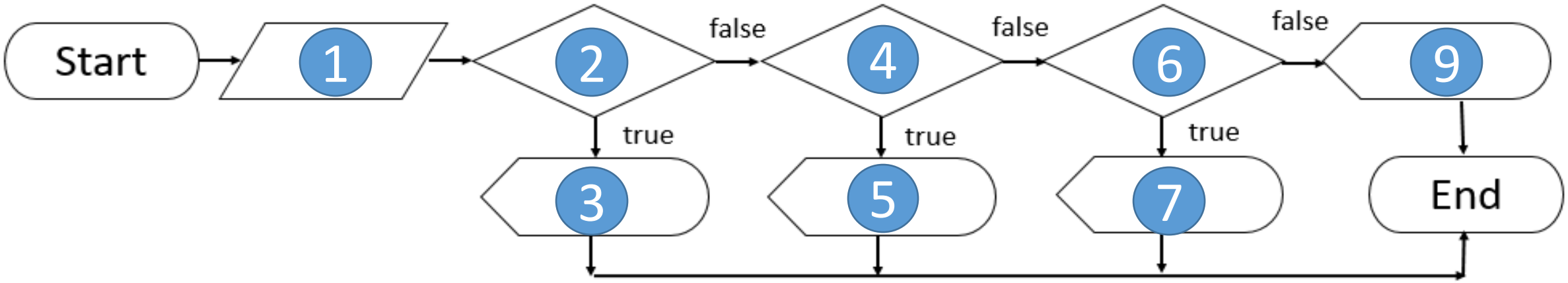
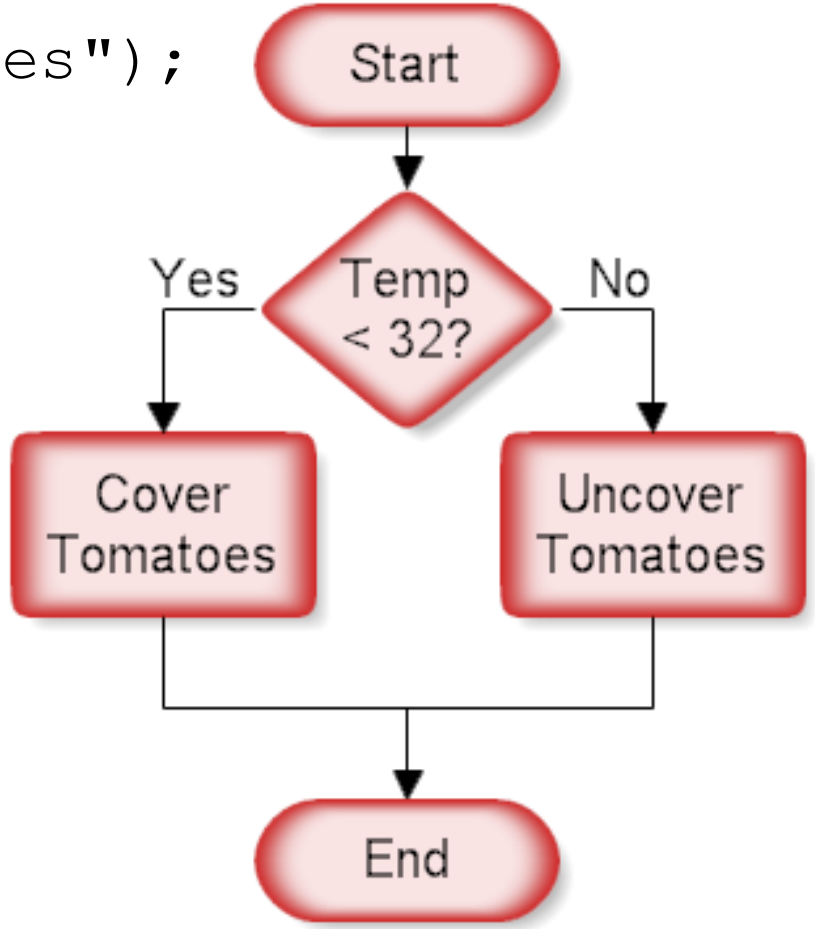


Finding Errors.

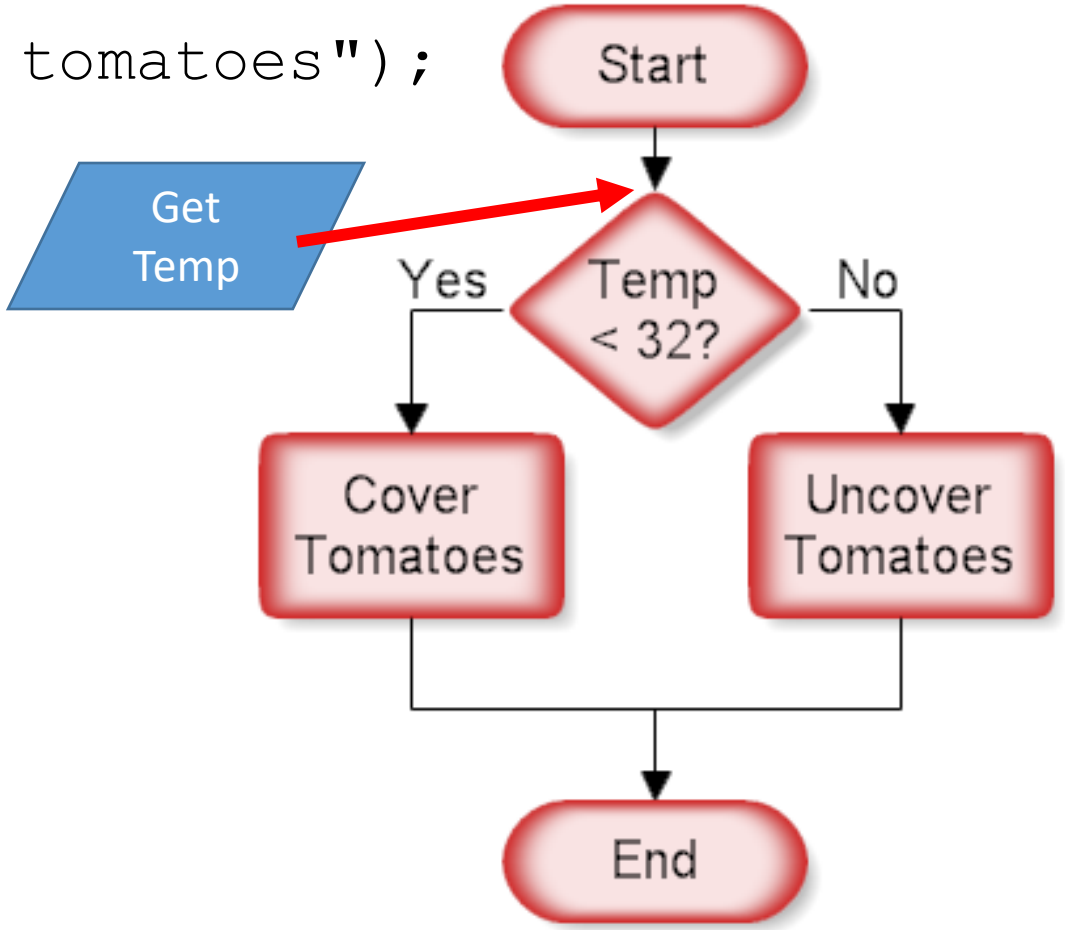
```
public tomatoes ()
{
    int temp = IO.inputInt ("Temperature? ");
    if (temp < 32)
        System.out.println ("Cover tomatoes");
    else
        System.out.println ("Uncover tomatoes");
}
```

What's missing from the code in the flow chart?

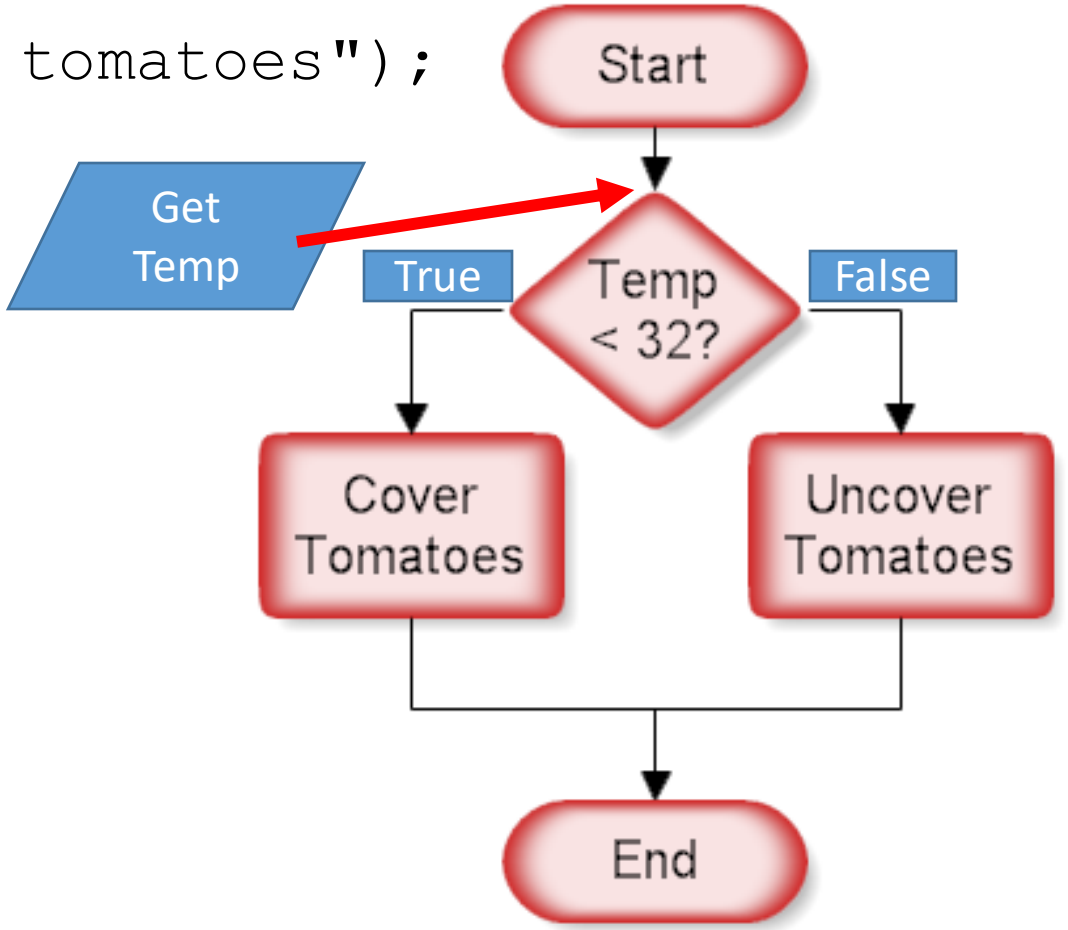


```
public tomatoes ()
{
    int temp = IO.inputInt (“Temperature? ");
    if (temp < 32)
        System.out.println ("Cover tomatoes");
    else
        System.out.println ("Uncover tomatoes");
}
```

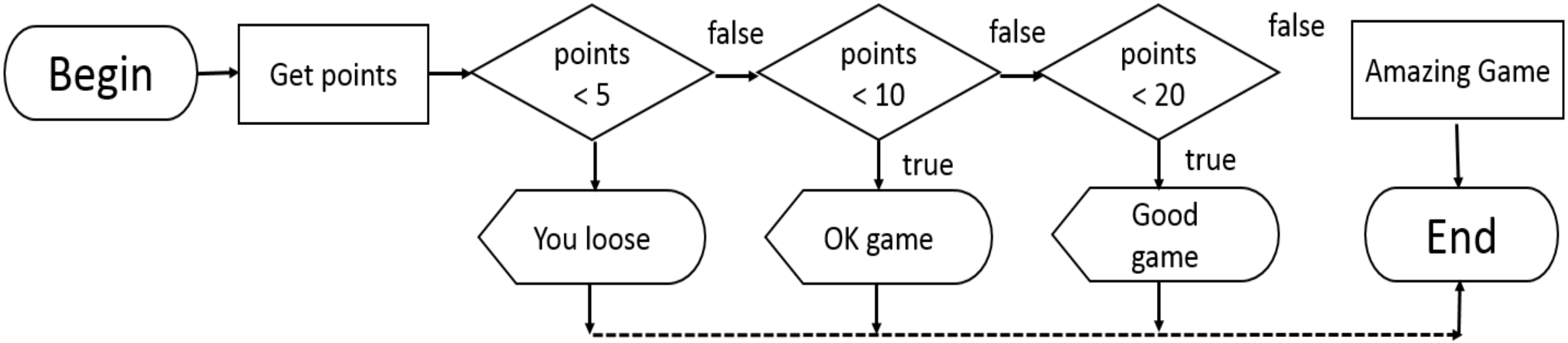
There is another error. What is it?



```
public tomatoes ()
{
    int temp = IO.inputInt (“Temperature? ");
    if (temp < 32)
        System.out.println ("Cover tomatoes");
    else
        System.out.println ("Uncover tomatoes");
}
```



Circle and correct 5 errors on this flowchart.



Circle and correct 5 errors on this flowchart.