Decision Statements

aka If Statements

Decision Statements

- Are a form of control statements
- They control which code is run at which times
- In java, the most common form is an if structure.

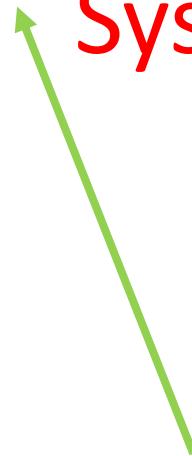```
int lvl = IO.inputInt ("Level? ");

if (lvl >= 2)
    System.out.println ("Pass");
```

```
int lvl = IO.inputInt ("Level? ");

if (lvl >= 2)
    System.out.println ("Pass");
```

Keyword for an if…

```
int lvl = IO.inputInt ("Level? ");

if (lvl >= 2)
    System.out.println ("Pass");
```

Boolean Expression
If true, the statement runs.

Keyword for an if…

```
int lvl = IO.inputInt ("Level? ");

if (lvl >= 2)
    System.out.println ("Pass");
```

Boolean
Expression
If true, the
statement runs.

Code to run if true

Keyword for an if...

```
int lvl = IO.inputInt ("Level? ");

if (lvl >= 2)
    System.out.println ("Pass");
else
    System.out.println ("Fail");
```

Default = else.
If not the first one, then run this one.

```
int lvl = IO.inputInt ("Level? ");

if (lvl >= 2)
    System.out.println ("Pass");
else
    System.out.println ("Fail");
```

lvl	Printed?
7	

```
int lvl = IO.inputInt ("Level? ");

if (lvl >= 2)
    System.out.println ("Pass");
else
    System.out.println ("Fail");
```

lvl	Printed?
7	Pass
1	

```java
int lvl = IO.inputInt ("Level? ");

if (lvl >= 2)
    System.out.println ("Pass");
else
    System.out.println ("Fail");
```

lvl	Printed?
7	Pass
1	Fail
2	

An If/Else Statement

```
int lvl = IO.inputInt ("Level? ");

if (lvl >= 2)
    System.out.println ("Pass");
else
    System.out.println ("Fail");
```

lvl	Printed?
7	Pass
1	Fail
2	Pass
-3	

```
int lvl = IO.inputInt ("Level? ");

if (lvl >= 2)
    System.out.println ("Pass");
else
    System.out.println ("Fail");
```

lvl	Printed?
7	Pass
1	Fail
2	Pass
-3	Fail
81	

An If/Else Statement

```
int lvl = IO.inputInt ("Level? ");

if (lvl >= 2)
    System.out.println ("Pass");
else
    System.out.println ("Fail");
```

lvl	Printed?
7	Pass
1	Fail
2	Pass
-3	Fail
81	Pass

If/Else if/Else

```
int lvl = IO.inputInt ("Level? ");
if (lvl == 7)
    System.out.println ("Outstanding");
else if (lvl >= 5)
    System.out.println ("Great work!");
else if (lvl >= 3)
    System.out.println ("Satisfactory");
else
    System.out.println ("Come for extra help");
```

In an if/else if structure, the FIRST true statement is run and then it skips to the end.

Nothing else is run once one is true.

If/Else if/Else

```
int lvl = IO.inputInt ("Level? ");
if (lvl == 7)
    System.out.println ("Outstanding");
else if (lvl >= 5)
    System.out.println ("Great work!");
else if (lvl >= 3)
    System.out.println ("Satisfactory");
else
    System.out.println ("Come for extra help");
```

lvl	Printed?
7	

If/Else if/Else

```java
int lvl = IO.inputInt ("Level? ");
if (lvl == 7)
    System.out.println ("Outstanding");
else if (lvl >= 5)
    System.out.println ("Great work!");
else if (lvl >= 3)
    System.out.println ("Satisfactory");
else
    System.out.println ("Come for extra help");
```

lvl	Printed?
7	Outstanding
6	

If/Else if/Else

```
int lvl = IO.inputInt ("Level? ");
if (lvl == 7)
    System.out.println ("Outstanding");
else if (lvl >= 5)
    System.out.println ("Great work!");
else if (lvl >= 3)
    System.out.println ("Satisfactory");
else
    System.out.println ("Come for extra help");
```

lvl	Printed?
7	Outstanding
6	Great Work!
5	

If/Else if/Else

```
int lvl = IO.inputInt ("Level? ");
if (lvl == 7)
    System.out.println ("Outstanding");
else if (lvl >= 5)
    System.out.println ("Great work!");
else if (lvl >= 3)
    System.out.println ("Satisfactory");
else
    System.out.println ("Come for extra help");
```

lvl	Printed?
7	Outstanding
6	Great Work!
5	Great Work!
4	

If/Else if/Else

```java
int lvl = IO.inputInt ("Level? ");
if (lvl == 7)
    System.out.println ("Outstanding");
else if (lvl >= 5)
    System.out.println ("Great work!");
else if (lvl >= 3)
    System.out.println ("Satisfactory");
else
    System.out.println ("Come for extra help");
```

lvl	Printed?
7	Outstanding
6	Great Work!
5	Great Work!
4	Satisfactory
3	

If/Else if/Else

```java
int lvl = IO.inputInt ("Level? ");
if (lvl == 7)
    System.out.println ("Outstanding");
else if (lvl >= 5)
    System.out.println ("Great work!");
else if (lvl >= 3)
    System.out.println ("Satisfactory");
else
    System.out.println ("Come for extra help");
```

lvl	Printed?
7	Outstanding
6	Great Work!
5	Great Work!
4	Satisfactory
3	Satisfactory
2	

If/Else if/Else

```
int lvl = IO.inputInt ("Level? ");
if (lvl == 7)
    System.out.println ("Outstanding");
else if (lvl >= 5)
    System.out.println ("Great work!");
else if (lvl >= 3)
    System.out.println ("Satisfactory");
else
    System.out.println ("Come for extra help");
```

lvl	Printed?
7	Outstanding
6	Great Work!
5	Great Work!
4	Satisfactory
3	Satisfactory
2	Come for extra help
-45	

If/Else if/Else

```
int lvl = IO.inputInt ("Level? ");
if (lvl == 7)
    System.out.println ("Outstanding");
else if (lvl >= 5)
    System.out.println ("Great work!");
else if (lvl >= 3)
    System.out.println ("Satisfactory");
else
    System.out.println ("Come for extra help");
```

lvl	Printed?
7	Outstanding
6	Great Work!
5	Great Work!
4	Satisfactory
3	Satisfactory
2	Come for extra help
-45	Come for extra help
90	

If/Else if/Else

```
int lvl = IO.inputInt ("Level? ");
if (lvl == 7)   ❌
    System.out.println ("Outstanding");
else if (lvl >= 5)
    System.out.println ("Great work!");
else if (lvl >= 3)
    System.out.println ("Satisfactory");
else
    System.out.println ("Come for extra help");
```

lvl	Printed?
7	Outstanding
6	Great Work!
5	Great Work!
4	Satisfactory
3	Satisfactory
2	Come for extra help
-45	Come for extra help
90	Great Work!

```
int lvl = IO.inputInt ("Level? ");
if (lvl == 7)
{
    System.out.println ("Outstanding");
    System.out.println ("Top level in class");
}
else if (lvl >= 5)
    System.out.println ("Great work!");
else if (lvl >= 3)
    System.out.println ("Satisfactory");
else
{
    System.out.println ("Come for extra help");
    System.out.println ("Review study techniques.");
}
```

Multi-line ifs require {} to set up a region of code.

Tracing

```
int x = IO.inputInt ("X? ");
if (x == 6)
    System.out.println ("turtle");
else if (x > 4)
    System.out.println ("fish");
else if (x > 2)
    System.out.println ("snail");
else
    System.out.println ("pineapple");
```

x	Printed?
6	

Tracing

```
int x = IO.inputInt ("X? ");
if (x == 6)
    System.out.println ("turtle");
else if (x > 4)
    System.out.println ("fish");
else if (x > 2)
    System.out.println ("snail");
else
    System.out.println ("pineapple");
```

x	Printed?
6	turtle
5	

```
int x = IO.inputInt ("X? ");
if (x == 6)
    System.out.println ("turtle");
else if (x > 4)
    System.out.println ("fish");
else if (x > 2)
    System.out.println ("snail");
else
    System.out.println ("pineapple");
```

x	Printed?
6	turtle
5	fish
7	

Tracing

```
int x = IO.inputInt ("X? ");
if (x == 6)
    System.out.println ("turtle");
else if (x > 4)
    System.out.println ("fish");
else if (x > 2)
    System.out.println ("snail");
else
    System.out.println ("pineapple");
```

x	Printed?
6	turtle
5	fish
7	fish
3	

```
int x = IO.inputInt ("X? ");
if (x == 6)
    System.out.println ("turtle");
else if (x > 4)
    System.out.println ("fish");
else if (x > 2)
    System.out.println ("snail");
else
    System.out.println ("pineapple");
```

x	Printed?
6	turtle
5	fish
7	fish
3	snail
4	

```
int x = IO.inputInt ("X? ");
if (x == 6)
    System.out.println ("turtle");
else if (x > 4)
    System.out.println ("fish");
else if (x > 2)
    System.out.println ("snail");
else
    System.out.println ("pineapple");
```

x	Printed?
6	turtle
5	fish
7	fish
3	snail
4	snail
2	

```
int x = IO.inputInt ("X? ");
if (x == 6)
    System.out.println ("turtle");
else if (x > 4)
    System.out.println ("fish");
else if (x > 2)
    System.out.println ("snail");
else
    System.out.println ("pineapple");
```

x	Printed?
6	turtle
5	fish
7	fish
3	snail
4	snail
2	pineapple
-1	

Tracing

```
int x = IO.inputInt ("X? ");
if (x == 6)
    System.out.println ("turtle");
else if (x > 4)
    System.out.println ("fish");
else if (x > 2)
    System.out.println ("snail");
else
    System.out.println ("pineapple");
```

x	Printed?
6	turtle
5	fish
7	fish
3	snail
4	snail
2	pineapple
-1	pineapple
90	

Tracing

```
int x = IO.inputInt ("X? ");
if (x == 6)
    System.out.println ("turtle");
else if (x > 4)
    System.out.println ("fish");
else if (x > 2)
    System.out.println ("snail");
else
    System.out.println ("pineapple");
```

x	Printed?
6	turtle
5	fish
7	fish
3	snail
4	snail
2	pineapple
-1	pineapple
90	fish

```
int y = IO.inputInt ("Y? ");
if (y >= 8)
    System.out.print ("A");
else if (y <= 15)
    System.out.print ("B");
if (y >= 10)
    System.out.print ("C");
else if (y >= 5)
    System.out.print ("D");
else
    System.out.print ("E");
```

y	Printed?
9	

Tracing

```
int y = IO.inputInt ("Y? ");
if (y >= 8)
    System.out.print ("A");
else if (y <= 15)
    System.out.print ("B");
if (y >= 10)
    System.out.print ("C");
else if (y >= 5)
    System.out.print ("D");
else
    System.out.print ("E");
```

y	Printed?
9	AD

Tracing

```
int y = IO.inputInt ("Y? ");
if (y >= 8)
    System.out.print ("A");
else if (y <= 15)
    System.out.print ("B");
if (y >= 10)
    System.out.print ("C");
else if (y >= 5)
    System.out.print ("D");
else
    System.out.print ("E");
```

y	Printed?
9	AD
8	

Tracing

```
int y = IO.inputInt ("Y? ");
if (y >= 8)
    System.out.print ("A");
else if (y <= 15)
    System.out.print ("B");
if (y >= 10)
    System.out.print ("C");
else if (y >= 5)
    System.out.print ("D");
else
    System.out.print ("E");
```

y	Printed?
9	AD
8	AD
16	

Tracing

```
int y = IO.inputInt ("Y? ");
if (y >= 8)
    System.out.print ("A");
else if (y <= 15)
    System.out.print ("B");
if (y >= 10)
    System.out.print ("C");
else if (y >= 5)
    System.out.print ("D");
else
    System.out.print ("E");
```

y	Printed?
9	AD
8	AD
16	AC
15	

Tracing

```
int y = IO.inputInt ("Y? ");
if (y >= 8)
    System.out.print ("A");
else if (y <= 15)
    System.out.print ("B");
if (y >= 10)
    System.out.print ("C");
else if (y >= 5)
    System.out.print ("D");
else
    System.out.print ("E");
```

y	Printed?
9	AD
8	AD
16	AC
15	AC
10	

Tracing

```
int y = IO.inputInt ("Y? ");
if (y >= 8)
    System.out.print ("A");
else if (y <= 15)
    System.out.print ("B");
if (y >= 10)
    System.out.print ("C");
else if (y >= 5)
    System.out.print ("D");
else
    System.out.print ("E");
```

y	Printed?
9	AD
8	AD
16	AC
15	AC
10	AC
5	

Tracing

```
int y = IO.inputInt ("Y? ");
if (y >= 8)
    System.out.print ("A");
else if (y <= 15)
    System.out.print ("B");
if (y >= 10)
    System.out.print ("C");
else if (y >= 5)
    System.out.print ("D");
else
    System.out.print ("E");
```

y	Printed?
9	AD
8	AD
16	AC
15	AC
10	AC
5	BD
2	

Tracing

```
int y = IO.inputInt ("Y? ");
if (y >= 8)
    System.out.print ("A");
else if (y <= 15)
    System.out.print ("B");
if (y >= 10)
    System.out.print ("C");
else if (y >= 5)
    System.out.print ("D");
else
    System.out.print ("E");
```

y	Printed?
9	AD
8	AD
16	AC
15	AC
10	AC
5	BD
2	BE
90	

Tracing

```
int y = IO.inputInt ("Y? ");
if (y >= 8)
    System.out.print ("A");
else if (y <= 15)
    System.out.print ("B");
if (y >= 10)
    System.out.print ("C");
else if (y >= 5)
    System.out.print ("D");
else
    System.out.print ("E");
```

y	Printed?
9	AD
8	AD
16	AC
15	AC
10	AC
5	BD
2	BE
90	AC
-3	

Tracing

```
int y = IO.inputInt ("Y? ");
if (y >= 8)
    System.out.print ("A");
else if (y <= 15)
    System.out.print ("B");
if (y >= 10)
    System.out.print ("C");
else if (y >= 5)
    System.out.print ("D");
else
    System.out.print ("E");
```

y	Printed?
9	AD
8	AD
16	AC
15	AC
10	AC
5	BD
2	BE
90	AC
-3	BE