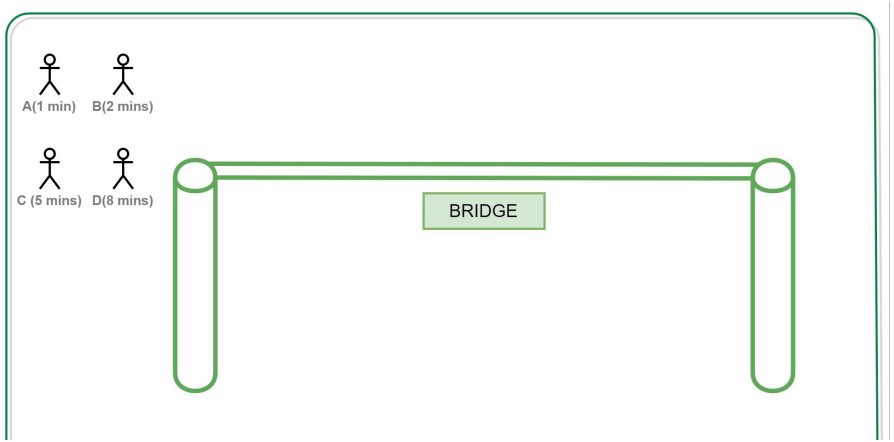
# LOGICAL OPERATORS & TEST CASES

# PUZZLE OF THE DAY

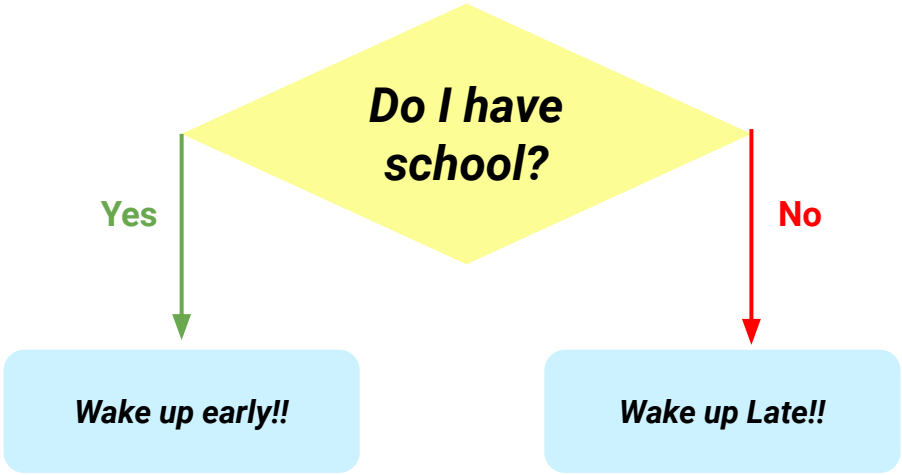



There are 4 persons (A, B, C and D) who want to cross a bridge at night.

1. A takes 1 minute to cross the bridge.
2. B takes 2 minutes to cross the bridge.
3. C takes 5 minutes to cross the bridge.
4. D takes 8 minutes to cross the bridge.

There is only one torch with them and the bridge cannot be crossed without the torch. We have already solved this problem but let's add a different condition now. The bridge has been strengthened and now allows **three people** on it at any given time. What is the minimum now required to cross the bridge?.

# MULTIPLE CONDITIONS




**What if Aditya has more than one condition based on which he has to decide to wake up early or not?**


Along with school, Aditya also attends swimming classes, some which are scheduled to be early in the morning if there is no school.

Now we have two conditions here!!

When does Aditya have to wake up early?

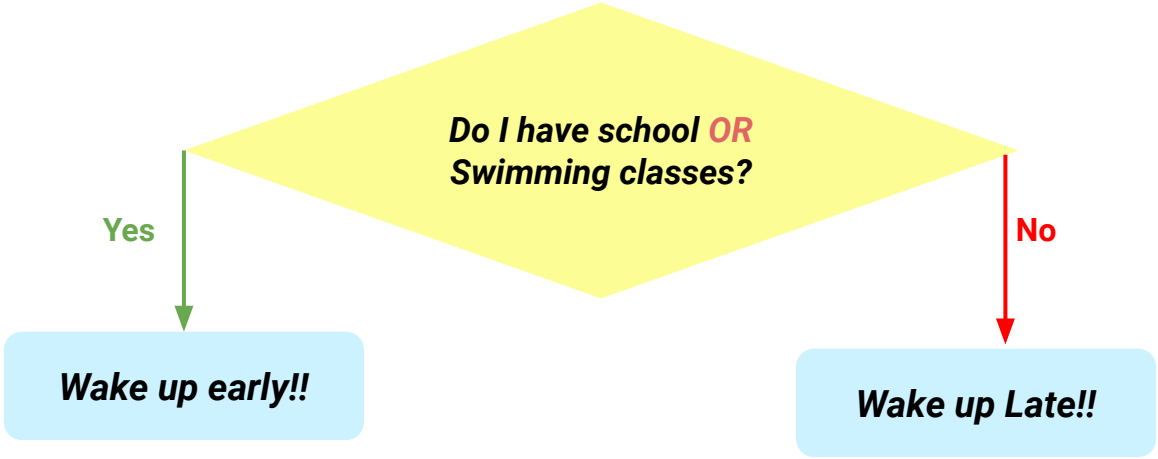
When does Aditya have to wake up late?


**OR**

→ **EARLY**

He has to wake up early if he has school or Swimming classes. Otherwise he can wake up late.

# FLOWCHART


Do I have school OR
Swimming classes?
Yes
No
Wake up early!!
Wake up Late!!

# LOGICAL OPERATORS

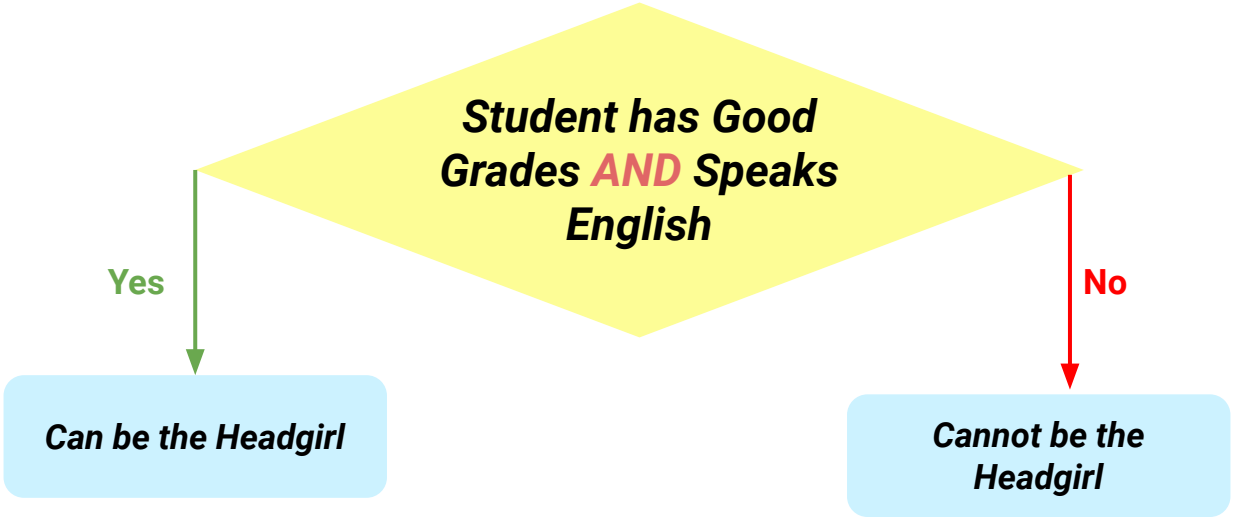
**Words that connect two or more conditions together are called Logical operators.**

**They are used while making decisions (decision box) to combine more than one condition together.**

| Operator | When to use | Examples |
|---|---|---|
| Or | Or' is used when **at least one** of the conditions has to be true. | You can eat if<br>(You == hungry) OR<br>(Food == cake) |

Three students from your class are being considered to become the class monitor - Aarohi, Sahana, and Aditi.

The qualities essential to become a class monitor are - :
Conditions -
1. The student should have good grades in their exams
2. The student should speak English fluently



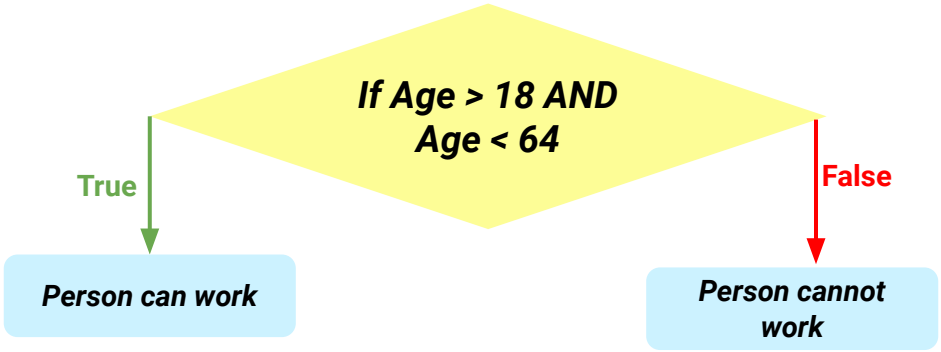

**Who amongst the three can become the Head girl based on the conditions?**

| Aarohi | Sahana | Aditi |
|---|---|---|
| • Has good grades in her exam | • Speaks English well | • Has good grades in her exam<br>• Speaks English well |

| Operator | When to use | Examples |
|---|---|---|
| Or | Or' is used when **at least one** of the conditions has to be true. | You can eat if<br>(You == hungry) OR<br>(Food == cake) |
| AND | AND is used when we want to join two conditions and need BOTH of them to be true. | A number is divisible by 6 when:<br><br>(Number % 2 ==0) AND<br>(Number % 3 ==0) |

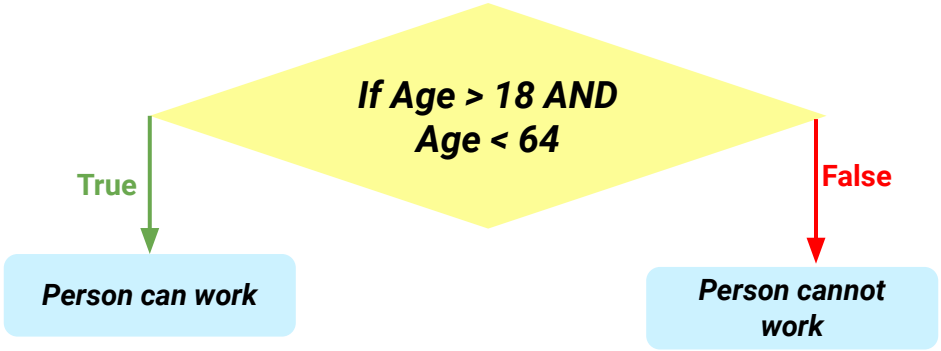
| Operator | When to use | Examples |
|---|---|---|
| Or | Or' is used when **at least one** of the conditions has to be true. | You can eat if<br>(You == hungry) OR<br>(Food == cake) |
| AND | AND is used when we want to join two conditions and need BOTH of them to be true. | A number is divisible by 6 when:<br><br>(Number % 2 ==0) AND<br>(Number % 3 ==0) |
| NOT | The 'Not' operator inverts the value of its condition/expression. | We can go outside if<br><br>NOT (Raining == True) |

# PRACTICE




**In the following flowchart do both the conditions need to be true to proceed or is just one fine?**

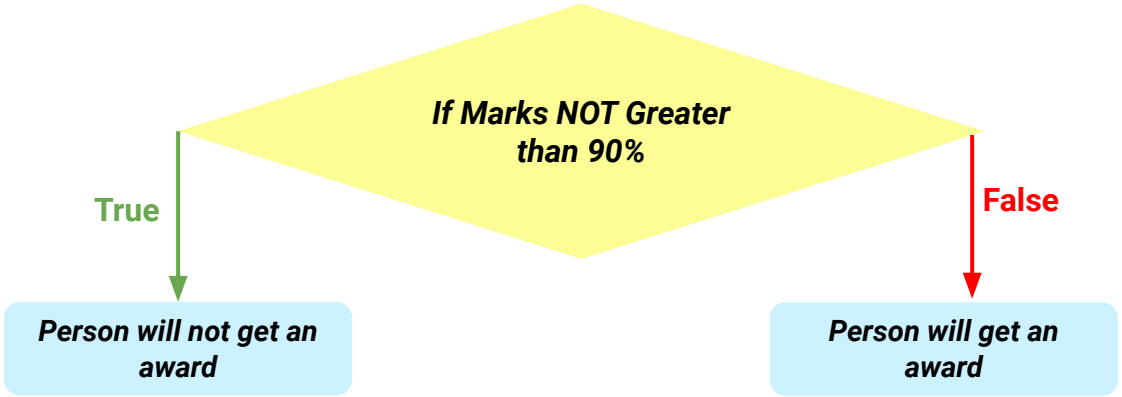
# PRACTICE




**In the following flowchart do both the conditions need to be true to proceed or is just one fine?**

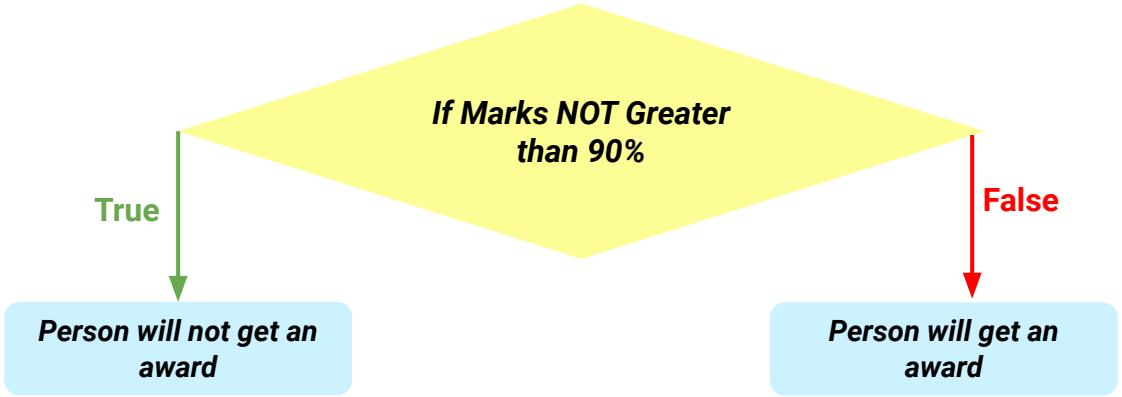
Both need to be true. A person has to be between 18 & 64 to work.

# PRACTICE




**If Marks = 80, what will be the output of the following program?**

# PRACTICE




**If Marks = 80, what will be the output of the following program?**

The person will not get an award.

# QUESTIONS

**Chaitanya's works at a multinational company selling toothpaste. If he goes to the office before 10:00 or after 18:00, it is closed, otherwise open. What logical operator would you use to check if the office is open or closed?**

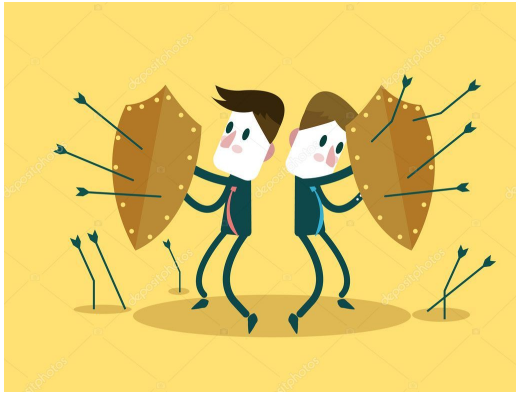
# QUESTIONS

**Chaitanya's works at a multinational company selling toothpaste. If he goes to the office before 10:00 or after 18:00, it is closed, otherwise open. What logical operator would you use to check if the office is open or closed?**

OR operator

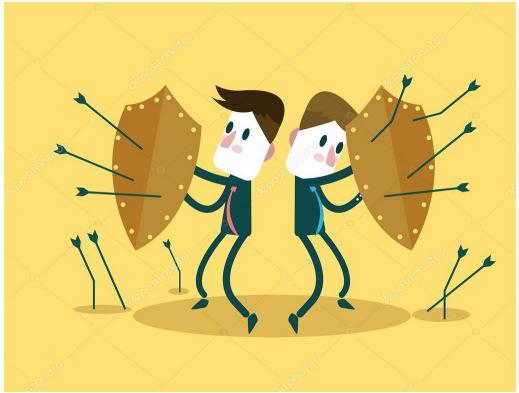
# QUESTIONS

**To be a soldier in the army, one needs to be less than 78kgs in weight and more than 5.5feet in height. What operator would you use to check if Vismay is eligible to join the unit?**



# QUESTIONS

**To be a soldier in the army, one needs to be less than 78kgs in weight and more than 5.5feet in height. What operator would you use to check if Vismay is eligible to join the unit?**



AND operator

# QUESTIONS

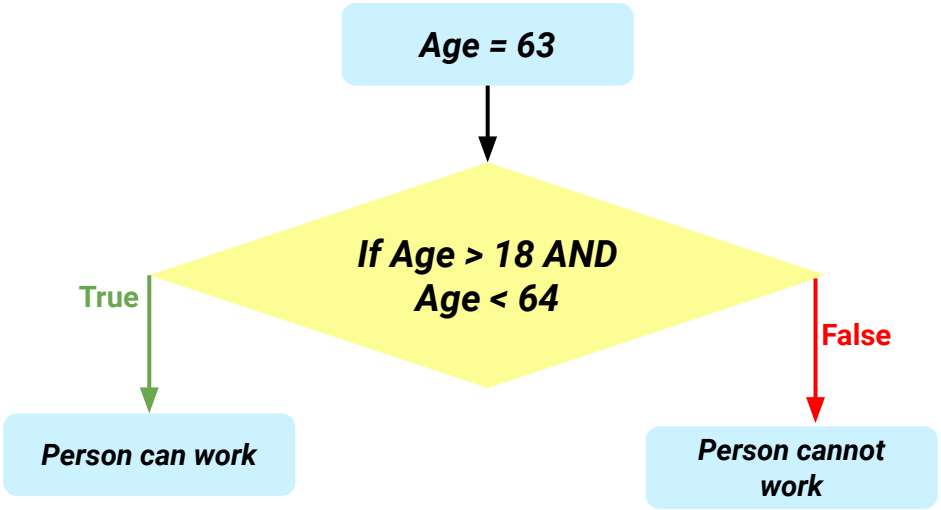
**A student is moved on to the next grade only if their marks is more than 50% and Attendance is more than 75%. If any one of these conditions aren't met, then the student is kept back in the same grade and has to repeat the year.**

# QUESTIONS

**A student is moved on to the next grade only if their marks is more than 50% and Attendance is more than 75%. If any one of these conditions aren't met, then the student is kept back in the same grade and has to repeat the year.**

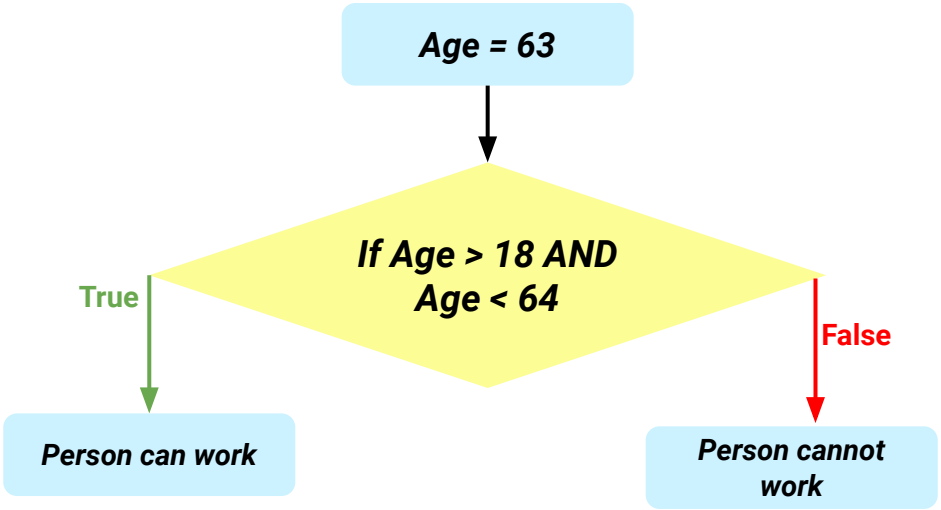

AND operator

# QUESTIONS




**Given variable value, will the computer select the TRUE branch or FALSE branch?**

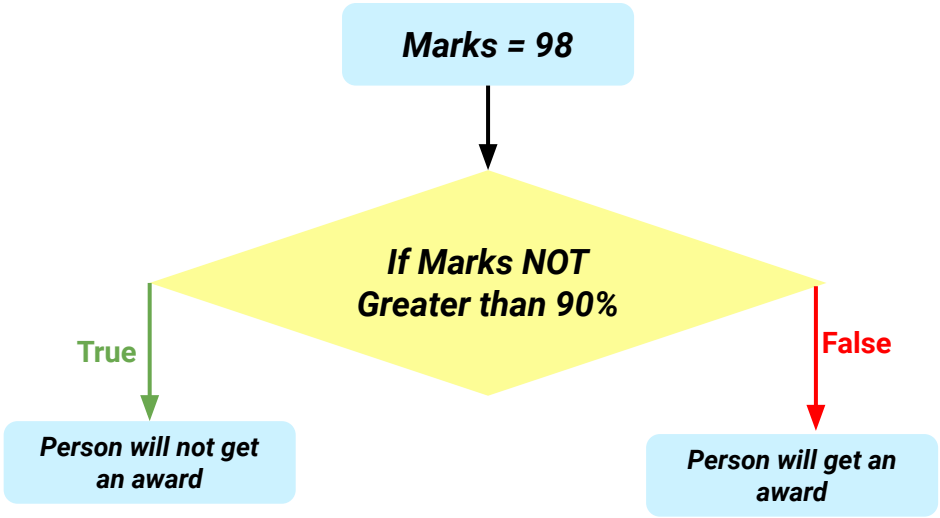
# QUESTIONS




**Given variable value, will the computer select the TRUE branch or FALSE branch?**

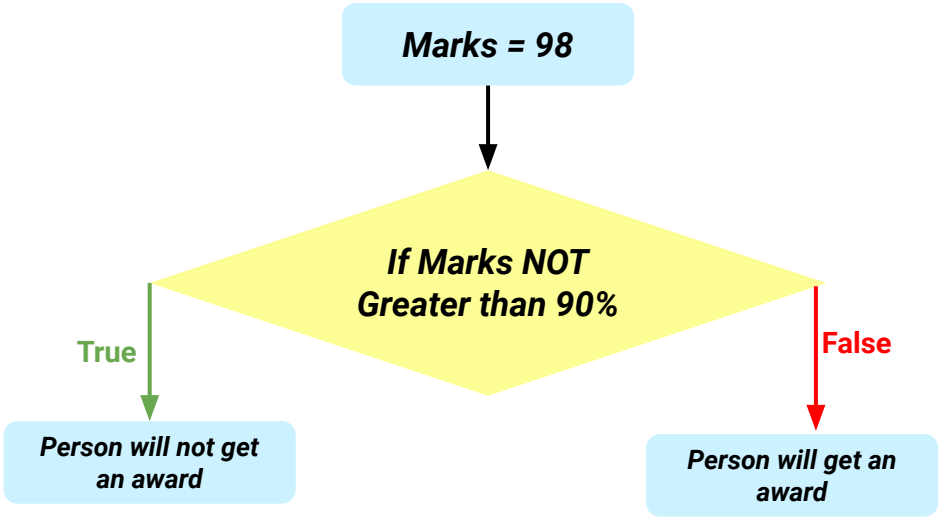
True branch as the person's age satisfies both conditions -
Age>18 & Age<64

# QUESTIONS




**Given variable value, will the computer select the TRUE branch or FALSE branch?**

# QUESTIONS




**Given variable value, will the computer select the TRUE branch or FALSE branch?**

FALSE - The condition marks **not** greater than 90% is not being met.

# QUESTIONS

**Problem - Write a program to input three angles of a triangle and check if that triangle is possible to form?**

We need two conditions. Can you think of them? If not both, think of the basic one at least.

# QUESTIONS

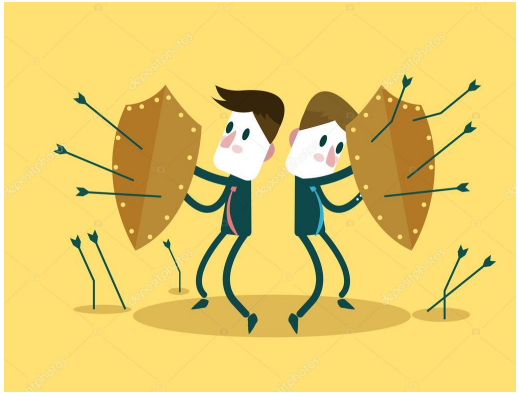
**Problem - Write a program to input three angles of a triangle and check if that triangle is possible to form?**

We need two conditions. Can you think of them? If not both, think of the basic one at least.

x+y+z=180º. Where x, y, z are angles of a triangle. Their sum should be 180º.
No angle can be 0º. Every angle needs to have a positive value

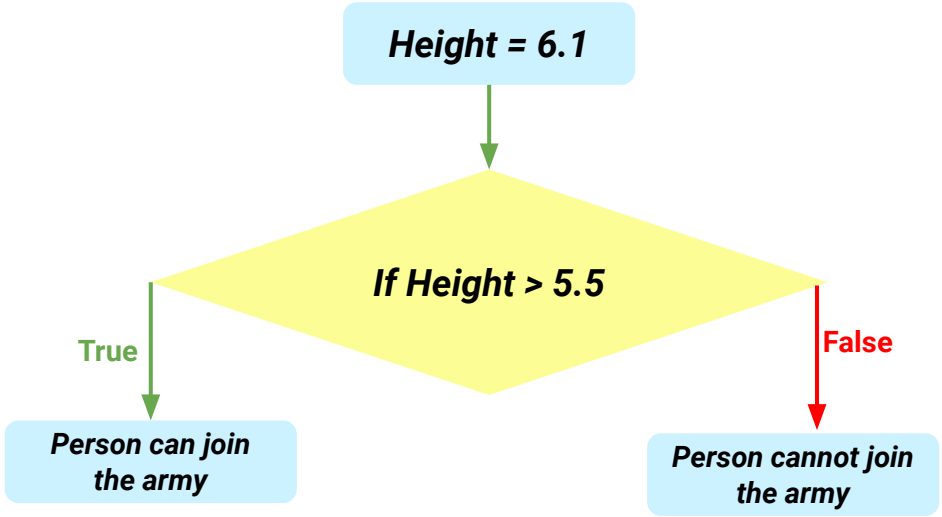
# INDEPENDENT PRACTICE

**To be a soldier in the army, one needs to be less than 78kgs in weight and more than 5.5feet in height. What operator would you use to check if Vismay is eligible to join the unit?**



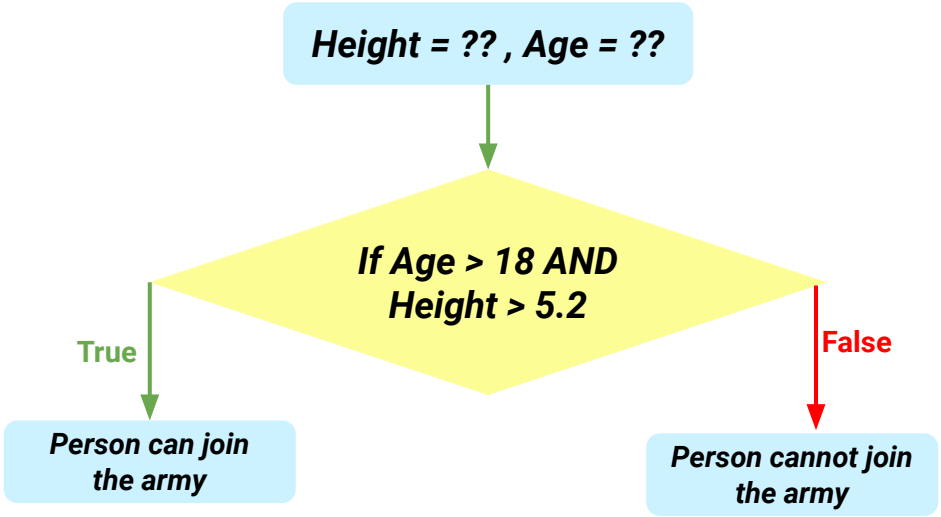
# INDEPENDENT PRACTICE

**A student is moved on to the next grade only if their marks is more than 50% and Attendance is more than 75%. If any one of these conditions aren't met, then the student is kept back in the same grade and has to repeat the year.**



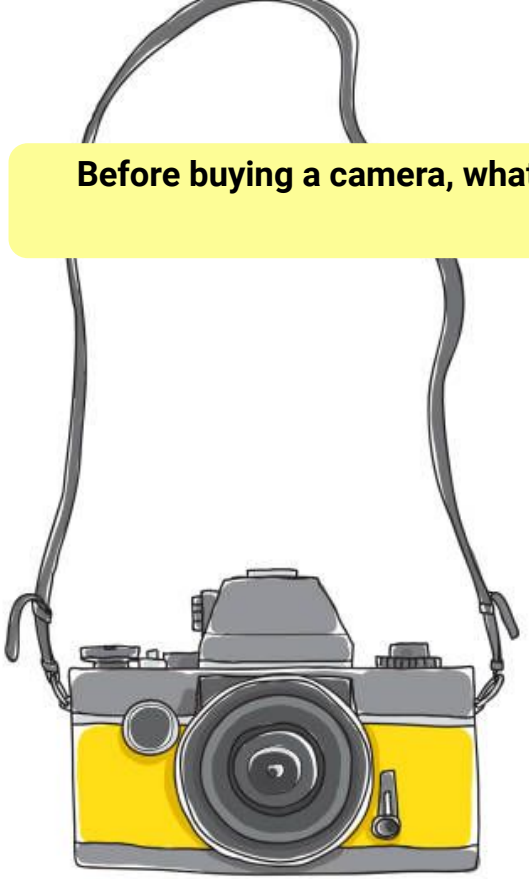

**Can you give the variables two values that would take it through the True branch, and two values that would take it through the false branch?**

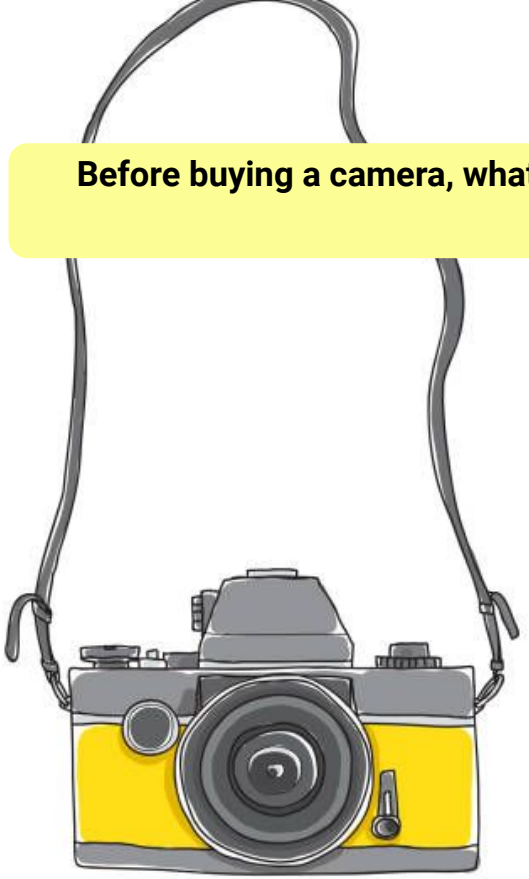
# TEST CASES




**Can you give the variables two values that would take it through the True branch, and two values that would take it through the false branch?**

**Before buying a camera, what are the different ways in which you would test it before buying?**





**Before buying a camera, what are the different ways in which you would test it before buying?**

With flash, without flash, in the dark, in the sun, with zoom, without zoom, in portrait mode, in landscape mode etc.

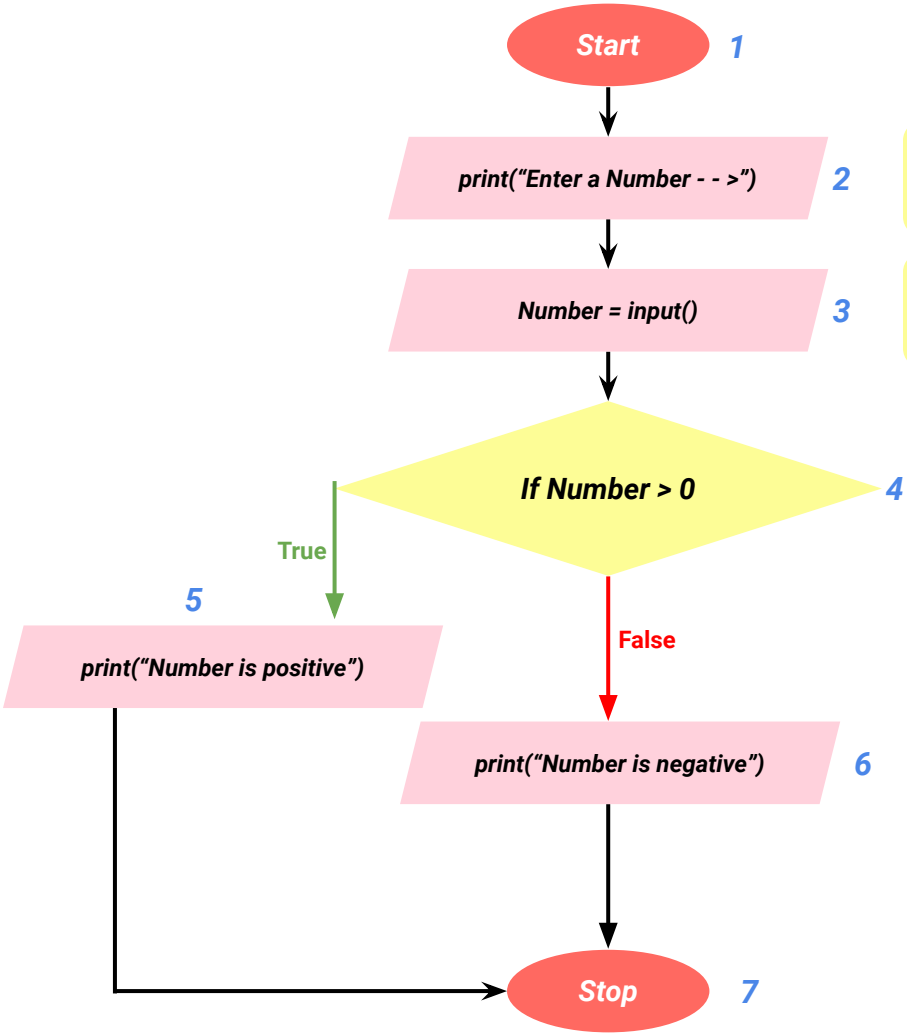
We also test some features combined together -
Zoom+flash, Potrait+zoom

## Rules to test flowcharts

A test case is a set of inputs required for running your program.
For a program which takes only one input(variable), a single test case can be any number like 12, 89, or -50.

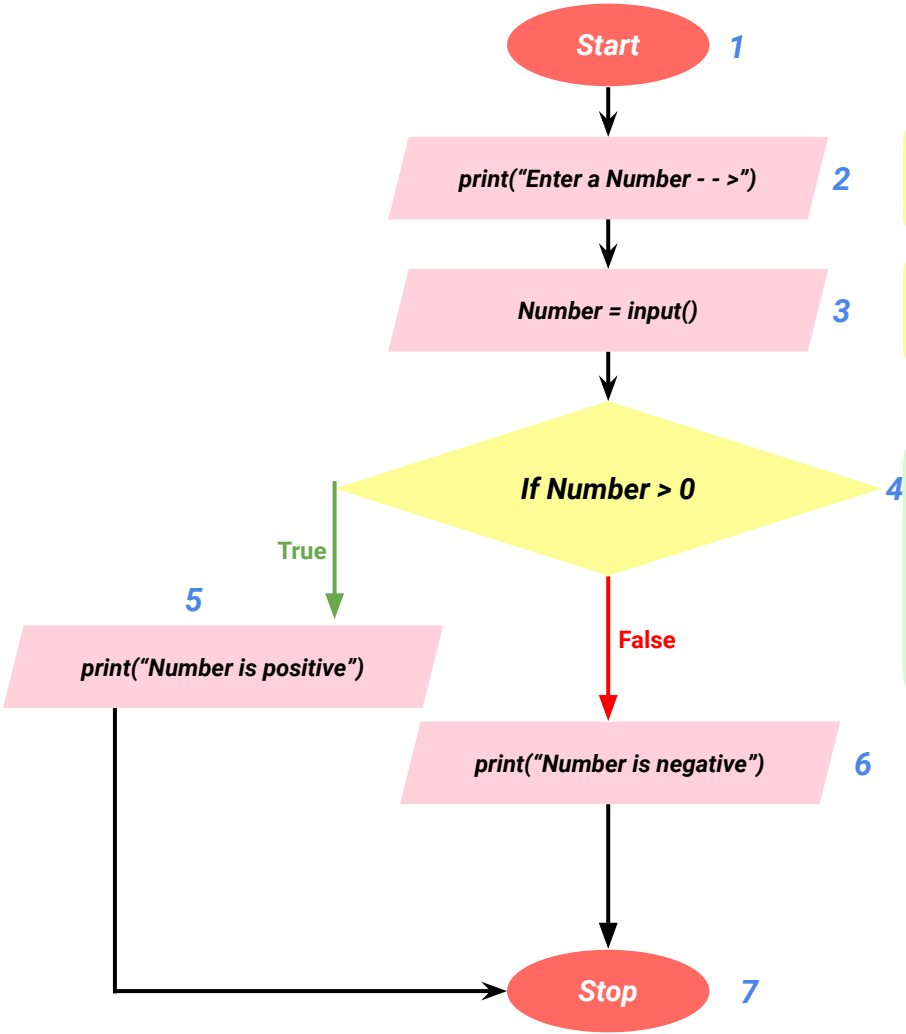
For a program which takes two inputs(variables), one test case will be something like (2, 30) (-4, -50), (-18, 19). So a single test case contains two sets of inputs that can be used to run the program.

**For a given flowchart, we build test cases in such a way that each and every part/route of the flowchart is explored and tested.**




**What route will the program take if we test it using numbers like - > 850, 23, 45, 67?**

**Did we visit every part of the flowchart with these test cases?**

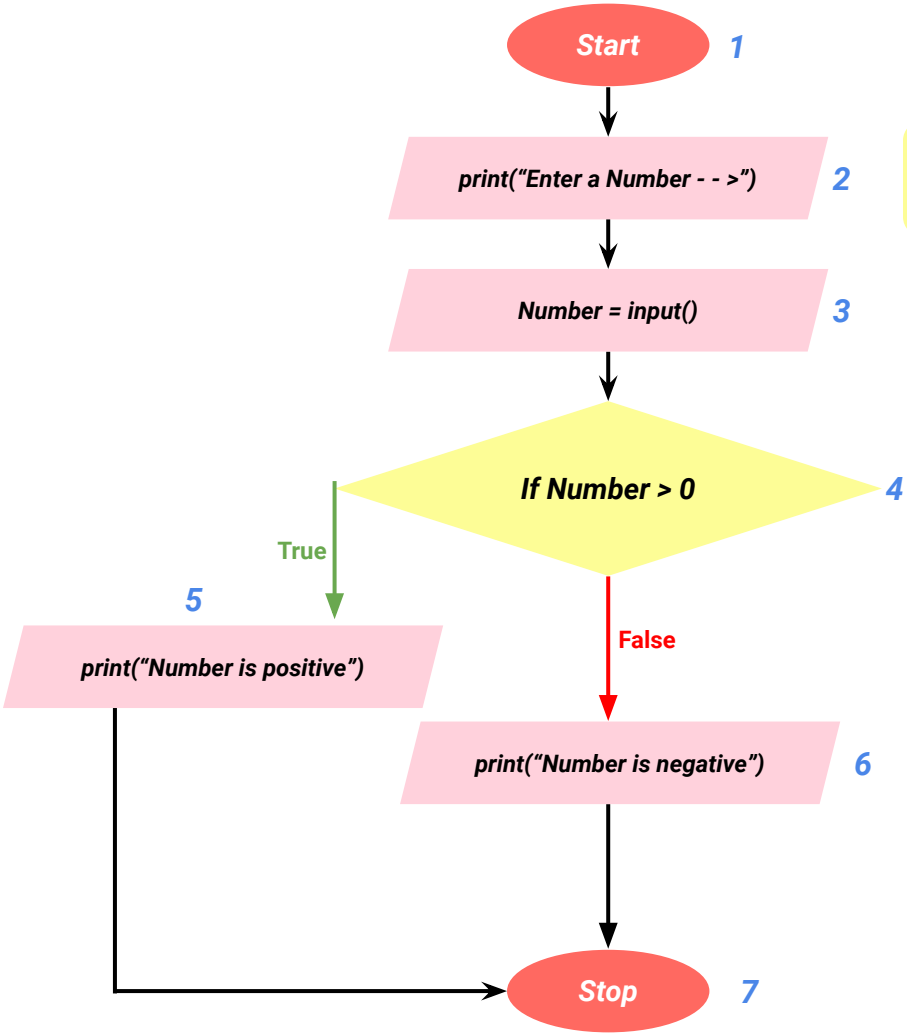



**What route will the program take if we test it using numbers like - > 850, 23, 45, 67?**

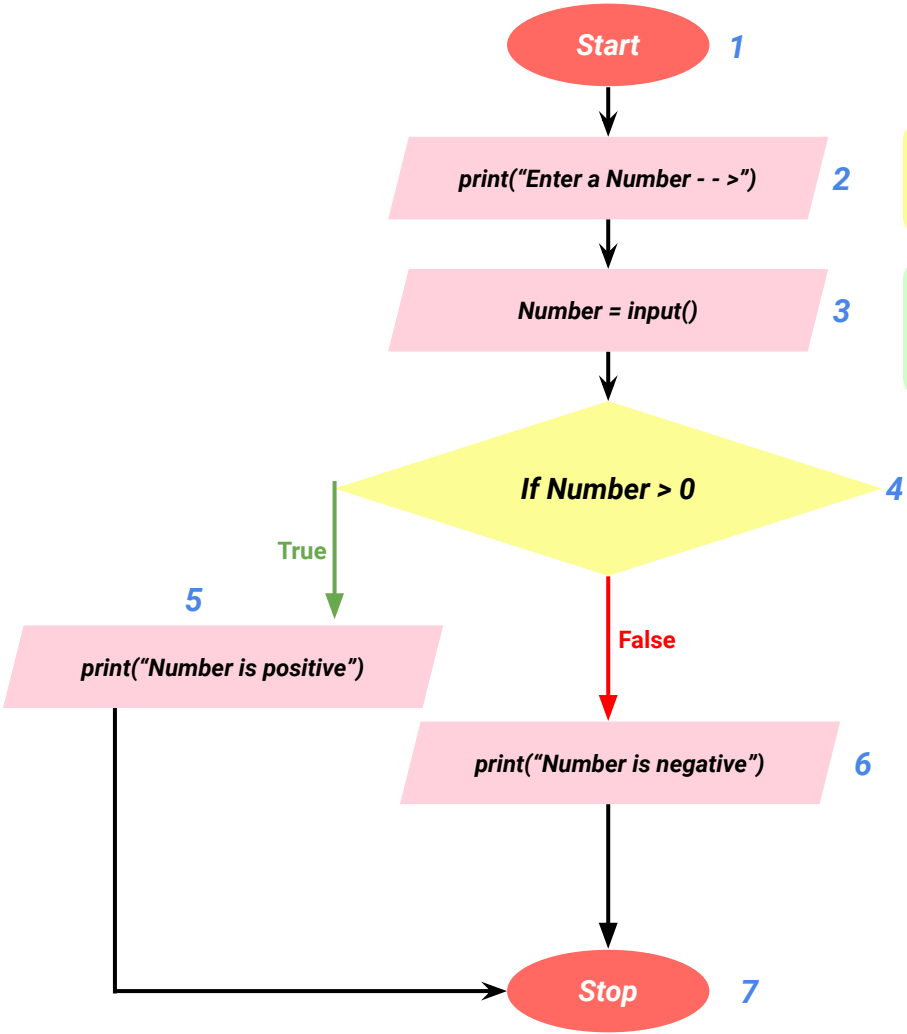
**Did we visit every part of the flowchart with these test cases?**

Route taken by the flowchart for all of these cases - 1→2→3→4→5→7

We never visit step #6




**Can you think of test cases where part #6 can also be visited?**



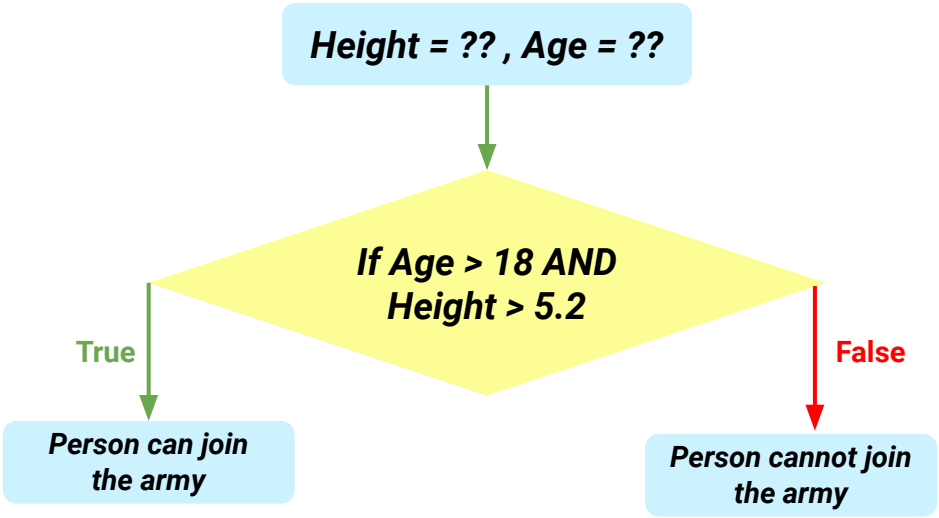

**Can you think of test cases where part #6 can also be visited?**

Negative numbers like -5, -701. -56 etc. We should conduct separate dry runs for these numbers too.

# EDGE CASES

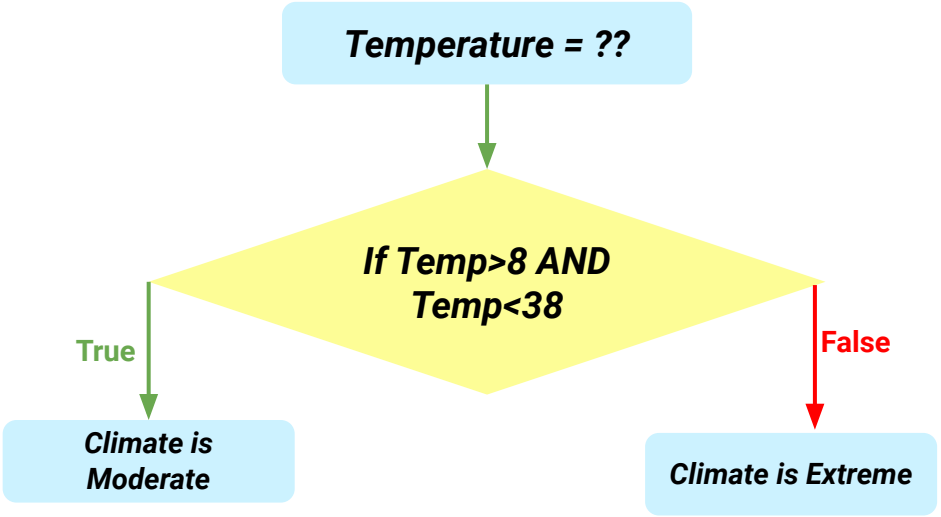
**An edge case is a test case which you did not think of or was not mentioned about in the problem statement but can break your program.**

# INDEPENDENT PRACTICE




**Perform the necessary number of dry runs on the following flowchart by using different sets of test cases.**

# INDEPENDENT PRACTICE




**Perform the necessary number of dry runs on the following flowchart by using different sets of test cases.**