



# DECISION BOXES & RELATIONAL OPERATORS

# PUZZLE OF THE DAY



8 identical balls(one is defective and weighs less)  
and a weighing machine



You are provided with 8 identical balls and a measuring instrument. 7 of the eight balls are equal in weight and one of the eight given balls is defective and weighs less. How many steps will it take for you to identify the odd ball. You can put multiple balls on the scale at the same time.

# A MIME





**Aaditya(11 y/o)** has to decide what time to wake up tomorrow.

He has two options -

1. Wake up early
2. Wake up late

**On what condition/basis will Aaditya make this decision?**



SCHOOL!! It will depend on what Aaditya has to do tomorrow.

**If** he has school he will have to wake up early, if he doesn't have school, he can wake up late.

***Do I have  
school?***

**Yes**

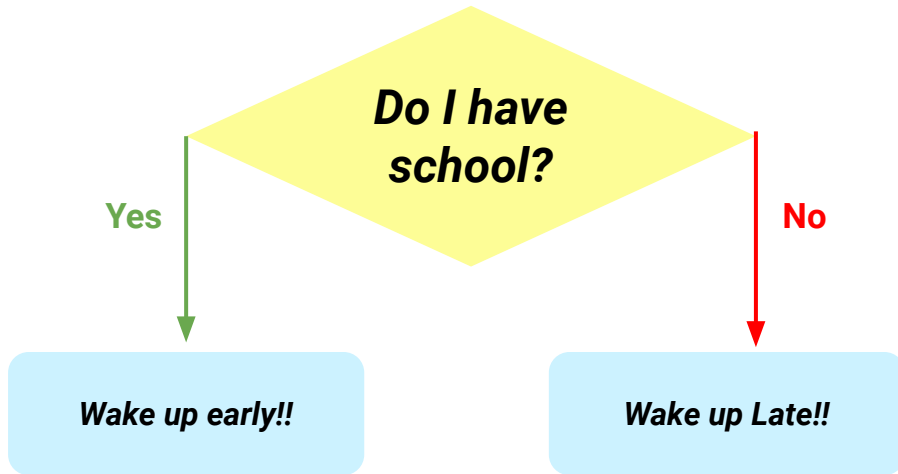
**No**

***Wake up early!!***

***Wake up Late!!***

**What kind of box are we using to  
write down the Condition?**

**How many lines are coming out of  
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**How many lines are coming out of the box? What do these lines go?**

We are using a Diamond shaped box.

There are two lines coming out of the decision box - Yes and No lines. These lines lead to the actions that we need to take in each of the cases.



Shreya(a teacher) is checking a student's Math solution and has to give students marks.

**What is the condition on which Shreya will give marks to the student? (It has to be a Yes/No question)**





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**What is the condition on which Shreya will give marks to the student? (It has to be a Yes/No question)**

***Is the answer correct?***



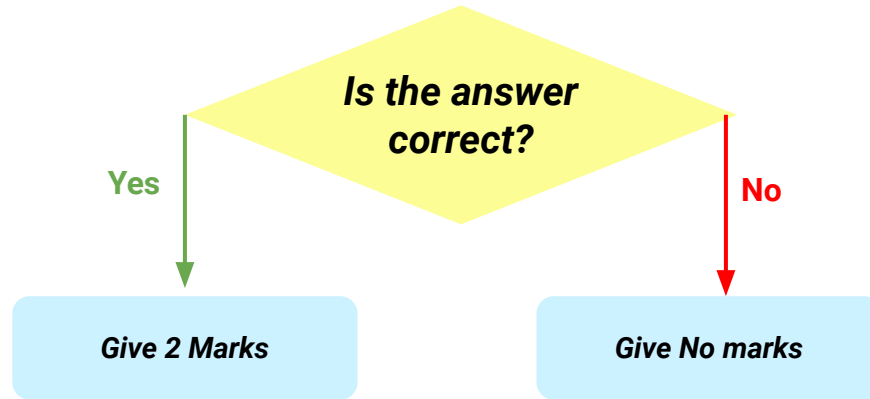
**What are the actions she will take if the answer is correct?  
And what if the answer is wrong?**



**What are the actions she will take if the answer is correct?  
And what if the answer is wrong?**

If the answer is correct, she will give it 2 marks. Else she will give no marks.

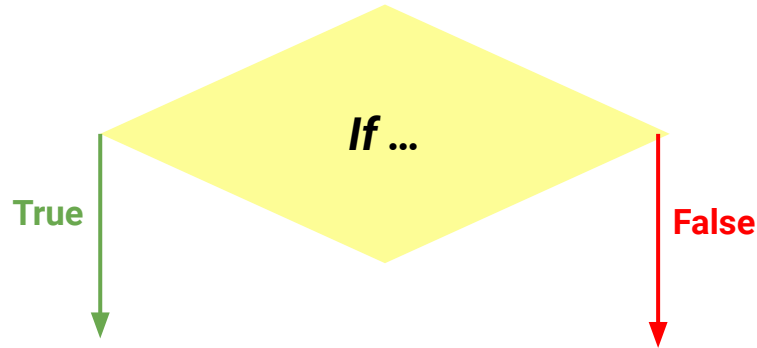
**Can you draw a decision diagram  
for this?**

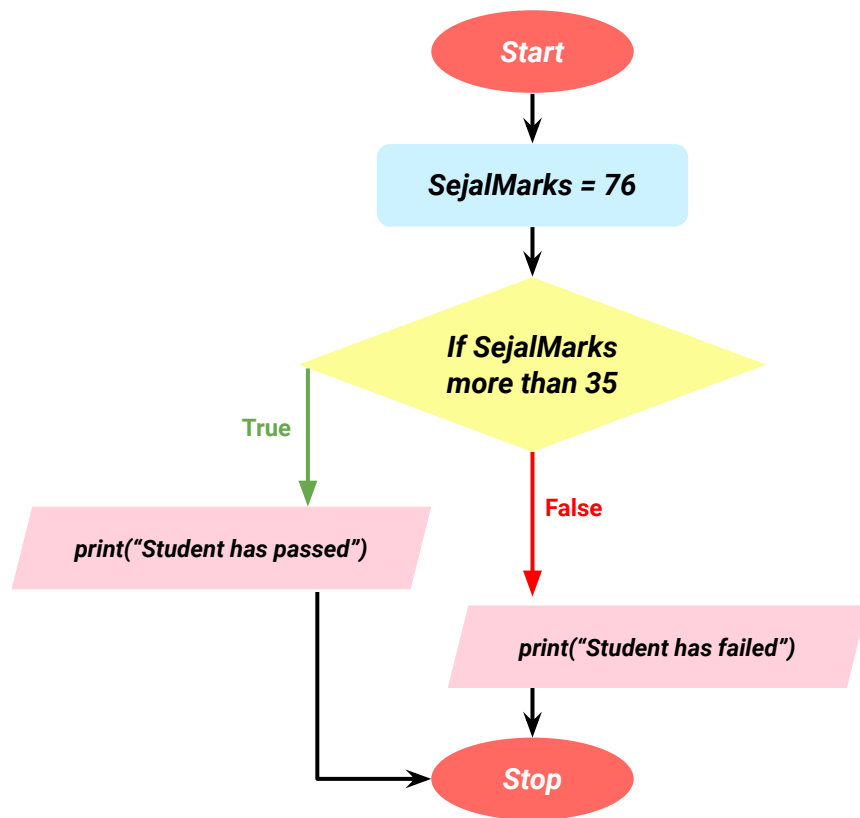


# INDEPENDENT PRACTICE

**Can you make a decision flow diagram for Susan who needs to decide if she has fever or not!! (if temperature is more than 99°F it can be considered to be a Fever)**

# DECISION BOXES IN COMPUTERS



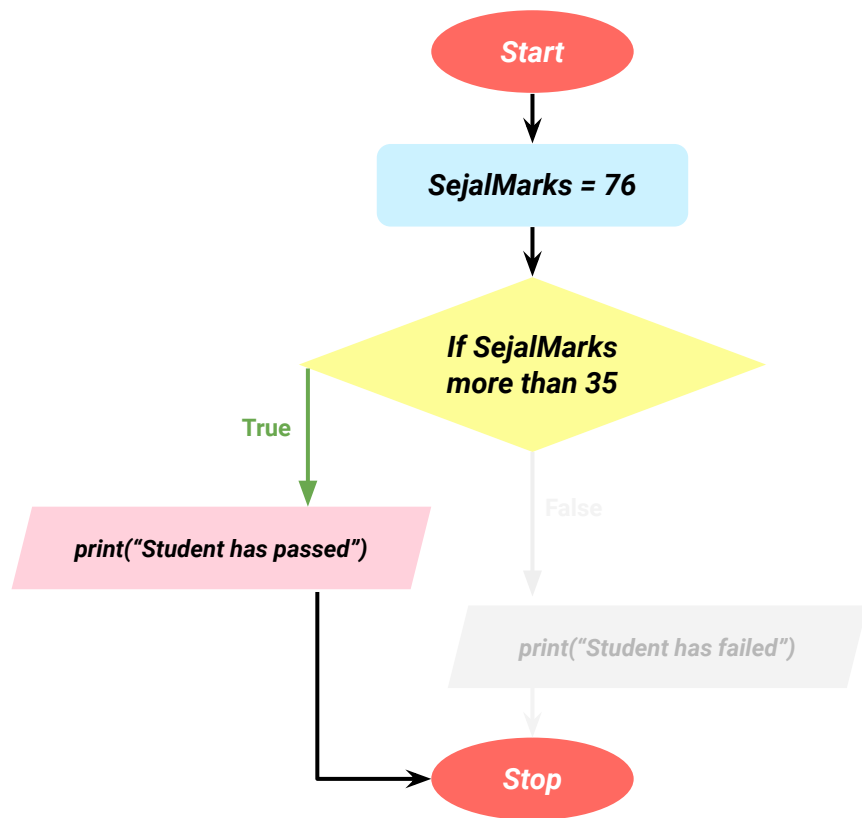


**Problem - Write a program to check and display if a student has passed or failed. (If Marks is more than 35, then student has passed)**

**What do you think is the student's name? How many marks did she get?**

**What is the condition that will decide if a student has passed or failed?**

**In this case, will the program take the True Route, or the False route?**



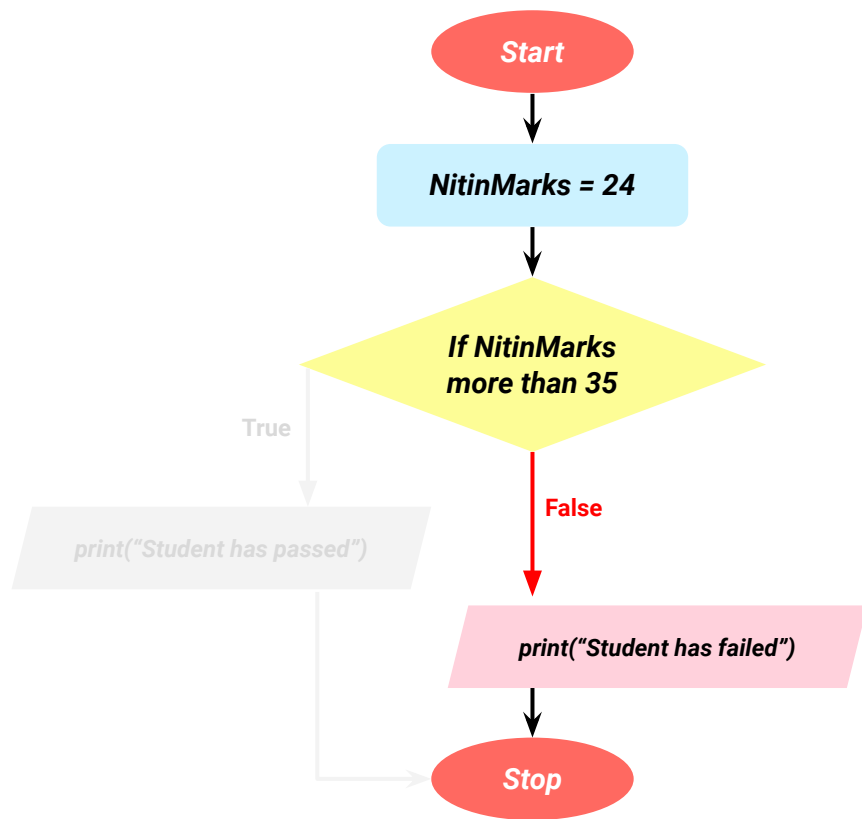
The students name is Sejal. She got 76 marks in her exam.

If marks is more than 35 - True, student has passed. False, then the student has failed.

In this case, the Program will take the TRUE route.

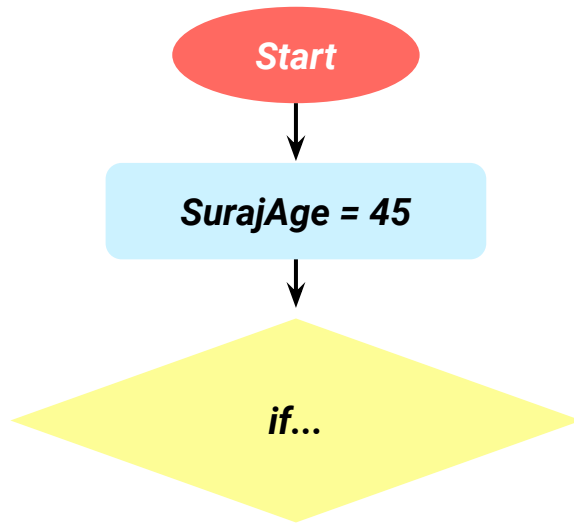
**What if we change the variable to NitinMarks = 24?**





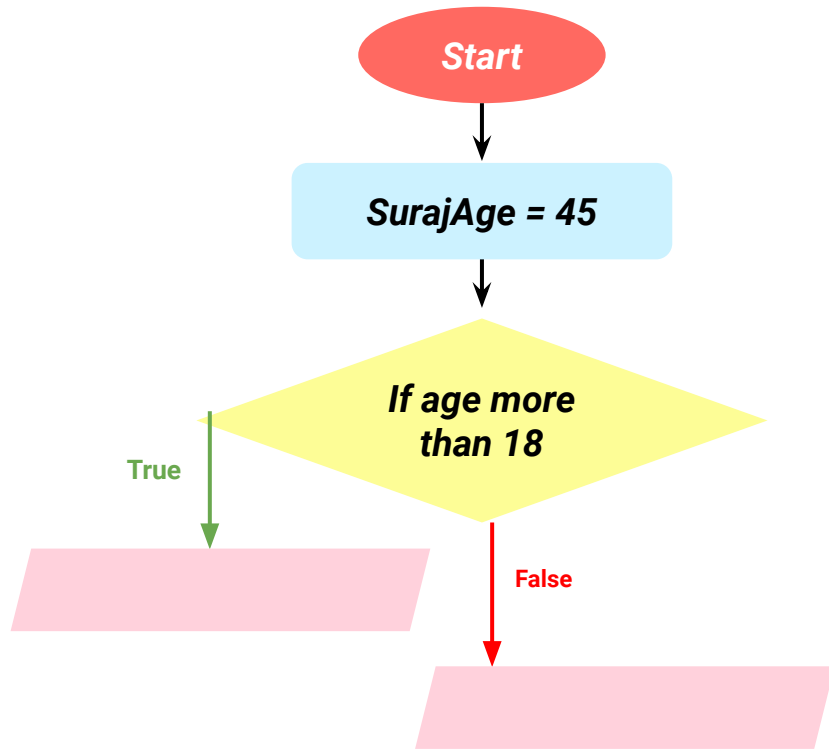
If the variable is NitinMarks = 24, then we will take the FALSE route as the condition is now false.

The output will be "Student has failed"



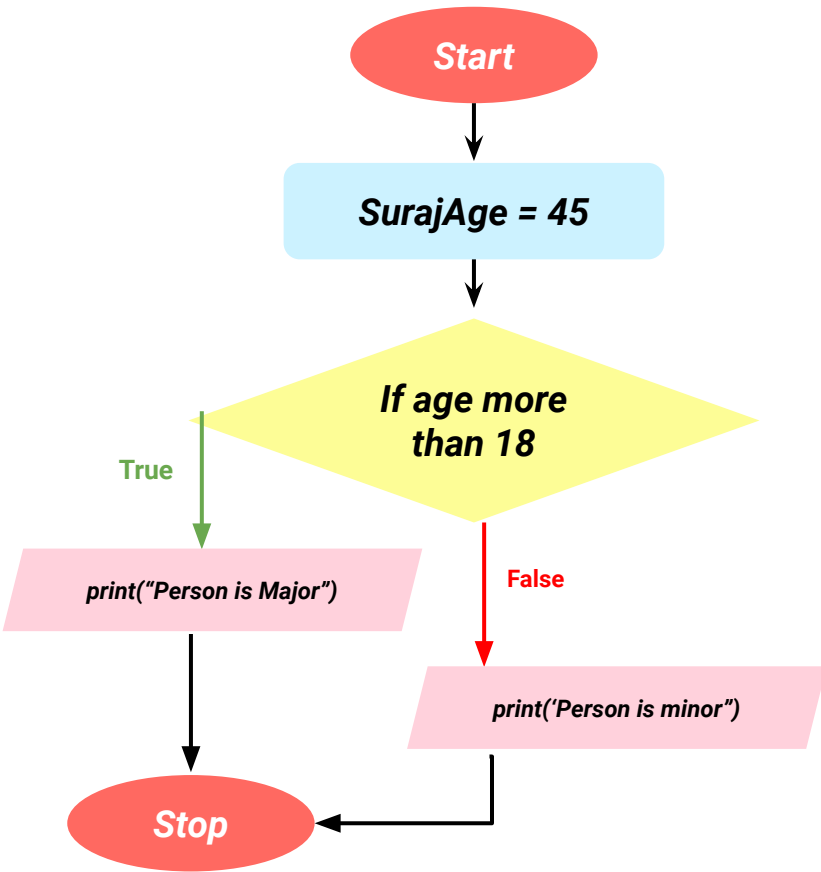
**PROBLEM 2 - Write a program to check if a person is a Major or a Minor**

**What condition will you add in this decision box?**



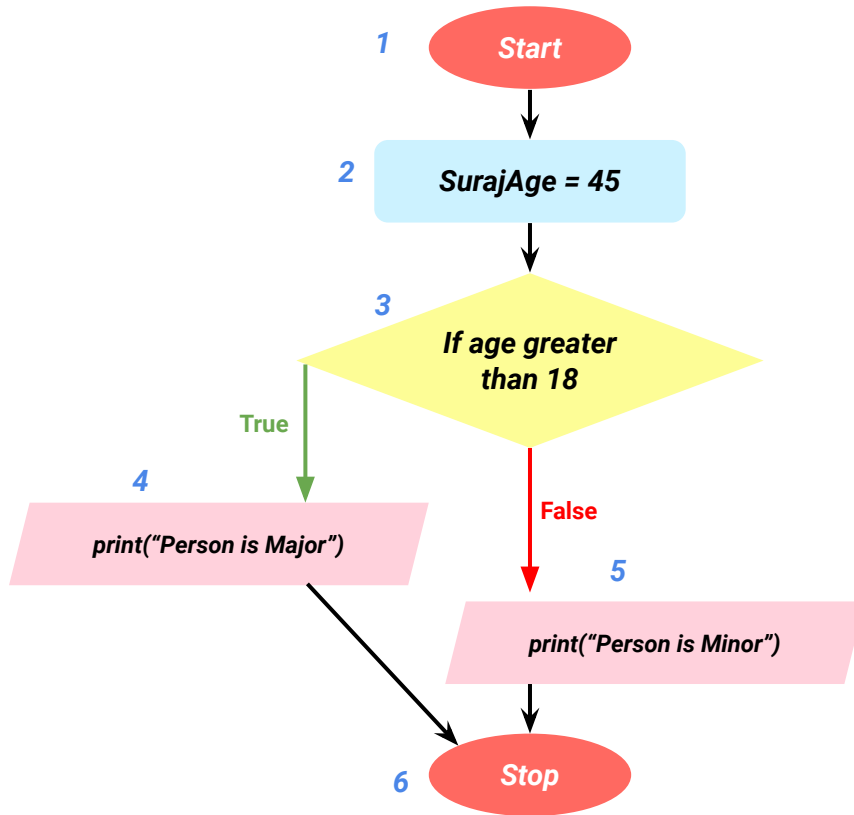
**PROBLEM 2 - Write a program to check if a person is a Major or a Minor**

**Now based on the condition, can you fill up the actions needed to be taken for True/False?**



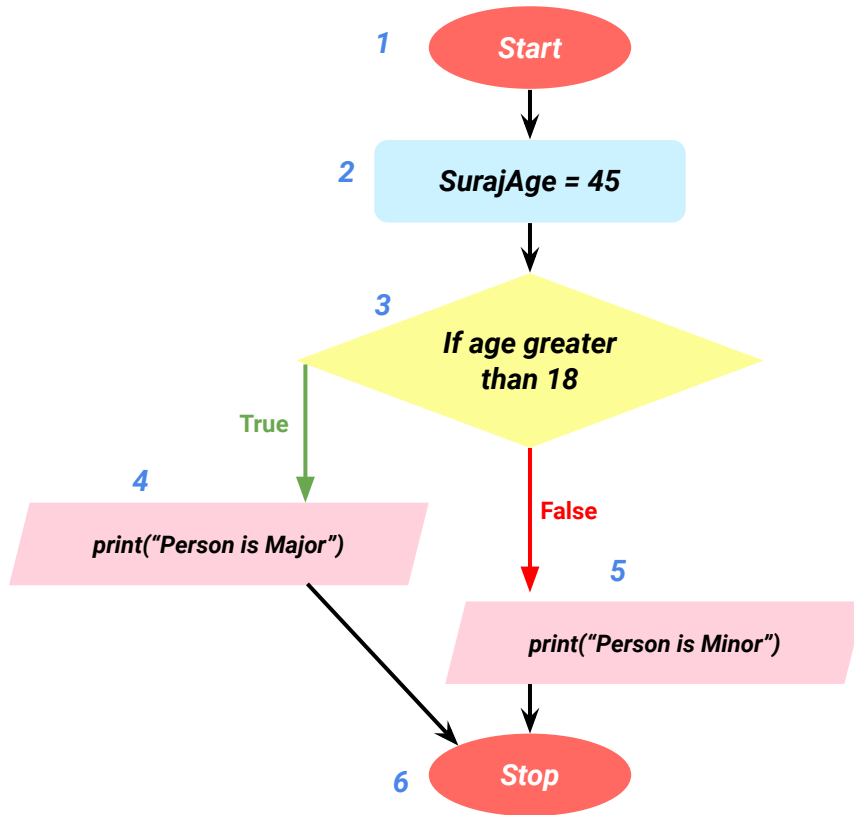
**PROBLEM 2 - Write a program to check if a person is a Major or a Minor**

**The Final Program**



For the variable SurajAge = 45, what route will the flowchart take?

For a variable AmirAge = 16, what route will the flowchart take?



For the variable SurajAge = 45, what route will the flowchart take?

1→2→3→4→6

For a variable AmirAge = 16, what route will the flowchart take?

1→2→3→5→6

# RELATIONAL OPERATORS

*If age greater  
than 18*

*If marks less  
than 35*

*If goals is  
equal to 3*

Which words give us relation between the number and variable? Can we replace these words with symbols?

# RELATIONAL OPERATORS

*If age greater  
than 18*

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equal to 3*

**Which words give us relation between the number and variable? Can we replace these words with symbols?**

Greater than, less than, equal to are some words we are using.

We can replace them with Math symbols like  $>$   $<$   $=$



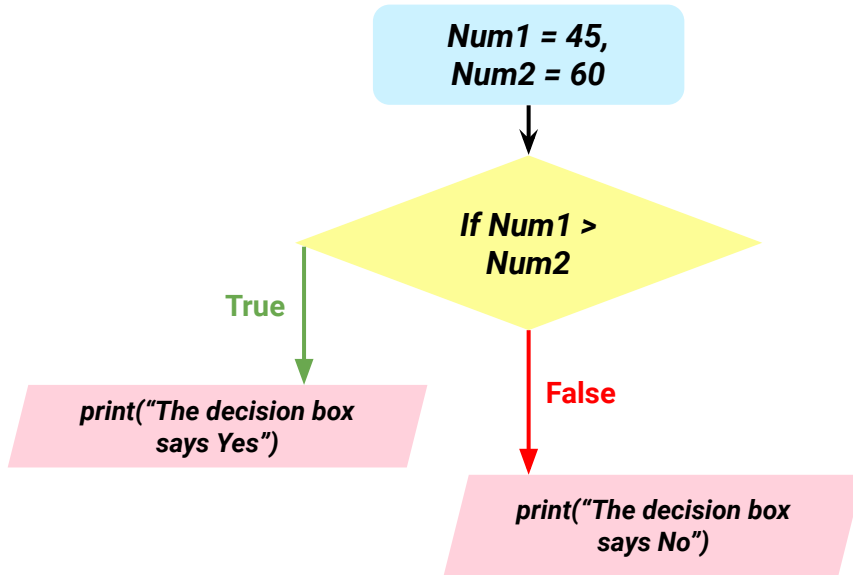
# RELATIONAL OPERATORS

Variable	Condition	True or False
age = 16	age > 18	False
age = 32	age > 18	
age = 40	age > 18	True
age = 10	age > 18	

**Complete the following table**

Operator	Symbol	Operation	Example
Greater than	>	Checks if the first number is greater than the second number. (evaluates to 'TRUE' if it is)	7 > 5 (True) 5 > 7 (False)
Less than	<	Checks if the first number is smaller than the second number. (evaluates to 'TRUE' if it is)	4 < 5 (True) 5 < 4 (False)
Greater than or equal to	>=	Checks if the first number is greater than or equal to the second number. (evaluates to 'TRUE' if it is)	6 >= 5 (True) 5 >= 5 (True) 4 >= 5 (False)
Less than or equal to	<=	Checks if the first number is smaller than or equal to the second number. (evaluates to 'TRUE' if it is)	4 <= 5 (True) 5 <= 5 (True) 6 <= 5 (False)

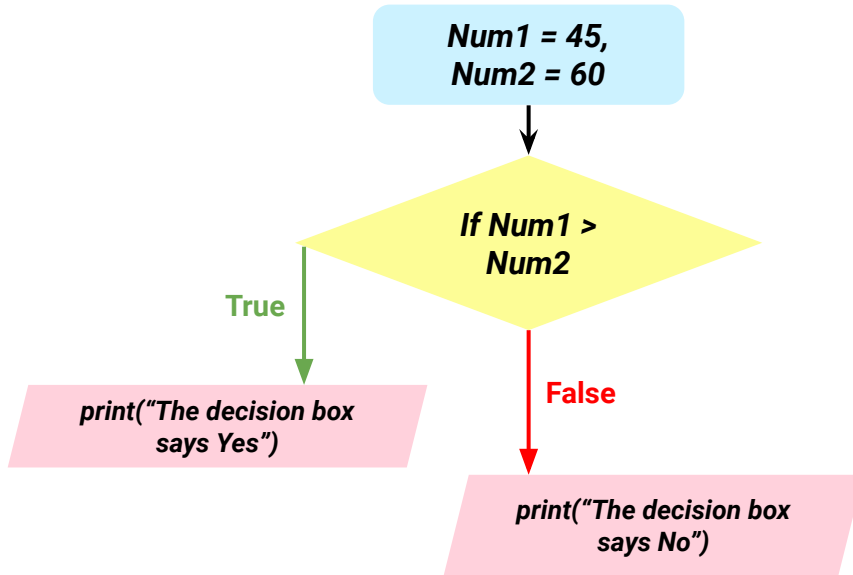
Operator	Symbol	Operation	Example
Equal to	==	Checks if the first number is equal to the second number. (evaluates to 'TRUE' if it is)	5 == 5 (True) 4 == 5 (False)
Not equal to	!=	Checks if the first number is equal to the second number. (evaluates to 'TRUE' if it is not equal)	4 != 5 (4 is not equal to five) (True) 5 != 5 (5 is not equal to 5 ) (False)



**In the above given flowchart, what are the two variables we are using?**

**In the decision box what is the condition. When will this condition be true?**

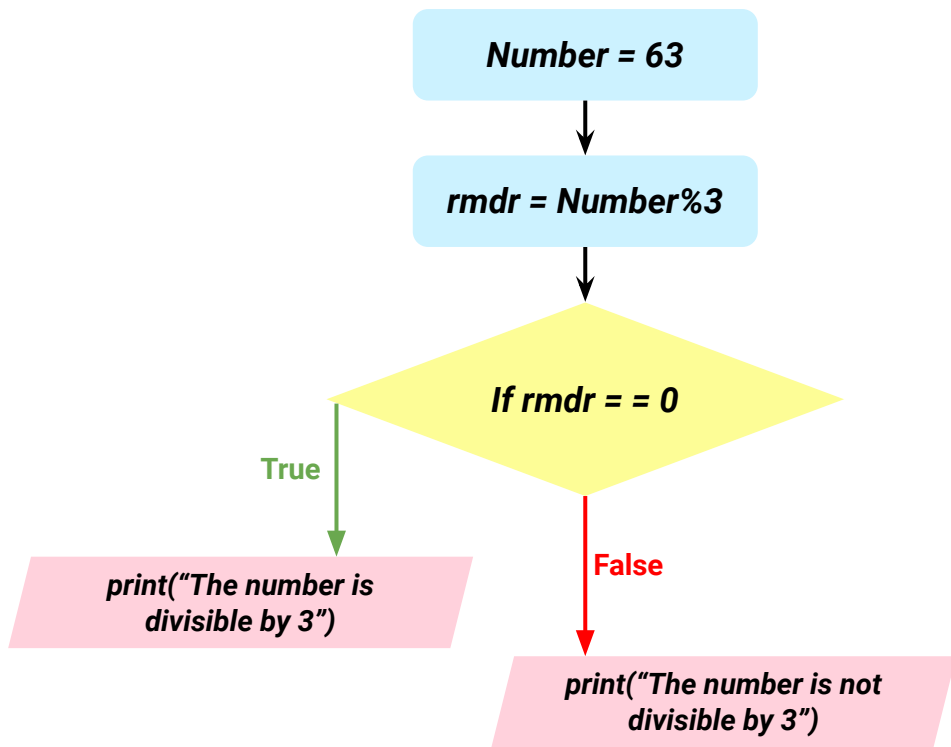
**In this example, will the decision box take the True route or the False route? What will be your final output?**



The two variables are Num1 and Num2

Num1 > Num2 is the condition It will be true only when Num1 is greater than Num2

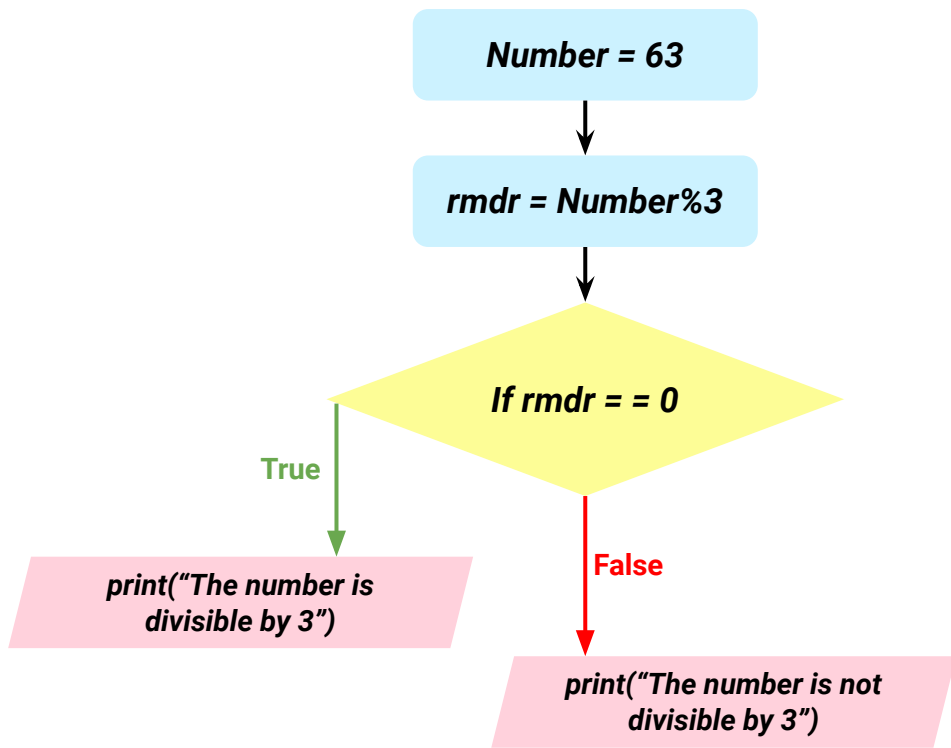
The condition Num1 > Num2 is false because 45 is not greater than 60. Hence we will take the 'False' route and the final output will be "The decision box says No."



**What variable are we using here?**

**What will be the value of rmdr in the second box?**

**The condition  $\text{rmdr} == 0$ , will this be true or false? Which route will we take and what will be the final output?**



**Number=63**

**63%3 is equal to 0. (The remainder when we divide 63 by 3 is 0) So the value of rmdr = 0.**

**The answer of this will be True, and we will take the 'True' route. The output will be "The number is divisible by 3"**

**In this flowchart, if we want to check if the number is divisible by five, what change will you make?**

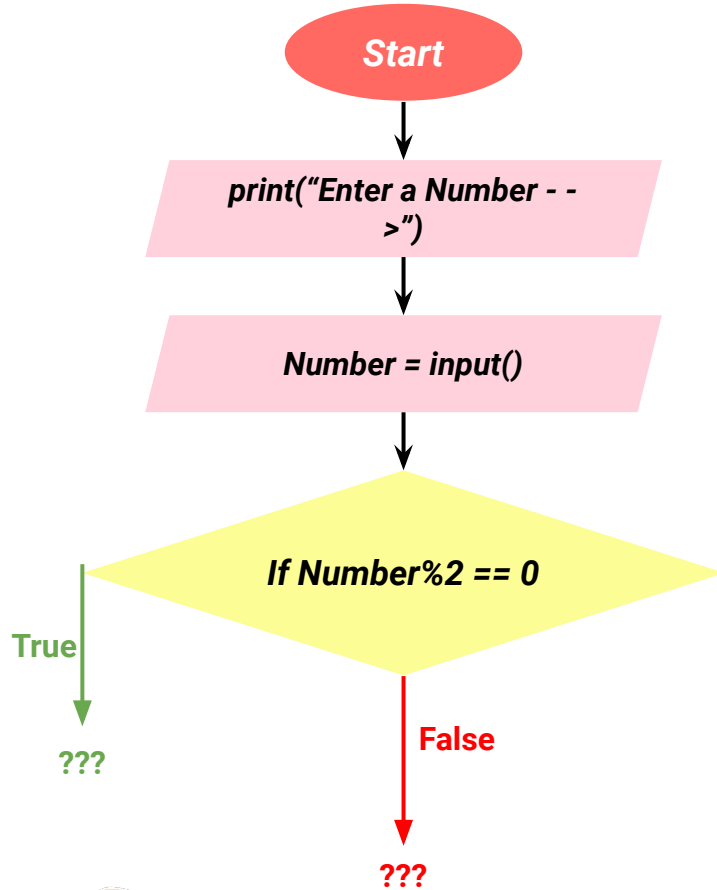
**In this flowchart, if we want to check if the number is divisible by five, what change will you make?**

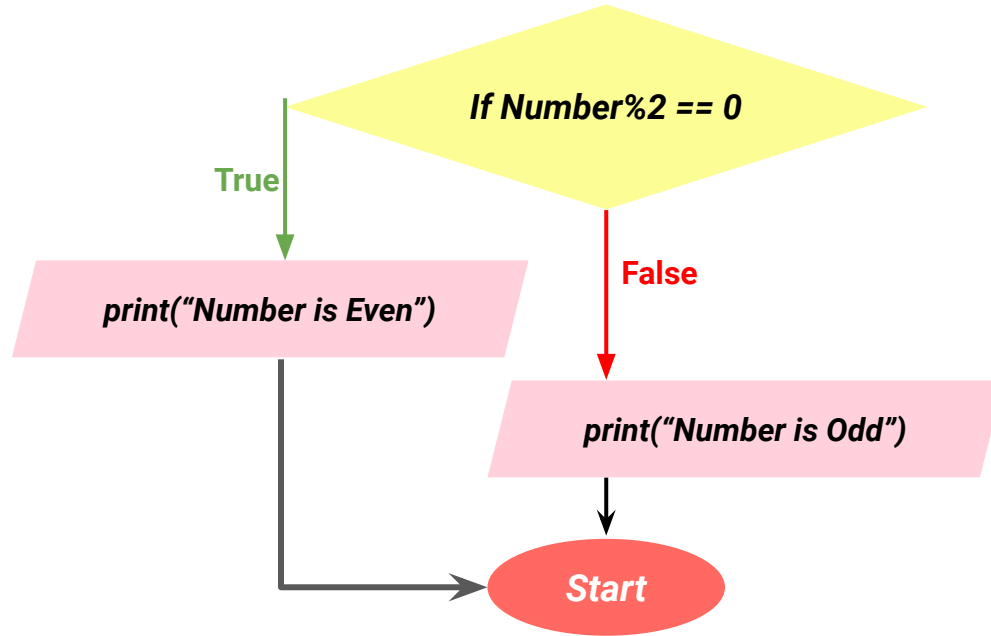
***$rm\text{dr} = \text{Number} \% 5$***



# QUESTION

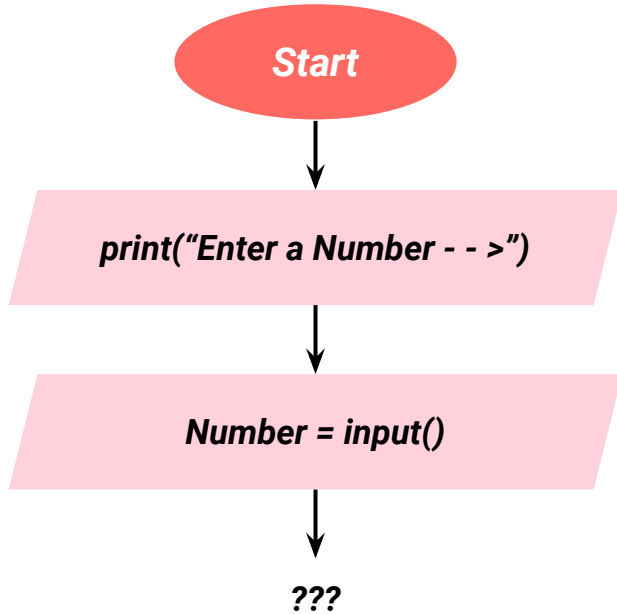
Accept a number from the user and check if it is an Even number or an Odd number.

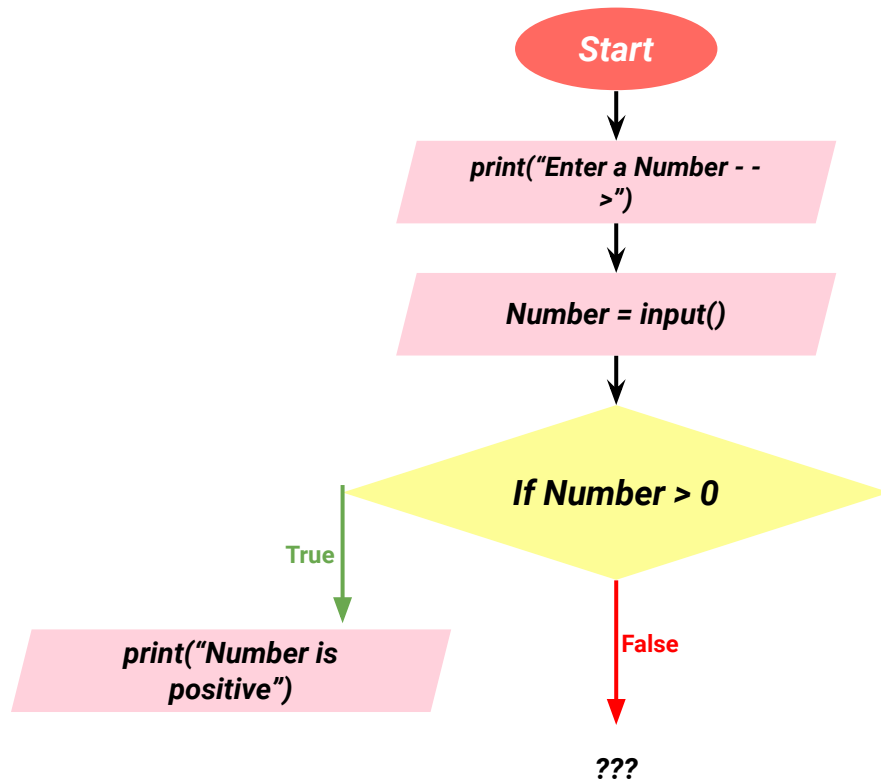




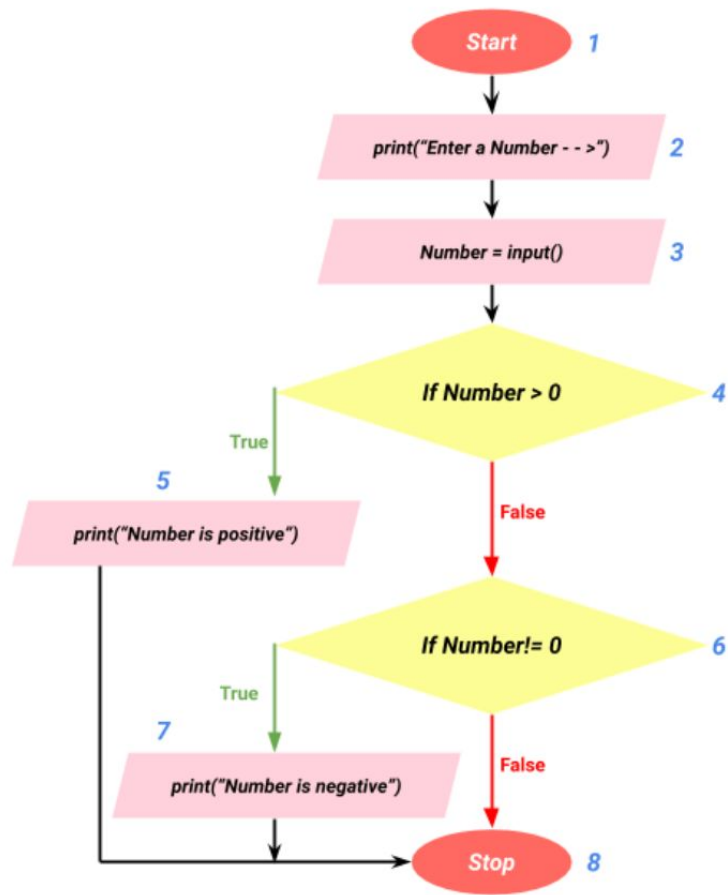
# QUESTION

Can you tell me when is a number positive?  
What will your condition be?  
(Use ' $>$ ' operator)



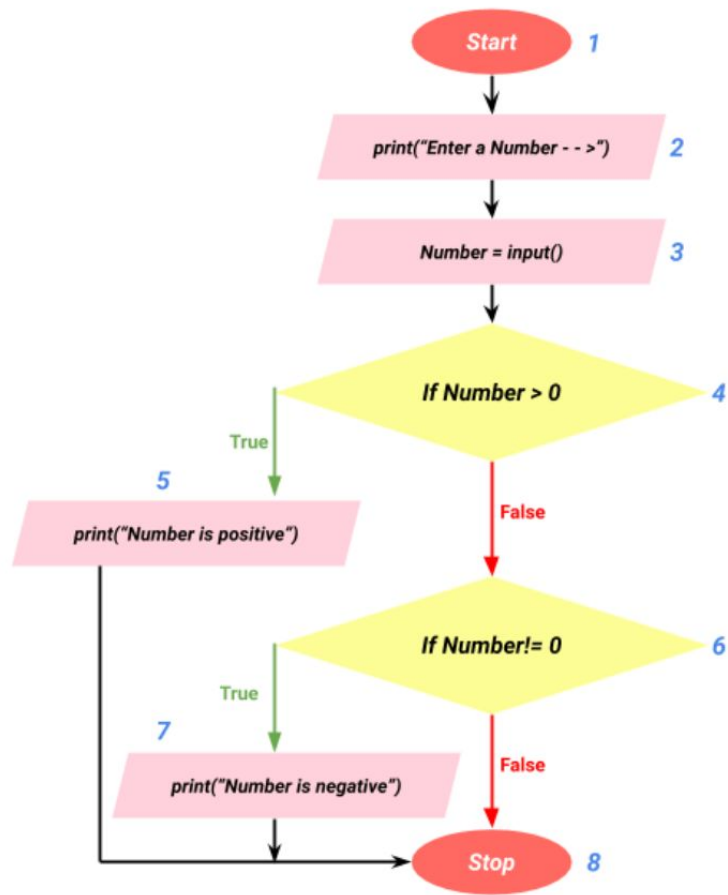


if `Number > 0` comes up to be 'No'? Does that mean the number entered is negative?



**What will be the route of the flowchart if the user enters the number -7**

**What will be the route of the flowchart if the user enters 0**



**What will be the route of the flowchart if the user enters the number -7**

**1→2→3→4→6→7→8**

**What will be the route of the flowchart if the user enters 0**

**1→2→3→4→6→8**

**State whether the following conditions and inputs will take the TRUE path or the FALSE path.**

**If  $\text{age} > 18$  and the user has entered 32 as their age.**

**If  $\text{budget} \leq 50,000$  and the user has entered 50,000.**

**If  $\text{height} > 45$  and the user has entered 45.**

**If  $\text{quantity} = 80$  and the user has entered 90.**

**If  $\text{quantity} \neq 80$  and the user has entered 90.**

**State whether the following conditions and inputs will take the TRUE path or the FALSE path.**

**If age > 18 and the user has entered 32 as their age.**

**TRUE**

**If budget ≤ 50,000 and the user has entered 50,000.**

**TRUE**

**If height > 45 and the user has entered 45.**

**FALSE**

**If quantity = 80 and the user has entered 90.**

**FALSE**

**If quantity != 80 and the user has entered 90.**

**TRUE**



**For the following conditions, mention three input values that will ensure the program takes the TRUE path and three input values that makes it go through the FALSE path.**

**If plates  $\geq 60$**

**If glasses  $< 90$**

**If bill  $\neq 0$**

**If customers  $= 45$**

# INDEPENDENT PRACTICE

A teacher has divided her classroom into groups of 5 based on their roll numbers. The last roll number of each group has been elected as the leader of the group who will manage the tasks performed by the group.

Write a flowchart for the teacher to enter the roll number of the student and check if he/she is a Group Leader or not?



# INDEPENDENT PRACTICE



Sunderlal is a trader who buys and sells Bats. For a particular trade, he wants to check if a trade was a profit or a loss. Write a flowchart for Mr Sunderlal to enter his cost and selling price, and indicate whether the trade he made was a profit or a loss.

- a. If  $SP > CP$ : Profit
- b.  $SP < CP$ : Loss
- c.  $SP$  equals  $CP$ : no profit, no loss

# INDEPENDENT PRACTICE

Deepali runs an auction where customers mention the price they are ready to pay for a painting. On average she gets three prices for a painting and it is then sold to the person quoting the highest price.

Write a flowchart for Deepali to enter the three prices and print which one is the highest and gets the painting.

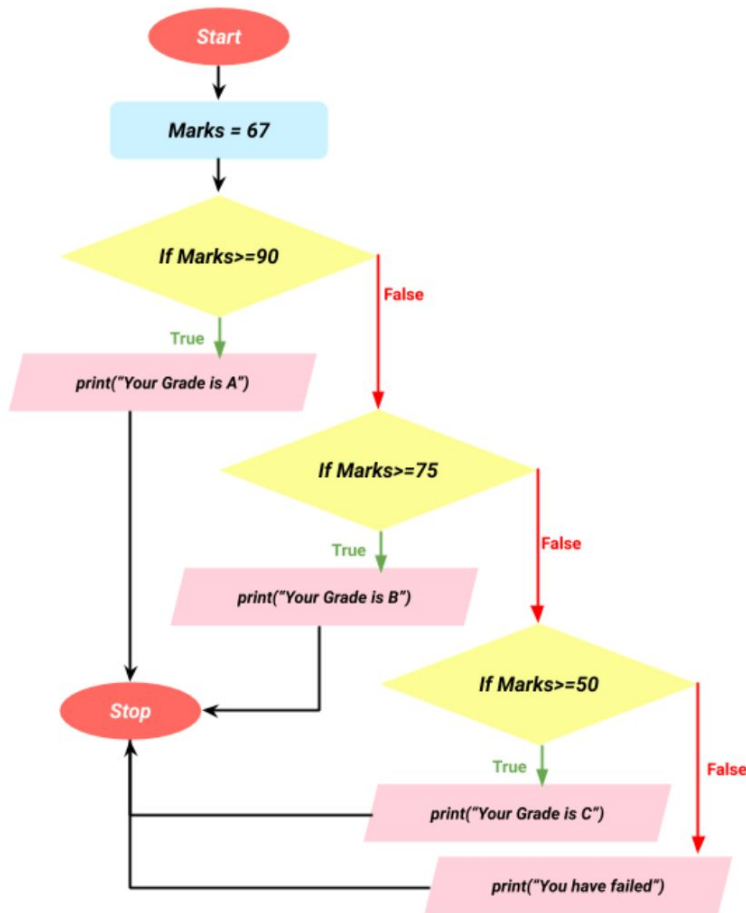


# INDEPENDENT PRACTICE

Roller Coasters require children to have a minimum height of 5 feet. Any child below this height is generally not allowed on them.

Write a flowchart to accept a child's height and display if he or she will be allowed to ride or not.





What will be the output of the following program?

What will be the output in the following cases?

Marks = 42

Marks = 90

Marks = 75