



OPERATORS AND DRY RUNS

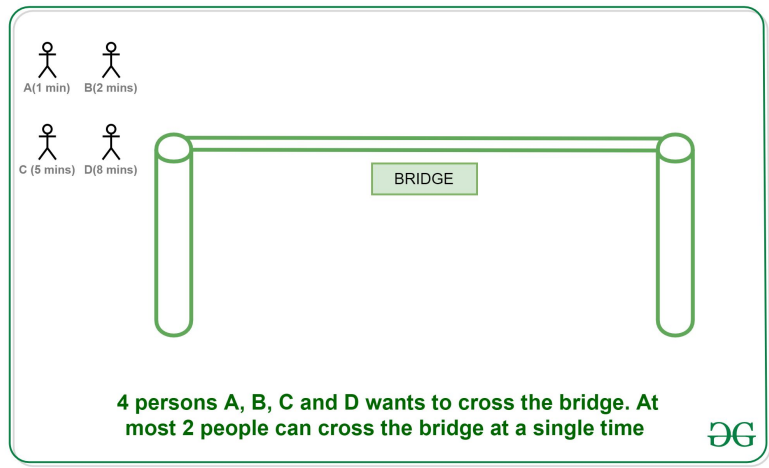
PUZZLE OF THE DAY

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.

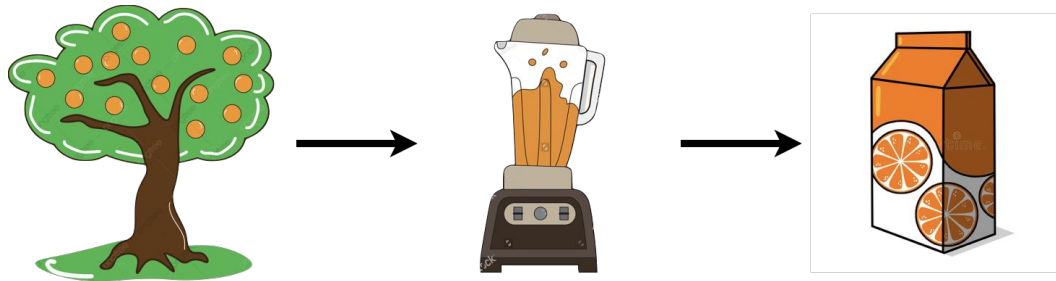
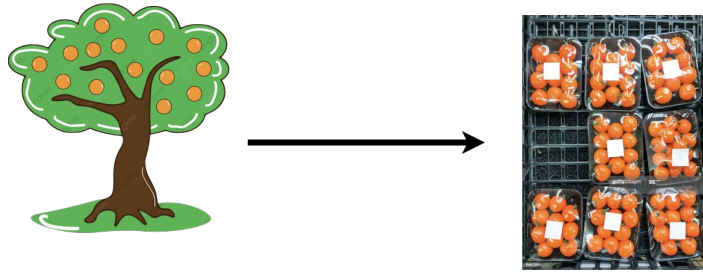
There is only one torch with them and the bridge cannot be crossed without the torch. There cannot be more than two persons on the bridge at any time, and when two people cross the bridge together, they must move at the slower person's pace.

Can they all cross the bridge in 15 minutes?



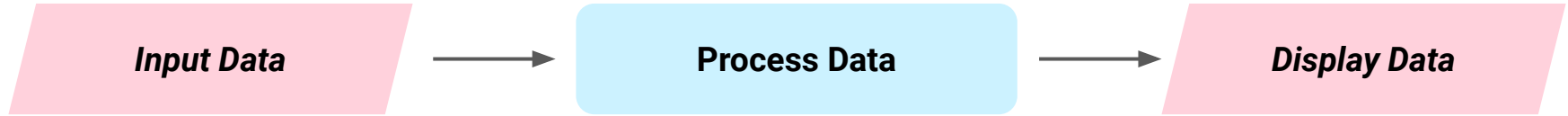


What differences do you notice in the two sets of images.

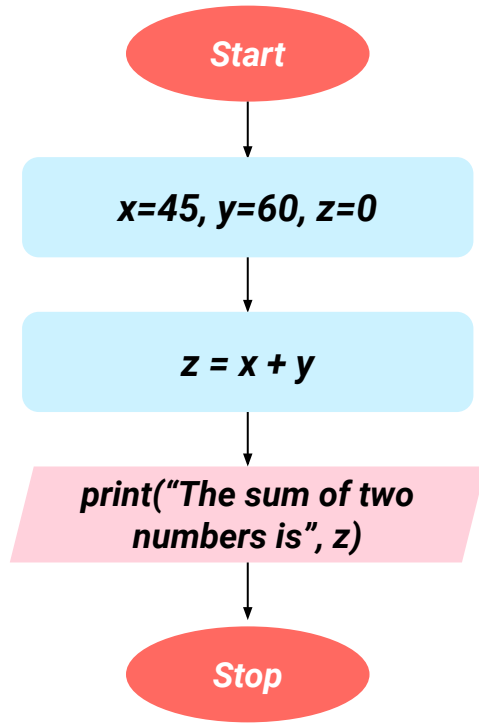


In the first set, we are just packaging the oranges and selling them without any changes.

In the second one, we are **processing** them, before selling.

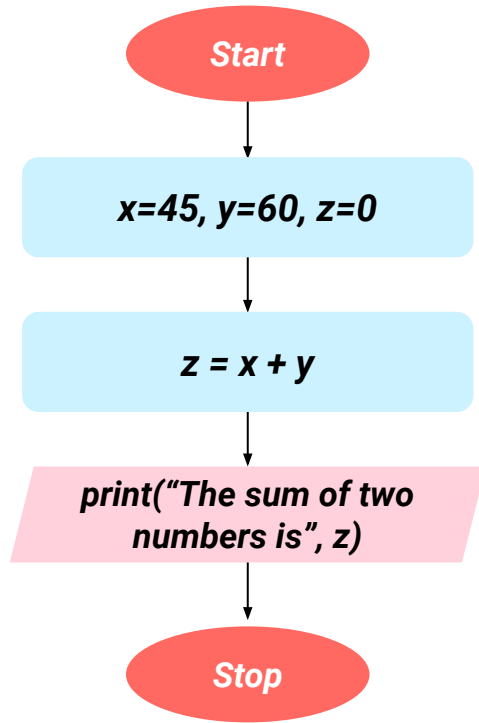


What Processes can we do with Numbers?



How many variables are we using here?

Are we asking the user for any input?



How many variables are we using here?

Are we asking the user for any input?

We are using **three** variables - x, y, and z.

No we are not asking the user to enter values for the variables. We are **giving them values in the program itself**.

VARIABLE INITIALISATION

Here we don't take a value for the variable from the user but write its value in the flowchart/program itself.

A = "Ronaldo"

B = 723

SchoolName = "Abc"

What symbol are we using to give a variable any value?

ASSIGNMENT OPERATOR

A = "Ronaldo"

Here the '=' symbol is called the assignment operator. It assigns the value on the **right hand side** to the variable on the **left hand side**.

Exmpl = 34+6

Observe the following assignments, what difference do you notice?

TextVar = "This is a sentence"

NumberVar = 745

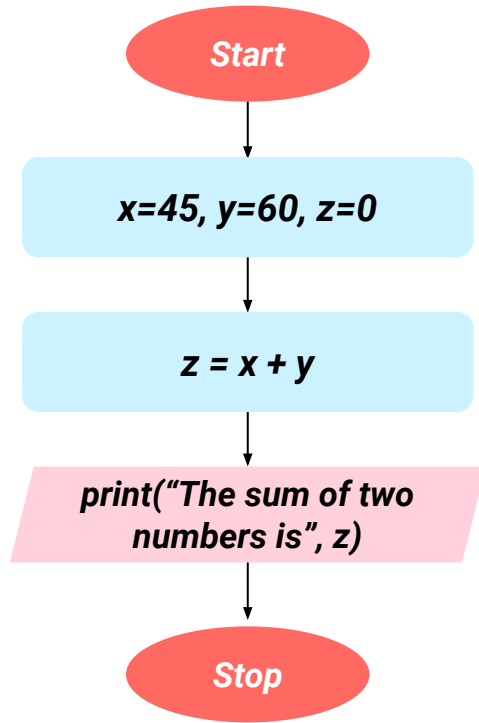
Observe the following assignments, what difference do you notice?

TextVar = "This is a sentence"

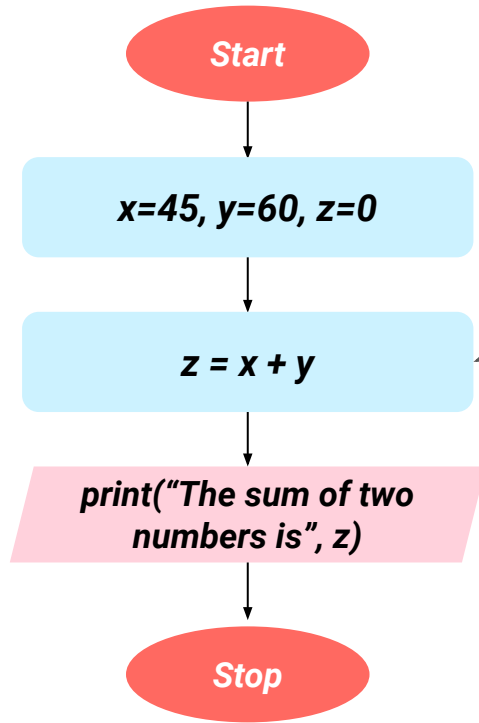
NumberVar = 745

To assign **textual** value to a variable, we need to frame them **inside " "** (double inverted commas)

For **numerical** values, we directly assign them to the variable. **No " "** required.

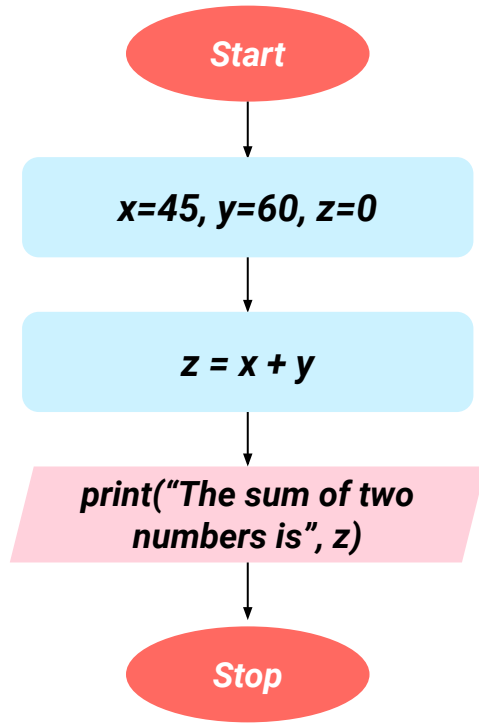


What new feature/box do you notice in this flowchart.



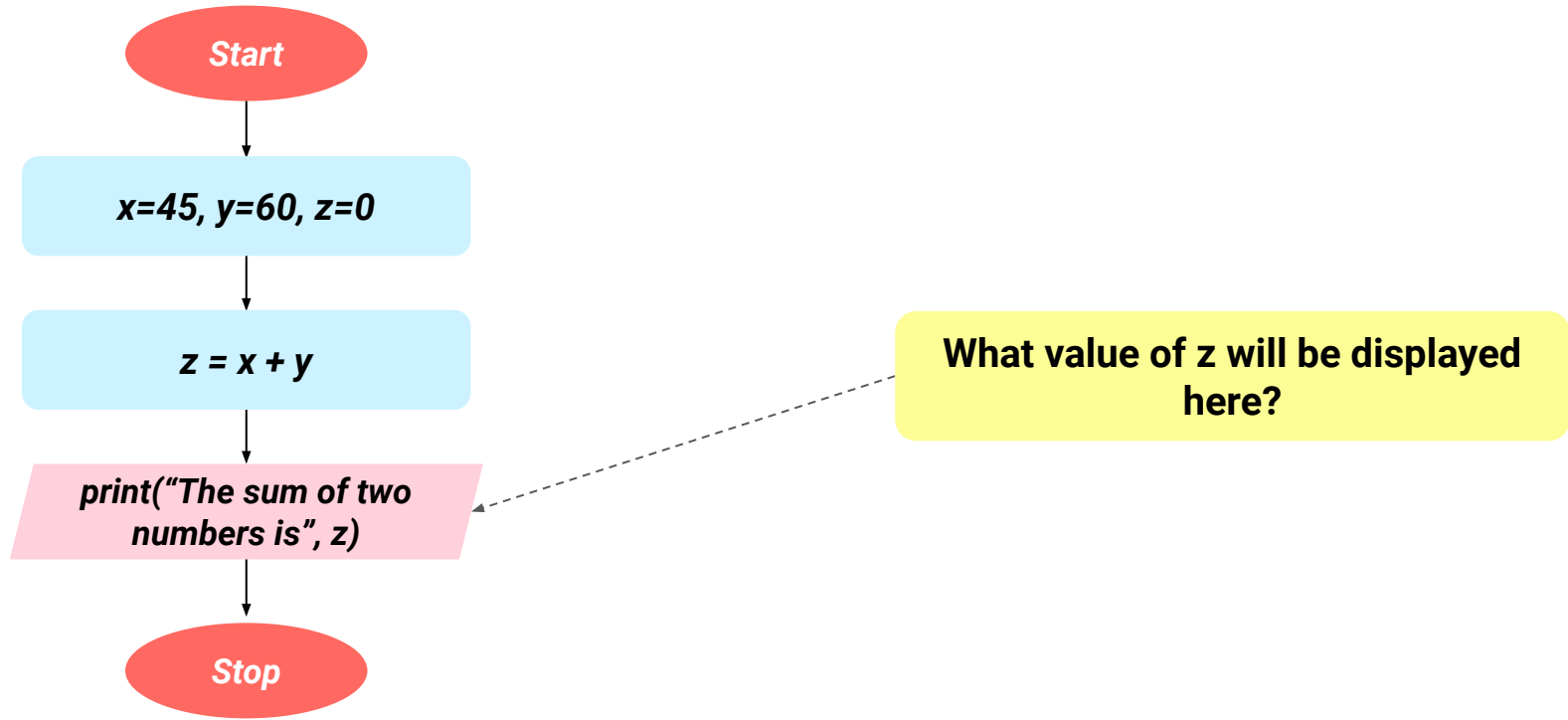
This is the process box, here we perform all sorts of operations on numbers, texts and we will learn more about them in the following classes.

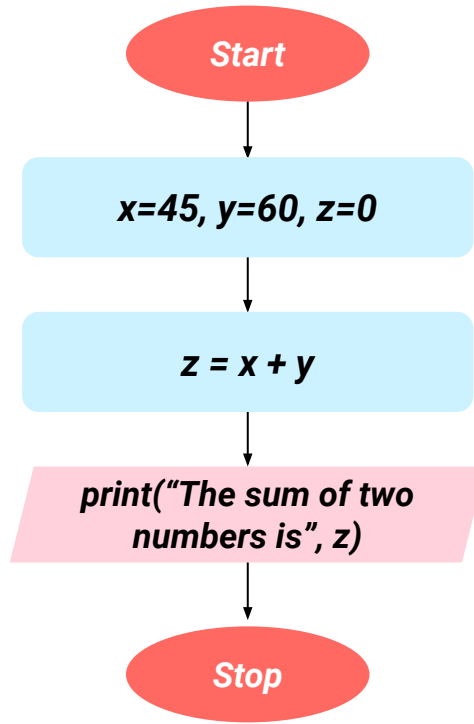
What process are we performing in this process box



We are performing addition. The **SUM** of variables x and y is calculated. The sum will be 10.

We are also perform **assignment operation**. The sum of x and y is assigned to z.





What value of z will be displayed here?

The sum of two numbers is 105

a computer's memory



x

y

z

What will be the value of x, y, and z in the computer's memory?

OTHER OPERATORS

Operator	Symbol	Operation	Example
Addition	+	Adds the given operands	$3+4 (=7)$
Subtraction	-	Subtracts the second number from the first	$7-5 (=2)$
Multiplication	*	Multiplies the given two operands	$4*3 (=12)$
Division	/	Divides first number by second number	$5/3 (=1.6666667)$

OTHER OPERATORS

Operator	Symbol	Operation	Example
Integer Division	//	Divides first number by second number and gives only the integer	5//3 (=1)
Modulus	%	Gives remainder when first number is divided by second	6%4 (=2)
Exponent	**	First number's power is raised to the second number	a**4 = a ⁴

OPERATORS - PRACTICE

Complete the given memory diagram based on the given processes

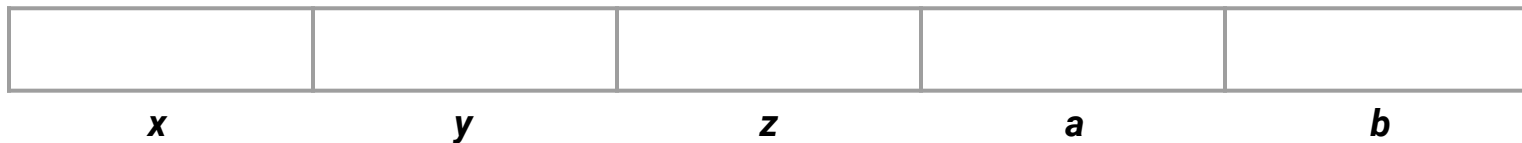
$x = 2//3$

$y = 14\%3$

$z = (11//2)*2$

$a = 12/3+12$

$b = 10**2\%2$



ANSWERS

Complete the given memory diagram based on the given processes

$$x = 2//3$$

$$y = 14\%3$$

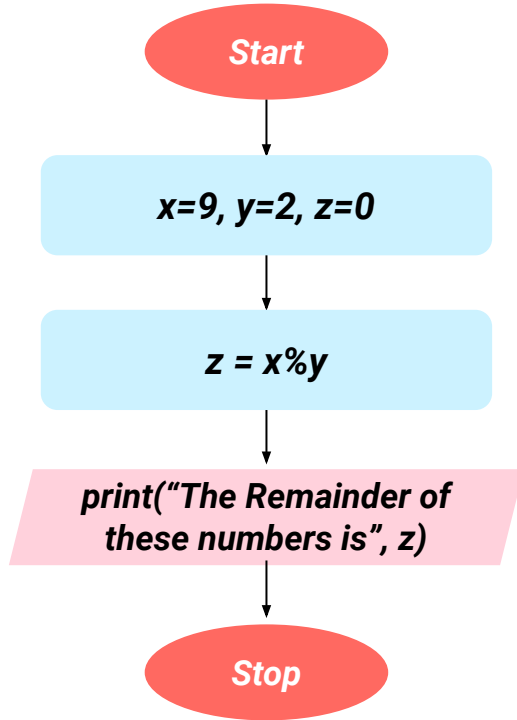
$$z = (11//2)*2$$

$$a = 12/3+12$$

$$b = 10**2\%2$$

0	2	10	16	0
x	y	z	a	b

PRACTICE



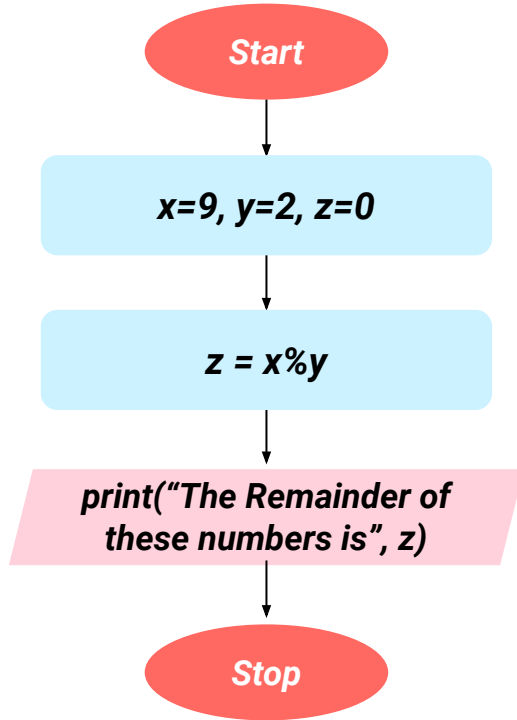
What are the variables we are using in the flowchart?

What does the % operator do with the two variables?

What will be the output of this program?

If we wanted to calculate the quotient and not the remainder, what operator would you use in that case?

PRACTICE



Variables we are using - x, y, and z

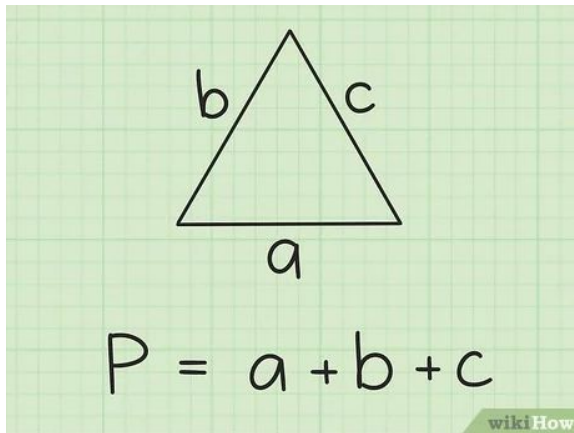
It calculates the remainder when dividing the two numbers

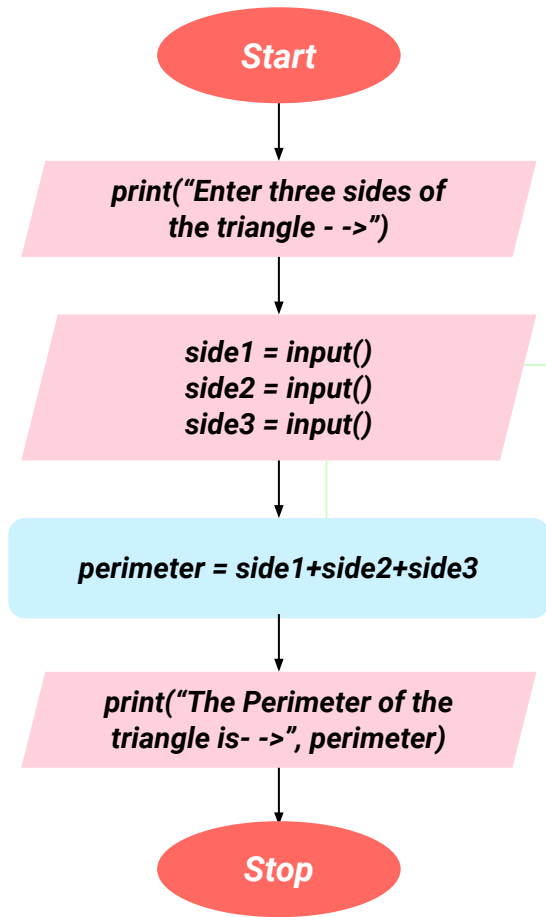
The Remainder of these numbers is 1

We would make use of the '/' operator.

PRACTICE

Write a flowchart to accept sides of a triangle and display its perimeter on the screen.





ANSWER

INDEPENDENT PRACTICE

Americans use the Fahrenheit scale, while Indians use Celsius. When Indians go to America, they find it very difficult to understand what the temperature is. Write a flowchart for Indians to enter the Fahrenheit temperature and get the Celsius temperature as the output.

Formula - $C = 5/9 * (F - 32)$

Output

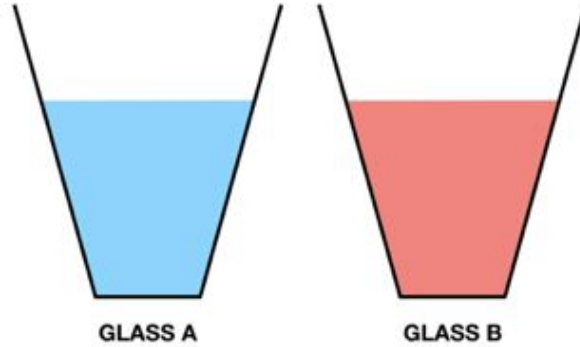
Enter Fahrenheit temperature -- > **68**

The Celsius temperature is -- > 20

Write a flowchart to find the value of $((a // b) * b) + (a \% b)$ where a and b are any numerical inputs.

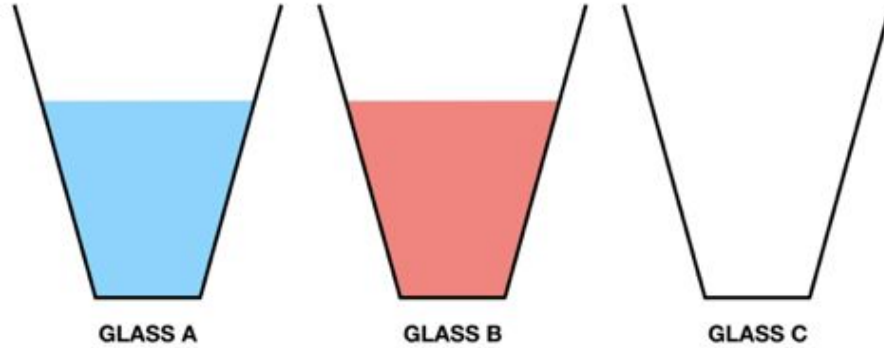
Write a flowchart to **print 1 if num is odd** and **0 if num is even**. Take input from the user. Use only operators.

PART II - A SPECIAL PROBLEM

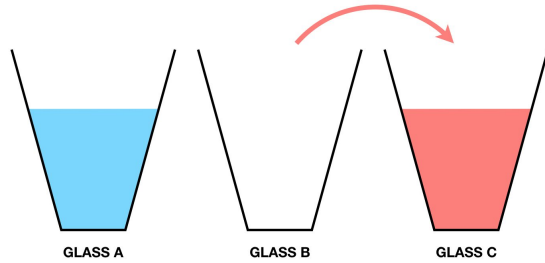


**You want to exchange the liquids in GlassA and GlassB.
How will you do it?**

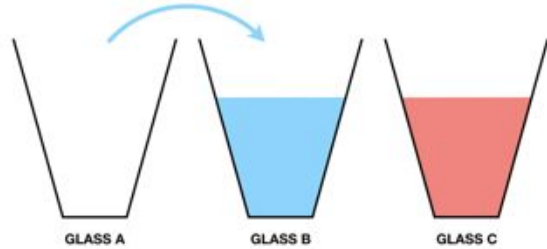
PART II - A SPECIAL PROBLEM



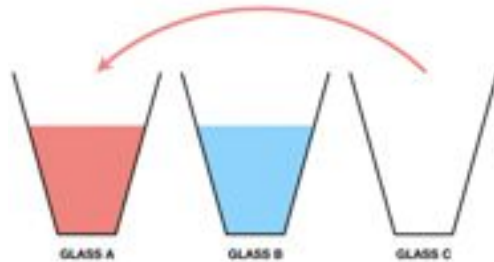
You're allowed to use a third container - GlassC.



Step 1 - Empty GlassB into GlassC



Step 2 - Empty GlassA into GlassB



Step 3 - Empty GlassC into GlassA

OUR PROBLEM

We want to exchange the values of two variables - **variableA** and **variableB**. How will you do so?

50	78			
<i>variableA</i>	<i>variableB</i>	<i>variableC</i>		

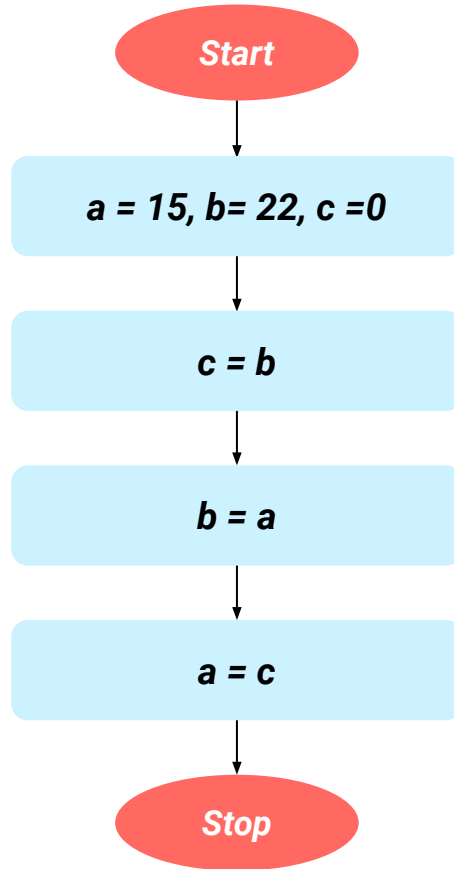


OUR PROBLEM

We want to exchange the values of two variables - **variableA** and **variableB**. How will you do so?

50	78			
<i>variableA</i>	<i>variableB</i>	<i>variableC</i>		

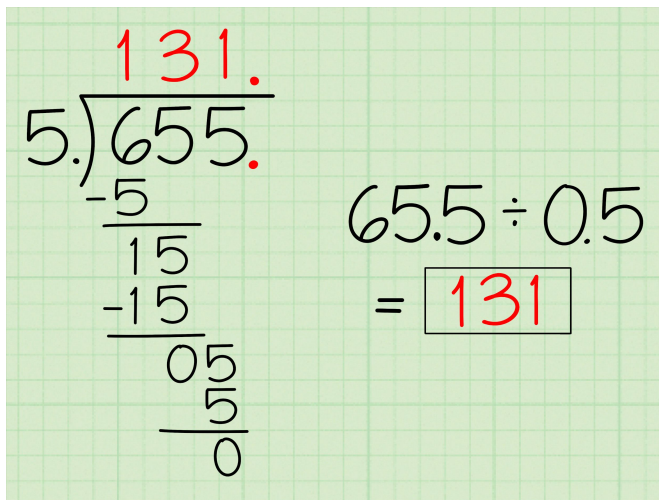
Write a flowchart to exchange their values.



Answer

PART III - DRY RUNS

After solving a Math problem, how do you check if your solution is correct or not?



The image shows a handwritten long division problem and its verification on a green grid background. The long division is $5 \overline{)655}$ with the quotient $131.$ written above. The steps of the division are shown: 5 is subtracted from 6 to get 1 , then 15 is subtracted from 15 to get 0 , and finally 15 is subtracted from 15 to get 0 . To the right, the multiplication $65.5 \div 0.5 = 131$ is shown, with the result 131 boxed in red.

$$\begin{array}{r} 131. \\ 5 \overline{)655} \\ \underline{-5} \\ 15 \\ \underline{-15} \\ 05 \\ \underline{-05} \\ 0 \end{array}$$
$$65.5 \div 0.5 = 131$$

PART III - DRY RUNS

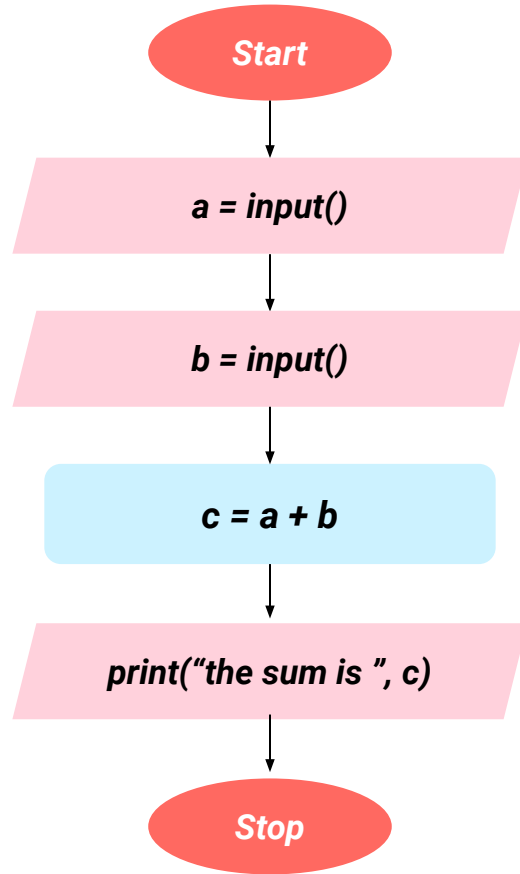
To check if our program correct, we test it using a method called Dry runs.

Let's do so for a flow chart where we are adding the values of two variables and printing it.

Steps -

1. First, make a table in which the first column is where we will write our instructions
2. Add a column to take input from the user wherever the command appears.
3. Add columns for each variable. If there are three variables, make three columns
4. One final column to display output.

Instructions	Input()	a	b	c	Output



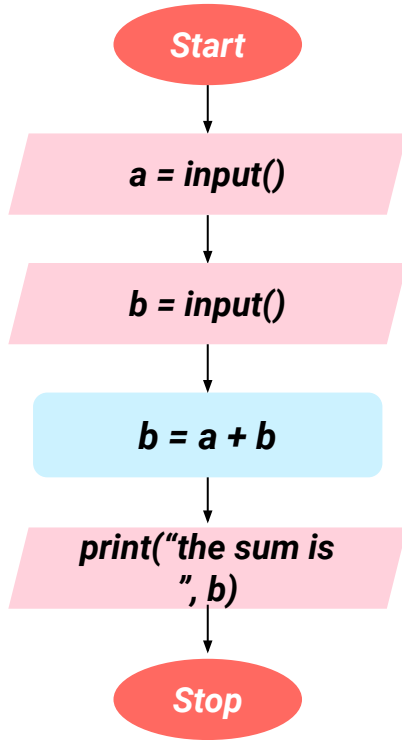
Instructions	Input()	a	b	c	Output
a=input()	45	45			

Instructions	Input()	a	b	c	Output
a=input()	45	45			
b=input()	30	45	30		

Instructions	Input()	a	b	c	Output
a=input()	45	45			
b=input()	30	45	30		
c = a + b		45	30	75	

Instructions	Input()	a	b	c	Output
a=input()	45	45			
b=input()	30	45	30		
c = a + b		45	30	75	
print("the sum is ", c)		45	30	75	The sum is 75

LET'S LOOK AT A SECOND EXAMPLE



Instructions	Input()	a	b	Output

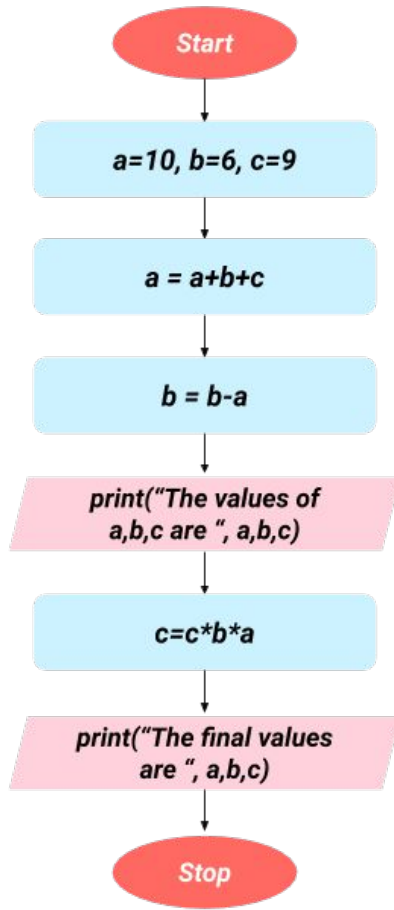
Take two values of a and b and complete the first two rows of the table.

Instructions	Input()	a	b	Output
a=input()	25	25		
b=input()	35	25	35	

What will you write for the instruction $b = a + b$

Instructions	Input()	a	b	Output
a=input()	25	25		
b=input()	35	25	35	
b = a+b			60	

The old value gets deleted and the new value will take its place. 35 will be removed and 60 be the value of b in this step.



Perform a Dry Run on this flowchart in your books.

INDEPENDENT PRACTICE

Write a program to accept length in inches, convert them into centimetres, and millimeters, and display the result on the screen. Take your own values and perform a dry run on the same as well.

Conversions -

1 inch = 2.54cm

1 inch = 25.4mm

Sample Output

Enter a length(in inches) -- > 15

In centimetres -- > 38.1

In millimetres -- > 381

INDEPENDENT PRACTICE

Arrange the following blocks in the correct order to achieve the given output.

Enter Selling price -- > 250

Enter Discount% -- > 10

The discount is -- > 25

The final price --> 225

Start

`print("Enter discount% →")`

`Discount = Percent/100*SP`

`print("Enter Selling price →")`

`FinalPrice = SP - Discount`

Stop

`Percent = Input()`

`SP = Input()`

**`print("The discount is →",
Discount)`**

**`print("The final price →",
FinalPrice)`**

INDEPENDENT PRACTICE

Perform a dry run on the following flowchart and calculate the final values of all variables

https://docs.google.com/document/d/1imQY_ZaTLGkFJKK2uDf28SJ3u3eopz3bEoUlcPd_XKI/edit