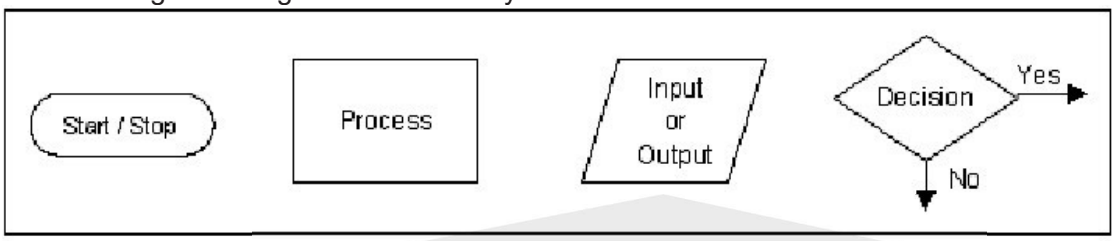
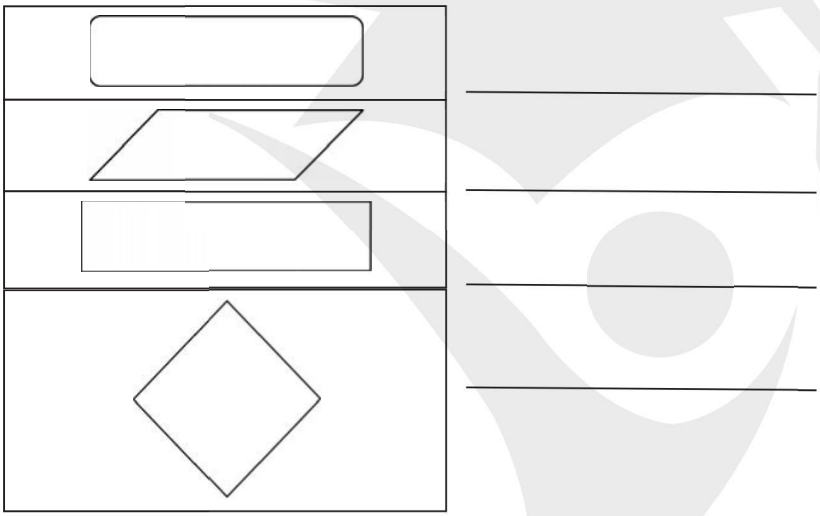
Flowchart

2.1.2 Flowchart

A flowchart is another way of breaking down a program in the form of a diagram.
The following are recognised flowchart symbols:



Write down the name of following flow chart symbols:



Q 11.1) Draw a flowchart that

- Inputs a number
- Find out number is negative or positive
- Output “Positive” or “Negative”

Q 11.2) Draw a flowchart that

- Inputs a number
- Find out number is even or odd (using MOD function)
- Output Even or ODD

Q11.3a) Write an algorithm, using flowchart only, that

- inputs three numbers
- outputs the greatest number

Q 11.3b) Write an algorithm, using flowchart only, that

- inputs three numbers
- outputs the smallest number

Q11.4a) Write an algorithm, using flowchart only, that

- inputs three numbers
- calculate total of two greatest numbers
- Output total

Q 11.4b) Write an algorithm, using flowchart only, that

- inputs three numbers
- calculate total of two smallest numbers
- Output total

COUNTING

Counting is used to find how many items are there by incrementing by 1 during each time loop is executed.

It is sometimes necessary to count how many times something happens.

To count up or increment by 1, we can use statements such as:

Count ← Count + 1

(new) (old)

i.e. INCREMENT (old) Count by 1 to get (new) Count

TOTALLING

Totalling is used to calculate running total. We can use a variable such as Total or Sum to hold the running total and assignment statements such as:

Total ← Total + Number

(new) (old)

i.e. ADD Number to (old) Total to obtain (new) Total

Count-controlled (FOR) loops

Count-controlled loop is used when the number of repetition is already known.

Example Question

a) Draw a flowchart to input 20 numbers and find the total and average of positive numbers

b) Explain how do you change your flowchart to work for 30 numbers that are between 0 and 100.

.....

.....

.....

.....

.....[3]

Redraw the flowchart for part b

Conditional Loop:

A loop which is executed on the basis of a condition.

Pre-condition (WHILE) loop in which condition is given at the start of loop and which is executed only when the condition is true, is called pre-condition loop.

Post-condition (REPEAT UNTIL) loop in which condition is given at the end of loop and which is executed only when the condition is false is called post-condition loop.

Rogue Value A value which stops input, used to terminate loop.

Q 11.8) Draw a flowchart that

Inputs the weight of a number of parcels in kilograms.

Validate parcel (parcels weighing more than 25 kilograms are rejected).

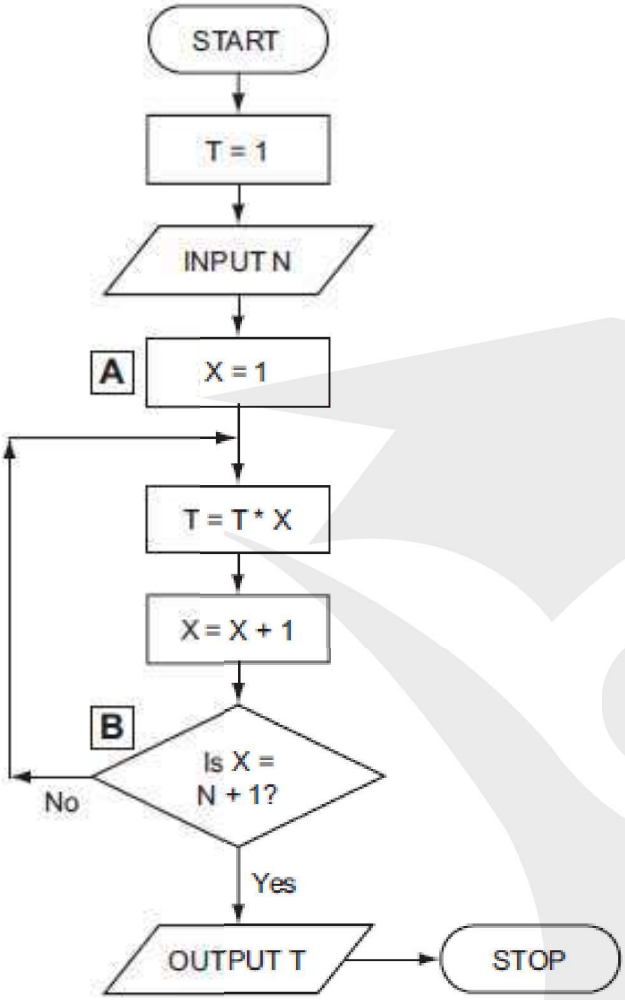
A value of –1 stops the input.

Outputs the total weight of the parcels accepted and number of parcels rejected.

Past Paper Question of same type in Summer 2015 P21& 23 Q 3

Q11.9)Summer 2009

Study the flowchart very carefully.



(a) Complete the table to show what outputs you would expect for the two inputs. [2]

Input N	Output T
5	
1	

(b) Write down a possible LOOP construct for the section A to B in the flowchart using pseudo code.

……

……

…….... [2]

Q 11.10) Draw an algorithm using flowchart that:

- Inputs the height of children who want to ride on a rollercoaster
- Validates height children under 1.2 metres are rejected.
- When eight children have been accepted, outputs message “Ready to go” and number of children rejected.

Past Paper Question of same type in Summer 20162210,0478 P21 &P23

Q11.11a) Draw a flowchart that

- Inputs 50 number
- Find out number is Integer or Real (using INT function)
- Count Integer and Odd Numbers
- Output how many were integer and odd

Q11.11b) Draw a flowchart that

- Inputs a series of numbers
- Calculates their total
- Stops input if a negative number is entered
- Output total.

Q 11.12) Draw a flowchart that

- Inputs temperature for a week (7 days)
- Outputs highest and lowest temperature

Q 11.13) Draw a flowchart that

- Inputs marks of a class of 30 students
- Outputs how many students are pass and how many are fail

Q 11.14) Draw a flowchart that

- Inputs per litre price of 5 different brands of milk
- Outputs how average price per litre

Q 11.15) Draw a flowchart that

Inputs a batch of 10 rice sacks for weight

- Validates sacks (sacks should weigh 50 kilograms each. Sacks weighing over 50.5 kilograms or less than 49.5 kilograms are rejected.)
- Outputs number of sacks accepted and the number of sacks rejected.

Past paper flowchart for same type of question in Winter 2017 P22 Q5
March 2018 P22 (India)

Q11.16) Draw a flowchart that

Inputs the weight in kilograms of a passenger stepping into a lift.
The lift can take a maximum of eight passengers or a maximum weight of 640 kilograms.

Q 11.17) Draw a flowchart that

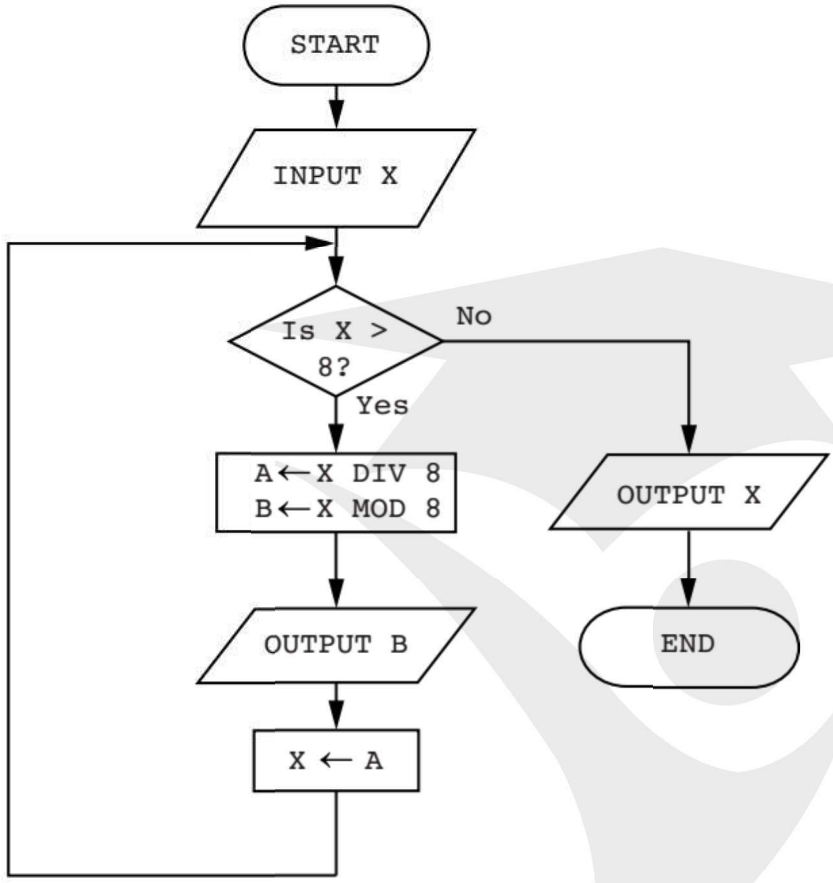
- Inputs name of 10 students in a class and store them in one dimension array
- Display list of names of students

Past paper flowchart for same type of question in Winter 2017 P21 Q5

Q 11.18)Winter 2016 P22 Q 3

Following flowchart is used to convert a denary number into octal (base 8)

The flowchart below inputs an integer. The predefined function DIV gives the value of the division, for example Z ←11 DIV 3 gives the value Z = 3. The predefined function MOD gives the value of the remainder, for example Z ←11 MOD 3 gives the value Z = 2.



Complete a trace table for each of the two input values **33** and **75**. [4]

Trace table for input value **33**

X	A	B	OUTPUT

Trace table for input value **75**

X	A	B	OUTPUT

Q 11.19) Draw a flowchart to convert denary number into binary

Test your flowchart by completing following trace table to convert denary number 20 into binary
[4]

X	A	B	OUTPUT

Q 11.20)Winter 2015 P23 Q 3

(a) This pseudo code inputs an integer. The predefined function DIV gives the value of the division, e.g. Y 10 DIV 3 gives the value Y = 3. The predefined function MOD gives the value of the remainder, e.g. Y 10 MOD 3 gives the value Y = 1.gives the value Y = 1.

```
INPUT X
WHILE X > 15
  DO
  T1 ← X DIV 16
  T2 ← X MOD 16
  CASE T2 OF
    10:OUTPUT A
    11:OUTPUT B
    12:OUTPUT C
    13:OUTPUT D
    14:OUTPUT E
    15:OUTPUT F
    OTHERWISE OUTPUT T2
  ENDCASE
  X ← T1
ENDWHILE
CASE X OF
  10:OUTPUT A
  11:OUTPUT B
  12:OUTPUT C
  13:OUTPUT D
  14:OUTPUT E
  15:OUTPUT F
  OTHERWISE OUTPUT X
ENDCASE
```

Complete a trace table for each of the **two** input values 37 and 191.

Trace table for input value 37

X	T1	T2	OUTPUT

Trace table for input value 191

X	T1	T2	OUTPUT

(b) State the purpose of the pseudo code in **part (a)**.

.....

.....[2]

Draw flowchart for the above pseudo code

Past paper question of same type in Winter 2015 P21 & 22

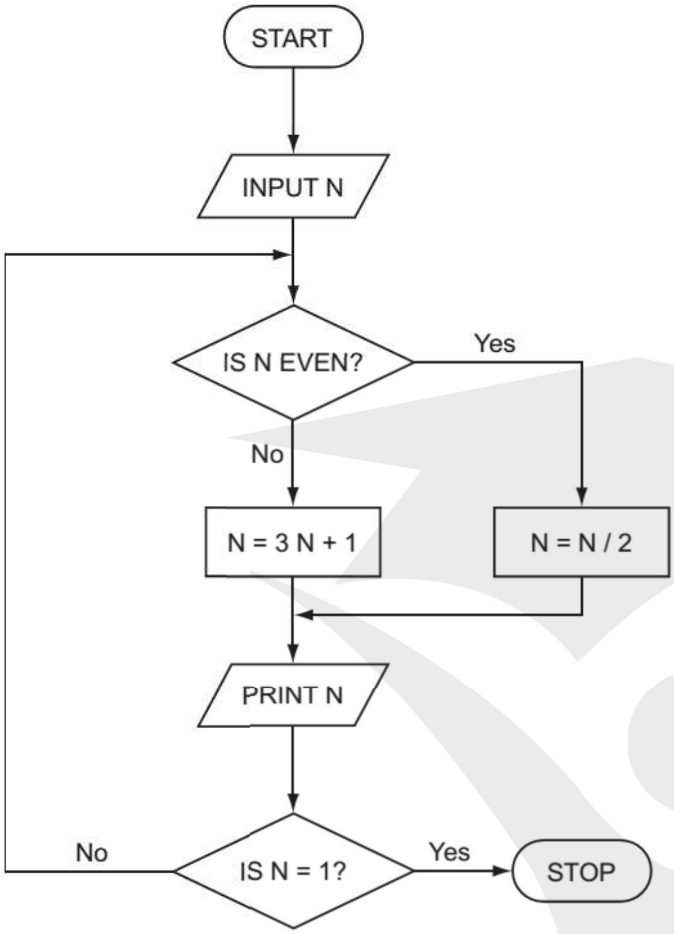
Q 11.20) Following flowchart is used to count digits in a number

```
DECLARE Count: Integer
DECLARE Num, x: Real
Count ← 0
INPUT Num
x ← PIN
REPEAT
    x ← x/10
    Count ← Count + 1
UNTIL x < 1
OUTPUT Count
```

Draw flowchart for the above pseudo code

Finding Output from flowchart

Q 11.21)Summer 2006



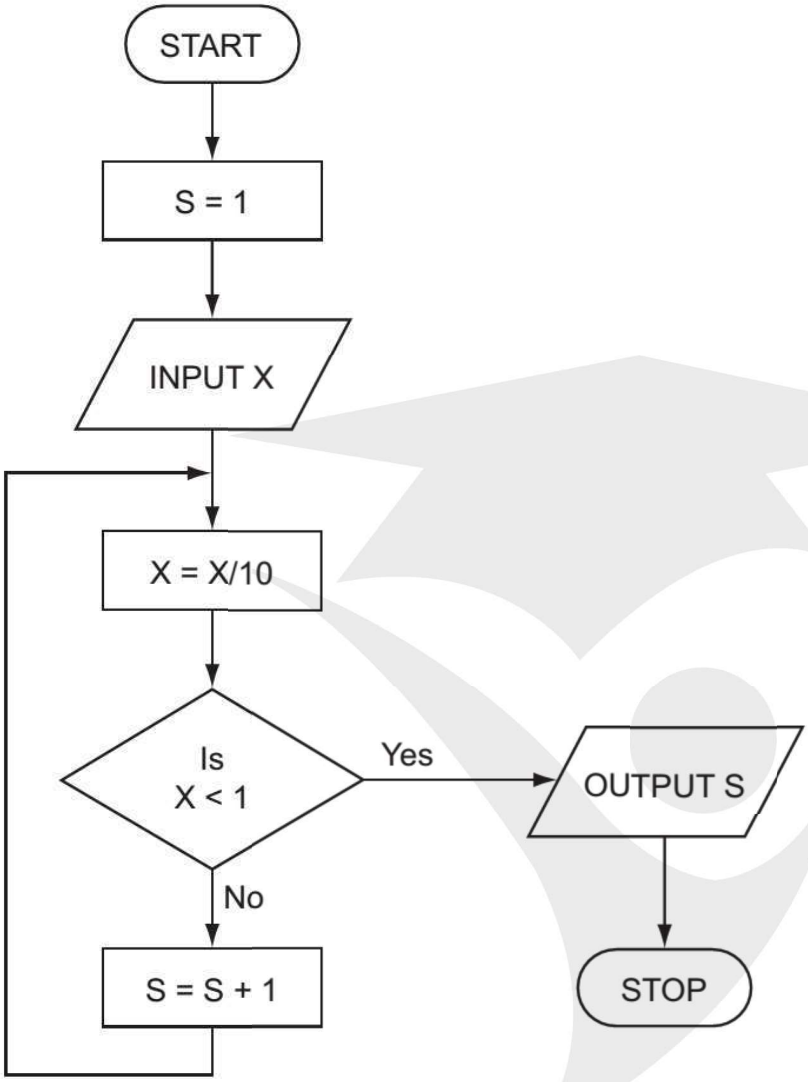
Trace the flow chart using the numbers 2 and 3. Write down each of the values of N in the order that they are printed out.

(a) 2 .....[1]

(b) 3 .....[2]

Q11.22)Summer 2007

Study the following flowchart very carefully.



(a) Complete the following table showing the expected output from the flowchart for the three sets of input data: [3]

INPUT X	OUTPUT S
48	
9170	
- 800	

(b) Input data needs to go through a validation process.

(i) Explain the term validation.

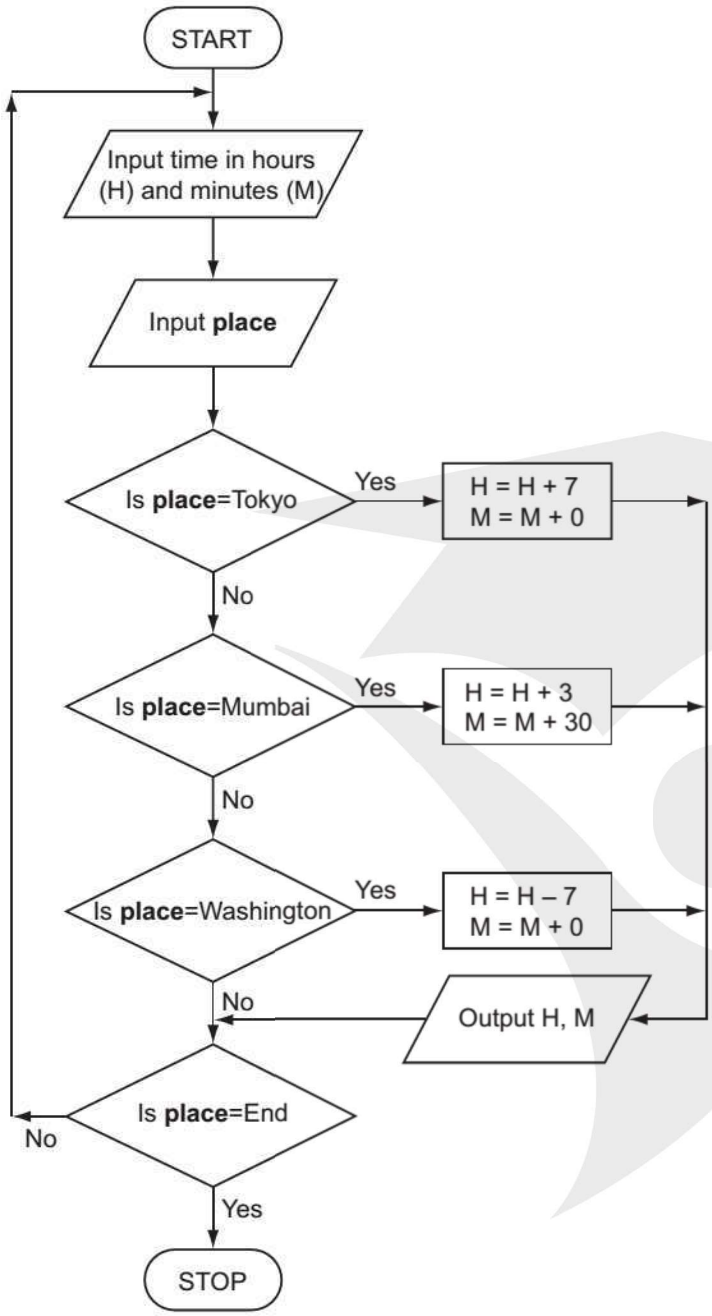
.....

(c) (ii) Describe one type of validation check

..... [2]

Q 11.23) Winter 2007

Majid lives in Cairo but often travels to Tokyo, Mumbai and Washington. A flow chart has been written so he can work out the local time in these three places.



(a) What output would be produced from the following input? [2]

Input			Output	
place	hours (H)	minutes (M)	H	M
Tokyo	11	15	18	15
Mumbai	15	10	18	40

(b) What problem would occur if place = Mumbai and H = 15 and M = 30?

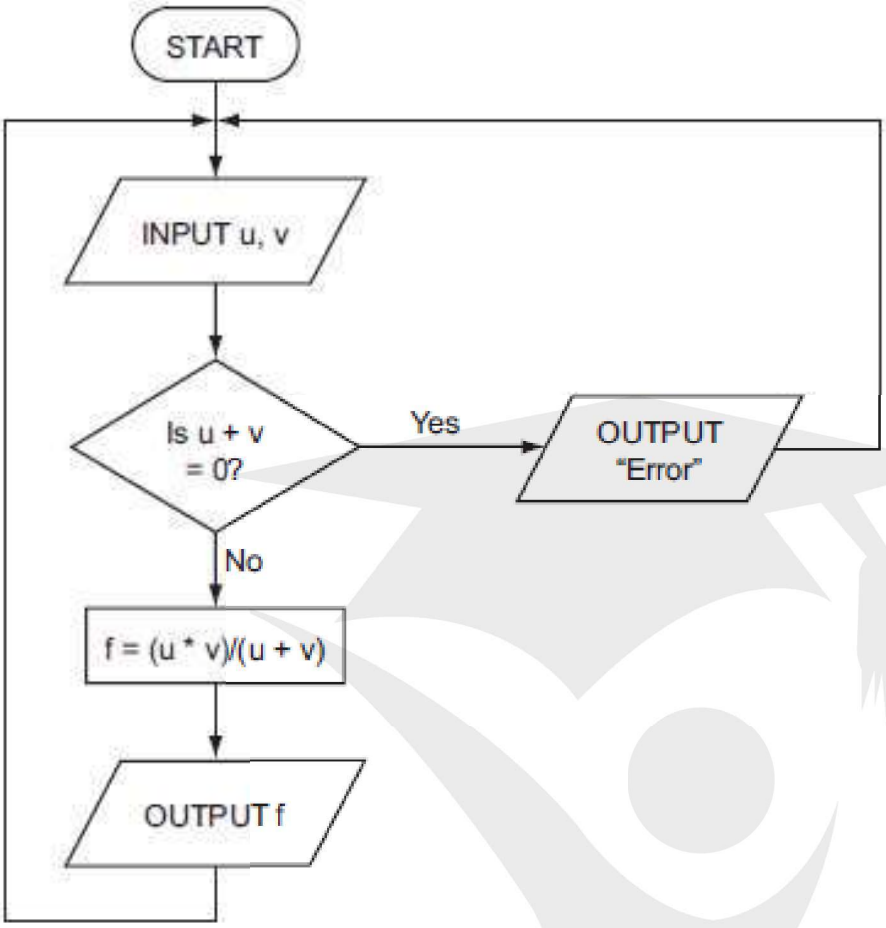
..... [1]

(c) What problem would occur if place = Washington and H = 4 and M = 0?

..... [1]

Q 11.24) Summer 2008

~~The following flowchart inputs two numbers, carries out a calculation and then outputs the result.~~



(a) Complete the following table for the three sets of input data. [3]

INPUT		OUTPUT
U	V	
5	5	
6	-6	
12	4	

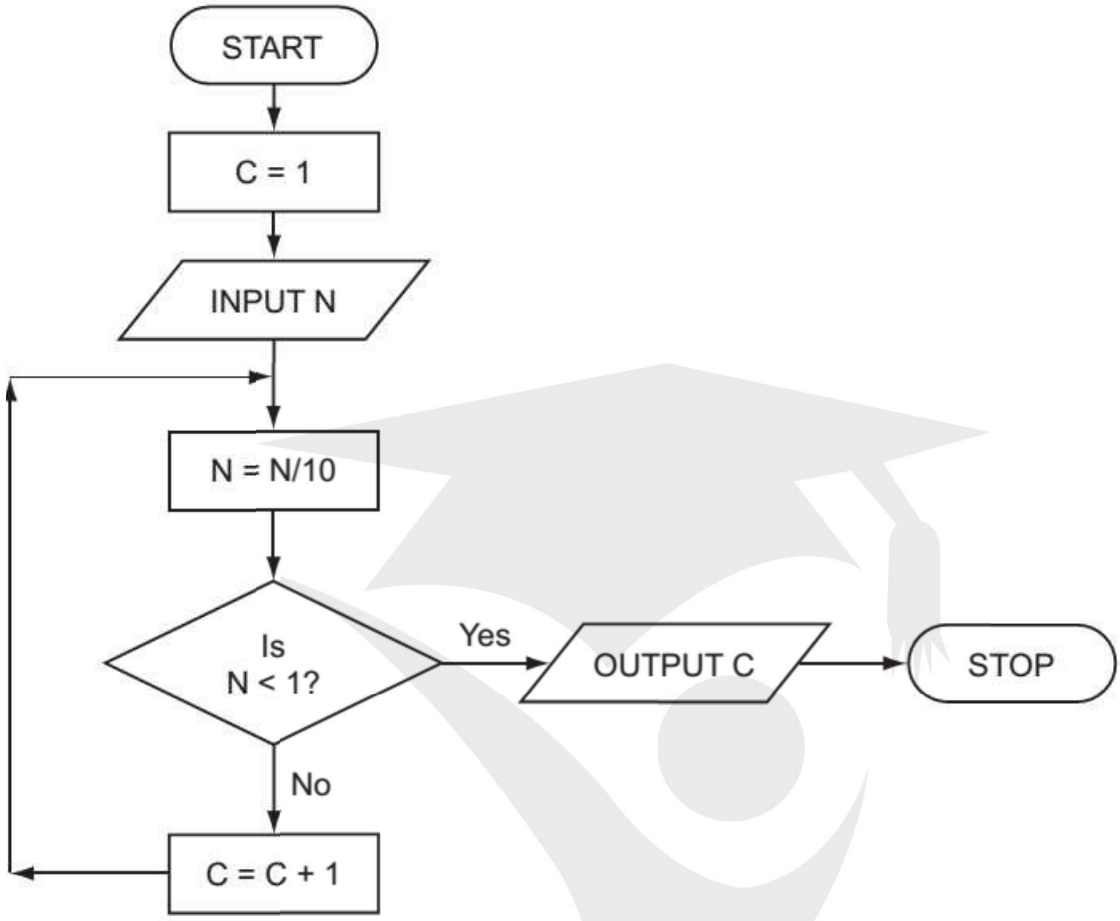
(b) The above algorithm has been placed in a library of routines. Give one advantage of doing this.

……

……[1]

Q 11.25)Winter 2009. P11

Study the flowchart.

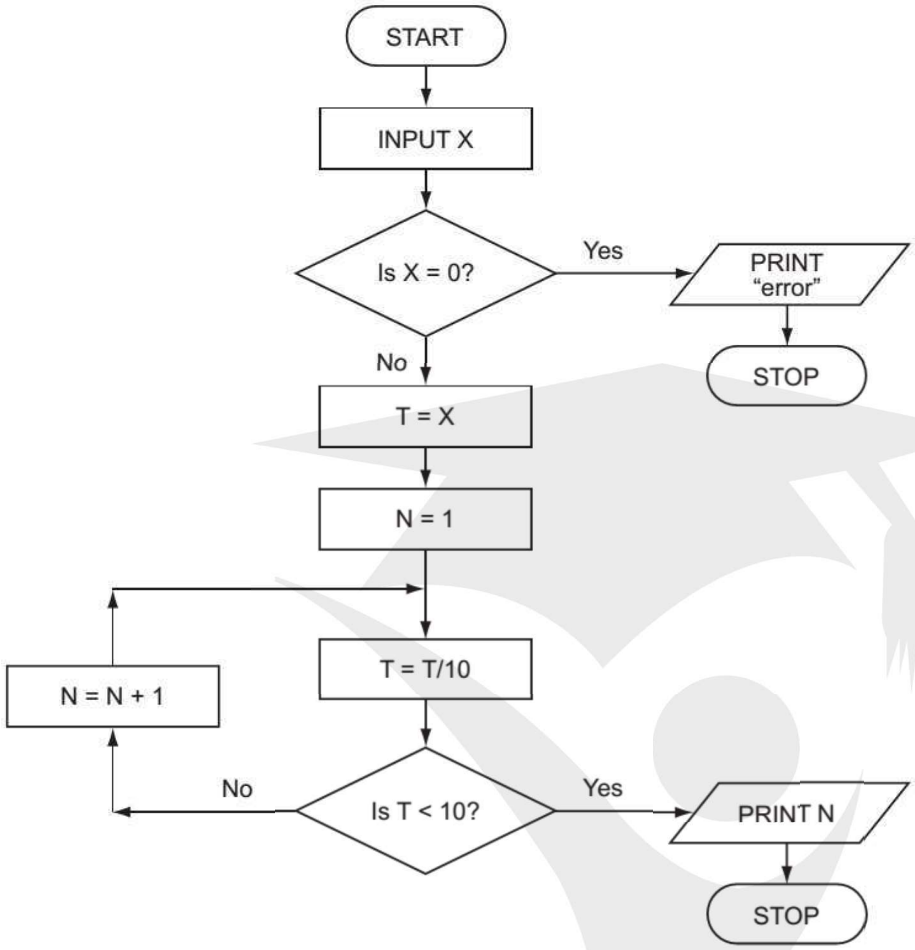


Complete the table to show what outputs you would expect for the three inputs. [3]

INPUT N	OUTPUT C
55	
2100	
1	

Q 11.26) Summer 2010 P12

Study the following flowchart very carefully:



What output would you expect if the following data was input into the flowchart? [3]

X	OUTPUT
-150	
540	
0	