

## Q2. Estimate Age of Tree (30 marks):

You can get a rough estimate of the age of a tree without cutting it down. The age of a tree depends on the circumference of the tree and also its growth factor. The circumference is measured around the trunk of the tree (the girth) at about 1m from the ground. The growth factors for some of the tree species are given in table.

Tree Species & Growth Factors	
Species	Growth Factor
American Beech	6
Basswood	3
Common Horsechestnut	8
Dogwood	7
European White Birch	5
White Fir	7.5

The formula to compute the estimated age of a tree is given below:

**Step 1)** Compute the Diameter at Breast Height (DBH). That is

DBH = The circumference of the tree (in inches)  $\div \pi$ , where

$$\pi = 3.141592$$

**Step 2)** With the species of the tree, obtain the Growth Factor from the table.

**Step 3)** Compute the estimated age of the tree, which is,

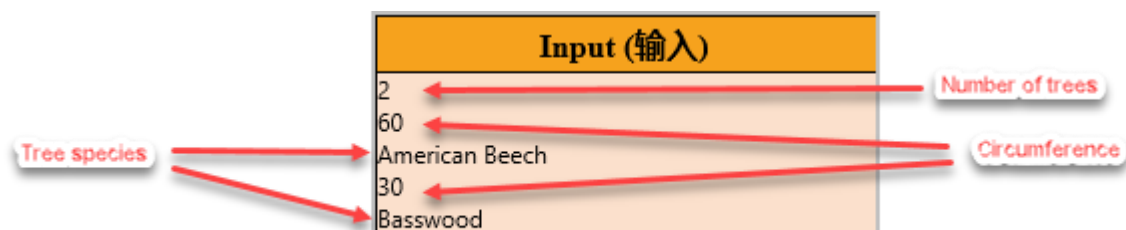
$$\text{Age of the Tree} = \text{DBH} \times \text{Growth Factor}$$

## Write a programme to

Input, in sequence,

- A **positive integer** that represents the number of tree(s) you intend to estimate its/their age(s).
- Subsequent entries will be the **circumference** of the first tree, followed by the **species** of that tree; and then circumference and species of the next tree, so on so forth until the data of all trees have been input.

**Example:**



**Output** the list of all the trees with their estimated ages. The output must comply with the following conditions:

**Condition (1):** For **each correct entry**, the output will be displayed as,

[Tree Species] : [Circumference] : [Estimated Age]

**Note 1:** The output values of both **circumference** and **estimated age** must be **rounded to and displayed in 1 decimal place**.

**Note 2:** There must be **ONE (1) space** before each **colon “:”** and **ONE (1) space** after each **colon “:”**.

**Condition (2):** For **each incorrect entry** such as the value of the **circumference is less than or equal to ZERO (0)**, the output will be displayed as,

The circumference for [tree species] must be greater than 0!

**Note:** There **must not be any space** before the exclamation mark “!”.

**Condition (3):** For **each incorrect entry** such as a tree species not listed in the above table is entered, the output will be displayed as,

Species entered is not available!

**Note:** There **must not be any space** before the exclamation mark “!”.

**Condition (4):** For the incorrect entry for the number of trees, such as a **non-positive or non-integer number** is entered, the output will be displayed as,

You must specify a positive integer number for the number of trees!

**Note 1:** There **must not be any space** before the exclamation mark “!”.

**Note 2:** After the above message is displayed, the programme can stop and no other output will be displayed.

## 试题 2. 树龄的估算 (30 分) :

估算一棵树的年龄，不一定非要砍了这棵树不可。其实一棵树的年龄也可以从树的圆周 (Circumference) 以及其成长因数 (Growth Factor) 来估算。树的圆周是以离地一米高的树干的周长来测量。下表显示一些已知树品种的成长因数。

树的品种和成长因数	
品种 (Species)	成长因数 (Growth Factor)
American Beech	6
Basswood	3
Common Horsechestnut	8
Dogwood	7
European White Birch	5
White Fir	7.5

有了上表，用以估算树龄的步骤如下：

**步骤 1)** 计算树的胸径 (Diameter at Breast Height, DBH) , 已知

$DBH = \text{树的圆周 (寸)} \div \pi$ , 其中

$$\pi = 3.141592$$

**步骤 2)** 根据树的品种，参考上表得出树的成长因数 (Growth Factor) 。

**步骤 3)** 用以下公式估算树的年龄，

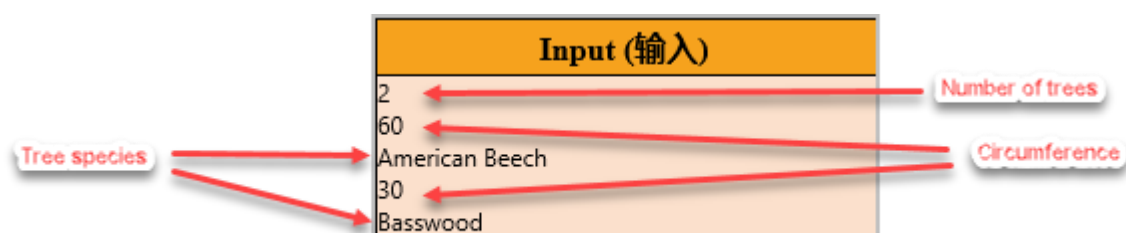
$$\text{树龄} = DBH \times \text{Growth Factor}$$

试写一程式以

依序输入

- 一个整数，以表示有多少棵树待估算其年龄。
- 接着输入第一棵树的圆周，然后品种；再接着下一棵树的圆周，品种，等等，一直到所有待估算的树的资料完全被输入为止。

例子：



依序输出所有树的估算年龄。其中输出必须严格遵守以下条件。

条件(1): 若输入值是**正确的**, 其输出必须以以下格式显示,

[树的品种]: [圆周]: [估算的树龄]

**注意事项 1**: 圆周以及树龄的输出, 必须近似并显示至小数点后一位。

**注意事项 2**: 冒号“:”之前及之后都必须要有空格。

条件(2): 若圆周的输入值是**错误的**, 即小于或等于零, 则输出必须为,

The circumference for [树的品种] must be greater than 0!

**注意事项**: 感叹号“!”之前**不能有**空格。

条件(3): 若树的品种的输入是**错误的**, 即不在之前所示的表格内, 则输出必须为

Species entered is not available!

**注意事项**: 感叹号“!”之前**不能有**空格。

条件(4): 若是树的数目输入值是**错误的**, 即非一正整数, 则输出为

You must specify a positive integer number for the number of trees!

**注意事项 1**: 感叹号“!”之前**不能有**空格。

**注意事项 2**: 以上信息显示后, 程式可以马上停止, 并不再有其他任何输出。

### Example (例子)

Input (输入)	Output (输出)
2 60 American Beech 30 Basswood	American Beech : 60.0 : 114.6 Basswood : 30.0 : 28.6
4.89 56 White Fir 85 Common Horsechestnut 28 European White Birch 94 American Beech	You must specify a positive integer number for the number of trees!
-3 76 Merdeka 45 European White Birch 28 Dogwood	You must specify a positive integer number for the number of trees!
4 56 White Fir -85 Common Horsechestnut -28 European White Birch 94 American Beech	White Fir : 56.0 : 133.7 The circumference for Common Horsechestnut must be greater than 0! The circumference for European White Birch must be greater than 0! American Beech : 94.0 : 179.5
4 56 White Fir 85 China Horsechestnut 28 Malaysian White Birch 94 American Beech	White Fir : 56.0 : 133.7 Species entered is not available! Species entered is not available! American Beech : 94.0 : 179.5