C++ Fundamentals: Exam

The following tasks should be submitted to the SoftUni Judge system, which will be open starting Sunday, 14 January 2018, 09:00 (in the morning) and will close the same day at 15:00. Submit your solutions here: https://judge.softuni.bg/Contests/Compete/Index/907.

For this exam, the code for each task should be a single C++ file, the contents of which you copy-paste into the Judge system.

Please be mindful of the strict input and output requirements for each task, as well as any additional requirements on running time, used memory, etc., as the tasks are evaluated automatically and not following the requirements strictly may result in your program's output being evaluated as incorrect, even if the program's logic is mostly correct.

You can use C++03 and C++11 features in your code.

Unless explicitly stated, any integer input fits into **int** and any floating-point input can be stored in **double**. On the Judge system, a C++ **int** is a **32-bit** signed integer and a C++ **double** is a **64-bit** IEEE754 floating point number.

NOTE: the tasks here are NOT ordered by difficulty level.

Task 4 – Interference (Exam-Task-4-Interference)

The commanders of the Rabble Alliance *(What? I'm avoiding copyright… and considering how Episode 8 went, it's not a very inaccurate name anyway…)* are in a starship and on the run from the Empire. They are receiving communications from their allies. It is very important for the Alliance to read the full contents of those messages and act on them. Also, **each message has a special priority code** somewhere **inside it**. The **priority code is just an integer number being sent along with the message**. If several messages are successfully received, the commanders need to first **read the one with the highest priority code**. Note that even though the code is inside the sent message, it is not an actual part of the message, i.e. it should be removed from the message when it is shown to the commanders.

For example, if we have received the following transmissions:

`i am your f15ather`

`10he might be your father but hes not your daddy`

`are you there yet100`

The first time the commanders request a message, the message they read will be

`are you there yet`

because it has the highest priority of **100**. The next message they read will be

`i am your father`

and the last will be

`he might be your father but hes not your daddy`

Note that the priority codes have been removed from the messages that the commanders receive, but are used to determine the order in which they receive them. Note also that if the commanders **request a report again**, there will be **no new messages** (all the messages have been read), even if one of the above messages repeats.

However, the Empire is jamming the transmissions. The jamming randomly makes some symbols in the messages **unreadable**. Luckily, the Alliance has anticipated this and has preemptively coordinated a workaround to the problem. Each ally of the alliance transmits their **message at a specific frequency**, and always **repeats the same message, at the same frequency**. That way, after enough transmissions, the message will probably be pieced together in full, because on each transmission there is **a chance that one of the previously unreadable symbols will be readable**, because each transmission has random unreadable symbols. In short, for each transmission on a certain frequency the Alliance receives, if we keep only the readable symbols, after enough transmissions we will probably have the full message. It isn't guaranteed this will work for all messages, but it's better than nothing, and – statistically – it should work for a lot of them.
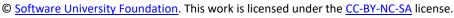
An example of this is the following received transmissions (the symbol "**?**" represents an unreadable symbol):

1. `98.3 they????Fromm10mBEHIND`
2. `12000 man12yBo??ansdied??getusthisinform?tion`
3. `98.3 theyCa??????10m??????`
4. `98.3 ????C?me?????????????`
5. `12000 ?????yBothansdiedtogetusthisinformation`
6. `98.3 theyCameFromm10mBEHIND`

If the commanders request the program to **report** the latest high-priority message **between transmissions 2 and 3**, there will be **no new messages to read** – because no message has yet been cleared of interference.

If they ask the program to **report between transmissions 5 and 6**, they will receive the message `manyBothansdiedtogetusthisinformation` – both messages have been cleared of interference, but this

message has a priority of **12**, whereas the other has a priority of **10**. If they ask again, they will receive the message **theyCameFrommmBEHIND**, which has the lower priority. Note that after that we continue to get transmissions with **theyCameFrommmBEHIND** message – as mentioned, the allies are sending their transmissions all the time, because they do not know when the Alliance will receive them in full. If the commanders request yet another **report after transmission 6**, they will **again have no new messages** – because the **theyCameFrommmBEHIND** message was **already reported between 5 and 6** by the commanders' request.

General Lelia *(you read that correctly)* has tasked you with writing a program, which reads transmissions, groups them based on the frequency they are coming from, clears the interference from transmissions in the same group, and – when asked – reports the highest-priority message. Hurry up! Time is running out, and you are her only hope! *(well… you and the room full of people solving the same exam…)*.

Input

The standard input will contain a sequence of lines, each containing either a transmission, or the string **report**, or the string **end**.

The line with the single string **end** stops the program.

The line with the single string **report** requests that the program print the current highest-priority message (if any). The program should also mark that message as already reported and not report it again later, even if it receives it again.

The lines containing a transmission have the following format: an integer or floating-point number – representing the frequency of the transmission – and a string with the contents of the transmission (a sequence containing digits **0**-**9** and English letters, **a**-**z**, **A**-**Z**), which may or may not have unreadable symbols (the symbol "**?**") due to interference. A single space will separate the number and the string. There will be no spaces in the contents of the transmission. The digits in the transmission will represent the priority code of the message.

Output

For each line with the single string **report**, print the **current highest-priority message** (which has been fully cleared of interference), or, if there is no such message, print the string **[no new messages]**.

Restrictions

Each transmission on the same frequency will have the same number of symbols, and each transmission will contain the same message – even though some of the symbols in the message might be **unreadable** (**?**).

Each (cleared of interference) message will contain only English letters (**a**-**z**, **A**-**Z**), and will contain no more than **20** symbols (not counting the symbols for the priority code)

Transmission frequencies will be integer or floating-point numbers between **80** and **20000**.

There will be no more than **100** messages, but the number of transmissions per message can be above **50**.

Priority codes will be integer numbers between **0** and **2147483647** inclusive.

There will be no more than **10000** lines in the input (including transmissions, **report** and **end** lines)
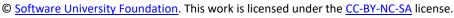
The total running time of your program should be no more than **0.2s**

The total memory allowed for use by your program is **5MB**

Example I/O

Example Input	Expected Output

151.3 he?1l? report 151.3 h?l1l? 120.3 ????2top 151.3 h?l1lo 120.3 top1???? report report 151.3 hel1l? report 107.7 2goodbye report 151.3 hel1l? 151.3 hel1lo report end	[no new messages] toptop hello [no new messages] goodbye [no new messages]
424.2 14hello 2000.0 105Appl?? 2000.0 105Appl?s 1999.0 105Applod 666.0 666???NumberOfTheBeast 2000.0 ???????e? report 666.0 666the??????????????? 666.0 666the??????????????? end	Apples
98.3 they????Fromm10mBEHIND report 12000 man12yBo??ansdied??getusthisinform?tion 98.3 theyCa??????10m?????? 98.3 ????C?me????????????? 12000 ?????yBothansdiedtogetusthisinformation report report 98.3 theyCameFromm10mBEHIND report end	[no new messages] manyBothansdiedtogetusthisinformation theyCameFrommmBEHIND [no new messages]