Challenge 9 - Defenders of the Galaxy

The galaxy is infested with colonies of nasty creatures, called the *Zorg*. Their only goal is to conquer and destroy every other form of intelligent life. They arrived on our home planet a few hours ago, and their numbers are counted in the millions. If they reach the capital city, all hope will be lost.

The *Zorg* battle strategy is basically to overrun their enemies with thousands and thousands of their minions, the *Zorglings*. They are weak creatures, like big cockroaches, but they are fast (**1 m/s**, according to our observations). Inside each one of them is a powerful, short-ranged bio-explosive, triggered by their mind, effectively converting them into moving grenades. Fortunately, to reach the walls of the great city of *Azundys*, they have to pass through a narrow canyon of **W** meters wide (allowing only **W** *Zorglings* to enter the canyon per second) and **H** meters long, heavily defended by our allies, the *Protass*, standing at the end of the canyon.

The *Protass* soldiers have laser guns. Each gun can fire once per second. Laser impact is fatal for the *Zorglings*, and the elite soldiers never miss a shot (this means that with 10 soldiers we can kill 10 *Zorglings* per second). Each soldier's equipment and training cost **S** gold. As soon as the *Zorlings* appear in the canyon entrance, they will be in range, so the soldiers can shoot them.

We also have a special weapon: the *Crematorium*. Its energy and fuel consumption are insane, but it will burn all the *Zorglings* present to ashes in the canyon at a given time. Each time the *Crematorium* is used, it costs **C** gold.

If a single *Zorgling* reaches the end of the canyon, it will blow up, destroying the last city defenses, and thus dooming the last standing free planet in this quadrant of the galaxy.

Given that you have **G** gold, and all the data that was presented above, you must output how long you will survive the attack, in seconds, with the most optimal configuration (how much you will spend in soldiers and how much in *Crematoriums*). You must assume that the *Zorg* army will be infinite, and they will try to enter the canyon continuously, with as many of them as they can.

Input

- *Integer **T***: Number of test cases.
- *T* tests cases follow. For each test case, in a single line, whitespace-separated:
  - *Integer **W***: width of the canyon, in meters
  - *Integer **H***: length of the canyon, in meters
  - *Integer **S***: price to train a soldier, in pieces of gold
  - *Integer **C***: price to trigger a *Crematorium*, in pieces of gold
  - *Integer **G***: amount of gold that you have

Output

For each test case, the number of seconds you can resist. If you think you can take on the *Zorg* overrun forever, output "-1" (without the quotes).

Example

Suppose there is a canyon of dimensions 3x2. You have 2 soldiers and 1 *Crematorium*. The battle will unfold as follows (*Zorglings* are represented by a "v", the canyon walls with a "#", and the city walls with a "-"):

```
#···#
#···#
#---#
```

Everything is ready. *t=0s*

```
#vvv#
#···#
#---#
```

Zorglings appear. *t=1s*

```
#··v#
#···#
#---#
```

The 2 soldiers instantly kill 2 *Zorglings*. *t=1s*

```
#vvv#
#··v#
#---#
```

More *Zorglings* appear. *t=2s*

```
#·vv#
#···#
#---#
```

The soldiers kill another 2 *Zorglings*. *t=2s*

```
#vvv#
#·vv#
#---#
```

More *Zorglings* appear. *t=3s*

```
#vvv#
#···#
#---#
```

The soldiers kill another 2 *Zorglings*. *t=3s*

```
#vvv#
#vvv#
#---#
```

More *Zorglings* appear. *t=4s*

```
#vvv#
#··v#
```

```
#---#
```

The soldiers kill another 2 *Zorglings*. *t=4s*

```
#···#
#···#
#---#
```

We have to use the *Crematorium* right now, killing every single *Zorgling* in the cannon. *t=4s*

```
#vvv#
#···#
#---#
```

Zorglings appear. *t=5s*

```
#··v#
#···#
#---#
```

The 2 soldiers instantly kill 2 *Zorglings*. *t=5s*

```
#vvv#
#··v#
#---#
```

More *Zorglings* appear. *t=6s*

```
#·vv#
#···#
#---#
```

The soldiers kill another 2 *Zorglings*. *t=6s*

```
#vvv#
#·vv#
#---#
```

More *Zorglings* appear. *t=7s*

```
#vvv#
#···#
#---#
```

The soldiers kill another 2 *Zorglings*. *t=7s*

```
#vvv#
#vvv#
#---#
```

More *Zorglings* appear. *t=8s*

```
#vvv#
```

```
#··v#
#---#
```

The soldiers kill another 2 *Zorglings*. *t=8s*

In *t=9*, one *Zorgling* reaches the walls, destroying the defenses. So, in this case, the output you should give is **8 seconds**.

Sample input

```
2
10 20 50 100 400
10 20 50 100 500
```

Sample output

```
100
-1
```

Submit & test your code

To test and submit code we provide a set of tools to help you. Download contest tools if you haven't already done that. You will then be able to test and submit your solution to this challenge with the challenge token.

```
Challenge token: YOoSjWZNqLTndXEfQrwS
```

To test your program

```
./test_challenge YOoSjWZNqLTndXEfQrwS path/program
```

A nice output will tell you if your program got the right solution or not. You can try as many times as you need.

To submit your program to the challenge

```
./submit_challenge YOoSjWZNqLTndXEfQrwS path/source_pkg.tgz path/program
```

Note that you first need to solve the test phase before submitting the code. During the submit phase, in some problems, we might give your program harder questions, so try to make your program failsafe.

Important: In this phase, you must provide the source code used to solve the challenge and, if necessary, a brief explanation of how you solved it.

Remember **you can only submit once!** Once your solution is submitted you won't be able to amend it to fix issues or make it faster, so please be sure your solution is finished before submitting it.

If you have any doubts, please check the info section.

Go ahead

I'm done! :)

Once you have submitted your code, hit refresh and continue to next challenge.

I'm stuck! :(

Be sure you follow the Tuenti Engineering twitter for updates and possible hints during the contest.

If this challenge is too hard and you are blocked, you will be able to skip it after two hours. Note that **you won't be able to complete it later**, and you have a limited number of challenges to skip.

Finally, if you run out of skips but are still really stuck with one problem, you will be able to skip it after 24 hours.

Challenge status:

Test case	Not done
Solution submitted	Not done
Skip	You still have to wait 0h, 30m and 0s to be able to skip this challenge

Refresh status