Solution for "Speed Reading" Bronze November 2007

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Let's go through a sample case:

```
10 3
2 4 1
6 1 5
3 3 3
```

The first cow will read for 4 minutes (finishing 8 pages), stop for 1 minute, and then work for 1 minute to finish the last 2 pages. Thus, it will take the first cow a total of 6 minutes to finish the book. The second cow will read for 1 minute (finishing 6 pages), then the cow will break for 5 minutes, and finally read for 1 more minute to finish the book, taking a total of 7 minutes. The third cow will read for 3 minutes (finishing 9 pages), take a 3 minute break, and then finish the book in 1 minute, also taking a total of 7 minutes. Thus, our answer is:

```
6
7
7
```

The pseudocode is as follows:

```
read n,k
for i from 0 through k-1:
    read numPages, time, break
    remainingPages = n
    timeTaken = 0
    while remainingPages > 0:
        a = min(time, remainingPages/numPages + 1)
        timeTaken += a
        remainingPages -= a*numPages
        if a = time:
            timeTaken += break
    print timeTaken
```

Another, faster solution is to use a formula to calculate all the times. We can label a "full session" as a segment of time including a full reading period (which takes r time) and a break. The number of full sessions necessary is `n/(r*s)`. The amount of time for a full session is `s+t`, so the total amount of time spent in full sessions is `(s+t) * (n/(r*s))`. At this time, there may still be some pages remaining which do not require a full reading period to finish. However, if we can finish the entire book in full sessions, we do not need a break for the last reading period after the book is complete, so we must subtract `t` in this case. Finally, if full sessions do not cover the entire book, there will be a bit of reading that needs to be completed to actually finish the book. The number of pages leftover is `n%(r*s)`, so the extra time that needs to be added is `(n%(r*s) + r - 1)/r`.

Let's demonstrate this formula on the third cow in the sample case. Once again, recall that `n` is 10 in this case:

```
3 3 3
```

Here, r,s, and t are all equal to 3. 10/9 is 1 (integer division), so we know that we need 1 full session. This full session involved 3 minutes of reading and 3 minutes of break. Then, after the full sessions are complete, the extra time that needs to be added is (1 + r - 1)/r = 1. Thus, the total time is 6+1:

```
7
```

Pseudo code is below.

```
read n, k
for i from 0 through k-1:
      answer = (s+t)*(n/(r*s))
      if n%(r*s)=0 and n!=0:
          answer -= t
      answer += ((n%(r*s))+r-1)/r
      print answer
```