Note: If you just want the static history, without the walkthrough of solving it, it's on pages 10-11.

Because there's no causality, there's no reason to start at the beginning. Instead, let's start with a few notes:

1 Notation

- Throughout this document, items are labeled often by their first letter, so D means duck. C is overloaded, so Co is computer and Cu is cucumber.
- Further data is listed in brackets afterward. R[5] is a robot of age 5. TM[+3] is a time machine with dial set to +3.
- Things the item is holding are listed in parenthesis. M(Co) is a monkey holding a computer. TM[+5](M(Co)) is a time machine with dial set to +5 containing a monkey holding a computer.
- ??? represents an unknown set of unknown items, possibly empty.
- Lowercase letters (n, a, ...) are numerical variables, which are not yet determined.

2 Data from REDHERRING

- At some point before timestep 0, we called in the answer REDHERRING. The only instruction that can have cause this is instruction 29 and the Monkey. Therefore the monkey must travel back in time from instruction 29 to a negative step, when he calls in REDHERRING.
- The monkey is told to call in the string that I've written in the answer slots, so it must be the case that at timestep 29, the string in the slots is REDHERRING.
- Each of the blank slots, 1-10, is written to exactly once over the course of the instructions (actually, the 2nd slot is never written to, but there is one ambiguous write - step 4 - so that must be the second slot if an E is going to get there somehow). Hence when the first slot is written to, in instruction 3, it must be an R, and so on. This leads to the following information:

Letter	Timestep	Fact
R	3	Time dial is at +18
E	4	Final Answer has an S shifted by the seventh letter of the answer in the second slot. 5 items present a
D	22	Sum of digits in Time dial is 9
H	8	Vowels present - Sixth letter of final answer = 8
E	16	Shortest name present has length 5. Almost certainly ROBOT.
R	25	Computer's age = 50
R	2	(No information)
I	10	Cs present + Time dial = 9
N	19	Cucumber's age is 14
G	5	The Robot wrote +7 to the time dial. The robot is thus age 7.

3 Time Travel Possibilities

The big red button can be pressed in exactly three circumstances:

1. The instructions tell me to press it.
2. The instructions tell me to instruct another item to press it.
3. The timestep is prime, and there is a duck in the time machine, meaning the duck presses it.

The first and second cases are easy to catalog. The third case is harder, but we at least know that it can *only* happen on prime timesteps.

Things can enter the time machine in exactly three ways:

1. The instructions tell me to put it in it.
2. The instructions tell me to instruct another item to put it in.
3. The timestep is prime, and a duck walks in.

Again, the first and second are easy to catalog. The third is much harder. These two sets of observations lead us to the following table. Question marks indicate that a situation is possible but not certain (e.g. "duck?" on prime timesteps - a duck may or may not have pressed the button). Note that items stay in the time machine until someone presses the button; if there's an uncertain button pressing (ducks), then the object may or may not still be in the machine on subsequent steps.

The table keeps track of everything except for ducks in the time machine - basically, there could always be ducks in the time machine. Note that ducks cannot take any actions before timestep 2, so they can't be in the machine until then, so they can press the button on timestep 3 at the earliest.

Timestep	Items in machine	Button Presses
-2	M(Co)	Monkey presses (per instruction 29)
3		ducks?
5		ducks?
6	R	I press
7		ducks?
11	Cu	ducks?
12	Cu?	
13	Cu?	I press (ducks irrelevant)
17		ducks?
19		ducks?
20	R	I press
22	2 unkowns, R	I press twice
23		ducks?
28	M(Co)	
29	M(Co)	I press
31	I	ducks?
32	I?	I press
37		ducks?
39		ducks?
⋮		

This table will be very useful to have, because it gives us a list of all possible time travel events. There is the final answer instructions event, 2 Monkey with the computer events, the cucumber event, the (2 unknowns) event, 3 robot events, and ducks flying everywhere, and that's it.

Let's look at some of the simpler ones:

- The instructions with the final answer are created on timestep 31 and destroyed on timestep 15. Thus it can't be one of the unknowns, so it only time travels once. So in particular, it must just go from 31/32 to 0.
- The Monkey is in a time loop (i.e. we never create or destroy it), so it must go from 28 to somwhere below -2, then from -2 to somewhere below 28. He could be one of the two unkowns, which might make that a bit more complicated.
- The cucumber is created at step 11, and destroyed at step 19. At step 19, it is supposed to be age 14 (per section 2). Thus is must go back in time exactly 6, either 11-¿5 or 13-¿7. It can't be an unknown

at 22, because there have to be duplicates of the unknowns (see instruction 22), and if it goes back 22-¿16 then is eaten on 19, there would only be one at time 22.

4 The Duck

At this point we could start at the beginning, and most teams will. That's fine; they'll go for a while, and things will mostly work out, but they won't quite be able to fit everything together. Eventually, they will notice the following.

At Timestep 26, there is a duck, which (after the timestep) is not in the time machine. You never do anything to the duck after that, so he's going to enter the machine at 29, and press the BRB at 31. This means that the instructions are sent back to timestep 0 from timestep 31, not 32, *and there is a duck with them*!

Armed with that data, let's start at the beginning.

5 Steps 1-6

Step 1 tells us that instructions arrived from the future with the final answer. Based on our table, this can only have been from timesteps 31, 32, or 22. But the instructions with the final answer were burned on step 15, and not created until step 31. Therefore it can't have been from 22, and must be from the end. As per the comment on the duck in section 4, it must have been from step 31, with an indeterminate number of ducks.

Steps 1 and 2 give us no information. Note that the appropriate letter mentioned in section 2 is an R, as per section 2, but we don't really care. Also note that all the ducks get in the time machine on step 2.

Step 3 tells us that the Time Machine's dial is at +18 (per section 2). Since nothing can have changed it up to this point, that means it's been at +18 for all negative times. Thereafter, we set it to the number of items in the room. We've currently got $(4 + n)$ items in the room: time machine, instructions w/answer, computer, blank instructions, and n ducks. Of course, other things might have arrived after timesteps 0, 1, or 2. Also note that the ducks press the button, so they are going to arrive in the future at an indeterminate time, depending on the number of items.

Step 4 tells us that the dial is currently at 5 (per section 2) (and the final answer has an S in the second slot). This means that n=1, so there was exactly one duck, and the time dial is at +5, so he's going to arrive on step 8. Moreover, no other objects arrived before timestep 3 (because we've already accounted for all 5).

Step 5 tells us that a robot of age 6 arrived at timestep 4, so he's age 7 at timestep 5. He sets the time dial to +7 (per section 2). In step 6, we put him in the Time Machine and send him off. The dial can't have changed, so he's headed for step 13 (6+7). So we have:

Timestep	Items before	Items after	Temporal arrivals	Temporal departures
-1	TM[+18]	TM[+18]		
0	TM[+18]	TM[+18], I, Co	I, D	
1	TM[+18], I, Co, I, C	TM[+18], I, Co, I, D		
2	TM[+18], I, Co, I, D	TM[+18](D), I, Co, I		
3	TM[+18](D), I, Co, I	TM[+5], I, Co, I	???	D→ 8
4	TM[+5], I, Co, I, ???	TM[+5], I, Co, I, ???	R[6], ???	
5	TM[+5], I, Co, I, R[7], ???	TM[+7], I, Co, I, R[7], ???	???	
6	TM[+5], I, Co, I, R[8], ???	TM[+7], I, Co, I, ???	???	R[8]→13
⋮				
8	???	???	D, ???	
⋮				
13	???	???	R[8], ???	
⋮				
31	???	???	???	I, D→ 0

6 Steps 7 through 11

In step 7 we are told that there are more than 4 items present. We've only got 4 that we know about (TM, I, Co, I), so something must have arrived between steps 3 and 6. We don't really know what or how, so let's go on.

Steps 8 and 9 are utterly unhelpful; we'll use them to learn the actual answer letter later. They do mean that the time dial is at a value less than 4 (and more than $7 - 26 - 26 - 26 = -71$).

Step 10 is slightly helpful; it tells us that the number of Cs present plus the time dial is 9. Unfortunately, we have no real idea about either of those things, so we can't learn the other.

In step 11, the cucumber is bought. We recall from section 3 that the cucumber must go either 11→5 or 13→7. That means that either the dial is currently at -6, or it will be on step 13. Between steps 11 and 13 is step 12. But looking at the new version of step 12 (from step 15 - remember that we're using the newer, updated copy of the instructions), it's clear that after step 12 the time dial will be at least negative 1. Hence the cucumber necessarily goes 11→6, and the time dial at step 11 is -6. This means that in step 9, the 4th, 5th, and 7th answers decremented us from +7 to -6, meaning they add to 13. So far we've got:

Timestep	Items before	Items after	Temporal arrivals	Temporal departures
⋮				
7	TM[+7], I, Co, I, Cu, ???	TM[+7], I, Co, I, Cu, ???	???	
8	TM[+7], I, Co, I, Cu, ???	TM[+7], I, Co, I, Cu, ???	D, ???	
9	TM[+7], I, Co, I, Cu, D, ???	TM[-6], I, Co, I, Cu, D, ???	???	
⋮				
11	TM[-6], I, Co, I, Cu, D, ???	TM[-6], I, Co, I, Cu, D, ???	???	Cu→5
⋮				
13	???	???	R[8], ???	
⋮				
16	???	???	M(Co), ???	
⋮				
31	???	???	???	I, D→ 0

Everything through step 9 looks good. Then at step 10, we are told, based on the time dial of -6, that there are 15 Cs present. We've got: timemaChine, instruCtions, Computer, instruCtions, CuCumber, duCk, making 7. So there need to be 8 more Cs. That's funny.

Also, in timestep 11, we need somebody to press the button so the cucumber can go back. It's not going to be me, because the instructions don't say to. Thus there must be a duck which presses the button at step 11. To do that, he has to enter at step 7. When he presses the button at step 11, he'll go back to step 6. That's great - a single duck in a time loop can press the button, like in warmup B. What's more, there can be n of these ducks in this time loop, all doing the same thing. In fact, there can be exactly the right number to get us the number of Cs that we need. That might be 8, or it might be fewer if things arrive from the future. For now, let's just call it n ducks. So the state is:

Timestep	Items before	Items after	Temporal arrivals	Temporal departures
⋮				
5	TM[+5], I, Co, I, R[7], ???	TM[+7], I, Co, I, R[7], ???	Cu, n D's???	
6	TM[+5], I, Co, I, R[8], Cu, n D's???	TM[+7], I, Co, I, Cu, n D's???	???	R[8]→13
7	TM[+7], I, Co, I, Cu, n D's???	TM[+7](n D's), I, Co, I, Cu, ???	???	
8	TM[+7](n D's), I, Co, I, Cu, ???	TM[+7](n D's), I, Co, I, Cu, ???	D, ???	
9	TM[+7](n D's), I, Co, I, Cu, D, ???	TM[-6](n D's), I, Co, I, Cu, D, ???	???	
10	TM[-6](n D's), I, Co, I, Cu, D, ???	TM[-6](n D's), I, Co, I, Cu, D, ???	???	
11	TM[-6](n D's), I, Co, I, Cu, D, ???	TM[-6](D), I, Co, I, Cu, ???	???	Cu, n D's→5
⋮				
13	???	???	R[8], ???	
⋮				
16	???	???	M(Co), ???	
⋮				
31	???	???	???	I, D→ 0

7 Steps 12 through 19

Step 12 can be done in two ways - the original, giving (-6 + 9th letter squared) or the new version from instruction 15, which just gives $(-6+4)^2 - 1 = 3$. So the time dial ends up at 3 and the 9th letter of the answer is a C.

Then on step 13 we press the button, sending the duck inside to step 16. On step 14 we write the new instruction on step 22 of the younger instructions. We're about to burn the older instructions so modifications there don't matter.

On step 15 we update the younger instructions and destroy the older. We've already used the second part. The first part means that instead of an S in the second slot, the answer has an S shifted by the 7th letter. Also on step 15, the robot (which arrived from step 6 to step 13) sets the time dial to 10 (we know his age because we know that at step 5 he was 7 steps old). On step 16, we confirm that the item with the shortest name present is in fact a robot, as per section 2.

On step 17, we add 7 to the time dial, bringing it to 17. The duck enters the time machine. On step 18 we destroy the robot, and on step 19 we destroy the cucumber, and the duck launches himself to step 36.

Timestep	Items before	Items after	Temporal arrivals	Temporal departures
⋮				
11	TM[-6](n D's), I, Co, I, Cu, D, ???	TM[-6](D), I, Co, I, Cu, ???	???	Cu, n D's→5
12	TM[-6](D), I, Co, I, Cu, ???	TM[3](D), I, Co, I, Cu, ???	???	
13	TM[3](D), I, Co, I, Cu, ???	TM[3], I, Co, I, Cu, ???	R[8],???	D→16
14	TM[3], I, Co, I, Cu, R[9], ???	TM[3], I, Co, I, Cu, R[9], ???	???	
15	TM[3], I, Co, I, Cu, R[10], ???	TM[10], Co, I, Cu, R[10], ???	???	
16	TM[10], Co, I, Cu, R[11], ???	TM[10], Co, I, Cu, R[11], ???	M(Co), D, ???	
17	TM[10], I, Co, I, Cu, R[12], M(Co), D, ???	TM[17](D), Co, I, Cu, R[12], M(Co), ???	???	
18	TM[17](D), Co, I, Cu, R[13], M(Co), ???	TM[17](D), Co, I, Cu, M(Co), ???	???	
19	TM[17](D), Co, I, Cu, M(Co), ???	TM[17], Co, I, M(Co), ???	???	D→ 36
⋮				
31	???	???	???	I, D→ 0
⋮				
36	???	???	D, ???	

8 Steps 20 through 22a

Now, let's think about this robot. He has to arrive at timestep 4 being 6 steps old. We buy him at step 20 and send him through the time machine immediately. But this would send him to timestep 37, and he never gets in the time machine on his own, so he'd just sit there forever. But we need him to be present at step 22, so we can send him back to step 4!

At step 22, there need to be duplicates of exactly two items. There are currently duplicate computers, and no talk of getting rid of them, so the computer is one of the items. But there aren't duplicates of anything else around. How can we get out of this? Well, if the time dial is negative (which instruction 21 says it will be), then simply by sending the younger duplicate back in time, you *create* the duplicate; anything at all could be the second duplicate. The available items are the instructions, the monkey, and ... the time machine. I believe that the only way out of the robots dilemma is to send the time machine.

Hence the two unknown objects are the Time Machine and the computer. Since the robot is not one of them, all he gets to do is: be bought at step 20, travel somewhere in time, then at step 22 travel back to step 4. Since he has to be age 6 when he arrives, at step 20 he must go back in time by 4. Thus the time machine at step 20 must have time dial -4. But we already know that the machine we've been tracking has dial +17. Hence "the Time Machine" is not the one we've been tracking - it is the older duplicate, as per rule #3.1.

So in step 20, there are two time machines, the older with dial -4 and the younger with dial +17. In step 21, we set the younger to also be -4. In step 22, then, we put the younger time machine in the older, along with the computer, and send them back to 18. Hence, through the first half of 22:

Timestep	Items before	Items after	Temporal arrivals	Temporal departures
⋮				
16	...	...	R[0],...	
17	R[1], ...	R[1], ...	...	...
18	TM[17](D), Co, I, Cu, R[13], M(Co), R[2], ???	TM[17](D), Co, I, Cu, M(Co), R[2], ???	TM[-4], Co, ???	
19	TM[17](D), Co, I, Cu, M(Co), R[3], TM[-4], Co, ???	TM[17], Co, I, M(Co), R[3], TM[-4], Co, ???	???	D→ 36
20	TM[17], Co, I, M(Co), R[4], TM[-4], Co, ???	TM[17], Co, I, M(Co), R[4], TM[-4], Co, ???	???	R[0] → 16
21	TM[17], Co, I, M(Co), R[5], TM[-4], Co, ???	TM[-4], Co, I, M(Co), R[5], TM[-4], Co, ???	???	
22a	TM[-4], Co, I, M(Co), R[6], TM[-4], Co, ???	I, M(Co), R[6], TM[-4], Co, ???		T[-4], Co→ 18
⋮				
31	???	???	???	I, D→ 0
⋮				
36	???	???	D, ???	

9 Steps 22b through 26

In the second half of 22, we modify the time dial in some strange way, and then send the 6 step old robot through. We know he has to come out at step 4, so the dial must end up at -18. So we learn that (first letter)-(last letter)=14. Then we kill all ducks in the room. As far as we know, there are no ducks. Moreover, we know that we *can't* kill any ducks - we never buy or create ducks, so we can never kill or destroy ducks. Hence there cannot be any ducks present at step 22, no matter what.

We also have a handwritten note to write the sum of the digits of the time machine (9) minus the third letter of the final answer into the third slot (D). So the third letter of the final answer is E.

In 23, we decrement the time dial by an unknown amount, from -18 to (-18-eighth letter).

In timestep 24, we simply learn a fact about the final answer; we'll come back to that.

In timestep 25, we learn that the computer's age is 50.

In step 26, we remove the duck from the time machine. That means that he got in at step 23, which means he appeared at step 22 (he can't have been there before, or he would be killed). So we've got:

Timestep	Items before	Items after	Temporal arrivals	Temporal departures
⋮				
22	TM[-4], Co, I, M(Co), R[6], TM[-4], Co, ???	I, M(Co), TM[-18], Co, ???	D (unclear where from), ???	T[-4], Co→ 18; R[6]→ 4
23	I, M(Co), TM[-18], Co, D, ???	I, M(Co), TM[-a](D), Co, ???	???	
24	I, M(Co), TM[-a](D), Co, ???	I, M(Co), TM[-a](D), Co, ???	???	
25	I, M(Co), TM[-a](D), Co, ???	I, M(Co), TM[-a](D), Co, ???	???	
26	I, M(Co), TM[-a](D), Co, ???	I, M(Co), TM[-a], Co, D, ???	???	
⋮				
31	???	???	???	I, D→ 0
⋮				
36	???	???	D, ???	

10 Steps 27 through 32

In step 27, we do nothing. In step 28 we hand the monkey the younger computer (taking away from him the older one) and put him in the time machine. In step 29, we send him back by some large number of steps, to before -2. He then chills until -2, when he pushes the button, appearing at 16 as we've already discussed. Also at step 29, the duck enters the time machine.

At this point we can count the computer's age as of timestep 25. It arrives at step 0, and first time travels at step 22, going back 4. Thus at step 29 it is age 33. It then goes back by a to timestep (29-a), meaning that at timestep -2 its age is $(-2-(29-a)+33) = 2+a$. At that point it jumps to timestep 16, so at timestep 25 its age is $(2+a+9) = 11+a$. For that to be 50, $a = 39$. Thus in timestep 23, the eighth letter is a U.

In step 30, we set the dial to an unknown thing.

In step 31, we write the final answer, and put it in the time machine. The duck takes it back to step 0. Hence the dial was at -31, meaning that in step 30, the 5th letter is 11, or K.

In step 32, we press the button, which has no effect because the machine is empty. We set the dial to negative something, and we leave.

The only remaining loose ends are the mysterious duck that arrives at step 22, and the poor duck that got launched into step 36. Of course at step 37 he will enter the time machine, and at step 41 he will press the button. Hence the time dial must be at -19, and he arrives at 22. So the first letter is a S.

So we have the final table:

Timestep	Items before	Items after	Temporal arrivals	Temporal departures
⋮				
27	I, M(Co), TM[-39], Co, D, ???	I, M(Co), TM[-39], Co, D, ???	???	
28	I, M(Co), TM[-39], Co, D, ???	I, Co, TM[-39](M(Co)), D, ???	???	
29	I, Co, TM[-39](M(Co)), D, ???	I, Co, TM[-39](D), ???	???	M(Co)→ −10
30	I, Co, TM[-39](D), ???	I, Co, TM[-31](D), ???	???	
31	I, Co, TM[-31](D), ???	Co, TM[-31], ???	???	I, D→ 0
32	Co, TM[-31](D), ???	TM[-19], ???	???	
⋮				
36	TM[-19], ???	TM[-19], ???	D, ???	
37	TM[-19], D, ???	TM[-19](D), ???	???	
38	TM[-19](D), ???	TM[-19](D), ???	???	
39	TM[-19](D), ???	TM[-19](D), ???	???	
40	TM[-19](D), ???	TM[-19](D), ???	???	
41	TM[-19](D), ???	TM[-19], ???	???	D→ 22

At this point we have a consistent history. Filling in the loose ends, n in steps 5-11 is equal to 8, and all the question marks are nothing. Thus we get the following history:

Timestep	Items before	Items after	Temporal arrivals	Temporal departures
-10	TM[+18]	TM[+18]	M(Co) from 29	
-2	TM[+18], M(Co)	TM[+18]		M(Co)→ 16
-1	TM[+18]	TM[+18]		
0	TM[+18]	TM[+18], I, Co	I, D from 31	
1	TM[+18], I, Co, I, D	TM[+18], I, Co, I D,		
2	TM[+18], I, Co, I, D	TM[+18](D), I, Co, I		
3	TM[+18](D), I, Co, I	TM[+5], I, Co, I		D→ 8
4	TM[+5], I, Co, I	TM[+5], I, Co, I	R[6] from 22	
5	TM[+5], I, Co, I, R[7]	TM[+7], I, Co, I, R[7]	Cu, 8 D's from 11	
6	TM[+5], I, Co, I, R[8], Cu, 8 D's	TM[+7], I, Co, I, Cu, 8 D's		R[8]→13
7	TM[+7], I, Co, I, Cu, 8 D's	TM[+7](8 D's), I, Co, I, Cu		
8	TM[+7](8 D's), I, Co, I, Cu	TM[+7](8 D's), I, Co, I, Cu	D from 3	
9	TM[+7](8 D's), I, Co, I, Cu, D	TM[-6](8 D's), I, Co, I, Cu, D		
10	TM[-6](8 D's), I, Co, I, Cu, D	TM[-6](8 D's), I, Co, I, Cu, D		
11	TM[-6](8 D's), I, Co, I, Cu, D	TM[-6](D), I, Co, I, Cu		Cu, n D's→5
12	TM[-6](D), I, Co, I, Cu	TM[3](D), I, Co, I, Cu		
13	TM[3](D), I, Co, I, Cu	TM[3], I, Co, I, Cu	R[8] from 6	D→16
14	TM[3], I, Co, I, Cu, R[9]	TM[3], I, Co, I, Cu, R[9]		
15	TM[3], I, Co, I, Cu, R[10]	TM[10], Co, I, Cu, R[10]		
16	TM[10], Co, I, Cu, R[11]	TM[10], Co, I, Cu, R[11]	M(Co), D, R[0] from -2, 13, 20	
17	TM[10], I, Co, I, Cu, R[12], M(Co), D, R[1]	TM[17](D), Co, I, Cu, R[12], M(Co), R[1]		
18	TM[17](D), Co, I, Cu, R[13], M(Co), R[2]	TM[17](D), Co, I, Cu, M(Co), R[2]	TM[-4], Co from 22	
19	TM[17](D), Co, I, Cu, M(Co), R[3], TM[-4], Co	TM[17], Co, I, M(Co), R[3], TM[-4], Co		D→ 36
20	TM[17], Co, I, M(Co), R[4], TM[-4], Co	TM[17], Co, I, M(Co), R[4], TM[-4], Co		R[0] → 16
21	TM[17], Co, I, M(Co), R[5], TM[-4], Co	TM[-4], Co, I, M(Co), R[5], TM[-4], Co		

Timestep	Items before	Items after	Temporal arrivals	Temporal departures
22	TM[-4], Co, I, M(Co), R[6], TM[-4], Co	I, M(Co), TM[-18], Co	D from 41	T[-4], Co→ 18; R[6]→ 4
23	I, M(Co), TM[-18], Co, D	I, M(Co), TM[-39](D), Co		
24	I, M(Co), TM[-39](D), Co	I, M(Co), TM[-39](D), Co		
25	I, M(Co), TM[-39](D), Co	I, M(Co), TM[-39](D), Co		
26	I, M(Co), TM[-39](D), Co	I, M(Co), TM[-39], Co, D		
27	I, M(Co), TM[-39], Co, D	I, M(Co), TM[-39], Co, D		
28	I, M(Co), TM[-39], Co, D	I, Co, TM[-39](M(Co)), D		
29	I, Co, TM[-39](M(Co)), D	I, Co, TM[-39](D)		M(Co)→ −10
30	I, Co, TM[-39](D)	I, Co, TM[-31](D)		
31	I, Co, TM[-31](D)	Co, TM[-31]		I, D→ 0
32	Co, TM[-31](D)	TM[-19]		
⋮				
36	TM[-19]	TM[-19]	D from 19	
37	TM[-19], D	TM[-19](D)		
38	TM[-19](D)	TM[-19](D)		
39	TM[-19](D)	TM[-19](D)		
40	TM[-19](D)	TM[-19](D)		
41	TM[-19](D)	TM[-19]		D→ 22

11 Answer

Gathering all our constraints on the answer:

Timestep	Constraint
4/15	second letter is S shifted by 7th letter
8	$n = 8$, so 27 vowels, so 6th letter is S
9	4th + 5th + 7th = 13
12	9th letter is C
14/22	3th letter is E
22	first letter minus last letter = 14
23	8th letter is U
24	Figure out the duck's path length; it's 25. So 2nd+3rd = 25
30	5th letter is K
32	1st letter is S

It's not hard to get the answer from that. 22 and 32 mean that the last letter is E. 14 and 24 mean the 2nd letter is T, so 4/15 says that the seventh letter is A. Then 9 says that the 4th letter is A.

STEAKSAUCE