

## Run the Numbers

Aaron Kaufman & Adam Maresca (ft. Ryan Thorngren)

Answer: **HEY YOU**

Each “equation” as given in the puzzle can be resolved down to a division problem for two numbers. The left sequences can be uniquely identified by an [Online Encyclopedia of Integer Sequences](#) code between 1 and 200,000; the right resolves to a number between 1 and 2000. These can be simplified, as the flavortext hints, and the GCFs provide a message.

Sequence	Clue	Reduced	Factor	Letter
A000168	(Android) 18	28/3	6	F
A030798	1098(-E)	1711/61	18	R
A033031	(SR-)71	33031/71	1	A
A106053	177 (stamped)	35351/59	3	C
A021620	1060(AM)	1081/53	20	T
A010602	(The Beast's) 666	589/37	18	R
A040687	(Question) 67	40687/67	1	A
A119966	(Local) 602	8569/43	14	N
A108262	(Issue) 574	7733/41	14	N
A111843	(Error) 423	12427/47	9	I
A052598	(Unicode &#)434	3757/31	14	N
A128155	10 (Orion Pictures)	25631/2	5	E
A000020	(Team) 1540	1/77	20	T
A000725	(HC-)125	29/5	25	Y

**FRACTRAN** is an esoteric programming language devised by the late, great John Conway; it runs through the list taking the reduced forms (or the originals, actually) as your program and using 90 as the input. The final result is a multiplied mass of repeating primes that, instead of attempting to render as a single 128-digit number, is best considered purely by its factorization. One can either work out the program's operation or find an online FRACTRAN interpreter to get:

$$11^8 \times 13^5 \times 17^{25} \times 19^{25} \times 23^{15} \times 29^{21}$$

Reading these exponents alphanumerically yields the final answer to the puzzle, **HEY YOU**.

### Author's Notes

Adam: When Aaron showed me FRACTRAN I absolutely had to start monkeying with it. Originally the output was coded to “805025025015021” but after getting my head around the program, I felt dealing out prime factors like a Vegas dealer at a blackjack table was both more elegant and a more fun mental image. I tried to get all the OEIS values under 100,000 (and pulled it off!) but for the sake of more distinct, easy-to-search sequences I had to let them creep into the six-digit range. Kept them all under 150,000, at least!

Aaron & Ryan: Rest in peace, John Conway.