

A Mystery Computer Program

1. Let $N = 500$ (or 1000 if you want more of a challenge).
2. Find the square root of N . This number without the decimal places is M . (e.g., If N is 500, then M is 22. If N is 1000, then M is 31.)
3. Write down 2 and the odd numbers up to N in a grid. (To save time, the grid is given below. Cross out all the numbers that are larger than N , if N is less than 1000.) Circle 2, which is the first number in the grid.
4. B is the first non-circled, non-crossed-out number. If B is greater than M , then goto step 9.
5. Circle B .
6. If B is less than 12, then cross out multiples of B , starting at B^2 and continuing until you have gone past N . Look for patterns! (This step saves *us* time compared with step 7, but is tough for computers. Why?)
7. If B is greater than 12, then multiply B by all non-crossed numbers starting with B itself (giving B^2) and working up. Cross out each product that you find. (Note: This step needs adjustment if $N \geq 13^3$, which is 2197.)
8. Go to step 4.
9. Circle all non-crossed-out numbers. (This is the end of the program.)

Now ask yourself this question: what is the purpose of this program?

2	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39
41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79
81	83	85	87	89	91	93	95	97	99	101	103	105	107	109	111	113	115	117	119
121	123	125	127	129	131	133	135	137	139	141	143	145	147	149	151	153	155	157	159
161	163	165	167	169	171	173	175	177	179	181	183	185	187	189	191	193	195	197	199
201	203	205	207	209	211	213	215	217	219	221	223	225	227	229	231	233	235	237	239
241	243	245	247	249	251	253	255	257	259	261	263	265	267	269	271	273	275	277	279
281	283	285	287	289	291	293	295	297	299	301	303	305	307	309	311	313	315	317	319
321	323	325	327	329	331	333	335	337	339	341	343	345	347	349	351	353	355	357	359
361	363	365	367	369	371	373	375	377	379	381	383	385	387	389	391	393	395	397	399
401	403	405	407	409	411	413	415	417	419	421	423	425	427	429	431	433	435	437	439
441	443	445	447	449	451	453	455	457	459	461	463	465	467	469	471	473	475	477	479
481	483	485	487	489	491	493	495	497	499	501	503	505	507	509	511	513	515	517	519
521	523	525	527	529	531	533	535	537	539	541	543	545	547	549	551	553	555	557	559
561	563	565	567	569	571	573	575	577	579	581	583	585	587	589	591	593	595	597	599
601	603	605	607	609	611	613	615	617	619	621	623	625	627	629	631	633	635	637	639
641	643	645	647	649	651	653	655	657	659	661	663	665	667	669	671	673	675	677	679
681	683	685	687	689	691	693	695	697	699	701	703	705	707	709	711	713	715	717	719
721	723	725	727	729	731	733	735	737	739	741	743	745	747	749	751	753	755	757	759
761	763	765	767	769	771	773	775	777	779	781	783	785	787	789	791	793	795	797	799
801	803	805	807	809	811	813	815	817	819	821	823	825	827	829	831	833	835	837	839
841	843	845	847	849	851	853	855	857	859	861	863	865	867	869	871	873	875	877	879
881	883	885	887	889	891	893	895	897	899	901	903	905	907	909	911	913	915	917	919
921	923	925	927	929	931	933	935	937	939	941	943	945	947	949	951	953	955	957	959
961	963	965	967	969	971	973	975	977	979	981	983	985	987	989	991	993	995	997	999