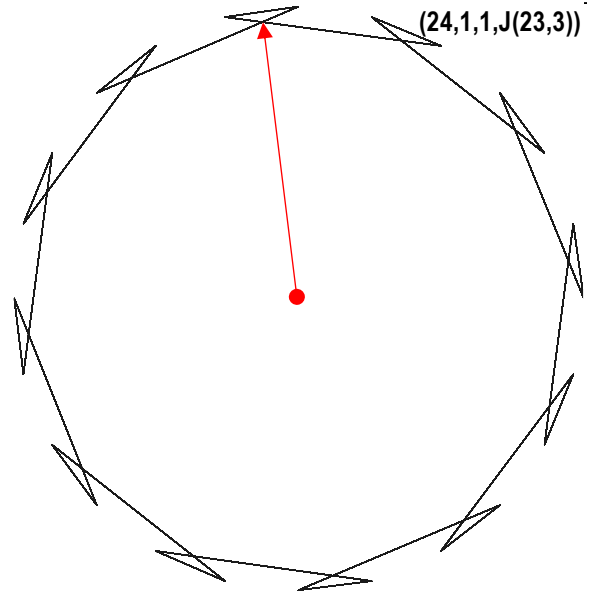
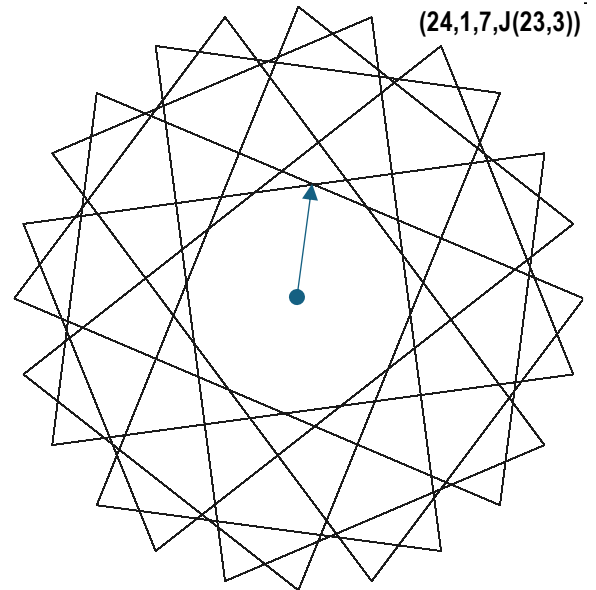


A Beating Clock

The vertex frame of the 1200-line image sequence [\(24,50,P,J\(23,3\)\)](#) shown to the right is a [dodecagon with eyelets](#). This image has VCF = 2 and all 24 vertices are used once. Using the structure posed in the [How Many Images](#) analysis (shown at bottom right), we see that there are 320 *P* values between 1 and 1200 that are not multiples of 2, 3, and 5, and therefore would be included in a complete image sequence. This sequence is striking because it seems to alternate between two sets of sub-images on a regular basis. These sub-images seem to make the clock beat. Here we explore why this happens.



Two styles of dodecagons. The top image shows the vertex frame for the 1200-line image (*P* = 1 always produces the VF regardless of *S*). Since *n* = 24, each vertex is like ½ hour. The first four jumps are: 0-23-2-1-4, which, in terms of a clockface, are: 12:00-11:30-1:00-12:30-2:00, and the 24th and last jump is 10:30-12:00. The intersection of the 2nd and 24th VF lines form the vertex of the dodecagon peak closest to the top at what would be considered **11:45, like the red hour hand**.



The other style of dodecagon has the innermost dodecagon with topmost peak at **12:15, like the smaller blue hour hand** in the middle image. This image is the same as you would find had you set the *Start Points* value to 350 = 50·7, and here is the [P = 349](#) version.

The SCF = 1 dodecagons are, of course, not exact because they are based on bundles of lines which create slight curves. These dodecagons seem to pulse in and out about every 100 units for *P*. By manually adjusting the *Start Points* value, you can see that the 11:45 style dodecagon is inside until about 67 or so, by 91, the 12:15 style is now inside, and it pulses inside until about 163 before receding. By 191, 11:45 is inside and pulses forward to about 251 before receding. By 299, 12:15 is inside and pulses forward to about 353, and so on.

In the middle range (from 500-700) it is harder to discern these dodecagon pulses as the center is small or nonexistent. Note that at *P* = 532, there is a small internal center, but 533 ≤ *P* ≤ 667 SCF = 1 *P* values have no discernable center.

One interesting cut point is near *P* = 500 (a traditional 12,5-star) which has dodecagon peak exactly at 12:00 o'clock. At nearby values of *P*, the innermost dodecagon seems to switch abruptly; at 497 the 11:45 dodecagon appears inside and at 499 the 12:15 dodecagon appears inside.

Finally, the order of internal dodecagons switch if the jump order (23,3) is replaced with [\(1,21\)](#).

Row R (R≤ROUND(S/2))	24 = n	5 = S	5 used rather than 50 since 50 = 2·5 ²	160 SCF = 1 < nS/2	By																								
R	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	row				
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	7				
2	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	6				
3	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	6				
4	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	6				
5	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	7				
6	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	7				
7	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	6				
8	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	6				
9	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	6				
10	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	7				
11	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	7				
12	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	6				
13	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	6				
14	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	6				
15	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	7				
16	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	7				
17	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	6				
18	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	6				
19	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	6				
20	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	7				
21	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	7				
22	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	6				
23	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	6				
24	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	6				
25	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	7				
	20 coprime P per												20				20				20				20				160