

## The 2018 AAVSO RR Lyrae Ephemeris

The AAVSO RR Lyrae Ephemeris provides the predicted time of maximum for RR Lyrae and Delta Sct type stars in the AAVSO RR Lyrae observing program. These times appear in Universal Time in the body of the ephemeris table. The time is rounded to the nearest half hour, providing sufficient accuracy to plan observing sessions while, hopefully, leaving sufficient doubt about the exact time in order to eliminate anticipatory bias. This ephemeris is designed for use by observers at American longitudes.

The top rows of the ephemeris table list the name of the star. Directly below the star's name are its approximate maximum and minimum magnitudes. These magnitudes are taken from the 4<sup>th</sup> edition of the GCVS and may be visual, photographic, or V.

Gerard Samolyk, AAVSO Short Period Pulsator Section

### REFERENCE

Kholopov, P. N., *et al.* 1985, *General Catalogue of Variable Stars*, Fourth Edition, Moscow.

Below that, in the row labeled "RISE". This is the approximate time required for the star to rise from minimum to maximum, in hours.

CCD observations of RR Lyrae type stars at all phases of their lightcurves are encouraged. This ephemeris can be used as a guide to determine what portion of the lightcurve is observable on a given night.

The numbers in the left-most column are the "double date" - the evening and the following morning - for the event times listed in the corresponding row. For example, 5-6 corresponds to the evening of the 5th and the morning of the 6th of the month. January 0-1 is the evening of December 31 and the morning of January 1.

	SW	XX	AT	SW	TZ	BH	RS	ST	SW	SZ	TV	TW	UU	UY	RW	TT	RR	XZ	DM	RW	XZ	RR	VX
	AND	AND	AND	AQR	AUR	AUR	BOO	BOO	BOO	BOO	BOO	BOO	BOO	BOO	CNC	CNC	CET	CYG	CYG	DRA	DRA	GEM	HER
MAX	9.3	10.3	10.8	10.5	11.2	11.1	9.8	10.6	11.3	12	10.8	10.8	11.2	10.6	10.7	11	9.3	9.1	11.2	11	9.6	10.7	9.9
MIN	10.8	11.6	11.5	12.1	12.8	12.6	11.3	11.8	12.7	13.4	11.5	12.1	12.7	12	12.6	12.3	10.3	10.5	12.7	12	10.3	11.9	10.4
RISE	2	3	3	1	2	2	2	3	2	2	3	2	1	2	2	3	2	3	2	2	3	2	2
0- 1	4.0				5.0	2.5	8.0		8.5		5.5			8.5	5.0	4.5	4.0	0.5			2.5	0.5	
1- 2	1.5	1.0			9.0	0.0		7.5	9.5						7.0	7.5		10.0			1.5	5.0	
2- 3			3.0		4.0	9.0			10.0			6.5		7.5	9.5	10.5			0.5	9.0	0.0	0.0	11.0
3- 4		5.0			8.0	7.0	8.5		10.5			8.0	10.0		11.5					6.5	10.5	5.0	
4- 5	3.5				3.0	5.0		10.0	11.5		7.0	9.5	8.0			3.0	1.0		2.5		9.5	9.5	
5- 6	1.0		5.0		7.0	3.0			12.0	7.5	5.5	11.0			3.0	6.0	3.5			1.0	8.5	4.5	
6- 7		2.5			2.0	0.5	9.0				9.0	12.5			5.5	9.0		2.0		9.0	7.0	9.0	
7- 8			1.5		6.0	9.5		13.0		10.0				12.5	7.5	12.0		0.5	1.5	6.0	6.0	4.0	
8- 9	3.5	6.5			1.0	7.5				11.0			11.0		10.0	1.5		10.0			5.0	9.0	
9-10	0.5				5.0	5.5		9.5		12.0	7.0		9.0	11.5	12.0	4.5	0.5			0.5	4.0	4.0	
10-11			3.5	1.0	9.5	3.0					5.5	6.0				7.5	3.0			8.5	2.5	8.5	
11-12	5.5	4.0			4.0	1.0						7.5		10.0	3.5	10.5				6.0	1.5	3.5	
12-13	3.0				8.5	10.0		12.5				9.0			6.0				2.0		0.5	8.0	
13-14	0.0		5.5		3.0	8.0						10.5		9.0	8.0	3.5		2.0		0.5	10.5	3.0	
14-15		1.0			7.5	5.5	7.0	9.0			7.0	12.0	9.5		10.5	6.5		0.5		8.0	9.5	8.0	
15-16	5.0		2.0		2.0	3.5			6.0		5.5		7.5	8.0	12.5	9.5	2.5	10.0	0.5		8.5	3.0	
16-17	2.5	5.0		0.5	6.5	1.5			6.5	7.0					2.0	12.5	5.0				7.5	7.5	
17-18					1.0	10.5	7.5	12.0	7.5	8.5					4.0	2.0				10.5	6.0	2.5	
18-19			4.0		5.5	8.0			8.0	9.5					6.5	5.0				8.0	5.0	7.0	9.5
19-20	4.5	2.5			0.0	6.0		8.5	8.5	10.5	7.0	7.0	10.0		8.5	8.0					4.0	2.0	
20-21	2.0		0.5		4.5	4.0	8.0		9.5	11.5	5.5	8.5	8.0	13.0	11.0	11.0	2.0	2.0	1.5		3.0	7.0	
21-22		6.5	6.0		8.5	2.0			10.0			10.0					4.5	0.5		10.5	1.5	2.0	
22-23		0.0			3.5	10.5		11.0	10.5			12.0		11.5	2.0	3.5		10.0		7.5	0.5	6.5	
23-24	4.0		2.5		7.5	8.5	8.5		11.5						4.5	6.5			0.0		11.0	1.5	9.5
24-25	1.5	4.0			2.5	6.5		8.0	12.0		7.0		10.5	10.5	7.0	10.0					9.5	6.0	
25-26					6.5	4.5					5.5		8.5		9.0	13.0	1.5		2.5	10.0	8.5	1.5	
26-27			4.5		1.5	2.5	8.5							9.5	11.5	2.5	4.0			7.0	7.5	6.0	
27-28	3.5	1.5		1.0	5.5	0.0		10.5				7.0				5.5		2.0			6.5	1.0	
28-29	1.0		1.0		0.5	9.0				8.0		8.5		8.5	2.5	8.5		0.5	1.0		5.0	5.5	9.5
29-30		5.5			4.5	7.0		7.5		9.0	7.0	10.0			5.0	11.5		10.0		9.5	4.0	0.5	
30-31					9.0	5.0				10.0	5.5	11.5	9.0	7.0	7.0		1.0			7.0	3.0	5.0	

	AR	DL	DY	SZ	UU	DG	DH	RR	SS	TV	WW	SZ	RR	RZ	AV	RV
	HER	HER	HER	HYA	HYA	HYA	HYA	LEO	LEO	LEO	LEO	LYN	LYR	LYR	PEG	UMA
MAX	10.6	11	10.2	10.6	10.7	11.6	11.4	10	10.5	11.5	11	9.1	7.1	10	9.9	10.1
MIN	11.6	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12	12.6	12	9.6	8.1	12	10.9	11.2
RISE	2	1	1	2	2	3	2	2	2	2	3	1	2	2	2	3
0- 1					6.0	4.0	4.0			11.5	5.5	2.5	0.5		2.5	
1- 2	11.5			3.5	7.0		3.5	11.0	5.5		10.0	4.5				10.5
2- 3	10.0		10.0	5.5	8.5	10.0		8.5	11.5	12.0		6.5			1.0	9.0
3- 4	8.5			7.0	9.5	4.5		6.5			5.5	8.5				7.5
4- 5	7.0			9.0	10.5			4.0	8.5	12.5	10.5	2.0				6.0
5- 6				10.5	12.0	10.5						4.0				4.5
6- 7			10.5	12.5		4.5		10.5	6.0	13.0	6.0	6.0				
7- 8								8.0	12.0		11.0	8.0		11.0		
8- 9		12.0				11.0	11.5	5.5				1.5	12.5	11.5		11.0
9-10	11.0			5.0	4.0	5.0	11.0	3.5	9.0	5.5	6.5	3.5		12.0	2.0	9.5
10-11	9.5		10.5	6.5	5.0		10.5				11.0	5.5		0.5		8.0
11-12	8.0	11.0		8.5	6.0	11.5	10.0	9.5	6.0	6.0		7.5			0.5	6.5
12-13	6.5			10.5	7.0	5.5	9.5	7.5	12.0		6.5	1.0	11.5			5.0
13-14				12.0	8.5		9.0	5.0		6.5	11.5	3.0	1.0			3.5
14-15					9.5	12.0	8.5	3.0	9.0			5.0				
15-16					10.5	6.0	8.0			6.5	7.0	7.0				
16-17				4.5	12.0		7.5	9.0	6.5		12.0	0.5	11.0		2.5	10.0
17-18	11.0			6.5		12.0	7.0	7.0	12.5	7.0		2.5	0.5			8.5
18-19	9.5			8.0		6.5	6.0	4.5			7.5	4.5			1.5	7.0
19-20	8.0			10.0			5.5		9.5	7.5	12.5	6.5				5.5
20-21				11.5	4.0		5.0				2.5	8.5			0.0	4.0
21-22		12.5			5.0	6.5	4.5	8.5	6.5	8.0	7.5	2.0				
22-23					6.0		4.0	6.5	12.5		12.5	4.0				
23-24				4.0	7.0		3.5	4.0		8.5	3.0	6.0				10.5
24-25		11.5		6.0	8.5	7.0			9.5		8.0	8.0				9.0
25-26	10.5			7.5	9.5			10.5		9.0	13.0	1.5	12.5		2.0	7.5
26-27	9.0			9.5	10.5			8.0	7.0		3.5	3.5				6.0
27-28	7.5	10.5		11.5	12.0	7.5		5.5	13.0	9.5	8.5	5.5			1.0	4.5
28-29								3.5				7.5				
29-30									10.0	10.0	4.0	1.0	11.5	10.5		
30-31				4.0		8.0	11.5	9.5			8.5	3.0	1.5	11.0		11.0

	SW	XX	AT	TZ	BH	RS	ST	SW	SZ	TV	TW	UU	UY	RW	TT	RR	XZ	DM	RW	XZ	RR	VX	AR	
	AND	AND	AND	AUR	AUR	BOO	BOO	BOO	BOO	BOO	BOO	BOO	BOO	CNC	CNC	CET	CYG	CYG	DRA	DRA	GEM	HER	HER	
MAX	9.3	10.3	10.8	11.2	11.1	9.8	10.6	11.3	12	10.8	10.8	11.2	10.6	10.7	11	9.3	9.1	11.2	11	9.6	10.7	9.9	10.6	
MIN	10.8	11.6	11.5	12.8	12.6	11.3	11.8	12.7	13.4	11.5	12.1	12.7	12	12.6	12.3	10.3	10.5	12.7	12	10.3	11.9	10.4	11.6	
RISE	2	3	3	2	2	2	3	2	2	3	2	1	2	2	3	2	3	2	2	3	2	2	2	
0- 1	3.0		3.0	3.5	2.5	6.5		4.0	11.0	4.0		7.0		9.5	4.0	3.5			4.0	2.0	0.5			
1- 2	0.5	3.0		8.0	0.5		10.0	5.0	12.0			5.0	6.0	12.0	7.0						0.5	5.0		
2- 3				2.5				5.5							1.0	10.0			9.5	11.0	9.5	10.0	10.5	
3- 4				7.0	7.5	7.0	7.0	6.0		7.0	5.0		5.0	3.0					6.5	10.0	4.5	8.0	9.0	
4- 5	2.5	0.0		1.5	5.0		13.0	7.0		5.5	6.5	10.0	12.0	5.5	2.5	0.5	0.5		4.0	8.5	9.0		7.5	
5- 6			1.5	6.0	3.0			7.5		4.0	8.0	8.0		7.5	6.0	3.0	10.0	0.5			7.5	4.0	6.0	
6- 7		4.5		0.5	1.0	7.5	9.5	8.0	5.0		9.5	5.5	11.0	10.0	9.0		8.5		9.0	6.5	9.0			
7- 8				5.0				8.5	6.0		11.0				12.0				6.0	5.5	4.0	10.0		
8- 9	2.5		3.5	9.0	7.5		6.5	9.5	7.5	7.0	12.5		10.0	1.5	1.5						4.0	8.5	8.0	
9-10		1.5		4.0	5.5	8.0	12.5	10.0	8.5	5.5		10.5		3.5	4.5						3.0	3.5		
10-11				8.0	3.5			10.5	9.5	4.0		8.5	8.5	6.0	7.5	2.5			8.5	2.0	8.0		10.0	
11-12				3.0	1.5	5.0	9.0	11.5	10.5		4.5	6.5		8.0	10.5		0.5		6.0	1.0	3.5		8.5	
12-13	2.0			7.0		8.5		12.0	11.5		6.0		7.5	10.5	0.0		10.0				11.0	8.0	10.5	7.0
13-14			2.0	2.0	8.0		6.0			7.5	7.5			12.5	3.0		8.5	0.0			10.0	3.0	8.0	5.5
14-15		3.0		6.0	6.0	5.5	12.0			6.0	9.0		6.5	2.0	6.0				8.5	9.0	7.5			
15-16				1.0	4.0	8.5				4.5	10.5	9.0		4.0	9.0	1.5			5.5	8.0	2.5			
16-17	1.5		4.0	5.0	2.0		8.5				12.0	7.0	5.5	6.5							6.5	7.0		
17-18		0.5		9.0		6.0						5.0	12.5	8.5	1.5						5.5	2.5	10.5	11.0
18-19			0.0	4.0	8.5		5.5		5.5	7.5				11.0	5.0		0.5	1.0	8.0	4.5	7.0	8.5	10.0	
19-20	3.5	4.5		8.0	6.5		11.5	4.0	7.0	6.0	4.0		11.5	0.0	8.0		10.0		5.0	3.5	2.0		8.5	
20-21	1.0			3.0	4.5	6.5		5.0	8.0	4.5	5.5	9.5		2.5	11.0	1.0	8.5				2.0	6.5	7.0	
21-22			2.5	7.0	2.0		8.0	5.5	9.0		7.0	7.5	10.0	4.5	0.5				10.5	1.0	1.5		5.5	
22-23		2.0		2.0	0.0			6.0	10.0		8.5	5.5		7.0	3.5				7.5	11.5	6.0	11.0		
23-24	3.0			6.0		7.0		7.0	11.0	7.5	10.5		9.0	9.0	6.5				5.0	10.0	1.5	8.5		
24-25	0.5			1.0	7.0		11.0	7.5	12.5	6.0	12.0			11.5	9.5						9.0	6.0		
25-26				5.0	4.5			8.0		4.5		10.5	8.0	0.5		0.5	0.5		10.0	8.0	1.0		11.0	
26-27			0.5	9.5	2.5	7.5	7.5	9.0				8.5		2.5	2.0	3.0	10.0	0.5	7.5	7.0	5.5		9.5	
27-28	2.5	3.5		4.0	0.5			9.5				6.0	7.0	5.0	5.0		8.5		4.5	5.5	0.5		8.0	

	DL	DY	SZ	UU	DG	DH	RR	SS	TV	WW	SZ	RR	RZ	AV	RV
	HER	HER	HYA	HYA	HYA	HYA	LEO	LEO	LEO	LEO	LYN	LYR	LYR	PEG	UMA
MAX	11	10.2	10.6	10.7	11.6	11.4	10	10.5	11.5	11	9.1	7.1	10	9.9	10.1
MIN	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12	12.6	12	9.6	8.1	12	10.9	11.2
RISE	1	1	2	2	3	2	2	2	2	3	1	2	2	2	3
0- 1		9.5	5.5	4.0	2.0		7.5	7.0	10.5		5.0		11.5		9.5
1- 2			7.5	5.0			5.0			4.0	7.0		12.0		8.0
2- 3	8.5		9.0	6.0	8.5	10.0	3.0	4.0	10.5	9.0	0.5	11.0			6.5
3- 4	13.0			7.5	2.5	9.5	0.5	10.0			2.5				5.0
4- 5		10.0		8.5		9.0	9.0		11.0	4.5	4.5				3.5
5- 6			1.5	9.5	9.0	8.5	7.0	7.5	3.5	9.5	6.5			0.5	2.0
6- 7	12.0		3.5	10.5	3.0	8.0	4.5		11.5		8.5	10.0			
7- 8			5.0			7.5	2.5	4.5	4.0	5.0	2.0				10.0
8- 9		10.5	7.0		9.0	7.0		10.5	12.0	9.5	4.0				8.5
9-10	11.0	7.5	8.5	1.5	3.5	6.5	8.5		4.0		6.0				7.0
10-11			10.5	2.5		6.0	6.5	7.5	12.5	5.0	8.0	9.5			5.5
11-12				4.0	9.5	5.5	4.0		4.5	10.0	1.5	12.5			4.0
12-13	10.0	10.5		5.0	3.5	5.0	1.5	4.5			3.5				2.5
13-14		8.0	3.0	6.0		4.0	10.5	11.0	5.0	5.5	5.5				
14-15			5.0	7.5	10.0	3.5	8.0			10.5	7.5	8.5			10.5
15-16	9.0		6.5	8.5	4.0	3.0	6.0	8.0	5.5	1.0	0.5	11.5			9.0
16-17			8.5	9.5		2.5	3.5			6.0	3.0				7.5
17-18		8.5	10.0	10.5	10.5	2.0	1.0	5.0	6.0	10.5	5.0		8.5		6.0
18-19					4.5	1.5	10.0	11.0		1.0	7.0		9.0		4.5
19-20	12.0					1.0	7.5		6.5	6.0	0.0	11.0	9.5		3.0
20-21			2.5	1.5			5.0	8.0		11.0	2.0		10.0		1.5
21-22		8.5	4.5	2.5	5.0		3.0		7.0	1.5	4.5		10.5	0.5	11.0
22-23	11.0		6.0	4.0			0.5	5.0		6.5	6.5		11.0		9.5
23-24			8.0	5.0			9.0	11.5	7.5	11.5	8.5	10.0	12.0		8.0
24-25			10.0	6.0	5.5	10.0	7.0			2.0	1.5				6.5
25-26	10.0	9.0		7.5		9.5	4.5	8.5	8.0	7.0	3.5				5.0
26-27				8.5		9.0	2.5				6.0				3.5
27-28			2.0	9.5	5.5	8.5		5.5	8.0	2.0	8.0	9.5			2.0

	SW	XX	AT	TZ	BH	RS	ST	SW	SZ	TV	TW	UU	UY	RW	TT	RR	XZ	DM	RW	XZ	RR	TW	VX	
	AND	AND	AND	AUR	AUR	BOO	BOO	BOO	BOO	BOO	BOO	BOO	BOO	CNC	CNC	CET	CYG	CYG	DRA	DRA	GEM	HER	HER	
MAX	9.3	10.3	10.8	11.2	11.1	9.8	10.6	11.3	12	10.8	10.8	11.2	10.6	10.7	11	9.3	9.1	11.2	11	9.6	10.7	10.5	9.9	
MIN	10.8	11.6	11.5	12.8	12.6	11.3	11.8	12.7	13.4	11.5	12.1	12.7	12	12.6	12.3	10.3	10.5	12.7	12	10.3	11.9	11.8	10.4	
RISE	2	3	3	2	2	2	3	2	2	3	2	1	2	2	3	2	3	2	2	3	2	2	2	
0- 1			12.0	8.5		4.5	4.5	10.0	4.0	7.5	5.0	4.0		7.5	8.0		7.0		2.0	4.5	5.0		9.0	
1- 2				3.0		8.0	10.5	10.5	5.0	6.0	7.0		5.5	9.5			5.0		9.5	3.5		6.0	6.5	
2- 3		0.5		7.5	5.0			11.5	6.5	4.5	8.5	11.0			1.0				7.0	2.5	5.0			
3- 4				2.0	3.0	5.0	7.0	12.0	7.5	3.0	10.0	9.0	4.5	1.0	4.0				4.0	1.0		6.0		
4- 5				6.5	1.0	8.0			8.5		11.5	7.0	12.0	3.0	7.0							4.5		
5- 6				1.0			4.0		9.5	7.5		5.0	3.5	5.5			10.0		9.5	10.5			9.0	
6- 7			1.0	5.5		5.5	10.0		10.5	6.0			10.5	7.5			8.5	10.0	6.5	9.0	4.5		7.0	
7- 8	1.5	2.0			5.5	8.5		2.5	12.0	4.5	3.5			10.0	2.5		7.0		4.0	8.0	9.0			
8- 9			12.5	4.5	3.5		6.5	3.0		3.0	5.0	9.5	9.5		5.5		5.0				7.0	4.0		
9-10				8.5	1.5	6.0	12.5	3.5			6.5	7.5		1.5	8.5				9.0	6.0	8.5			
10-11				3.5			3.5	4.5		7.5	8.0	5.5	8.5	3.5					6.5	4.5	3.5		9.5	
11-12	1.5			7.5		3.0	9.0	5.0	3.5	6.0	9.5	3.5		6.0	1.0				3.5	3.5	8.0		7.0	
12-13				2.5	6.0	6.5		5.5	4.5	4.5	11.0		7.0	8.0	4.0		10.0				2.5	3.5		
13-14			11.0	6.5	4.0		6.0	6.0	6.0	3.0		10.0		10.5	7.0	1.5	8.5		8.5	1.5	8.0			
14-15			1.5	1.5	1.5	3.5	12.0	7.0	7.0			8.0	6.0				7.0	9.5	6.0		3.0			
15-16	1.0	1.0		5.5		7.0		7.5	8.0	7.5	3.0	6.0		2.0			5.0		3.5	10.5	7.5		9.5	
16-17							8.5	8.0	9.0	6.0	4.5	4.0	5.0	4.0	3.0						9.5	2.5		7.5
17-18				4.5	6.5	4.0		9.0	10.0	4.5	6.0		12.0	6.5	6.0				8.5	8.0	7.0			
18-19				9.0	4.5	7.5	5.5	9.5	11.5	3.0	7.5	11.0	4.0	8.5	9.0	1.0			5.5	7.0	2.5			
19-20				3.5	2.0		11.5	10.0	12.5		9.0	8.5	11.0				10.0		3.0	6.0	7.0			
20-21		2.5		8.0		4.5		11.0		7.5	10.5	6.5			1.5		8.5			5.0	2.0		9.5	
21-22			11.5	2.5		8.0	8.0	11.5		6.0	12.0	4.5	10.0	2.5	4.5		6.5		8.0	3.5	6.5		7.5	
22-23			2.0	7.0	7.0			12.0	3.0	4.5				4.5	7.5		5.0		5.5	2.5	1.5		5.5	
23-24				1.5	4.5	5.0	5.0		4.0	3.0	2.5		8.5	7.0		0.5			2.5	1.5	6.5			
24-25				6.0	2.5	8.0	11.0		5.5		4.0	9.5		9.0					10.5		1.5			
25-26				0.5	0.5				6.5	7.5	5.5	7.5	7.5		3.0				8.0	10.5	6.0		10.0	
26-27				5.0		5.5	7.5	2.5	7.5	6.0	7.0	5.0		0.5	6.0		10.0		5.0	9.5	1.0		8.0	
27-28			0.5	9.0		8.5		3.0	8.5	4.5	8.5	3.0	6.5	3.0			8.5	10.0	2.5	8.5	5.5		5.5	
28-29		1.0		4.0	5.0		4.5	3.5	9.5	3.0	10.5			5.0			6.5		10.0	7.0	0.5			
29-30			12.0	8.0	3.0	6.0	10.5	4.5	11.0		12.0	10.0	5.5	7.5	2.0		5.0		7.5	6.0	5.5			
30-31	1.5			3.0	1.0			5.0	12.0	7.5		8.0		9.5	5.0				4.5	5.0			10.0	

	AR	DL	DY	SZ	UU	DG	DH	RR	SS	TV	WW	SZ	RR	RZ	RV
	HER	HER	HER	HYA	HYA	HYA	HYA	LEO	LEO	LEO	LEO	LYN	LYR	LYR	UMA
MAX	10.6	11	10.2	10.6	10.7	11.6	11.4	10	10.5	11.5	11	9.1	7.1	10	10.1
MIN	11.6	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12	12.6	12	9.6	8.1	12	11.2
RISE	2	1	1	2	2	3	2	2	2	2	3	1	2	2	3
0- 1	6.5	9.0		4.0			8.0	8.5	11.5		7.0	1.0			
1- 2	5.0		9.5	6.0			7.5	6.5	2.5	8.5		3.0			10.0
2- 3	4.0		6.5	7.5	0.5	6.0	7.0	4.0	8.5		2.5	5.0			8.5
3- 4		8.0			1.5		6.5	2.0		9.0	7.5	7.5	8.5		7.0
4- 5					3.0		6.0	10.5	5.5	1.5		0.5	12.0		5.5
5- 6	10.5		9.5		4.0	6.5	5.5	8.0		9.5	3.0	2.5			4.0
6- 7	9.5	7.0	7.0	2.0	5.0	0.5	5.0	6.0	3.0	1.5	8.0	4.5			2.5
7- 8	8.0	11.5		3.5	6.0		4.5	3.5	9.0	10.0		6.5	8.0		1.0
8- 9	6.5			5.5	7.5	7.0	4.0	1.0		2.0	3.5		11.0		10.5
9-10	5.0		10.0	7.0	8.5	1.0	3.5	10.0	6.0	10.5	8.0	2.0		7.0	9.0
10-11	3.5	10.5	7.5		9.5		3.0	7.5		2.5		4.0		7.5	7.5
11-12						7.5	2.5	5.0	3.0		3.5	6.0	7.0	8.0	6.0
12-13						1.5	1.5	3.0	9.0	3.0	8.5	8.0	10.5	8.5	4.5
13-14	10.5	9.5	10.0	1.5	0.5		1.0	0.5				1.5		9.0	3.0
14-15	9.0		7.5	3.0	1.5	8.0	0.5	9.0	6.0	3.5	4.0	3.5		9.5	1.5
15-16	7.5			5.0	3.0	2.0		7.0			9.0	5.5		10.5	11.0
16-17	6.0	8.5		7.0	4.0			4.5	3.5	4.0		7.5	9.5	11.0	9.5
17-18	4.5		10.5	8.5	5.0	8.0		2.5	9.5		4.5	1.0		11.5	8.0
18-19	3.5		8.0		6.0	2.5				4.5	9.0	3.0		12.0	6.5
19-20		7.5			7.5			8.5	6.5			5.0			5.0
20-21		12.0		1.0	8.5	8.5		6.5		5.0	4.5	7.0	8.5		3.5
21-22	10.5			3.0	9.5	2.5		4.0	3.5		9.5	0.5	12.0		2.0
22-23	9.0	6.5	8.0	4.5			8.0	2.0	9.5	5.5		2.5			
23-24	7.5	11.0	5.5	6.5			7.5	10.5			5.0	4.5			10.0
24-25	6.0			8.0	0.5	3.0	7.0	8.0	6.5	5.5		6.5	8.0		8.5
25-26	4.5				1.5		6.5	6.0				8.5	11.0		7.0
26-27	3.0	10.0	8.5		3.0		6.0	3.5	4.0	6.0	5.5	2.0			5.5
27-28			6.0	0.5	4.0	3.5	5.5	1.0	10.0			4.0			4.0
28-29				2.5	5.0		5.0	10.0		6.5	0.5	6.0	7.0		2.5
29-30	10.0	9.0		4.5	6.5		4.5	7.5	7.0		5.5	8.0	10.5		1.0
30-31	8.5		9.0	6.0	7.5	4.0	4.0	5.0		7.0		1.5			10.5

## AAVSO RR Lyrae Ephemeris for April 2018

all times in U.T.

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	XX	AT	SW	TZ	BH	RS	ST	SW	SZ	TV	TW	UU	UY	RW	TT	XZ	DM	RW	XZ	RR	TW	VX	AR
	AND	AND	AQR	AUR	AUR	BOO	BOO	BOO	BOO	BOO	BOO	BOO	BOO	CNC	CNC	CYG	CYG	DRA	DRA	GEM	HER	HER	HER
MAX	10.3	10.8	10.5	11.2	11.1	9.8	10.6	11.3	12	10.8	10.8	11.2	10.6	10.7	11	9.1	11.2	11	9.6	10.7	10.5	9.9	10.6
MIN	11.6	11.5	12.1	12.8	12.6	11.3	11.8	12.7	13.4	11.5	12.1	12.7	12	12.6	12.3	10.5	12.7	12	10.3	11.9	11.8	10.4	11.6
RISE	3	3	1	2	2	2	3	2	2	3	2	1	2	2	3	3	2	2	3	2	2	2	2
0- 1			10.0	7.0		3.0	7.0	5.5		6.0	2.0	6.0	4.0					2.0	4.0	5.0	5.5	8.0	7.0
1- 2				2.0		6.5		6.0	1.5	4.5	3.5	4.0	11.5	1.0				10.0	2.5			6.0	5.5
2- 3				6.0			4.0	7.0	2.5	3.0	5.0	1.5	3.0	3.0		10.0		7.0	1.5	4.5	5.5	3.5	4.5
3- 4		10.5			3.5	3.5	10.0	7.5	3.5	1.5	7.0	10.5	10.5	5.5	3.5	8.5		4.5					3.0
4- 5				5.0	1.5	7.0		8.0	5.0	7.5	8.5	8.5	2.0	8.0	6.5	6.5	9.0	1.5	11.0	4.5	5.5	10.5	1.5
5- 6						1.0	6.5	9.0	6.0	6.0	10.0	6.5	9.0			5.0		9.5	9.5			8.0	11.0
6- 7			9.5	4.0		4.0		9.5	7.0	4.5	11.5	4.5				3.5		7.0	8.5	4.0	5.0	6.0	10.0
7- 8						7.5	3.5	10.0	8.0	3.0		2.5	8.0	1.5	2.0		8.0	4.0	7.5			4.0	8.5
8- 9				3.0	4.0	1.5	9.5	11.0	9.0	1.5	2.0			3.5	5.5			1.5	6.5	3.5	5.0		7.0
9-10				7.0	1.5	4.5		11.5	10.5		3.5	9.0	7.0	6.0		10.0		9.0	5.0			10.5	5.5
10-11	1.5			2.0		7.5	6.0		11.5	6.0	5.0	7.0		8.0		8.5		6.5	4.0	3.5	5.0	8.5	4.0
11-12		10.5	10.5	6.0		2.0				4.5	6.5	5.0	5.5			6.5		3.5	3.0			6.5	2.5
12-13				1.0		5.0	3.0	1.0	1.0	3.0	8.0	3.0			4.0	5.0	8.5	1.0	2.0	3.0	5.0	4.0	1.0
13-14				5.0	4.0	8.0	9.0	1.5	2.0	1.5	9.5		4.5	2.0	7.0	3.5		9.0					11.0
14-15					2.0	2.5		2.5	3.0		11.0	10.0		4.0				6.0	11.0	2.5	5.0	11.0	9.5
15-16				4.0		5.5	5.5	3.0	4.5	6.0		7.5	3.5	6.5				3.5	10.0			8.5	8.0
16-17		9.0				8.5	11.5	3.5	5.5	4.5	1.5	5.5	10.5	8.5	2.5	10.0			8.5	2.5	5.0	6.5	6.5
17-18			10.0	3.0		2.5	2.5	4.5	6.5	3.0	3.0	3.5	2.5		5.5	8.0	9.5	8.5	7.5	7.0		4.5	5.0
18-19				7.5	4.5	6.0	8.5	5.0	7.5	1.5	4.5	1.5	9.5			6.5		6.0	6.5	2.0	5.0		4.0
19-20	11.0	11.0		2.0	2.5			5.5	8.5		6.0	10.5	1.0	2.5		5.0		3.0	5.5	6.5			2.5
20-21				6.5		3.0	5.0	6.5	10.0	6.0	7.5	8.5	8.5	4.5	1.5	3.5	8.0		4.0	1.5	5.0	9.0	
21-22				1.0		6.5	11.0	7.0	11.0	4.5	9.0	6.5		7.0	4.5			8.0	3.0	6.5		6.5	10.5
22-23				5.5			2.0	7.5		3.0	10.5	4.0	7.0					5.5	2.0	1.5	5.0	4.5	9.5
23-24			9.0		5.0	3.5	8.0	8.0		1.5		2.0				10.0		2.5		6.0			8.0
24-25		9.5		4.5	3.0	7.0		9.0	1.5		1.0		6.0			8.0		10.5	11.0	1.0	5.0		6.5
25-26						1.0	4.5	9.5	2.5	6.0	2.5	9.0		3.0	3.0	6.5	9.0	8.0	10.0	5.5	9.5	9.0	5.0
26-27				3.5		4.0	10.5	10.0	4.0	4.5	4.0	7.0	5.0	5.0	6.0	5.0		5.0	9.0		5.0	7.0	3.5
27-28		11.5				7.5	1.5	11.0	5.0	3.0	5.5	5.0		7.5		3.5		2.5	7.5	5.5	9.5	5.0	2.0
28-29			10.5	2.5		1.5	7.0	11.5	6.0	1.5	7.0	3.0	4.0				7.5	10.5	6.5		4.5		
29-30				6.5	3.5	4.5			7.0		8.5		11.0		1.5			7.5	5.5	5.0	9.5		10.5

	DL	DY	SZ	UU	DG	DH	RR	SS	TV	WW	SZ	RR	RZ	AV	RV
	HER	HER	HYA	HYA	HYA	HYA	LEO	LEO	LEO	LEO	LYN	LYR	LYR	PEG	UMA
MAX	11	10.2	10.6	10.7	11.6	11.4	10	10.5	11.5	11	9.1	7.1	10	9.9	10.1
MIN	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12	12.6	12	9.6	8.1	12	10.9	11.2
RISE	1	1	2	2	3	2	2	2	2	3	1	2	2	2	3
0- 1		6.5				3.5	3.0	4.0		1.0	3.5		6.5		9.0
1- 2	8.0	3.5				3.0			7.5	6.0	5.5	6.5	7.0		7.5
2- 3					4.5	2.5	9.0	1.0			7.5	9.5	7.5		6.0
3- 4		9.0				2.0	7.0	7.5	8.0	1.5	1.0		8.5		4.5
4- 5	7.0	6.5	2.0			1.5	4.5			6.5	3.0		9.0		3.0
5- 6	11.5	4.0	4.0	1.5	4.5		2.5	4.5	8.5		5.0	5.5	9.5		1.5
6- 7			5.5	3.0						1.5	7.0	9.0	10.0		11.0
7- 8	6.0	9.5		4.0			8.5	1.5		6.5			10.5		9.5
8- 9	10.5	7.0		5.0	5.0		6.5	7.5	1.0		2.5		11.0		8.0
9-10		4.5		6.5			4.0			2.0	4.5	5.0	11.5		6.5
10-11	5.0			7.5			2.0	4.5	1.5	7.0	6.5	8.0			5.0
11-12	9.5	10.0	1.5		5.5						8.5	11.0			3.5
12-13		7.0	3.5				8.0	1.5	2.0	2.5	2.0			9.0	2.0
13-14		4.5	5.5				6.0	8.0		7.5	4.0				
14-15	8.5				6.0		3.5		2.5		6.0	7.0			10.0
15-16		10.0					1.5	5.0		3.0	8.0	10.5			8.5
16-17		7.5		1.5					3.0	7.5	1.5				7.0
17-18	7.5	5.0		3.0	6.5	6.0	7.5	2.0			3.5				5.5
18-19	11.5		1.5	4.0		5.5	5.5	8.0	3.0	3.0	5.5	6.5			4.0
19-20		10.5	3.0	5.0		5.0	3.0				7.5	9.5	4.5		2.5
20-21	6.5	8.0	5.0	6.5		4.5		5.0	3.5				5.0		
21-22	10.5	5.0	6.5	7.5		4.0	9.5			3.5	3.0		5.5	8.5	10.5
22-23						3.5	7.0	2.0	4.0		5.0	5.5	6.0		9.0
23-24	5.5					3.0	4.5	8.5			7.0	9.0	7.0		7.5
24-25	9.5	8.0			1.5	2.5	2.5		4.5	4.0			7.5		6.0
25-26		5.5	1.0			2.0		5.5			2.5		8.0		4.5
26-27			2.5			1.5	8.5		5.0		4.5	5.0	8.5		3.0
27-28	8.5		4.5	2.0	1.5	1.0	6.5	2.5		4.0	6.5	8.0	9.0		1.5
28-29		8.5	6.5	3.0			4.0	8.5	5.5		8.5	11.5	9.5	9.0	11.0
29-30		6.0		4.0			2.0				2.0		10.0		9.5

## AAVSO RR Lyrae Ephemeris for May 2018

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	SW	XX	AT	SW	TZ	BH	RS	ST	SW	SZ	TV	TW	UU	UY	RW	TT	XZ	DM	RW	XZ	RR	TW	VX
	AND	AND	AND	AQR	AUR	AUR	BOO	BOO	BOO	BOO	BOO	BOO	BOO	BOO	CNC	CNC	CYG	CYG	DRA	DRA	GEM	HER	HER
MAX	9.3	10.3	10.8	10.5	11.2	11.1	9.8	10.6	11.3	12	10.8	10.8	11.2	10.6	10.7	11	9.1	11.2	11	9.6	10.7	10.5	9.9
MIN	10.8	11.6	11.5	12.1	12.8	12.6	11.3	11.8	12.7	13.4	11.5	12.1	12.7	12	12.6	12.3	10.5	12.7	12	10.3	11.9	11.8	10.4
RISE	2	3	3	1	2	2	2	3	2	2	3	2	1	2	2	3	3	2	2	3	2	2	2
0- 1					1.5		7.5	4.0		8.0	6.0	10.5	9.5	2.5		4.5	10.0	10.0	5.0	4.5		4.5	9.5
1- 2							2.0	10.0		9.5	4.5		7.5	10.0	3.5		8.0	6.0	2.0	3.0	4.5	9.5	7.0
2- 3		11.0	10.0				5.0		2.0	10.5	3.0		5.5	1.5	5.5		6.5		10.0	2.0		4.5	5.0
3- 4					4.5		8.0	6.5	2.5		1.5	2.0	3.5	9.0			5.0	8.5	7.0		4.5	9.5	3.0
4- 5				10.0			2.5		3.0			3.5	1.5			3.5	3.5		4.5			4.5	
5- 6				8.0	3.5	1.5	5.5	3.5	3.5		6.0	5.5	10.5	7.5			2.0		1.5	10.0	4.0	9.5	9.5
6- 7							8.5	9.5	4.5	2.0	4.5	7.0	8.0		1.5			7.0	9.5	9.0		4.5	7.5
7- 8			8.5		2.5		2.5		5.0	3.5	3.0	8.5	6.0	6.5	3.5		10.0		7.0	8.0	3.5	9.5	5.0
8- 9	10.5						6.0	6.0	5.5	4.5	1.5	10.0	4.0		6.0	2.0	8.0	9.5	4.0	6.5		4.5	3.0
9-10					1.5				6.5	5.5			2.0	5.5		5.0	6.5	5.5	1.5	5.5	3.5	9.0	
10-11		10.0	10.5	9.0		2.0	3.0	3.0	7.0	6.5	6.0		11.0				5.0		9.5	4.5		4.5	9.5
11-12				7.0			6.5	9.0	7.5	7.5	4.5	2.0	9.0	4.0			3.5	8.0	6.5	3.5	3.0	9.0	7.5
12-13	10.0		7.0		5.0				8.5	9.0	3.0	3.5	7.0		2.0		1.5		4.0	2.0		4.5	5.5
13-14							3.5	5.5	9.0	10.0	1.5	5.0	4.5	3.0	4.0	3.5					2.5	9.0	3.5
14-15					4.0		7.0		9.5	11.0		6.5	2.5	10.5	6.5		9.5	6.5	9.0			4.5	
15-16			9.0	10.5		2.5		2.5	10.0		6.0	8.0		2.0			8.0		6.0	10.5	2.5	9.0	10.0
16-17	9.5			8.5	3.0		4.0	8.5	11.0		4.5	9.5	9.5	9.0			6.5	9.0	3.5	9.0		4.5	8.0
17-18							7.0			1.5	3.0	11.0	7.5			2.5	5.0			8.0	2.0	9.0	5.5
18-19			11.0		2.0			5.0		3.0	1.5		5.5	8.0	2.5		3.5		8.5	7.0		4.0	3.5
19-20							4.5	11.0		4.0		1.5	3.5		4.5		1.5	7.5	6.0	5.5	1.5	9.0	1.5
20-21	9.0		7.5			3.0	7.5	2.0		5.0	6.0	3.0		7.0					3.0	4.5		4.0	10.0
21-22				9.5	5.0		2.0	8.0	2.0	6.0	4.5	4.5	10.0				9.5	10.0		3.5	1.5	9.0	8.0
22-23				7.5			5.0		2.5	7.0	3.0	6.0	8.0	6.0		4.0	8.0	6.0	8.5	2.5		4.0	6.0
23-24		10.0	9.5		4.0		8.0	4.5	3.0	8.5	1.5	7.5	6.0				6.5		5.5			9.0	3.5
24-25							2.0	10.5	4.0	9.5		9.0	4.0	4.5	3.0		5.0	8.5	3.0			4.0	1.5
25-26					3.0		5.5	1.5	4.5	10.5	6.0	10.5	2.0		5.0		3.5			10.5		9.0	10.5
26-27				11.0			8.5	7.5	5.0		4.5		10.5	3.5		2.5	1.5		8.0	9.5		4.0	8.0
27-28				9.0	2.0		2.5		5.5		3.0		8.5					7.0	5.0	8.0		9.0	6.0
28-29			8.0	7.0			6.0	4.0	6.5		1.5	2.5	6.5	2.5			9.5		2.5	7.0		4.0	4.0
29-30							9.0	10.0	7.0	2.5		4.0	4.5	9.5			8.0	9.5	10.5	6.0		9.0	2.0
30-31					5.0		3.0		7.5	3.5	6.5	5.5	2.5		3.5	1.5	6.5	5.5	7.5	5.0	4.5	4.0	10.5

	AR	DL	DY	SZ	UU	DG	DH	RR	SS	TV	WW	SZ	RR	RZ	AV	RV
	HER	HER	HER	HYA	HYA	HYA	HYA	LEO	LEO	LEO	LEO	LYN	LYR	LYR	PEG	UMA
MAX	10.6	11	10.2	10.6	10.7	11.6	11.4	10	10.5	11.5	11	9.1	7.1	10	9.9	10.1
MIN	11.6	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12	12.6	12	9.6	8.1	12	10.9	11.2
RISE	2	1	1	2	2	3	2	2	2	2	3	1	2	2	2	3
0- 1	9.0	7.5	3.0		5.0	2.0			5.5	6.0	4.5	4.0	4.0	10.5	8.0	8.0
1- 2	7.5											6.0	7.5	11.0		6.5
2- 3	6.0		9.0					6.0	2.5	6.5			10.5		7.0	5.0
3- 4	4.5	6.5	6.0	2.5		2.5		3.5			5.0					3.5
4- 5	3.5	11.0	3.5	4.0						7.0		3.5	3.5			2.0
5- 6	2.0								6.0			5.5	6.5			
6- 7		5.5	9.0			3.0					5.0		9.5			10.0
7- 8	10.0	10.0	6.5					5.5	3.0						8.5	8.5
8- 9	9.0		4.0		2.0			3.0				3.0				7.0
9-10	7.5	4.5			3.0	3.5					5.5	5.0	5.5	3.0	7.5	5.5
10-11	6.0	9.0	9.5	2.0	4.0				6.0				9.0	3.5		4.0
11-12	4.5		7.0	4.0	5.0			7.0						4.0		2.5
12-13	3.0	3.5	4.0			3.5		4.5	3.0		6.0	2.0		5.0		
13-14	1.5	8.0					4.0	2.5				4.5	5.0	5.5		10.5
14-15			9.5				3.5					6.5	8.0	6.0	9.5	9.0
15-16	10.0	2.5	7.0			4.0	3.0		6.5					6.5		7.5
16-17	8.5	7.0	4.5				2.5	6.5				1.5		7.0	8.0	6.0
17-18	7.0		2.0	1.5			2.0	4.0	3.5	1.5	1.5	3.5	4.0	7.5		4.5
18-19	5.5		10.0	3.5		4.5	1.5	2.0				6.0	7.5	8.0	7.0	3.0
19-20	4.0	6.0	7.5		2.0					2.0			10.5	8.5		
20-21	3.0	10.5	5.0		3.0				6.5		2.0			9.0		11.0
21-22			2.0		4.0			6.0		2.5		3.0	3.5	9.5		9.5
22-23		5.0	10.5		5.5			3.5	4.0			5.0	6.5	10.0		8.0
23-24	10.0	9.5	7.5							3.0	2.5		10.0	10.5	9.0	6.5
24-25	8.5		5.0													5.0
25-26	7.0	4.0	2.5	3.0					7.0	3.5		2.5			7.5	3.5
26-27	5.5	8.5	10.5					5.5			2.5	4.5	6.0			2.0
27-28	4.0		8.0					3.0	4.0	4.0		6.5	9.0		6.5	
28-29	2.5	3.0	5.5													10.0
29-30		7.5	3.0							4.5	3.0	2.0				8.5
30-31	11.0				2.0			7.0	7.0			4.0	5.0			7.0

	SW	XX	AT	SW	TZ	RS	ST	SW	SZ	TV	TW	UU	UY	RW	TT	RR	XZ	DM	RW	XZ	RR	TW	VX
	AND	AND	AND	AQR	AUR	BOO	BOO	BOO	BOO	BOO	BOO	BOO	BOO	CNC	CNC	CET	CYG	CYG	DRA	DRA	GEM	HER	HER
MAX	9.3	10.3	10.8	10.5	11.2	9.8	10.6	11.3	12	10.8	10.8	11.2	10.6	10.7	11	9.3	9.1	11.2	11	9.6	10.7	10.5	9.9
MIN	10.8	11.6	11.5	12.1	12.8	11.3	11.8	12.7	13.4	11.5	12.1	12.7	12	12.6	12.3	10.3	10.5	12.7	12	10.3	11.9	11.8	10.4
RISE	2	3	3	1	2	2	3	2	2	3	2	1	2	2	3	2	3	2	2	3	2	2	2
0- 1	10.5	9.0	10.0			6.5	7.0	8.5	4.5	5.0	7.0		8.5				5.0		5.0	3.5		8.5	8.5
1- 2	7.5			10.0				9.0	5.5	3.5	8.5	9.5					3.5	8.0	2.0	2.5		4.0	6.5
2- 3			6.5	8.0		3.5	3.5	9.5	6.5	2.0	10.5	7.0	7.5					4.0	10.0			8.5	4.0
3- 4				6.5	3.0	7.0	9.5	10.5	8.0			5.0							7.5			4.0	2.0
4- 5	10.0								9.0	6.5		3.0	6.0		3.0		9.5	6.5	4.5	10.5		8.5	11.0
5- 6	7.0	10.5	8.5		2.0	4.0	6.5		10.0	5.0	2.0			4.0			8.0		2.0	9.5		4.0	8.5
6- 7						7.0				3.5	3.5	10.0	5.0				6.5	8.5	9.5	8.5		8.5	6.5
7- 8			5.0	9.5			3.0			2.0	5.5	8.0					5.0	5.0	7.0	7.0		4.0	4.5
8- 9	9.5	8.0	10.5	7.5		4.5	9.0				7.0	6.0	4.0		1.5	10.5	3.5		4.5	6.0		8.5	2.0
9-10	6.5			5.5		7.5		2.0	2.0	6.5	8.5	3.5						7.5		5.0		3.5	
10-11			7.0			2.0	6.0	2.5	3.0	5.0	10.0		2.5	2.0				3.5	9.5	4.0		8.5	9.0
11-12						5.0		3.0	4.0	3.5		10.5		4.0			9.5	9.5	6.5	2.5	3.0	3.5	6.5
12-13	9.0			11.0	3.5	8.0	2.5	4.0	5.0	2.0		8.5					8.0	6.0	4.0			8.5	4.5
13-14		9.0	9.0	9.0		2.0	8.5	4.5	6.0		2.0	6.5			10.0		6.5				2.5	3.5	2.5
14-15				7.0	2.5	5.5		5.0	7.5	6.5	3.5	4.5					5.0	8.0	9.0	10.5		8.5	
15-16			5.5			8.5	5.0	6.0	8.5	5.0	5.0	2.5	7.5				3.0	4.5	6.5	9.5	2.0	3.5	9.0
16-17	8.5					2.5		6.5	9.5	3.5	6.5			2.5					3.5	8.5		8.5	7.0
17-18						6.0	2.0	7.0		2.0	8.0	9.0	6.5	4.5	2.0			6.5		7.5	2.0	3.5	5.0
18-19		10.5	7.5	10.0		9.0	8.0	7.5			9.5	7.0				9.5	9.5		8.5	6.0		8.5	2.5
19-20				8.0		3.0		8.5		6.5		5.0	5.5				8.0	9.0	6.0	5.0		3.5	
20-21	8.0			6.0		6.5	4.5	9.0		5.0		3.0					6.5	5.5	3.5	4.0		8.0	9.5
21-22		8.0	9.5				10.5	9.5	2.5	3.5			4.5				5.0			3.0		3.5	7.0
22-23						3.5		10.5	3.5	2.0	3.0	10.0		3.0			3.0	7.5	8.5			8.0	5.0
23-24	10.0		6.0		2.5	6.5	7.5		4.5		4.5	7.5	3.0					4.0	5.5			3.5	3.0
24-25	7.5			9.5					5.5	6.5	6.0	5.5						10.0	3.0	11.0		8.0	
25-26				7.5		4.0	4.0		7.0	5.0	7.5	3.5	2.0				9.5	6.0		9.5		3.5	9.5
26-27		9.5	8.0	5.5		7.0	10.0		8.0	3.5	9.0				2.5		8.0		8.0	8.5		8.0	7.5
27-28	9.5								9.0	2.0	10.5	10.5					6.5	8.5	5.5	7.5		3.5	5.5
28-29	7.0					4.5	7.0	2.0	10.0			8.5	8.0	3.5			5.0	4.5	2.5	6.5		8.0	3.0
29-30		7.0	10.0	10.5		7.5		2.5		6.5		6.5					3.0		10.5	5.0		3.0	

	AR	DL	DY	SZ	UU	DG	DH	RR	SS	TV	WW	SZ	RR	RZ	AV	RV
	HER	HER	HER	HYA	HYA	HYA	HYA	LEO	LEO	LEO	LEO	LYN	LYR	LYR	PEG	UMA
MAX	10.6	11	10.2	10.6	10.7	11.6	11.4	10	10.5	11.5	11	9.1	7.1	10	9.9	10.1
MIN	11.6	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12	12.6	12	9.6	8.1	12	10.9	11.2
RISE	2	1	1	2	2	3	2	2	2	2	3	1	2	2	2	3
0- 1	9.5	2.0	8.5		3.0			4.5		4.5			8.0	2.5		5.5
1- 2	8.0	6.5	6.0	2.5				2.5	4.5		3.5			3.5	8.5	4.0
2- 3	6.5	11.0	3.0											4.0		2.5
3- 4	5.0											3.5	4.0	4.5	7.0	
4- 5	4.0	5.5	8.5							3.5			7.5	5.0		10.5
5- 6	2.5	10.0	6.0					4.0					10.5	5.5	6.0	9.0
6- 7			3.5					2.0	4.5					6.0		7.5
7- 8	10.5	4.5										3.0	3.5	6.5	5.0	6.0
8- 9	9.5	9.0	9.0	2.0			2.0						6.5	7.0	9.0	4.5
9-10	8.0		6.5										10.0	7.5		3.0
10-11	6.5	3.5	4.0		2.0			3.5						8.0	8.0	
11-12	5.0	8.0			3.0				5.0			2.5	2.5	8.5		
12-13	3.5		9.5			2.0						4.5	6.0	9.0	6.5	9.5
13-14	2.0	2.5	6.5						2.0				9.0	9.5		8.0
14-15		7.0	4.0					5.5						10.5	5.5	6.5
15-16	10.5			2.0		2.5		3.0				2.0	2.0	11.0		5.0
16-17	9.0		9.5						5.0			4.0	5.0			3.5
17-18	7.5	6.0	7.0										8.5		8.5	2.0
18-19	6.0	10.0	4.5						2.0							
19-20	4.5		2.0					5.0							7.5	10.0
20-21	3.5	5.0	10.0					2.5				3.5	4.5			8.5
21-22	2.0	9.0	7.5		2.0				5.5				7.5	2.0	6.0	7.0
22-23			4.5		3.0								10.5	2.5		5.5
23-24	10.0	4.0	2.0						2.5	2.0				3.0	5.0	4.0
24-25	9.0	8.0	10.0					4.0				3.0	3.5	3.5	9.0	2.5
25-26	7.5		7.5					2.0		2.0			6.5	4.0		
26-27	6.0	3.0	5.0										10.0	4.5	8.0	10.5
27-28	4.5	7.0	2.5							2.5				5.0		9.0
28-29	3.0		10.5						2.5			2.5	3.0	5.5	6.5	7.5
29-30		2.0	8.0					3.5		3.0		4.5	6.0	6.0		6.0

## AAVSO RR Lyrae Ephemeris for July 2018

all times in U.T.

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	SW	XX	AT	SW	BH	RS	ST	SW	SZ	TV	TW	UU	UY	RW	RR	XZ	DM	RW	XZ	TW	VX	AR	DL
	AND	AND	AND	AQR	AUR	BOO	BOO	BOO	BOO	BOO	BOO	BOO	BOO	CNC	CET	CYG	CYG	DRA	DRA	HER	HER	HER	HER
MAX	9.3	10.3	10.8	10.5	11.1	9.8	10.6	11.3	12	10.8	10.8	11.2	10.6	10.7	9.3	9.1	11.2	11	9.6	10.5	9.9	10.6	11
MIN	10.8	11.6	11.5	12.1	12.6	11.3	11.8	12.7	13.4	11.5	12.1	12.7	12	12.6	10.3	10.5	12.7	12	10.3	11.8	10.4	11.6	12.4
RISE	2	3	3	1	2	2	3	2	2	3	2	1	2	2	2	3	2	2	3	2	2	2	1
0- 1				8.5		1.5	3.5	3.0		5.0	2.5	4.0					7.0	8.0	4.0	8.0			6.0
1- 2	9.5	11.0	6.5	6.5		5.0		4.0		3.5	4.0	2.0					3.5	5.0	3.0	3.0	7.5	10.0	
2- 3	6.5			5.0	10.5	8.0		4.5	2.0	2.0	5.5		6.0			9.5	9.5	2.5	2.0	8.0	5.5	8.5	
3- 4						2.0	6.5	5.0	3.0		7.0	9.0			8.0	8.0	5.5	10.0		3.0	3.5	7.0	5.0
4- 5		8.0	8.5			5.5		6.0	4.0	6.5	9.0	7.0	4.5		10.5	6.5	2.0	7.5	11.0	8.0		5.5	9.5
5- 6	9.0			10.0		8.5	3.0	6.5	5.0	5.0		5.0				5.0	8.0	4.5	10.0	3.0		4.0	
6- 7	6.0		5.0	8.0		2.5	9.0	7.0	6.5	3.5		3.0	3.5			3.0	4.0	2.0	9.0	8.0	8.0	3.0	4.0
7- 8		5.5	10.5	6.0		6.0		7.5	7.5	2.0								10.0	7.5	3.0	5.5		8.5
8- 9				4.0			6.0	8.5			2.0		2.5		7.5	11.0	6.5	7.0	6.5	8.0	3.5		
9-10	8.5	9.5	7.0			3.0				6.5	3.5	7.5		2.0	10.0	9.5	2.5	4.5	5.5	3.0		9.5	3.0
10-11	5.5					6.5	2.5			5.0	5.5	5.5				8.0	9.0		4.5	8.0		8.5	7.5
11-12			3.0	9.0			8.5			3.5	7.0	3.5				6.5	5.0	9.5	3.0	3.0	8.0	7.0	
12-13		7.0	9.0	7.5		3.5				2.0	8.5					4.5		7.0	2.0	7.5	6.0	5.5	2.0
13-14	8.0			5.5	9.5	6.5	5.5									3.0	7.5	4.0		3.0	4.0	4.0	6.5
14-15	5.0	11.0	5.5	3.5					2.5	6.5		8.0			9.5		3.5			7.5		2.5	
15-16			11.0			4.0	2.0		3.5	5.0		6.0	6.0	2.5		11.0	10.0	9.0	10.0	3.0			
16-17	10.0			10.5		7.0	8.0		4.5	3.5	2.0	4.0				9.5	6.0	6.5	9.0	7.5	8.5		5.5
17-18	7.5	8.5	7.5	8.5		2.0	6.0	2.0	3.5	2.0	3.5	2.0	5.0			8.0	2.0	3.5	8.0	3.0	6.0	9.5	10.0
18-19	4.5			6.5	10.0	4.5	5.0	2.5	7.0		5.0					6.5	8.5		6.5	7.5	4.0	8.0	
19-20			3.5	4.5		7.5		3.0	8.0	6.5	6.5	9.0	4.0		9.0	4.5	4.5	9.0	5.5	2.5	2.0	6.5	4.5
20-21	9.5	6.0	9.5					4.0		5.0	8.0	6.5				3.0		6.0	4.5	7.5		5.0	9.0
21-22	7.0					5.0	7.5	4.5		3.5		4.5	3.0					7.0	3.5	3.5	2.5	8.5	3.5
22-23		10.0	5.5	10.0		8.0		5.0		2.0		2.5				11.0	3.0		2.0	7.5	6.5	2.5	3.5
23-24				8.0	10.0	2.0	4.5	6.0								9.5	9.5	8.5		2.5	4.0		8.0
24-25	9.0			6.0		5.5		6.5		6.5					8.0	8.0	5.5	6.0		7.5	2.0	10.5	
25-26	6.5	7.5	8.0	4.0		8.5		7.0	2.0	5.0	3.0	7.5			11.0	6.5		3.0	10.0	2.5		9.5	2.5
26-27						2.5	7.0	8.0	3.0	3.5	4.5	5.5				4.5	8.0		9.0	7.5	8.5	8.0	7.0
27-28			4.0			6.0			4.0	2.0	6.0	3.0				3.0	4.0	8.0	8.0	2.5	6.5	6.5	
28-29	8.5		10.0	9.0	10.5		4.0		5.5		7.5		6.5					5.5	7.0	7.5	4.5	5.0	
29-30	6.0			7.0		3.0			6.5	6.5					7.5	11.0	6.5	2.5	5.5	2.5	2.5	3.5	6.0
30-31		8.5	6.0	5.0		6.0			7.5	5.0		8.0	5.5		10.0	9.5	2.5	10.5	4.5	7.5		2.0	

	DY	RR	SS	TV	WW	SZ	RR	RZ	AV	RV
	HER	LEO	LEO	LEO	LEO	LYN	LYR	LYR	PEG	UMA
MAX	10.2	10	10.5	11.5	11	9.1	7.1	10	9.9	10.1
MIN	10.6	11.7	12	12.6	12	9.6	8.1	12	10.9	11.2
RISE	1	2	2	2	3	1	2	2	2	3
0- 1	5.5				2.0		9.0	6.5	5.5	4.5
1- 2	2.5							7.0		3.0
2- 3						2.0	2.0	7.5	4.5	
3- 4	8.5		3.0				5.0	8.5	8.5	
4- 5	5.5	3.0					8.5	9.0	3.5	
5- 6	3.0							9.5	7.5	8.0
6- 7								10.0		6.5
7- 8	8.5						4.5	10.5	6.0	5.0
8- 9	6.0		3.0				7.5	11.0		3.5
9-10	3.5	2.5					11.0		5.0	2.0
10-11									9.0	
11-12	9.0						3.5		4.0	
12-13	6.5						7.0		8.0	8.5
13-14	3.5		3.5				10.0		3.0	7.0
14-15		2.0						2.0	7.0	5.5
15-16						2.5	3.0	2.5		4.0
16-17	6.5						6.0	3.0	5.5	2.5
17-18	4.0						9.0	3.5		
18-19								4.0	4.5	
19-20						2.0	2.0	4.5	8.5	9.0
20-21	7.0						5.5	5.0	3.5	7.5
21-22	4.5						8.5	5.5	7.5	6.0
22-23								6.0		4.5
23-24		3.0						7.0	6.5	3.0
24-25	7.0						4.5	7.5		
25-26	4.5						7.5	8.0	5.0	
26-27	2.0						11.0	8.5	9.5	
27-28								9.0	4.0	8.0
28-29	7.5	2.5				3.0	3.5	9.5	8.0	6.5
29-30	5.0						7.0	10.0	3.0	5.0
30-31	2.5			2.0			10.0	10.5	7.0	3.5

	SW	XX	AT	SW	TZ	BH	RS	ST	SW	SZ	TV	TW	UU	UY	RW	RR	XZ	DM	RW	XZ	RR	TW	VX
	AND	AND	AND	AQR	AUR	AUR	BOO	BOO	BOO	BOO	BOO	BOO	BOO	BOO	CNC	CET	CYG	CYG	DRA	DRA	GEM	HER	HER
MAX	9.3	10.3	10.8	10.5	11.2	11.1	9.8	10.6	11.3	12	10.8	10.8	11.2	10.6	10.7	9.3	9.1	11.2	11	9.6	10.7	10.5	9.9
MIN	10.8	11.6	11.5	12.1	12.8	12.6	11.3	11.8	12.7	13.4	11.5	12.1	12.7	12	12.6	10.3	10.5	12.7	12	10.3	11.9	11.8	10.4
RISE	2	3	3	1	2	2	2	3	2	2	3	2	1	2	2	2	3	2	2	3	2	2	2
0- 1				3.0				6.5			3.5		6.0				8.0	9.0	8.0	3.5		2.5	
1- 2	8.5		2.5	1.5			3.5				2.0		4.0	4.5			6.5	5.0	5.0	2.5		7.0	7.0
2- 3	5.5	6.0	8.0	10.5				3.0				2.5	2.0				4.5		2.5			2.5	4.5
3- 4	2.5			8.5		9.0					6.5	4.0		3.0		7.0	3.0	7.5	10.5			7.0	2.5
4- 5	10.5	10.0	4.5	6.5			4.0		1.5		5.0	5.5				9.5	1.5	3.5	7.5	10.5		2.5	
5- 6	8.0	3.5	10.5	4.5				6.0	2.0	1.5	3.5		6.5	2.0			11.0	9.5	5.0	9.0		7.0	
6- 7	5.0			2.5	9.0				2.5	2.5	2.0		4.5				9.5	6.0	2.0	8.0		2.5	7.0
7- 8		7.5	6.5				4.5	2.5	3.5	3.5			2.5				8.0	2.0	10.0	7.0		7.0	5.0
8- 9	10.0			9.5		9.5			4.0	5.0	6.5					6.5	6.0	8.0	7.0	6.0		2.5	2.5
9-10	7.5	11.5	3.0	7.5		7.5	1.5		4.5	6.0	5.0					9.0	4.5	4.5	4.5	4.5		7.0	
10-11	4.5	5.0	8.5	5.5			5.0	5.5	5.0		3.5	2.0					3.0		1.5	3.5		2.0	
11-12				4.0					6.0		2.0	3.5	5.0				1.5	7.0	9.5	2.5		7.0	7.0
12-13	9.5	9.0	5.0	2.0			2.0	2.0				5.5	3.0				11.0	3.0	7.0	1.5		2.0	5.0
13-14	7.0		10.5	11.0		10.0	5.5				6.5	7.0				6.0	9.5	9.0	4.0			7.0	3.0
14-15	4.0		1.5	9.0		7.5					5.0					8.5	8.0	5.5	1.5	10.5		2.0	
15-16		6.5	7.0	7.0	9.0		2.5	5.0			3.5					11.0	6.0	1.5	9.5	9.5		7.0	
16-17	9.0			5.0			6.0				2.0		5.5	3.5			4.5	7.5	6.5	8.0		2.0	7.5
17-18	6.5	10.5	3.5	3.0				1.5		2.0			3.5		11.5		3.0	4.0	4.0	7.0		7.0	5.5
18-19	3.5	3.5	9.0			10.0	3.0			3.0	6.5	2.0	1.5	2.5		5.5	1.5			6.0		2.0	3.0
19-20				10.0		8.0	6.0				4.5	5.0	3.5				8.0	11.0	6.0	9.0	5.0		7.0
20-21	8.5	7.5	5.5	8.5				4.5		5.5	3.5	5.0		1.5		10.5	9.5	2.5	6.0	3.5		2.0	
21-22	6.0		11.0	6.5			3.5				2.0	6.5	6.5				8.0	8.5	3.5	2.5		6.5	
22-23	3.0		2.0	4.5									4.5				6.0	5.0		1.5		2.0	5.5
23-24		5.0	7.5	2.5		10.5		7.0	1.5		6.5		2.0				4.5		8.5			6.5	3.5
24-25	8.0				9.5	8.5	4.0		2.0		5.0					7.5	3.0	7.0	6.0	10.5		2.0	
25-26	5.5	9.0	4.0	9.5				4.0	2.5		3.5					10.0	1.5	3.5	3.0	9.5		6.5	
26-27	2.5		9.5	7.5					3.5		2.0	1.5	7.0				11.0	9.5		8.5	9.5	2.0	
27-28	10.5			5.5			4.5		4.0		3.0	5.0					9.5	5.5	8.5	7.5		6.5	5.5
28-29	7.5	6.5	6.0	3.5				6.5	4.5	1.5	6.5	4.5	3.0				8.0	2.0	5.5	6.0		2.0	3.5
29-30	5.0			1.5		9.0	1.5		5.5	2.5	5.0	6.0		4.0		7.0	6.0	8.0	3.0	5.0		6.5	1.5
30-31		10.5	2.5	11.0			5.0	3.5	6.0	4.0	3.5						9.5	4.5	4.0		4.0		1.5

	AR	DL	DY	SS	RR	RZ	AV	RV
	HER	HER	HER	LEO	LYR	LYR	PEG	UMA
MAX	10.6	11	10.2	10.5	7.1	10	9.9	10.1
MIN	11.6	12.4	10.6	12	8.1	12	10.9	11.2
RISE	2	1	1	2	2	2	2	3
0- 1							2.0	1.5
1- 2		5.0			3.0		6.0	
2- 3			5.0		6.0			
3- 4	7.5		2.5		9.5		4.5	
4- 5	6.0	4.0		1.5			9.0	7.0
5- 6	4.5				2.0	1.5	3.5	5.5
6- 7	3.0		5.5		5.5	2.0	7.5	4.0
7- 8	2.0	3.0	3.0		8.5	2.5	2.5	2.0
8- 9		7.5				3.0	6.5	
9-10					1.5	3.5		
10-11	9.0	2.0	6.0		4.5	4.0	5.5	
11-12	7.5	6.5	3.5		8.0	5.0		
12-13	6.0				11.0	5.5	4.0	6.0
13-14	4.5					6.0	8.5	4.5
14-15	3.0	5.5	6.0		4.0	6.5	3.0	2.5
15-16	1.5		3.5		7.0	7.0	7.0	
16-17					10.0	7.5	2.0	
17-18		4.5				8.0	6.0	
18-19	8.5		6.5		3.0	8.5		
19-20	7.0		4.0		6.0	9.0	5.0	6.5
20-21	5.5	3.5	1.5		9.5	9.5	9.0	5.0
21-22	4.0	7.5				10.0	3.5	3.0
22-23	3.0		7.0		2.0		8.0	1.5
23-24	1.5	2.5	4.0		5.5		2.5	
24-25		6.5	1.5		8.5		6.5	
25-26							1.5	
26-27	8.5	1.5			1.5		5.5	7.0
27-28	7.0	5.5	4.5		4.5			5.5
28-29	5.5		2.0		8.0	1.5	4.5	3.5
29-30	4.0				11.0	2.0	8.5	2.0
30-31	2.5	4.5				2.5	3.0	

## AAVSO RR Lyrae Ephemeris for September 2018

all times in U.T.

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	SW	XX	AT	SW	TZ	BH	RS	ST	SW	SZ	TV	TW	UU	UY	RW	TT	RR	XZ	DM	RW	XZ	RR	TW
	AND	AND	AND	AQR	AUR	AUR	BOO	BOO	BOO	BOO	BOO	BOO	BOO	BOO	CNC	CNC	CET	CYG	CYG	DRA	DRA	GEM	HER
MAX	9.3	10.3	10.8	10.5	11.2	11.1	9.8	10.6	11.3	12	10.8	10.8	11.2	10.6	10.7	11	9.3	9.1	11.2	11	9.6	10.7	10.5
MIN	10.8	11.6	11.5	12.1	12.8	12.6	11.3	11.8	12.7	13.4	11.5	12.1	12.7	12	12.6	12.3	10.3	10.5	12.7	12	10.3	11.9	11.8
RISE	2	3	3	1	2	2	2	3	2	2	3	2	1	2	2	3	2	3	2	2	3	2	2
0- 1	10.0	4.0	8.0	9.0							2.0							3.0		8.0	3.0		6.5
1- 2	7.5			7.0			2.0				0.5							1.5	6.5	5.0	1.5	8.5	1.5
2- 3	4.5	8.0	4.5	5.0									3.5	1.5			4.0	11.0	3.0	2.5			6.5
3- 4	1.5	1.5	10.0	3.0		9.5						1.0	1.5		10.5	10.0	6.5	9.5	9.0		11.0	8.0	1.5
4- 5	9.5	12.0	1.0	1.0	8.5	7.0	2.5	3.0			3.5	2.5		0.5			9.0	7.5	5.0	7.5	9.5		6.5
5- 6	7.0	5.5	6.5			5.0					2.0	4.0					11.5	6.0	1.5	5.0	8.5	8.0	1.5
6- 7	4.0			8.0	7.5						0.5							4.5	7.5	2.0	7.5		6.5
7- 8	1.5	9.5	3.0	6.0			3.0						4.0				3.5	3.0	3.5		6.5	7.5	1.5
8- 9	9.0	2.5	8.5	4.0	6.5	9.5				1.0			2.0			11.5	6.0	1.5	10.0	7.5	5.0		6.5
9-10	6.5			2.5		7.5		2.5		2.0	3.5				11.0		8.5	11.0	6.0	4.5	4.0		1.5
10-11	3.5	7.0	5.0			5.5	3.5		0.5	3.5	2.0						11.0	9.5	2.0	2.0	3.0		6.5
11-12	1.0		10.5						1.5		0.5	0.5						7.5	8.5		2.0		1.5
12-13	8.5	11.0	1.5	7.5			1.0	5.0	2.0			2.0	5.0		10.0			6.0	4.5	7.0	0.5		6.0
13-14	6.0	4.0	7.0	5.5	8.5	10.0	4.0		2.5			4.0	2.5				5.5	4.5	1.0	4.5	11.0		1.5
14-15	3.0			3.5		8.0		2.0	3.5		4.0		0.5				8.0	3.0	7.0	1.5	10.0		6.0
15-16		8.0	3.5	1.5	7.5	6.0	1.0		4.0		2.5			2.0	11.5		10.5	1.5	3.0		8.5		1.5
16-17	8.0	1.5	9.0				4.5				1.0							11.0	9.5	6.5	7.5		6.0
17-18	5.5			8.5	6.5			4.5						1.0		12.0		9.5	5.5	4.0	6.5		1.5
18-19	2.5	5.5	5.5	6.5		10.5	1.5						3.5				5.0	7.5	1.5	1.0	5.5		6.0
19-20	10.5		11.0	5.0		8.5		1.0		0.5	4.0		1.5				7.5	6.0	8.0	9.0	4.0		1.5
20-21	7.5	9.5	2.0	3.0		6.5				1.5	2.5	2.0			10.0		10.0	4.5	4.0	6.5	3.0		6.0
21-22	5.0	3.0	7.5	1.0			2.0			3.0	1.0	3.5				10.5		3.0		3.5	2.0		1.0
22-23	2.0				9.0			4.0		4.0		5.0						1.5	6.5	1.0	1.0		6.0
23-24	10.0	7.0	4.0	8.0		11.0							4.0				4.0	11.0	2.5	9.0	11.0		1.0
24-25	7.0		9.5	6.0	8.0	9.0	2.5	0.5			4.0		2.0				7.0	9.5	9.0	6.0	10.0	9.5	6.0
25-26	4.5	11.0		4.0		6.5					2.5						9.5	7.5	5.0	3.5	9.0		1.0
26-27	1.5	4.5	6.0	2.0	7.0						1.0				10.5		12.0	6.0	1.0	0.5	7.5	9.0	6.0
27-28	9.5		11.5				3.0	3.5										4.5	7.5	8.5	6.5		1.0
28-29	6.5	8.5	2.5									1.5	4.5	2.5			3.5	3.0	3.5	5.5	5.5	9.0	6.0
29-30	4.0	2.0	8.0	7.5		9.0			1.0		4.0	3.0	2.5				6.0	1.5	10.0	3.0	4.5		1.0

	VX	AR	DL	DY	SZ	UU	DH	RR	WW	SZ	RR	RZ	AV	RV
	HER	HER	HER	HER	HYA	HYA	HYA	LEO	LEO	LYN	LYR	LYR	PEG	UMA
MAX	9.9	10.6	11	10.2	10.6	10.7	11.4	10	11	9.1	7.1	10	9.9	10.1
MIN	10.4	11.6	12.4	10.6	11.7	12.3	12.6	11.7	12	9.6	8.1	12	10.9	11.2
RISE	2	2	1	1	2	2	2	2	3	1	2	2	2	3
0- 1		1.0		5.0							4.0	3.5	7.5	
1- 2				2.0							7.0	4.0	2.0	
2- 3	4.0		3.5									4.5	6.0	
3- 4	1.5					11.5				8.5		5.0	1.0	
4- 5		6.5									3.0	5.5	5.0	4.0
5- 6		5.0	2.5	2.5							6.5	6.0	9.0	2.5
6- 7		3.5									9.5	6.5	4.0	1.0
7- 8	4.0	2.5								8.0		7.0	8.0	
8- 9	2.0	1.0	1.5		12.0						2.5	7.5	2.5	
9-10				3.0							5.5	8.0	7.0	
10-11							11.5	10.5			8.5		1.5	
11-12			0.5							7.5			5.5	4.5
12-13	4.0	6.5	5.0								1.5			3.0
13-14	2.0	5.0		3.0							4.5		4.5	1.5
14-15		3.5		0.5		11.5					8.0		8.5	
15-16		2.0	4.0		11.5								3.5	
16-17		0.5									0.5		7.5	
17-18	4.5			3.5							4.0		2.0	
18-19	2.5		3.0	1.0							7.0	0.5	6.5	5.0
19-20									11.0			1.0	1.0	3.5
20-21		6.0								8.5		2.0	5.0	2.0
21-22		4.5	2.0	4.0							3.0	2.5	9.0	0.5
22-23	4.5	3.0		1.0					11.5		6.5	3.0	4.0	
23-24	2.5	2.0									9.5	3.5	8.0	
24-25			1.0							8.0		4.0	3.0	
25-26			5.5	4.0		11.5		11.5			2.5	4.5	7.0	
26-27				1.5							5.5	5.0	1.5	4.0
27-28	5.0										9.0	5.5	6.0	2.5
28-29	2.5	6.0	4.5							7.5		6.0		1.0
29-30	0.5	4.5		4.5				10.5			1.5	6.5	4.5	

	SW	XX	AT	SW	TZ	BH	RS	ST	SW	SZ	TV	TW	UU	UY	RW	TT	RR	XZ	DM	RW	XZ	RR	TW	
	AND	AND	AND	AQR	AUR	AUR	BOO	BOO	BOO	BOO	BOO	BOO	BOO	BOO	CNC	CNC	CET	CYG	CYG	DRA	DRA	GEM	HER	
MAX	9.3	10.3	10.8	10.5	11.2	11.1	9.8	10.6	11.3	12	10.8	10.8	11.2	10.6	10.7	11	9.3	9.1	11.2	11	9.6	10.7	10.5	
MIN	10.8	11.6	11.5	12.1	12.8	12.6	11.3	11.8	12.7	13.4	11.5	12.1	12.7	12	12.6	12.3	10.3	10.5	12.7	12	10.3	11.9	11.8	
RISE	2	3	3	1	2	2	2	3	2	2	3	2	1	2	2	3	2	3	2	2	3	2	2	
0- 1	1.0			5.5	5.0	7.0			1.5	0.0	2.5		0.5			11.0	9.0		6.0	0.0	3.0	8.5		
1- 2	9.0	6.0	4.5	3.5	9.0	5.0			2.0	1.0	1.0				8.5	11.5	9.0	2.0			2.0		1.0	
2- 3	6.5		10.0	1.5			0.5	3.0						0.0	10.5			7.5	8.5	5.5	1.0	8.0		
3- 4	3.5	10.0	1.0		8.0												3.0	6.0	4.5	2.5	11.5		1.0	
4- 5	0.5	3.0	6.5			9.5							3.0			9.5	5.5	4.5	0.5		10.0	8.0		
5- 6	8.5		12.0	6.5	7.0	7.5	1.0				2.5	12.5	1.0				8.0	3.0	7.0			9.0	1.0	
6- 7	6.0	7.0	3.0	4.5		5.5					1.0	1.0					11.0	1.0	3.0	5.0	8.0	7.5		
7- 8	3.0	0.5	8.5	2.5	6.0	3.5		2.5				2.5			9.0					2.5	6.5		1.0	
8- 9	0.5	11.5		0.5			1.5								11.0	8.0	2.5	9.0	5.5		5.5	7.0		
9-10	8.0	4.5	5.0		5.0	10.0										11.5	5.0	7.5	1.5		4.5		1.0	
10-11	5.5		10.5		9.5	8.0					2.5		1.5				7.5	6.0	8.0	4.5	3.5	7.0		
11-12	2.5	8.5	1.5	6.0		6.0	2.0				1.0						10.0	4.5	4.0	2.0	2.0		0.5	
12-13	10.5	2.0	7.0	4.0	8.5	3.5		2.0		0.5								3.0	0.0		1.0	6.5		
13-14	7.5			2.0						2.0							9.5	10.0	2.0	1.0	6.5	7.0	11.5	0.5
14-15	5.0	6.0	3.5	0.0	7.5	10.5	2.5					0.5			11.5		4.5		2.5	4.5	10.5	6.0	5.5	
15-16	2.0		9.0			8.5					2.5	2.0	2.5	0.5			7.0	9.0	8.5	1.5	9.0		0.5	
16-17	10.0	10.0		7.0	6.5	6.0					1.0		0.5				9.5	7.5	5.0		8.0	6.0	5.5	
17-18	7.0	3.5	5.5	5.0		4.0		1.5	0.0							8.5		6.0	1.0	7.0	7.0		0.5	
18-19	4.5		11.0	3.0	5.5				1.0						7.5	11.5	1.5	4.5	7.0	4.0	6.0	5.5	5.5	
19-20	1.5	7.5	2.0	1.5		11.0	0.5		1.5						10.0		4.0	3.0	3.5	1.5	4.5		0.5	
20-21	9.5	1.0	7.5			9.0			2.0		2.5		3.0		12.0		6.5	1.0			3.5		5.5	
21-22	6.5	11.5			8.5	6.5					1.0		1.0				9.0		5.5	6.5	2.5		0.5	
22-23	4.0	5.0	4.0	6.5		4.5	0.5	1.0				0.5				10.5		9.0	2.0	3.5	1.5		5.5	
23-24	1.0		9.5	4.5	7.5					0.0		2.0						7.5	8.0	1.0	0.0	9.5	0.5	
24-25	9.0	9.0	0.0	2.5						1.5					8.0		3.5	6.0	4.5		10.5		5.0	
25-26	6.0	2.0	6.0	0.5	6.5	9.0	1.0				2.5				10.5		6.0	4.5	0.5	6.0	9.5	9.0	0.5	
26-27	3.5		11.5			7.0					1.0		1.5				9.0	8.5	3.0	6.5	3.5	8.0	5.0	
27-28	0.5	6.5	2.5		5.5	5.0		0.5								12.0	11.0	1.0	3.0	0.5	7.0	9.0	0.5	
28-29	8.5		8.0	5.5			1.5														6.0		5.0	
29-30	5.5	10.5		4.0	4.5												3.0	9.0	5.0	6.0	5.0	8.5	0.5	
30-31	3.0	3.5	4.5	2.0	8.5	9.5		3.0			2.5				8.5	7.5	5.5	7.5	1.5	3.0	3.5		5.0	

	VX	AR	DL	DY	SZ	UU	DG	DH	RR	SS	TV	WW	SZ	RR	RZ	AV	RV
	HER	HER	HER	HER	HYA	HYA	HYA	HYA	LEO	LEO	LEO	LEO	LYN	LYR	LYR	PEG	UMA
MAX	9.9	10.6	11	10.2	10.6	10.7	11.6	11.4	10	10.5	11.5	11	9.1	7.1	10	9.9	10.1
MIN	10.4	11.6	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12	12.6	12	9.6	8.1	12	10.9	11.2
RISE	2	2	1	1	2	2	3	2	2	2	2	3	1	2	2	2	3
0- 1		3.0		2.0										5.0		8.5	
1- 2		1.5	3.5									12.5				3.5	
2- 3		0.0					11.0	11.5					7.0			7.5	
3- 4	3.0							11.0						1.0		2.5	
4- 5	1.0		2.5	2.0		9.0		10.5	10.0					4.0		6.5	3.0
5- 6						10.0	11.5	10.0						7.0		1.0	1.5
6- 7					10.5	11.5		9.5					6.5			5.5	0.0
7- 8		4.0	1.5		12.0								8.5	0.0			10.0
8- 9	3.0	2.5		2.5			12.0							3.0		4.0	
9-10	1.0	1.5							9.5					6.5		8.0	
10-11			0.5										6.0		0.5	3.0	
11-12							12.5						8.0		1.0	7.0	
12-13				3.0							9.0			2.5	1.5	2.0	2.0
13-14	3.5			0.0	10.0									5.5	2.0	6.0	0.5
14-15	1.0		4.0		12.0				9.0					5.5	2.5	0.5	10.5
15-16		4.0				9.0					9.0	7.5		3.0	5.0		
16-17		2.5		3.0		10.0								1.5	3.5	9.0	
17-18		1.0	3.0	0.5		11.5					11.5			5.0	4.0	3.5	
18-19									10.5			9.5			4.5	7.5	
19-20	1.5									11.5	12.0		7.0		5.0	2.5	2.5
20-21			2.0		9.5									1.0	5.5	6.5	1.0
21-22				1.0	11.5						12.5	10.0		4.0	6.0	1.5	11.0
22-23														7.5		5.5	
23-24		3.5	1.0						10.0					6.5		0.0	
24-25	1.5	2.5						11.5		11.5		10.0	8.5	0.0		4.0	
25-26		1.0		1.0				11.0						3.5		8.5	
26-27						9.0		10.5						6.5		3.0	3.0
27-28						10.5		10.0			10.5	5.5				7.0	1.5
28-29					11.0	11.5		9.5	9.5				8.0			2.0	0.0
29-30	2.0			1.5						12.0				2.5		6.0	10.0
30-31			3.0				9.0					11.0		5.5		1.0	

	SW	XX	AT	SW	TZ	BH	RS	ST	SW	SZ	TW	UU	UY	RW	TT	RR	XZ	DM	RW	XZ	RR	TW	VX
	AND	AND	AND	AQR	AUR	AUR	BOO	BOO	BOO	BOO	BOO	BOO	BOO	CNC	CNC	CET	CYG	CYG	DRA	DRA	GEM	HER	HER
MAX	9.3	10.3	10.8	10.5	11.2	11.1	9.8	10.6	11.3	12	10.8	11.2	10.6	10.7	11	9.3	9.1	11.2	11	9.6	10.7	10.5	9.9
MIN	10.8	11.6	11.5	12.1	12.8	12.6	11.3	11.8	12.7	13.4	12.1	12.7	12	12.6	12.3	10.3	10.5	12.7	12	10.3	11.9	11.8	10.4
RISE	2	3	3	1	2	2	2	3	2	2	2	1	2	2	3	2	3	2	2	3	2	2	2
0- 1	0.0		10.0		3.5	7.5								11.0	10.5	8.0	6.0		0.5	2.5	8.0	0.0	
1- 2	8.0	7.5	0.5		7.5	5.5						0.0					4.5	3.5		1.5			
2- 3	5.5	1.0	6.5		2.5	3.5			10.5	11.0							2.5			0.5	8.0	0.0	
3- 4	2.5			5.0	6.5	1.0		11.5	11.0	12.5					6.5	2.5	1.0	6.0	2.5	10.5			
4- 5		5.0	2.5	3.0		10.0			12.0					6.5	9.5	5.0		2.5	10.5	9.5	7.5	0.0	
5- 6	7.5		8.5	1.0	5.5	8.0			0.0				12.0	9.0	12.5	7.5					8.5		
6- 7	5.0	9.0				6.0					10.5	0.5		11.0			7.5	4.5		7.0	7.0	0.0	
7- 8	2.0	2.5	5.0		4.5	3.5					12.5						6.0	1.0	2.5	6.0			
8- 9					9.0	1.5	0.0								8.0	2.0	4.5		10.5	5.0	7.0	0.0	
9-10	7.0	6.5	1.0	4.5	3.5	10.5									11.0	4.5	2.5	3.0		4.0			0.0
10-11	4.5		7.0	2.5	8.0	8.5								7.0		7.0	1.0		5.0	2.5	6.5	0.0	
11-12	1.5	10.5		0.5	2.5	6.0								9.5				5.5	2.0	1.5			
12-13	9.5	4.0	3.0		7.0	4.0								11.5	6.5			1.5	10.0	0.5	6.5		
13-14	6.5		9.0			2.0									9.5	1.5	7.5				10.5		
14-15	4.0	8.0			6.0	11.0		1.5		12.0	10.5				12.5	4.0	6.0	4.0	4.5	9.5	6.0		0.5
15-16	1.0	1.5	5.0	3.5		8.5					12.0					6.5	4.5	0.5	1.5	8.5			
16-17	9.0			1.5	5.0	6.5					0.5			7.5		9.0	2.5	6.5	9.5	7.5	5.5		
17-18	6.0	5.5	1.5		9.0	4.5								10.0	8.5		1.0	2.5		6.0			
18-19	3.5		7.5		4.0	2.5							12.5	12.0	11.5	1.0			4.0	5.0	5.5		
19-20	0.5	9.5			8.0			1.0								3.5		5.0	1.5	4.0			0.5
20-21	8.5	2.5	3.5	5.0	3.0	9.0							11.5			6.0	7.5	1.0		3.0	5.0		
21-22	5.5		9.5	3.0	7.0	7.0		12.5	10.5					6.0	7.0	8.5	6.0				1.5		
22-23	3.0	6.5	0.0	1.0		5.0			11.5			0.5		8.0	10.0		4.5	3.5	4.0	0.5	4.5		
23-24	0.0	0.0	5.5		6.0	3.0			12.0		11.5			10.5		0.0	2.5		1.0	11.0	9.0		
24-25	8.0	11.0						0.5	0.0		0.5			12.5		3.0	1.0	6.0		10.0	4.5		1.0
25-26	5.0	4.0	2.0		5.0	9.5				11.5					5.5	5.5		2.0		8.5	9.0		
26-27	2.5		8.0	4.0	9.5	7.5		12.0		12.5					8.5	8.0			3.5	7.5	4.0		
27-28		8.0		2.5	4.0	5.5								6.5	12.0		7.5	4.5	1.0	6.5	8.5		
28-29	7.5	1.5	4.0	0.5	8.5	3.0	0.0							8.5			6.0	0.5		5.0	3.5		
29-30	4.5		10.0		3.0	1.0								11.0		2.0	4.0	7.0		4.0	8.0		1.0

	AR	DL	DY	SZ	UU	DG	DH	RR	SS	TV	WW	SZ	RR	RZ	AV	RV
	HER	HER	HER	HYA	HYA	HYA	HYA	LEO	LEO	LEO	LEO	LYN	LYR	LYR	PEG	UMA
MAX	10.6	11	10.2	10.6	10.7	11.6	11.4	10	10.5	11.5	11	9.1	7.1	10	9.9	10.1
MIN	11.6	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12	12.6	12	9.6	8.1	12	10.9	11.2
RISE	2	1	1	2	2	3	2	2	2	2	3	1	2	2	2	3
0- 1							8.0					5.0			5.0	
1- 2	2.0						7.5					7.0				
2- 3	0.5					9.5		9.0		11.0			1.5	0.5	3.5	
3- 4				9.0				6.5	12.0				5.0	1.0		
4- 5				10.5								4.5		1.5	2.5	0.5
5- 6		1.0		12.5	8.0	9.5			9.5	11.5	6.5			2.0	6.5	10.5
6- 7					9.0			10.5					1.0	2.5	1.5	9.0
7- 8					10.5			8.5		7.0			4.0	3.0	5.5	
8- 9		0.0			11.5	10.0			12.5	12.0	4.0			3.5	0.5	
9-10	2.0										6.0			4.0	4.5	
10-11	0.5			8.5					9.5	7.5	8.0	0.0				
11-12				10.5		10.5		10.0		12.0			3.5		3.0	1.0
12-13				12.0				8.0					3.5			11.0
13-14									12.5	9.5	7.5	5.5			2.0	9.5
14-15						11.0				12.5	7.5				6.0	7.5
15-16			0.0				11.5		10.0	10.0			2.5		1.0	
16-17					8.0		11.0	9.5		8.0					5.0	
17-18	1.5			8.0	9.0	11.5	10.5	7.0		10.5	13.0	5.0				
18-19	0.0	1.5		10.0	10.5		10.0		13.0		7.0				4.0	
19-20			0.5	11.5	11.5		9.5			11.0	8.5		2.0			0.0
20-21						11.5	9.0		10.0				5.0		2.5	10.0
21-22		0.5					8.5	9.0		11.0		4.5			7.0	8.0
22-23							8.0	6.5		8.5	6.5				1.5	
23-24			0.5			12.0	7.5			11.5		8.5	1.0		5.5	
24-25	2.5			7.5									4.5	0.0	0.5	
25-26	1.5			9.5				10.5	10.5	12.0	9.0	4.0		0.5	4.5	
26-27	11.0			11.5		12.5		8.5				6.0		1.0		0.5
27-28			1.0		8.0					12.5		8.0	0.5	1.5	3.5	10.5
28-29					9.0					9.5		3.5	2.0			8.5
29-30					10.5	13.0				13.0		3.5		2.5	2.0	

	SW	XX	AT	SW	TZ	BH	ST	SW	SZ	TW	UU	UY	RW	TT	RR	XZ	DM	RW	XZ	RR	AR	DL	SZ
	AND	AND	AND	AQR	AUR	AUR	BOO	BOO	BOO	BOO	BOO	BOO	CNC	CNC	CET	CYG	CYG	DRA	DRA	GEM	HER	HER	HYA
MAX	9.3	10.3	10.8	10.5	11.2	11.1	10.6	11.3	12	10.8	11.2	10.6	10.7	11	9.3	9.1	11.2	11	9.6	10.7	10.6	11	10.6
MIN	10.8	11.6	11.5	12.1	12.8	12.6	11.8	12.7	13.4	12.1	12.7	12	12.6	12.3	10.3	10.5	12.7	12	10.3	11.9	11.6	12.4	11.7
RISE	2	3	3	1	2	2	3	2	2	2	1	2	2	3	2	3	2	2	3	2	2	1	2
0- 1	2.0	5.5	0.5		7.5	10.0				9.5				7.5	5.0	2.5	3.0		3.0	3.5			5.5
1- 2			6.0		2.0	8.0	11.5			11.0		13.0		10.5	7.5	1.0		0.5	2.0	8.0			7.5
2- 3	7.0				6.5	5.5				12.5			4.5					8.5	0.5	3.0			9.0
3- 4	4.5	3.0	2.5	1.5	1.0	3.5					10.5	11.5	6.5				1.5		11.0	7.5			11.0
4- 5	1.5				5.5	1.5							9.0	6.0	1.5			3.0	10.0	2.5	11.0		12.5
5- 6		7.0				10.5			9.5			10.5	11.5	9.0	4.0			4.0	0.0	9.0	7.5	9.5	
6- 7	6.5	0.5	4.5		4.5	8.0	11.0		11.0					12.0	7.0	4.0	0.0	8.0	7.5	2.5			
7- 8	4.0				8.5	6.0		8.5	12.0			9.5				2.5			6.5	7.0			
8- 9	1.0	4.5	1.0	3.0	3.5	4.0		9.5		9.0			5.0	4.5		1.0	2.5	2.5	5.5	2.0			7.0
9-10			6.5	1.0	7.5	2.0		10.0		11.0	9.5		7.0	7.5	1.0			10.5	4.5	6.5			8.5
10-11	6.0	8.5			2.5	10.5		10.5		12.5			9.5	11.0	3.5		5.0	7.5	3.0	1.5			10.5
11-12	3.5	1.5	3.0		6.5	8.5	10.5	11.5					11.5		6.0		1.0		2.0	6.5	1.0		12.5
12-13	0.5				1.5	6.5		12.0										2.0	1.0	1.5	10.5		
13-14		6.0			5.5	4.5							6.5			4.0	3.5	10.0	11.0	6.0	9.0		
14-15	5.5		5.0	2.0		2.5				10.0			5.5	9.5	0.5	2.5			10.0				
15-16	3.0			0.0	4.5	0.0							7.5	12.5	3.0	1.0			9.0	5.5			6.5
16-17	0.0	3.0	1.5		8.5	9.0	10.0		9.0	9.0		12.0	10.0		5.5		2.0	2.0	8.0				8.5
17-18			7.0		3.5	7.0			10.5	10.5			12.0	5.0				10.0	6.5	5.5			10.0
18-19	5.0	7.0			8.0	5.0			11.5	12.0		11.0		8.0			4.5		5.5				12.0
19-20	2.5	0.5	3.5		2.5	2.5	12.5		12.5		10.5		3.5	11.0	0.0		0.5		4.5	5.0	0.5		
20-21				1.5	7.0	0.5					10.0		6.0		2.5	4.0		1.5	3.5		10.5		
21-22	7.5	4.5			1.5	9.5	9.5						8.0	3.5	5.0	2.5	3.0	9.5	2.0	4.5	9.0		
22-23	4.5		5.5		6.0	7.5							10.5	7.0		1.0			1.0	9.5			6.0
23-24	2.0	8.5			0.5	5.0							12.5	10.0					11.5	4.5			8.0
24-25		2.0	2.0		5.0	3.0	12.0			8.5				13.0			1.5	1.0	10.0	9.0			9.5
25-26	7.0		7.5	2.5	9.0	1.0		8.0		10.0	9.0		4.0		2.0			9.0	9.0	4.0			11.5
26-27	4.0	6.0		0.5	4.0	10.0		8.5		11.5			6.5	5.5	4.5		4.0		8.0	8.5		12.5	
27-28	1.5		4.0		8.0	7.5		9.5					8.5	8.5	7.0	4.0			7.0	3.5	0.5		
28-29					3.0	5.5		10.0	10.0				11.0	11.5		2.5		1.0	5.5	8.5	10.0		
29-30	6.5	3.5	0.5		7.0	3.5	11.5	10.5	11.0			12.5				1.0	2.5	9.0	4.5	3.5			6.0
30-31	3.5		6.0		2.0	1.5		11.5	12.0		10.0			4.0	1.5				3.5	8.0			7.5

	UU	DG	DH	RR	SS	TV	WW	SZ	RR	RZ	AV	RV
	HYA	HYA	HYA	LEO	LEO	LEO	LEO	LYN	LYR	LYR	PEG	UMA
MAX	10.7	11.6	11.4	10	10.5	11.5	11	9.1	7.1	10	9.9	10.1
MIN	12.3	12.6	12.6	11.7	12	12.6	12	9.6	8.1	12	10.9	11.2
RISE	2	3	2	2	2	2	3	1	2	2	2	3
0- 1	11.5	7.0		10.0	10.5			5.5				5.5
1- 2				8.0			9.5	7.5			1.0	
2- 3				5.5	7.5				2.5			
3- 4		7.5					5.0	3.0				
4- 5							10.0	5.0			4.0	11.0
5- 6				9.5	11.0			7.0				9.0
6- 7	6.0	8.0		7.5			5.5		2.0		3.0	7.5
7- 8	7.0			5.0	8.0		10.5	2.5				6.0
8- 9	8.0		11.5					4.5			1.5	
9-10	9.0	8.5	10.5				6.0	6.5				
10-11	10.5		10.0	9.0	11.0	7.5	10.5	8.5	1.0		0.5	
11-12	11.5		9.5	6.5				2.0			4.5	
12-13		8.5	9.0		8.0	8.0	6.0	4.0				9.5
13-14			8.5				11.0	6.0			3.5	8.0
14-15			8.0	10.5		8.5		8.0	0.5			6.5
15-16		9.0	7.5	8.5	11.5		6.5	1.5	3.5		2.5	
16-17			7.0	6.0		8.5	11.5	3.5				
17-18	6.0		6.5		8.5			5.5		0.0	1.0	
18-19	7.0	9.5	6.0			9.0	7.0	7.5		0.5		
19-20	8.0		5.5	10.0			11.5		3.0	1.0	0.0	10.0
20-21	9.5			8.0	11.5	9.5		3.0		2.0	4.0	8.5
21-22	10.5	10.0		5.5			7.0	5.0		2.5		7.0
22-23	11.5				8.5	10.0	12.0	7.0			3.0	5.5
23-24									2.0			
24-25		10.5		9.5		10.5	7.5	2.5			2.0	
25-26				7.5	12.0		12.5	4.5				
26-27				5.0		11.0		6.5			0.5	10.5
27-28		10.5			9.0		8.0	8.5	1.0		5.0	9.0
28-29	6.0					11.5	13.0	2.0				7.5
29-30	7.0			9.0				4.0			3.5	6.0
30-31	8.0	11.0	11.5	6.5	12.0	12.0	8.0	6.0				