

## The 2017 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	12.0	10.8	10.8	11.2	10.6	10.7	11.0	9.3	9.1	11.2	11.0	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	12.0	12.6	12.3	10.3	10.5	12.7	12.0	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			1.5		4.0	5.5		9.5							5.5		4.0	3.5	1.5		2.5	8.0	10.5
1- 2	4.5	1.0			8.0	3.5									7.5	4.5		2.0			1.5	3.0	
2- 3	2.0				3.0	1.0	8.0		6.5				10.0		10.0	7.5		0.5		10.0	0.5	7.5	
3- 4		5.0	3.5	0.0	7.0	10.0		12.5	7.5	7.0	7.0		8.0	12.0	12.0	10.5		10.0		7.0	10.5	2.5	
4- 5					2.0	8.0			8.0	8.5		6.0					1.0				9.5	7.0	
5- 6	4.0				6.0	6.0	8.5	9.0	8.5	9.5		8.0		11.0	3.5	3.0	3.5		2.0		8.5	2.0	10.5
6- 7	1.5	2.5	5.5		1.0	3.5			9.0	10.5		9.5			6.0	6.0				9.5	7.5	7.0	
7- 8					5.0	1.5			10.0	11.5		11.0	10.5	9.5	8.0	9.0		3.5		7.0	6.0	2.0	
8- 9		6.5	2.0		9.5	10.5	9.0	12.0	10.5		7.0	12.5	8.5		10.5	12.5		2.0	0.5		5.0	6.5	
9-10	3.5				4.0	8.5			11.0					8.5	12.5	2.0	0.5	0.5			4.0	1.5	
10-11	1.0				8.5	6.0		8.5	12.0						2.0	5.0	3.0	10.0		9.5	3.0	6.0	11.0
11-12		4.0	4.0		3.0	4.0								7.5	4.0	8.0				6.5	1.5	1.5	
12-13					7.5	2.0									6.5	11.0					0.5	6.0	
13-14	3.5		0.5		2.0	11.0		11.5			7.0	7.5	9.0		8.5				1.5	1.0	11.0	1.0	
14-15	0.5	1.5	6.0	0.5	6.5	8.5						9.0	7.0		11.0	3.5		3.5		9.0	9.5	5.5	
15-16					1.0	6.5		8.0		8.0		10.5				6.5	2.5	2.0		6.0	8.5	0.5	
16-17	5.5	5.5	2.5		5.5	4.5	7.0			9.0		12.0		12.5	2.0	9.5	5.0	0.0	0.0		7.5	5.0	
17-18	3.0				0.0	2.5				10.0					4.5	12.5		10.0		0.5	6.5	0.5	
18-19	0.0				4.5	0.5		11.0		11.0	7.0		10.0	11.5	7.0	2.0			2.5	8.5	5.0	5.0	
19-20		3.0	4.5		8.5	9.0	7.5			12.0	5.5		8.0		9.0	5.0				6.0	4.0	9.5	
20-21	5.0				3.5	7.0		7.5						10.0	11.5	8.5	2.0				3.0	4.5	
21-22	2.5	7.0	1.0		7.5	5.0			6.5			7.0				11.5	4.5	3.5	1.0	0.5	2.0	9.0	
22-23		0.0			2.5	3.0	8.0		7.5			8.5		9.0	2.5			2.0		8.5	0.5	4.0	
23-24					6.5	0.5		10.0	8.0		7.0	10.0	10.5		5.0	4.0		0.0			11.0	9.0	
24-25	4.5	4.0	3.0		1.5	9.5			8.5		5.5	11.5	8.5	8.0	7.0	7.0		10.0			10.0	4.0	
25-26	2.0				5.5	7.5	8.5		9.5						9.5	10.0	1.5			0.0	9.0	8.5	
26-27					0.5	5.5		13.0	10.0	7.5					11.5		4.0		2.0	8.0	7.5	3.5	9.5
27-28		1.5	5.0		4.5	3.0			10.5	8.5						2.5					6.5	8.0	
28-29	4.0				9.0	1.0	8.5	9.5	11.0	9.5	7.0				3.0	5.5		3.5			5.5	3.5	
29-30	1.5	5.5	1.5		3.5	10.0			12.0	10.5	5.5	6.5	9.0	13.0	5.5	8.5		2.0	0.5	10.5	4.5	8.0	
30-31					8.0	8.0				11.5		8.0	7.0		7.5	11.5	1.0	0.0		7.5	3.0	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	11.0	10.2	10.6	10.7	11.6	11.4	10.0	10.5	11.5	11.0	9.1	7.1	10.0	9.9	10.1	
MIN	11.6	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12.0	12.6	12.0	9.6	8.1	12.0	10.9	11.2	
RISE	2	1	1	2	2	3	2	2	2	2	3	1	2	2	2	3	
0- 1	8.5			7.0				9.0	11.0	11.0		12.0	6.0	0.0		2.0	10.0
1- 2	7.0			9.0	4.0			8.5	8.5		11.0		8.0				8.5
2- 3				11.0	5.0	9.0		8.0	6.5	8.0		7.5	1.5			1.0	7.0
3- 4				12.5	6.0	3.0		7.5	4.0		11.5	12.5	3.5				5.5
4- 5					7.5			6.5				2.5	5.5				4.0
5- 6		12.5			8.5	9.0		6.0	10.5	11.0	12.0	7.5	7.5				
6- 7	11.0			5.0	9.5	3.5		5.5	8.0			12.5	1.0				
7- 8	9.5			7.0	11.0			5.0	5.5	8.0	12.5	3.0	3.0			2.5	10.5
8- 9	8.0	11.5		8.5	12.0	9.5		4.5	3.5			8.0	5.0	12.5	11.0		9.0
9-10				10.5		3.5		4.0		5.5	13.0	13.0	7.0		11.5	1.5	7.5
10-11				12.0				3.5	9.5	11.5		3.5	0.5		12.0		6.0
11-12		10.5				10.0		7.5				8.5	2.5		0.5	0.5	4.5
12-13					4.0	4.0		5.0	8.5	5.5			4.5	11.5			
13-14				4.5	5.0			3.0				4.0	6.5	1.0			
14-15	10.5			6.5	6.0	10.5			5.5	6.0	8.5	8.5					11.0
15-16	9.0			8.0	7.5	4.5		9.0	11.5			2.0					9.5
16-17	8.0			10.0	8.5			7.0			6.5	4.0	4.0	10.5		2.0	8.0
17-18				12.0	9.5	11.0	11.5	4.5	8.5			9.0	6.0	0.5			6.5
18-19		12.5			11.0	5.0	11.0			7.0		8.0				1.0	5.0
19-20				12.0		10.5	11.0	6.0			4.5	1.0					3.5
20-21				4.5		11.5	10.0	8.5	12.0	7.0	9.5	3.5					
21-22		11.5	10.0	6.0		5.5	9.5	6.5				5.5					
22-23	10.5			8.0			9.0	4.0	9.0	7.5	5.0	7.5					10.0
23-24	9.0			9.5	4.0	11.5	8.5				9.5	0.5			3.0		8.5
24-25	7.5	10.5		11.5	5.0	6.0	8.0	10.5	6.0	8.0		2.5					7.0
25-26			10.0		6.5		7.5	8.0	12.0		5.0	5.0	12.5		1.5		5.5
26-27					7.5	12.0	7.0	5.5		8.5	10.0	7.0					4.0
27-28				4.0	8.5	6.0	6.5	3.5	9.0			0.0			0.5		
28-29				5.5	9.5		6.0			9.0	5.5	2.0					
29-30			10.5	7.5	11.0	12.5	5.5	9.5	6.5		10.5	4.0	11.5				10.5
30-31	10.0			9.5	12.0	6.5	5.0	7.5	12.5	9.5		6.5	1.0	10.5			9.0

	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	12.0	10.8	10.8	11.2	10.6	10.7	11.0	9.3	9.1	11.2	11.0	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	12.0	12.6	12.3	10.3	10.5	12.7	12.0	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				2.5	5.5		12.5				9.5	5.0	11.5	10.0	1.0	3.5	10.0		5.0	2.0	7.5	9.5	8.5
1- 2	3.5	3.0	3.5	7.0	3.5						11.5			12.0	4.5		8.0			1.0	2.5	7.5	7.5
2- 3	1.0			1.5	1.5	6.5	9.0			7.0			10.5	1.5	7.5				10.0	11.0	7.0		6.0
3- 4				6.0						5.5		9.5		3.5	10.5				7.5	10.0	2.5		
4- 5		0.5		0.5	8.5		6.0			4.0		7.5	9.5	6.0		0.5			4.5	9.0	7.0		
5- 6	3.0			5.0	6.0	7.0	12.0	4.0	5.5		4.5	5.5		8.0	3.0	3.0				8.0	2.0	9.5	
6- 7	0.5	4.5	2.0	9.0	4.0			4.5	7.0		6.0		8.5	10.5	6.0		0.0	0.0	9.5	6.5	6.5	7.5	
7- 8				4.0	2.0		8.5	5.5	8.0	7.0	8.0			12.5	9.0		10.0		7.0	5.5	1.5		10.0
8- 9				8.0		7.5		6.0	9.0	5.5	9.5	10.5	7.0	2.0			8.0		4.0	4.5	6.0		8.5
9-10	2.5	2.0	4.0	3.0	8.5		5.5	6.5	10.0	4.0	11.0	8.5		4.0	1.5					3.5	1.5		7.0
10-11				7.0	6.5		11.5	7.5	11.0		12.5	6.0	6.0	6.5	4.5	2.5			9.5	2.0	6.0	10.0	5.5
11-12			0.5	2.0	4.5	8.0		8.0	12.5					8.5	7.5				6.5	1.0	1.0	8.0	
12-13				6.0	2.5		8.0	8.5		7.0				11.0	10.5				4.0	11.5	5.5		
13-14	2.5			1.0	0.0	5.0		9.5		5.5	4.5	11.0	12.0		0.0		0.0			10.0	0.5		
14-15		3.5	2.5	5.0		8.5		10.0		4.0	6.0	9.0		2.5	3.5		9.5		9.0	9.0	5.5		11.0
15-16				9.0	7.0		11.0	10.5			7.5	7.0	11.0	4.5	6.5	1.5	8.0		6.5	8.0	0.5	10.0	9.5
16-17				4.0	5.0	5.5		11.0	5.0		9.0			7.0	9.5				3.5	7.0	5.0	8.0	8.5
17-18	2.0	0.5		8.0	2.5	8.5	7.5	12.0	6.5	7.0	10.5		10.0	9.0							5.5	0.0	7.0
18-19				3.0	0.5				7.5	5.5	12.0			11.5	2.0				8.5	4.5	4.5		5.5
19-20		4.5	0.5	7.0		6.0			8.5	4.0		9.5	8.5	0.5	5.0			0.5	6.0	3.5	9.0		
20-21				2.0	7.5		10.5		9.5			7.5		2.5	8.0	1.0	0.0				2.5	4.5	10.5
21-22	1.5			6.0	5.5			10.5			4.0	5.5	7.5	5.0			9.5			1.0	9.0	8.0	
22-23		2.0	3.0	1.0	3.0	6.5	7.0		12.0	7.0	5.5			7.5	0.5		8.0		8.5	0.0	4.0		11.0
23-24				5.0	1.0		13.0			5.5	7.0		6.5	9.5	3.5				5.5	10.5	8.5		9.5
24-25	3.5			0.0				4.0		4.0	8.5	10.0		12.0	6.5					9.0	3.5		8.0
25-26	1.0			4.0	8.0	7.0	10.0	5.0			10.0	8.0	5.0	1.0	9.5	0.5				8.0	8.0	10.5	6.5
26-27				8.5	5.5			5.5			11.5	6.0	12.5	3.0		3.0			8.0	7.0	3.5	8.5	5.0
27-28		3.5	1.0	3.0	3.5		6.5	6.0		7.0				5.5	2.5		0.0		5.5	6.0	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	11.0	10.2	10.6	10.7	11.6	11.4	10.0	10.5	11.5	11.0	9.1	7.1	10.0	9.9	10.1
MIN	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12.0	12.6	12.0	9.6	8.1	12.0	10.9	11.2
RISE	1	1	2	2	3	2	2	2	2	3	1	2	2	2	3
0- 1						4.0	5.0	3.5		6.0	8.5		11.0		7.5
1- 2				1.5		3.5	3.0	9.5	10.0	10.5	1.5		11.5		6.0
2- 3		10.5	1.5	3.0	7.0	3.0	0.5			1.0	3.5	11.0	12.0		4.5
3- 4	12.0	8.0	3.5	4.0	1.0	2.5	9.0	6.5	10.5	6.0	5.5				3.0
4- 5			5.5	5.0		2.0	7.0	12.5		11.0	8.0				1.5
5- 6			7.0	6.5	7.5	1.5	4.5	3.5	11.0	1.5	1.0			0.0	11.0
6- 7	11.0		9.0	7.5	1.5	1.0	2.5	9.5		6.5	3.0	10.0			9.5
7- 8		8.5		8.5					11.0	11.5	5.0				8.0
8- 9				9.5	8.0		8.5	7.0	3.5	2.0	7.0				6.5
9-10	10.0		1.5	11.0	2.0		6.5	13.0	11.5	7.0	0.5				5.0
10-11			3.0				4.0	4.0	4.0		2.5	9.0			3.5
11-12		8.5	5.0		8.0	10.0	1.5	10.0	12.0	2.0	4.5	12.5			2.0
12-13	9.0		6.5	1.5	2.5	9.5	10.5		4.5	7.0	6.5			0.5	
13-14			8.5	3.0		9.0	8.0	7.0	12.5		0.0				10.0
14-15			10.5	4.0	8.5	8.5	5.5		4.5	2.5	2.0				8.5
15-16		9.0		5.0	2.5	8.0	3.5	4.0		7.5	4.0	11.5			7.0
16-17	12.5			6.5		7.5	1.0	10.5	5.0		6.0				5.5
17-18			2.5	7.5	9.0	7.0	9.5			3.0	8.0				4.0
18-19			4.5	8.5	3.0	6.5	7.5	7.5	5.5	8.0	1.5		8.5		2.5
19-20	11.5	9.5	6.5	10.0		6.0	5.0				3.5	11.0	9.0		
20-21			8.0	11.0	9.5	5.5	3.0	4.5	6.0	3.5	5.5		9.5		10.5
21-22			10.0		3.5	5.0	0.5	10.5		8.0	7.5		10.0	0.0	9.0
22-23	10.5					4.5	9.0		6.5		1.0		10.5		7.5
23-24		9.5		2.0	10.0	4.0	7.0	7.5		3.5	3.0	10.0	11.0		6.0
24-25			2.5	3.0	4.0	3.5	4.5		7.0	8.5	5.0		12.0		4.5
25-26	9.5		4.0	4.0		3.0	2.5	4.5			7.0				3.0
26-27			6.0	5.0	10.5	2.0		11.0	7.5	4.0	0.5				1.5
27-28		10.0	7.5	6.5	4.5	1.5	8.5			9.0	2.5	9.5			11.0

## AAVSO RR Lyrae Ephemeris for March 2017

all times in U.T.

Page 1

	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	12.0	10.8	10.8	11.2	10.6	10.7	11.0	9.3	9.1	11.2	11.0	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	12.0	12.6	12.3	10.3	10.5	12.7	12.0	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				7.5	1.5	7.5	12.5	6.5	6.0	5.5			11.5	7.5	5.5		9.5		2.5	4.5	3.0		
1- 2			12.5	2.0			3.5	7.5	7.0	4.0	3.5	11.0		10.0	8.5		8.0		10.5	3.5	7.5		
2- 3		1.0		6.5		4.5	9.5	8.0	8.0	2.5	5.0	8.5	10.0				6.5		7.5	2.5	2.5		11.0
3- 4				1.0	6.0	8.0		8.5	9.0		6.5	6.5		1.5	1.0				5.0	1.5	7.5		8.5
4- 5				5.5	4.0		6.0	9.5	10.0	7.0	8.0	4.5	9.0	3.5	4.0				2.0		2.5		6.5
5- 6					2.0	5.0	12.0	10.0	11.5	5.5	9.5			6.0	7.0				10.0	10.5	7.0		
6- 7			11.0	4.5		8.0		10.5	12.5	4.0	11.5		8.0	8.0					7.5	9.5	2.0		
7- 8		2.5	1.5	8.5			9.0	11.5		2.5		9.5		10.5			9.5	9.5	4.5	8.0	6.5		
8- 9				3.5	6.5	5.5		12.0				7.5	7.0		2.5		8.0		2.0	7.0	1.5		9.0
9-10				7.5	4.5	8.5	5.5		3.0	7.0	3.0	5.0		2.0	5.5		6.5		10.0	6.0	6.5		6.5
10-11				2.5	2.5		11.5		4.0	5.5	4.5	3.0	5.5	4.0	9.0				7.0	5.0	1.5		
11-12				6.5		6.0			5.5	4.0	6.5			6.5					4.5	3.5	6.0		
12-13	1.5			1.5			8.0	2.0	6.5	2.5	8.0	10.0	4.5	8.5	1.5					2.5	1.0		
13-14				5.5	7.0	3.0		3.0	7.5		9.5	8.0	11.5		4.5	1.5			9.5	1.5	5.5		9.0
14-15			11.5		5.0	6.5	5.0	3.5	8.5	7.0	11.0	6.0	3.5		7.5		9.5		6.5		0.5		7.0
15-16		1.0	2.0	4.5	2.5		11.0	4.0	9.5	5.5	12.5	4.0	10.5	2.5			8.0		4.0	10.5	5.5		
16-17	1.5			9.0	0.5	3.5		5.0	11.0	4.0				4.5			6.5			9.5			
17-18				3.5		7.0	7.5	5.5	12.0	2.5	3.0	10.5	9.5	7.0	3.0				9.0	8.5	5.0		
18-19				8.0				6.0			4.5	8.5		9.0	6.0	1.0			6.5	7.5			9.5
19-20				2.5	5.0	4.0	4.5	7.0		7.0	6.0	6.5	8.5		9.0				3.5	6.0	4.5		7.0
20-21	1.0	2.5	0.5	7.0	3.0	7.5	10.5	7.5		5.5	7.5	4.5		0.5				10.0		5.0			
21-22				1.5	1.0			8.0	3.5	4.0	9.0		7.0	3.0	1.5		9.5		9.0	4.0	4.5		
22-23			12.0	6.0		4.5	7.0	8.5	5.0	2.5	10.5			5.0	4.5		8.0		6.0	3.0	9.0		
23-24				0.5		8.0		9.5	6.0		12.0	9.0	6.0	7.5	8.0	0.5	6.5		3.5	1.5	4.0	9.5	9.5
24-25				5.0	5.5		4.0	10.0	7.0	7.0		7.0		9.5						0.5	8.5		7.5
25-26				9.0	3.5	5.0	10.0	10.5	8.0	5.5	2.5	5.0	5.0						8.5	11.0	3.5	9.5	
26-27				4.0	1.5	8.0		11.5	9.0	4.0	4.0		12.0	1.0	3.5				6.0	9.5	8.5		
27-28				8.0			6.5	12.0	10.5	2.5	5.5		3.5	3.0	6.5		11.0		3.0	8.5	3.5	9.5	
28-29		1.5	1.0	3.0		5.5			11.5		7.0	10.0	11.0	5.5			9.5			7.5	8.0		9.5
29-30				7.0	6.0	8.5	3.5		12.5	7.5	8.5	7.5		7.5			8.0		8.0	6.5	3.0	9.5	7.5
30-31			12.5	2.0	4.0		9.5			6.0	10.0	5.5	10.0	10.0	2.0		6.5		5.5	5.0	7.5		5.5

	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	11.0	10.2	10.6	10.7	11.6	11.4	10.0	10.5	11.5	11.0	9.1	7.1	10.0	10.1
MIN	11.6	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12.0	12.6	12.0	9.6	8.1	12.0	11.2
RISE	2	1	1	2	2	3	2	2	2	2	3	1	2	2	3
0- 1		8.5	7.5		7.5		1.0	6.5	8.0	8.0		4.5	12.5		9.5
1- 2					8.5		0.5	4.0			4.5	6.5			8.0
2- 3	10.5				10.0	5.0		2.0	5.0	8.5	9.0	8.5			6.5
3- 4	9.0	7.5	10.5	2.0				10.5	11.0			2.0	8.5		5.0
4- 5	8.0	12.0	7.5	4.0				8.0	2.0	8.5	4.5	4.0	11.5		3.5
5- 6	6.5			5.5	0.5	5.0		6.0	8.0		9.5	6.0			2.0
6- 7	5.0	6.5		7.5	2.0			3.5		9.0		8.0			
7- 8	3.5	11.0	10.5		3.0			1.0	5.0	1.5	5.0	1.5	7.5		10.0
8- 9			8.0		4.0	5.5		10.0	11.5	9.5		3.5	11.0		8.5
9-10					5.0		8.0	7.5	2.5	2.0		5.5			7.0
10-11	10.5	10.0		1.5	6.5		7.5	5.0	8.5	10.0	5.5	7.5		7.0	5.5
11-12	9.0			3.5	7.5	6.0	7.0	3.0		2.0		1.0	7.0	7.5	4.0
12-13	7.5		8.5	5.0	8.5		6.5	0.5	5.5	10.5	0.5	3.0	10.0	8.0	2.5
13-14	6.0	9.0	5.5	7.0			6.0	9.0	11.5	2.5	5.5	5.0		8.5	1.0
14-15	4.5					6.5	5.5	7.0	2.5			7.0		9.0	10.5
15-16	3.0					0.5	5.0	4.5	8.5	3.0	1.0			10.0	9.0
16-17		8.0	8.5		0.5		4.5	2.5			6.0	2.5	9.5	10.5	7.5
17-18		12.0	6.0	1.0	2.0	7.0	4.0		5.5	3.5		4.5		11.0	6.0
18-19	10.0			3.0	3.0	1.0	3.5	8.5			1.5	6.5		11.5	4.5
19-20	8.5	7.0		5.0	4.0		3.0	6.5	3.0	4.0	6.5	8.5		12.0	3.0
20-21	7.5	11.0	9.0	6.5	5.5	7.0	2.5	4.0	9.0			2.0	8.5		1.5
21-22	6.0		6.5	8.5	6.5	1.5	2.0	2.0		4.5	1.5	4.0	12.0		11.0
22-23	4.5				7.5		1.5	10.5	6.0		6.5	6.0			9.5
23-24	3.0	10.0			8.5	7.5	1.0	8.0		5.0		8.0			8.0
24-25			9.5	1.0		1.5		6.0	3.0		2.0	1.5	8.0		6.5
25-26			6.5	2.5				3.5	9.0	5.5	7.0	3.5	11.0		5.0
26-27	10.0	9.0		4.5		8.0		1.0				5.5			3.5
27-28	8.5			6.0	0.5	2.0		10.0	6.0	6.0	2.5	7.5			2.0
28-29	7.0		9.5	8.0	2.0			7.5			7.5	1.0	7.0		
29-30	5.5	8.0	7.0		3.0	8.5		5.0	3.5	6.0		3.0	10.0		10.0
30-31	4.0				4.0	2.5		3.0	9.5		3.0	5.0			8.5

## AAVSO RR Lyrae Ephemeris for April 2017

all times in U.T.

Page 1

	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	12.0	10.8	10.8	11.2	10.6	10.7	11.0	9.1	11.2	11.0	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	12.0	12.6	12.3	10.5	12.7	12.0	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				6.0	2.0	6.0		2.5	2.0	4.5	11.5	3.5	1.5		5.0	5.0	8.0	2.5	4.0	2.5	9.5	3.5	2.5
1- 2							6.0	3.0	3.0	3.0		1.5	8.5	1.5		3.0		10.5	3.0		4.5		1.5
2- 3				5.0		3.0		3.5	4.5	1.5	2.0	10.5		3.5				8.0	2.0	2.5	9.5	10.0	11.0
3- 4						6.5	3.0	4.0	5.5	7.5	3.5	8.5	7.5	6.0		11.0		5.0			4.5	8.0	9.5
4- 5		11.0	10.0	4.0	4.5		9.0	5.0	6.5	6.0	5.0	6.5		8.0	4.0	9.5		2.5	11.0	2.0	9.5	5.5	8.0
5- 6					2.0	3.5		5.5	7.5	4.5	6.5	4.0	6.5		7.0	8.0	8.5	10.0	10.0	6.5	4.5	3.5	7.0
6- 7	11.0			3.0		7.0	5.5	6.0	8.5	3.0	8.0	2.0				6.5		7.5	8.5	1.5	9.0		5.5
7- 8				7.0		1.0	11.5	7.0	10.0	1.5	10.0		5.5	2.0		5.0		5.0	7.5	6.5	4.5	10.0	4.0
8- 9				2.0		4.0	2.5	7.5	11.0	7.5	11.5	9.0		4.0	2.5	3.0		2.0	6.5	1.5	9.0	8.0	2.5
9-10		9.0	11.0	6.0	4.5	7.5	8.5	8.0		6.0		7.0	4.0	6.5	5.5			10.0	5.5	6.0	4.5	6.0	1.0
10-11			9.0	1.0	2.5	1.5		9.0		4.5	1.5	5.0	11.5	8.5		11.0	9.5	7.0	4.0	1.0	9.0	3.5	11.0
11-12				5.0		4.5	5.0	9.5	1.5	3.0	3.0	3.0	3.0			9.5		4.5	3.0	5.5	4.5		9.5
12-13		11.0				7.5	11.0	10.0	2.5	1.5	4.5		10.0		1.0	8.0		1.5	2.0		9.0	10.5	8.0
13-14				4.0		2.0	2.0	10.5	4.0	7.5	6.5	9.5	2.0	2.5	4.0	6.5	8.0	9.5		5.5	4.5	8.0	6.5
14-15						5.0	8.0	11.5	5.0	6.0	8.0	7.5	9.0	4.5		4.5		7.0	11.0		9.0	6.0	5.0
15-16			10.5	3.0	3.0	8.0			6.0	4.5	9.5	5.5		7.0		3.0		4.0	10.0	5.0	4.0	4.0	3.5
16-17				7.5	1.0	2.5	4.5		7.0	3.0	11.0	3.5	8.0					1.5	9.0		9.0		2.0
17-18		9.5		2.0		5.5	10.5	1.0	8.0	1.5		1.5			3.0	11.0		9.5	7.5	4.5	4.0	10.5	
18-19				6.5		8.5	1.5	1.5	9.5	7.5	1.0	10.5	7.0		6.0	9.5	9.0	6.5	6.5		9.0	8.5	10.5
19-20	11.0			1.0		2.5	7.5	2.5	10.5	6.0	3.0	8.0		3.0		8.0		4.0	5.5	4.5	4.0	6.5	9.0
20-21		11.5		5.5	3.5	6.0		3.0	11.5	4.5	4.5	6.0	5.5	5.0		6.5		1.0	4.5		9.0	4.0	8.0
21-22			9.5		1.5		4.0	3.5		3.0	6.0	4.0		7.5	1.5	4.5	7.5	9.0	3.0	4.0	4.0		6.5
22-23				4.5		3.0	10.0	4.0	1.0	1.5	7.5	2.0	4.5		4.5	3.0		6.0	2.0		9.0	11.0	5.0
23-24						6.5		5.0	2.0	7.5	9.0	11.0					10.0	3.5	1.0	3.5	4.0	8.5	3.5
24-25				3.5			7.0	5.5	3.5	6.0	10.5	9.0	3.5	1.0		11.0			11.5		9.0	6.5	2.0
25-26		10.0			4.0	3.5		6.0	4.5	4.5		7.0	10.5	3.5		9.5		8.5	10.0	3.5		4.5	
26-27			11.0	2.5	1.5	7.0	3.5	7.0	5.5	3.0		4.5	2.5	5.5	3.0	8.0	8.5	6.0	9.0		8.5		10.5
27-28				6.5		1.0	9.5	7.5	6.5	1.5	2.5	2.5	9.5	8.0	6.0	6.5		3.0	8.0	3.0			9.0
28-29				1.5		4.0		8.0	7.5	7.5	4.0		1.0			4.5			6.5		8.5	9.0	7.5
29-30				5.5		7.5	6.0	9.0	9.0	6.0	5.5	9.5	8.5			3.0		8.5	5.5	2.5		6.5	6.0



	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	11.0	10.2	10.6	10.7	11.6	11.4	10.0	10.5	11.5	11.0	9.1	7.1	10.0	9.9	10.1
MIN	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12.0	12.6	12.0	9.6	8.1	12.0	10.9	11.2
RISE	1	1	2	2	3	2	2	2	2	3	1	2	2	2	3
0- 1				5.5					6.5	7.5	7.0		6.0		7.0
1- 2	7.0	10.0	2.0	6.5			9.0	6.5				6.0	6.5		5.5
2- 3	11.5	7.5	4.0	7.5	3.0		7.0		7.0	3.0	2.5	9.5	7.0		4.0
3- 4		4.5	6.0				4.5	3.5			4.5		7.5	9.5	2.5
4- 5	6.0					6.0	2.5		7.5		6.5		8.5		
5- 6	10.5	10.0			3.5	5.5				3.5	8.5	5.5	9.0		10.5
6- 7		7.5				5.0	8.5	7.0	8.0		2.0	8.5	9.5		9.0
7- 8	5.0	5.0				4.5	6.5				4.0		10.0		7.5
8- 9	9.5		2.0	2.0	4.0	4.0	4.0	4.0	8.5	4.0	6.0		10.5		6.0
9-10		10.5	3.5	3.0		3.5	2.0				8.0	4.5	11.0		4.5
10-11		8.0	5.5	4.0		3.0		1.0			1.0	8.0	11.5		3.0
11-12	8.5	5.5		5.5	4.0	2.5	8.0	7.0	1.0	4.0	3.5	11.0			1.5
12-13				6.5		2.0	6.0				5.5			9.0	11.0
13-14				7.5		1.5	3.5	4.0	1.5		7.5				9.5
14-15	7.5	8.0			4.5		1.0			4.5		7.0			8.0
15-16		5.5	1.5					1.0	2.0		2.5	10.5			6.5
16-17			3.0				7.5	7.5			5.0				5.0
17-18	6.5		5.0		5.0		5.0		2.5	5.0	7.0				3.5
18-19	11.0	8.5					3.0	4.5				6.5			2.0
19-20		6.0		2.0					3.0		2.0	9.5			
20-21	5.5			3.0	5.5		9.0	1.5		5.0	4.0		4.5		10.0
21-22	10.0			4.0			7.0	7.5	3.5		6.5		5.0		8.5
22-23		9.0	1.0	5.5			4.5				8.5	5.5	5.5		7.0
23-24	4.5	6.5	3.0	6.5	6.0		2.5	4.5	3.5	5.5	1.5	8.5	6.5		5.5
24-25	9.0	3.5	4.5	7.5							3.5		7.0		4.0
25-26			6.5				8.5	1.5	4.0	1.0	5.5		7.5		2.5
26-27		9.0			6.0	6.5	6.5	8.0		6.0	8.0	5.0	8.0		
27-28	8.0	6.5				6.0	4.0		4.5		1.0	8.0	8.5		10.5
28-29		4.0				5.5	2.0	5.0		1.5	3.0	11.0	9.0	9.0	9.0
29-30						4.5			5.0	6.0	5.0		9.5		7.5

	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	12.0	10.8	10.8	11.2	10.6	10.7	11.0	9.1	11.2	11.0	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	12.0	12.6	12.3	10.5	12.7	12.0	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			8.5						9.5	10.0	4.5	7.0	7.5		1.5	2.0	1.5		5.5	4.5		8.5	4.5
1- 2					4.5	2.0	4.5	3.0	10.0	11.0	3.0	8.5	5.5	7.0	3.5	5.0	11.0	9.5	3.0	3.5	2.5	4.0	2.5
2- 3	9.0			10.0			7.5	9.0	10.5		1.5	10.0	3.5		6.0		9.5	5.5		2.0		8.5	
3- 4			10.5	8.0	3.5		2.0				7.5			6.0			8.0		8.0		2.0	4.0	9.0
4- 5							5.0	5.5		2.0	6.0		10.0				6.5	8.0	5.0			8.5	7.0
5- 6			7.0		2.5		8.0			3.0	4.5	2.0	8.0	5.0		3.5	4.5		2.5	10.5	2.0	3.5	5.0
6- 7						2.5	2.5	2.5		4.0	3.0	3.5	6.0		2.0		3.0		10.5	9.0		8.5	2.5
7- 8					1.5		5.5	8.5	1.5	5.0	1.5	5.0	4.0	4.0	4.0		1.5	6.5	7.5	8.0	1.5	3.5	
8- 9			9.0	9.5			8.5		2.5	6.0	7.5	6.5	2.0		6.5		11.0		5.0	7.0		8.5	9.5
9-10				7.5			2.5	5.0	3.0	7.0	6.0	8.0	10.5	2.5		2.0	9.5	9.0	2.0	6.0		3.5	7.0
10-11		10.0			5.0		6.0	11.0	3.5	8.5	4.5	10.0	8.5	10.0			8.0		10.0	4.5		8.5	5.0
11-12			11.0			3.0	9.0	2.0	4.5	9.5	3.0		6.5	1.5			6.0		7.5	3.5		3.5	3.0
12-13					4.0		3.0	8.0	5.0	10.5	1.5		4.5	8.5	2.5		4.5	7.5	4.5	2.5		8.5	
13-14	10.5		7.5	10.5			6.5		5.5		7.5	1.5	2.5		4.5		3.0		2.0			3.5	9.5
14-15				9.0	3.0			4.5	6.0		6.0	3.0		7.5		4.0	1.5	10.0	9.5			8.5	7.5
15-16							3.5	10.5	7.0		4.5	4.5	9.5				11.0	6.0	7.0	10.5		3.5	5.0
16-17			9.5		2.0		7.0	1.5	7.5	2.5	3.0	6.5	7.0	6.5			9.5		4.0	9.5	4.5	8.5	3.0
17-18	10.0							7.5	8.0	3.5	1.5	8.0	5.0				8.0	8.5	1.5	8.0		3.5	
18-19		9.0					4.0		9.0	4.5	7.5	9.5	3.0	5.5	3.0	2.5	6.0		9.5	7.0	4.5	8.0	9.5
19-20				10.0	5.0		7.0	4.0	9.5	5.5	6.0	11.0			5.0		4.5		6.5	6.0		3.5	7.5
20-21				8.0				10.0	10.0	6.5	4.5		10.0	4.0			3.0	7.0	4.0	5.0	4.0	8.0	5.5
21-22	9.5		8.0		4.0		4.5		11.0	8.0	3.0		8.0				1.5			3.5		3.5	3.5
22-23						1.5	7.5	7.0		9.0	1.5	3.0	6.0	3.0			11.0	9.5	9.0	2.5	4.0	8.0	
23-24		10.5			3.0		2.0			10.0		4.5	3.5	10.5		4.5	9.5	5.5	6.5	1.5		3.5	10.0
24-25			10.0				5.0	3.5		11.0	6.0	6.0	1.5	2.0	3.5		8.0		3.5		3.5	8.0	8.0
25-26	9.0			9.5	2.0		8.0	9.5			4.5	7.5	10.5	9.0	5.5		6.0	8.0		10.5		3.0	5.5
26-27				7.5			2.0		1.5		3.0	9.0	8.5				4.5		8.5	9.5	3.0	8.0	3.5
27-28						2.0	5.5	6.5	2.5	2.0	1.5	10.5	6.5	8.0		3.0	3.0		6.0	8.5		3.0	
28-29					5.5		8.5		3.0	3.0			4.5				1.5	6.5	3.0	7.0	3.0	8.0	10.0
29-30			8.5				2.5	3.0	3.5	4.0	6.0		2.5	7.0	1.5		11.0			6.0		3.0	8.0
30-31				10.5	4.5		6.0	9.0	4.5	5.0	4.5	2.5			4.0		9.5	9.0	8.5	5.0	2.5	8.0	6.0

	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	11.0	10.2	10.6	10.7	11.6	11.4	10.0	10.5	11.5	11.0	9.1	7.1	10.0	9.9	10.1
MIN	11.6	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12.0	12.6	12.0	9.6	8.1	12.0	10.9	11.2
RISE	2	1	1	2	2	3	2	2	2	2	3	1	2	2	2	3
0- 1	4.5	7.0	9.5	2.5	2.0		4.0		2.0				4.0	10.0	8.0	6.0
1- 2	3.0		7.0	4.5	3.0		3.5	6.0		5.5	1.5		7.0	10.5		4.5
2- 3	1.5		4.5		4.0		3.0	3.5				2.5	10.5	11.0	6.5	3.0
3- 4		6.0	1.5		5.5		2.5		5.0	6.0		4.5				
4- 5	10.0	10.5	10.0				2.0				2.0	6.5	3.0			11.0
5- 6	8.5		7.0				1.5		2.0	6.5			6.5			9.5
6- 7	7.5	5.0	4.5			1.5		5.5				2.0	9.5			8.0
7- 8	6.0	9.5	2.0	2.0				3.0			2.5	4.0			8.5	6.5
8- 9	4.5		10.0	4.0					5.5			6.0				5.0
9-10	3.0	4.0	7.5			2.0							5.5		7.5	3.5
10-11	1.5	8.5	5.0					7.0	2.5		2.5	1.5	9.0	3.0		2.0
11-12			2.5		2.0			4.5				3.5		3.5		
12-13	10.0	3.0	10.5		3.0	2.5		2.5				5.5		4.0		10.0
13-14	8.5	7.5	8.0		4.5				5.5		3.0		5.0	5.0		8.5
14-15	7.0		5.0	1.5	5.5								8.0	5.5	9.0	7.0
15-16	5.5		2.5	3.5		3.0		6.5	2.5			3.0		6.0		5.5
16-17	4.0	6.5						4.0			3.5	5.0		6.5	8.0	4.0
17-18	2.5	11.0	8.0					2.0					4.0	7.0		2.5
18-19			5.5			3.0			6.0				7.5	7.5	7.0	
19-20	11.0	5.5	3.0								3.5	2.5	10.5	8.0		10.5
20-21	9.5	10.0						6.0	3.0	1.5		4.5		8.5		9.0
21-22	8.0		8.5			3.5		3.5				6.5	3.5	9.0		7.5
22-23	7.0	4.5	6.0	3.0	2.0		4.5			2.0	4.0		6.5	9.5		6.0
23-24	5.5	9.0	3.0		3.0		4.0		6.0			2.0	9.5	10.0	8.5	4.5
24-25	4.0				4.5	4.0	3.5			2.5		4.0		10.5		3.0
25-26	2.5	3.5	9.0		5.5		2.5	5.5	3.5		4.5	6.0			7.5	
26-27		7.5	6.0				2.0	3.0		3.0			5.5			11.0
27-28	11.0		3.5			4.5	1.5					1.5	9.0			9.5
28-29	9.5	2.5							6.5	3.5	4.5	3.5				8.0
29-30	8.0	6.5	9.0	2.5				7.0				5.5				6.5
30-31	6.5	11.0	6.5	4.5				4.5	3.5	4.0			5.0		9.0	5.0

	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	12.0	10.8	10.8	11.2	10.6	10.7	11.0	9.3	9.1	11.2	11.0	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	12.0	12.6	12.3	10.3	10.5	12.7	12.0	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		9.0	5.0	8.5		9.0		5.0	6.0	3.0	4.0	9.0	5.5				8.0	5.0	5.5	4.0		3.0	3.5
1- 2			10.5	6.5	3.5	3.0	6.0	5.5	7.5		5.5	7.0					6.0		3.0	2.5	2.0	8.0	
2- 3	8.0					6.5		6.5	8.5		7.0	5.0	4.5				4.5	7.5				3.0	10.5
3- 4			7.0		2.5		2.5	7.0	9.5	6.0	8.5	3.0					3.0	3.5	8.0		2.0	8.0	8.0
4- 5						3.5	8.5	7.5		4.5	10.0		3.5	2.0				9.5	5.5	10.5		3.0	6.0
5- 6	10.5	10.5		10.0		7.0		8.0		3.0		9.5		4.0				6.0	2.5	9.5		8.0	4.0
6- 7	7.5		9.0	8.0			5.5	9.0				7.5	2.5				9.5		10.5	8.5		3.0	2.0
7- 8				6.0		4.0		9.5			2.0	5.5					7.5	8.0	7.5	7.5		7.5	10.5
8- 9		8.0	5.5			7.0	2.0	10.0		2.5	6.0	3.5	3.5			10.5	6.0	4.5	5.0	6.0		3.0	8.5
9-10	10.0						8.0		3.5	4.5	5.0		8.5		2.0		4.5		2.5	5.0		7.5	6.5
10-11	7.0				3.5	4.5			4.5	3.0	6.5	10.5		2.5			3.0	7.0	10.0	4.0		3.0	4.0
11-12			7.5	9.0		7.5	5.0		5.5		8.0	8.5	7.5	4.5					7.5	3.0		7.5	2.0
12-13				7.5	2.5	2.0	10.5		7.0		10.0	6.0					11.0	9.0	4.5			3.0	11.0
13-14	9.5	9.5		5.5		5.0			8.0	6.0		4.0	6.0		10.0		9.5	5.5	2.0			7.5	8.5
14-15	6.5		9.5			8.0	7.5	2.0	9.0	4.5		2.0					7.5		10.0	11.0		3.0	6.5
15-16						2.0		2.5	10.0	3.0			5.0				6.0	7.5	7.0	10.0		7.5	4.5
16-17		7.0	6.0	10.5		5.5	4.0	3.0			3.0	9.0		3.0			4.5	4.0	4.5	8.5		2.5	2.0
17-18	9.0			8.5		8.5	10.0	3.5			4.5	7.0	4.0				3.0	10.0		7.5		7.5	
18-19		11.0		6.5		2.5		4.5		6.0	6.5	5.0			2.5	9.5		6.0	9.5	6.5		2.5	9.0
19-20			8.0			6.0	7.0	5.0	2.0	4.5	8.0	2.5	2.5				11.0		6.5	5.5		7.5	6.5
20-21						9.0		5.5	3.0	3.0	9.5						9.5	8.5	4.0	4.0		2.5	4.5
21-22	8.5	8.0			2.5	3.0	3.5	6.5	4.0		11.0	9.5					7.5	4.5		3.0		7.5	2.5
22-23			10.0	10.0		6.5	9.5	7.0	5.0			7.5		3.5			6.0		9.0	2.0		2.5	
23-24				8.0				7.5	6.5	6.0		5.5					4.5	7.0	6.5			7.5	9.0
24-25			6.5	6.0		3.5	6.5	8.5	7.5	4.5	3.0	3.5	7.5				3.0	3.5	3.5			2.5	7.0
25-26	8.0					6.5		9.0	8.5	3.0	4.5							9.5		10.0		7.5	5.0
26-27		9.5					3.0	9.5	9.5		6.0	10.0	6.5				11.0	5.5	9.0	9.0	3.0	2.5	2.5
27-28			8.5			4.0	9.0	10.0			7.5	8.0			2.5		9.5		6.0	7.5		7.5	
28-29	10.0			9.0		7.0				6.0	9.0	6.0	5.5	4.0			7.5	8.0	3.5	6.5	2.5	2.5	9.5
29-30	7.5	7.0		7.0			6.0			4.5	10.5	4.0					6.0	4.0		5.5		7.0	7.0

	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	11.0	10.2	10.6	10.7	11.6	11.4	10.0	10.5	11.5	11.0	9.1	7.1	10.0	9.9	10.1
MIN	11.6	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12.0	12.6	12.0	9.6	8.1	12.0	10.9	11.2
RISE	2	1	1	2	2	3	2	2	2	2	3	1	2	2	2	3
0- 1	5.0		4.0					2.5					8.0	2.0		3.5
1- 2	3.5	5.5								4.5		3.0		2.5	8.0	
2- 3	2.0	10.0	9.5		2.0									3.5		
3- 4			7.0		3.0					5.0			4.0	4.0	7.0	10.0
4- 5	10.5	4.5	4.0					4.0	4.0				7.5	4.5		8.5
5- 6	9.0	9.0		2.5				2.0				2.5	10.5	5.0	6.0	7.0
6- 7	7.5		9.5									4.5		5.5		5.5
7- 8	6.5	3.5	7.0										3.5	6.0	4.5	4.0
8- 9	5.0	8.0	4.5										6.5	6.5	8.5	2.0
9-10	3.5		2.0					3.5	4.0			2.0	10.0	7.0		
10-11	2.0	2.5	10.0									4.0		7.5	7.5	10.5
11-12		7.0	7.5										2.5	8.0		9.0
12-13	10.5		5.0	2.0									6.0	8.5	6.5	7.5
13-14	9.0		2.0		2.0			5.5					9.0	9.0		6.0
14-15	7.5	6.0	10.5		3.0			3.0	4.5		2.0	3.5		10.0	5.5	4.5
15-16	6.0	10.5	7.5										2.0	10.5	9.5	2.5
16-17	4.5		5.0										5.0	11.0		
17-18	3.0	5.0	2.5				2.5				2.0		8.0		8.0	11.0
18-19		9.5	10.5				2.0	4.5				3.0				9.5
19-20			8.0					2.5	4.5						7.0	8.0
20-21	10.0	4.0	5.5								2.5		4.0			6.5
21-22	8.5	8.5	3.0			2.0							7.5		6.0	5.0
22-23	7.0											2.5	10.5	2.0		3.0
23-24	6.0	3.0	8.5					4.0			3.0	4.5		2.5	5.0	
24-25	4.5	7.5	6.0		2.0	2.0		2.0	5.0				3.5	3.0	9.0	
25-26	3.0		3.0		3.0								6.5	3.5		10.0
26-27		2.0							2.0	2.0	3.0	1.5	10.0	4.0	7.5	8.5
27-28		6.5	8.5			2.5						4.0		4.5		7.0
28-29	10.0	11.0	6.0					3.5		2.5			2.5	5.0	6.5	5.5
29-30	8.5		3.5							5.0	3.5		6.0	5.5		3.5

	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	12.0	10.8	10.8	11.2	10.6	10.7	9.3	9.1	11.2	11.0	9.6	10.5	9.9	10.6	11.0
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	12.0	12.6	10.3	10.5	12.7	12.0	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	4.5		10.5	5.0		4.5				3.0		2.0	4.0			4.5		8.5	4.5	2.5	5.0	7.0	5.5
1- 2		11.0		3.0		7.5	2.5		2.5							3.0	6.5	6.0	3.0	7.0	3.0	5.5	10.0
2- 3	10.0		7.0			1.5	8.5		3.5		2.5	9.0	3.0				2.5	3.0	2.0	2.5		4.0	
3- 4	7.0			10.5		5.0		2.0	4.5	6.0	4.0	6.5		2.0	8.0	11.0	9.0			7.0		2.5	4.5
4- 5		8.5	3.0	8.5	9.5	8.0	5.5	2.5	6.0	4.5	5.5	4.5	2.0		10.5	9.0	5.0	8.0		2.5	7.5		9.0
5- 6			9.0	6.5		2.0		3.0	7.0	3.0	7.0	2.5				7.5		5.5	10.0	7.0	5.0		
6- 7	9.5			4.5		5.5	2.0	3.5	8.0		8.5					6.0	7.5	2.5	9.0	2.0	3.0	9.5	3.5
7- 8	6.5	6.0	5.5			8.5	8.0	4.5								4.5	3.5	10.5	8.0	7.0		8.0	8.0
8- 9			11.0			2.5		5.0		6.0		7.5			7.5	3.0	10.0	8.0	6.5	2.0		7.0	
9-10		10.0		9.5	10.0	6.0	5.0	5.5		4.5		5.5		2.5	10.0		6.0	5.0	5.5	7.0	7.5	5.5	2.5
10-11	9.0		7.5	7.5				6.5		3.0	2.0	3.0				11.0	2.0	2.5	4.5	2.0	5.5	4.0	7.0
11-12	6.0			5.5		3.0		7.0		1.5	3.5		6.0			9.0	8.5	10.5	3.5	7.0	3.5	2.5	
12-13		7.0	3.5	4.0		6.5	7.5	7.5	2.0		5.0					7.5	4.5	7.5	2.0	2.0			
13-14			9.5					8.5	3.0	6.5	6.5	8.0	4.5			6.0		5.0		7.0		11.0	6.0
14-15	8.5			11.0	10.5	3.5	4.5		4.0	5.0	8.0	6.0		9.5	4.5	7.0	2.0			2.0	8.0	9.5	
15-16	5.5		5.5	9.0		6.5			5.5	3.5		4.0	3.5			3.0	3.0	10.0	10.0	7.0	5.5	8.0	
16-17				7.0					6.5	2.0		2.0					9.5	7.0	9.0	2.0	3.5	6.5	5.0
17-18		8.5		5.0		4.0	7.0		7.5				2.5			11.0	5.5	4.5	8.0	7.0		5.0	9.5
18-19	8.0		8.0	3.0		7.0				6.5		8.5				9.0			7.0	2.0		3.5	
19-20	5.0				11.0		4.0			5.0	3.0	6.5		9.0	7.5	8.0	9.5	5.5	6.5	8.0	2.0	4.0	
20-21		6.0	4.0	10.0		4.5				3.5	5.0	4.5				6.0	4.0	7.0	4.5	2.0	6.0		8.5
21-22	10.0		10.0	8.0		7.5				2.0	6.5	2.5				4.5		4.0	3.5	6.5	3.5	10.5	
22-23	7.5	10.0		6.5			6.5	2.0				8.0				3.0	6.5		2.5	2.0		9.0	3.0
23-24	4.5		6.0	4.5		5.0		2.5		6.5							2.5	9.5		6.5		7.5	7.5
24-25						8.0	3.5	3.0	2.5	5.0		7.0	6.0		8.5	11.0	9.0	6.5		2.0	8.0	6.5	
25-26	9.5	7.5			9.0	2.0	9.0	4.0	3.5	3.5		5.0		11.0	9.0	5.0	4.0	10.5	6.5	6.0	5.0	2.0	
26-27	7.0		8.5	9.5		5.5		4.5	5.0	2.0		3.0	5.0			7.5			9.0	2.0	4.0	3.5	6.5
27-28				7.5		8.5	6.0	5.0	6.0		3.0					6.0	7.5	9.0	8.0	6.5	2.0	2.0	
28-29		5.0	4.5	5.5		2.5		5.5	7.0	6.5	4.5		4.0			4.5	3.5	6.0	7.0				
29-30	9.0		10.5	3.5		6.0	3.0	6.5	8.0	5.0	6.0	8.0		7.5	3.0	9.5	3.5	6.0	6.5	8.5	10.5	5.5	
30-31	6.5	9.0			9.5		8.5	7.0		3.5	7.5	5.5	2.5	10.5		6.0		4.5			6.5	9.0	9.5

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

	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	12.0	10.8	10.8	11.2	10.6	10.7	9.3	9.1	11.2	11.0	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	12.0	12.6	10.3	10.5	12.7	12.0	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	3.5		6.5	10.5		7.5	3.0				2.0		3.5				11.0	2.0	8.5	3.5		6.5	4.0
1- 2				9.0			6.0	5.5					1.5	1.5			9.0	8.5	6.0	2.5		1.5	2.0
2- 3	8.5	6.5	3.0	7.0							6.5						7.5	4.5	3.0	1.5		6.5	
3- 4	6.0		8.5	5.0			3.5	2.0			5.0				7.0	6.0						1.5	
4- 5	3.0	10.5		3.0	9.0	10.0				2.0	3.5	2.5	6.5		9.5	4.5	7.0	8.5	10.5			6.5	6.5
5- 6		3.5	5.0			8.0				3.0	2.0	4.0	4.5				2.5	3.0	5.5	9.5		1.5	4.5
6- 7	8.5		11.0	10.0			4.0	5.0		4.5	6.5	5.5	2.0					9.0	3.0	8.5		6.5	2.0
7- 8	5.5	7.5	1.5	8.0						5.5	6.5						10.5	5.5		7.0		1.5	
8- 9	2.5		7.0	6.0				1.5			5.0				6.5	9.0	1.5	8.0	6.0			6.0	
9-10	10.5			4.0		10.5	4.5				3.5		7.0		9.0	7.5	7.5	5.0	5.0			1.5	6.5
10-11	8.0	5.0	3.5	2.0		8.0			2.0		2.0		5.0	4.5			6.0	4.0	2.5	4.0		6.0	4.5
11-12	5.0		9.0				1.5	4.5	2.5				3.0		11.5		4.5		10.5	2.5		1.5	2.5
12-13		9.0		9.5			5.0		3.0		6.5	2.0		3.0			2.5	6.5	7.5	1.5	9.5	6.0	
13-14	10.0		5.5	7.5	9.0				4.0		5.0	3.5			6.0			2.5	5.0			1.5	
14-15	7.5		11.0	5.5		10.5	2.0	7.0	4.5		3.5	5.0		2.0		8.5	10.5	8.5	2.0	10.5		6.0	7.0
15-16	4.5	6.5	2.0	3.5		8.5	5.5		5.0	1.5	2.0	6.5	5.5		11.0	9.0	5.0	10.0	9.5			1.5	5.0
16-17			7.5	1.5				4.0	6.0	2.5			3.5				7.5		7.5	8.5		6.0	2.5
17-18	9.5	10.5		10.5			2.5			4.0	6.5		1.5				6.0	7.0	4.5	7.5			
18-19	7.0	4.0	4.0	8.5			6.0			5.0	5.0				5.5	4.5	3.5	2.0	6.0			6.0	
19-20	4.0		9.5	6.5				6.5		6.0	3.5				8.0	2.5	9.5	9.5	5.0				7.0
20-21		8.0		4.5		9.0	3.0				2.0	1.5	6.0		10.5		5.5	7.0	4.0			6.0	5.0
21-22	9.0		6.0	3.0			6.0	3.5				3.0	4.0				10.5	2.0	4.0	3.0			3.0
22-23	6.5				9.5						6.5	5.0	2.0				9.0	8.0	1.5	1.5		6.0	
23-24	3.5	5.5	2.5	10.0			3.5				5.0	6.5					7.5	4.5	9.5				
24-25			8.0	8.0				6.0			3.5				7.5	6.0		6.5	11.0			6.0	7.5
25-26	8.5	9.5		6.0		9.5					2.0		7.0	3.5	10.0	4.5	6.5	4.0	9.5				5.0
26-27	6.0		4.5	4.0		7.5	4.0	3.0					5.0				2.5	3.0		8.5		6.0	3.0
27-28	3.0		10.0	2.0						2.0	6.5		2.5	2.5				9.0	9.0	7.5			
28-29		6.5							1.5	3.5	5.0	1.5					10.5	5.0	6.5	6.5		6.0	
29-30	8.0		6.5	9.0			4.5	5.5	2.0	4.5	3.5	3.0			7.0	9.0	1.5	3.5	5.0				
30-31	5.5	11.0		7.5		10.0			2.5	5.5	2.0	4.5			9.5	7.5	7.5		4.0			5.5	5.5



## AAVSO RR Lyrae Ephemeris for August 2017

all times in U.T.

Page 2

	AR	DL	DY	SS	RR	RZ	AV	RV
	HER	HER	HER	LEO	LYR	LYR	PEG	UMA
MAX	10.6	11.0	10.2	10.5	7.1	10.0	9.9	10.1
MIN	11.6	12.4	10.6	12.0	8.1	12.0	10.9	11.2
RISE	2	1	1	2	2	2	2	3
0- 1	7.5		6.0				1.5	
1- 2	6.0	4.5	3.5		3.0		5.5	
2- 3	4.5				6.0			
3- 4	3.0				9.0		4.5	6.0
4- 5	1.5	3.5	6.5				8.5	4.5
5- 6		7.5	3.5		2.0		3.5	3.0
6- 7					5.0	1.5	7.5	1.5
7- 8	8.5	2.5			8.5	2.0	2.0	
8- 9	7.0	6.5	6.5			2.5	6.5	
9-10	6.0		4.0			3.0		
10-11	4.5		1.5		4.5	3.5	5.0	7.0
11-12	3.0	5.5			7.5	4.0	9.5	5.0
12-13	1.5		7.0	1.5	11.0	5.0	4.0	3.5
13-14			4.5			5.5	8.0	2.0
14-15		4.5	1.5		3.5	6.0	3.0	
15-16	8.5				7.0	6.5	7.0	
16-17	7.0				10.0	7.0	1.5	
17-18	5.5	3.5	4.5			7.5	6.0	7.5
18-19	4.0		2.0		3.0	8.0		5.5
19-20	2.5				6.0	8.5	4.5	4.0
20-21		2.5			9.5	9.0	9.0	2.5
21-22		7.0	5.0			9.5	3.5	
22-23			2.5		2.0	10.0	7.5	
23-24	8.0	1.5			5.5		2.5	
24-25	6.5	6.0			8.5		6.5	
25-26	5.5		5.0					6.0
26-27	4.0		2.5		1.5		5.5	4.5
27-28	2.5	5.0			4.5			3.0
28-29					7.5		4.0	1.5
29-30			5.5		11.0	1.5	8.5	
30-31		4.0	3.0			2.0	3.0	

## AAVSO RR Lyrae Ephemeris for September 2017

all times in U.T.

Page 1

	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	12.0	10.8	10.8	11.2	10.6	10.7	11.0	9.3	9.1	11.2	11.0	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	12.0	12.6	12.3	10.3	10.5	12.7	12.0	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	2.5	4.0	3.0	5.5		7.5	1.5	2.5	3.0							11.5		6.0	3.5	8.5	3.0		1.0	
1- 2	10.5		8.5	3.5		5.5			4.0				3.5					4.0	10.0	6.0	2.0		5.5	
2- 3	7.5	8.0		1.5	8.5								1.5				4.0	2.5	6.0	3.0	0.5		1.0	
3- 4	5.0	1.5	5.0				2.0	5.0			3.5				11.0		6.5	1.0	2.0	0.5	11.0		5.5	
4- 5	2.0		10.5	8.5	7.5	10.0					2.0					10.0	9.0	10.5	8.5	8.5	10.0		1.0	
5- 6	10.0	5.5	1.5	6.5		8.0		2.0				1.0					11.5	9.0	4.5	5.5	8.5		5.5	
6- 7	7.5		7.0	4.5	6.5	6.0	2.5			0.5		2.5	4.0					7.5	1.0	3.0	7.5		0.5	
7- 8	4.5	9.5		2.5						1.5		4.0	2.0				3.5	6.0	7.0		6.5		5.5	
8- 9	1.5	3.0	3.5	0.5				4.5		3.0	3.5						6.0	4.0	3.0	8.0	5.5		0.5	
9-10	9.5		9.0			10.5	3.0			4.0	2.0						11.5	11.5	8.5	2.5	9.5	5.5	4.0	5.5
10-11	7.0	7.0		8.0		8.5		1.5			0.5							11.0	1.0	5.5	2.5	3.0		0.5
11-12	4.0		5.5	6.0	8.5	6.5								4.5	1.5			10.5	1.5		2.0			5.5
12-13	1.5	11.0	11.0	4.0			3.5							2.5				9.0	8.0	7.5	1.0	9.0		0.5
13-14	9.0	4.5	2.0	2.0	7.5			4.0			3.5	0.5		0.5		10.5	5.5	7.5	4.0	5.0	11.0			5.5
14-15	6.5		7.5				0.5				2.0	2.0			10.0		8.0	6.0		2.5	10.0	9.0	0.5	
15-16	3.5	8.5		9.0	6.5	9.0	4.0	1.0	0.5		0.5	3.5					10.5	4.0	6.5		9.0			5.5
16-17	1.0	1.5	4.0	7.0		7.0				1.5								2.5	2.5	7.5	7.5	8.5		0.5
17-18	8.5		9.5	5.0			1.0		2.0				3.0					1.0	9.0	4.5	6.5			5.5
18-19	6.0	6.0		3.0			4.5	3.5	2.5	1.0	3.5		1.0				5.0	10.5	5.0	2.0	5.5	8.0		
19-20	3.0		6.0	1.5					3.5	2.5	2.0						7.5	9.0	1.0		4.5			5.0
20-21		10.0	11.5		9.0	9.5	1.5		4.0	3.5	0.5				10.0		10.0	7.5	7.5	7.0	3.0	8.0		
21-22	8.0	3.0	2.5	8.5		7.0												6.0	3.5	4.5	2.0			5.0
22-23	5.5		8.0	6.5	8.0	5.0						1.5	4.0			10.5		4.0	10.0	1.5	1.0	7.5		
23-24	2.5	7.0		4.5			2.0	3.0			3.5	3.0	1.5				4.5	2.5	6.0		11.5			5.0
24-25	10.5		4.5	2.5	7.0						2.0	5.0		2.0			7.0	1.0	2.0	7.0	10.0			
25-26	7.5	11.0	10.0	0.5		10.0					0.5						9.5	10.5	8.5	4.0	9.0			5.0
26-27	5.0	4.5	1.0			7.5	2.5							1.0	10.5		12.0	9.0	4.5	1.5	8.0			
27-28	2.0		6.5	7.5		5.5							4.5					7.5	0.5		7.0			5.0
28-29	10.0	8.5		5.5				2.5			3.5		2.5				3.5	5.5	7.0	6.5	5.5			
29-30	7.0	2.0	3.0	4.0	9.0		3.0			1.0	2.0						6.5	4.0	3.0	3.5	4.5			5.0

	VX	AR	DL	DY	SZ	UU	DG	DH	RR	WW	SZ	RR	RZ	AV	RV
	HER	HER	HER	HER	HYA	HYA	HYA	HYA	LEO	LEO	LYN	LYR	LYR	PEG	UMA
MAX	9.9	10.6	11.0	10.2	10.6	10.7	11.6	11.4	10.0	11.0	9.1	7.1	10.0	9.9	10.1
MIN	10.4	11.6	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12.0	9.6	8.1	12.0	10.9	11.2
RISE	2	2	1	1	2	2	3	2	2	3	1	2	2	2	3
0- 1	3.5											4.0	2.5	7.0	
1- 2	1.0	6.5					11.5				8.0	7.0	3.5	2.0	
2- 3		5.0	3.0										4.0	6.0	5.0
3- 4		3.5		3.5					11.0				4.5	0.5	3.5
4- 5		2.0		0.5			12.0					3.0	5.0	5.0	2.0
5- 6	3.5	0.5	2.0								7.5	6.0	5.5	9.0	0.5
6- 7	1.5					11.5			11.5			9.5	6.0	3.5	
7- 8				3.5									6.5	7.5	
8- 9			1.0	1.0								2.0	7.0	2.5	
9-10		6.5	5.5					10.5	11.5			5.5	7.5	6.5	
10-11	3.5	5.0										8.5	8.0	1.5	4.0
11-12	1.5	3.5		4.0										5.5	2.5
12-13		2.0	4.5	1.5	11.5							1.5			1.0
13-14												4.5		4.5	
14-15											8.5	8.0		8.5	
15-16	4.0		3.5	4.0										3.0	
16-17	2.0			1.5								0.5		7.0	
17-18		6.0				11.5						4.0		2.0	4.5
18-19		4.5	2.5								8.0	7.0		6.0	3.0
19-20		3.0		4.5				11.5					0.5	1.0	1.5
20-21	4.0	1.5		2.0									1.5	5.0	
21-22	2.0		1.5									3.0	2.0	9.0	
22-23			6.0								7.5	6.5	2.5	4.0	
23-24				5.0								9.5	3.0	8.0	
24-25				2.0									3.5	2.5	5.0
25-26	4.5	6.0	5.0									2.5	4.0	6.5	3.5
26-27	2.0	4.5										5.5	4.5	1.5	2.0
27-28		3.0										8.5	5.0	5.5	0.5
28-29		1.5	4.0	2.5		11.5			10.5				5.5		
29-30												1.5	6.0	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	12.0	10.8	10.8	11.2	10.6	10.7	11.0	9.3	9.1	11.2	11.0	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	12.0	12.6	12.3	10.3	10.5	12.7	12.0	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	4.5		8.5	2.0		10.0				2.0	0.5	1.5				8.0	9.0	2.5		1.0	3.5	6.5	0.0	
1- 2	1.5	6.0			8.0	8.0	0.5					3.0			9.0	11.0	11.5	1.0	5.5		2.5		5.0	
2- 3	9.5		5.0			6.0									11.0				1.5	6.0	1.0	6.0	0.0	
3- 4	6.5	10.0	10.5	7.0	7.0	4.0		2.0	0.0				3.0			3.0	9.0	8.0	3.5	11.5			5.0	
4- 5	4.0	3.5	1.5	5.0			0.5		0.5		2.0		1.0				5.5	7.5	4.0	0.5	10.5	5.5	0.0	
5- 6	1.0		7.0	3.0	6.0	10.5			1.5		0.5					10.0	8.5	5.5	0.0		9.0		5.0	
6- 7	9.0	7.5		1.0		8.5				2.0							11.0	4.0	6.5	6.0	8.0		0.0	
7- 8	6.5	1.0	3.5		5.0	6.5	1.0					12.0			9.5			2.5	2.5	3.0	7.0		5.0	
8- 9	3.5	11.5	9.0		9.5	4.5		1.5				1.0			11.5		2.5	1.0	8.5	0.5	6.0			
9-10	0.5	5.0		6.5							2.0	2.5	1.5			8.5	5.0		5.0		4.5		5.0	
10-11	8.5		5.5	4.5	8.5		1.5			0.5	0.5					11.5	7.5	9.0	1.0	5.5	3.5			
11-12	6.0	9.0	11.0	2.5		9.0				1.5				0.0			10.5	7.5	7.0	2.5	2.5	9.5	4.5	
12-13	3.0	2.0	2.0	0.5	7.5	7.0									7.5			5.5	3.5		1.5			
13-14	0.5		7.5			4.5	2.0	1.0							10.0		2.0	4.0			0.0	9.0	4.5	
14-15	8.0	6.0			6.5						2.0		2.0		12.0	10.0	4.5	2.5	6.0	5.0	10.5			
15-16	5.5		4.0	5.5							0.5		0.0				7.0	1.0	2.0	2.5	9.5	8.5	4.5	
16-17	2.5	10.5	9.5	3.5	5.5	9.5	2.5					0.5					9.5		8.0		8.0			
17-18	10.5	3.5	0.0	1.5		7.0						2.0							9.0	4.5		7.0	8.5	4.5
18-19	7.5		6.0			5.0		0.5							8.0	9.0	1.5	7.5	0.5	5.0	6.0			
19-20	5.0	7.5	11.5		8.5						2.0		3.0		10.5	12.0	4.0	5.5	6.5	2.0	5.0	8.0	4.5	
20-21	2.0	1.0	2.5	7.0							0.5		0.5				6.5	4.0	3.0		3.5			
21-22	10.0	11.5	8.0	5.0	7.5	9.5	0.0	3.0									9.0	2.5			2.5	7.5	4.5	
22-23	7.0	5.0		3.0		7.5				0.0	1.0							1.0	5.0	4.5	1.5			
23-24	4.5		4.5	1.0	6.5	5.5				0.5	2.0					10.5			1.5	1.5	0.5	7.5	4.5	
24-25	1.5	9.0	10.0			3.5	0.5			1.5		2.0	0.0	0.5	8.5		3.5	9.0	7.5		10.5			
25-26	9.5	2.5	0.5		5.5					2.0		0.5	1.5	1.5	10.5		6.0	7.5	4.0	7.0	9.5	7.0	4.5	
26-27	6.5		6.5	6.0		10.0		2.5									8.5	5.5		4.0	8.5			
27-28	4.0	6.5	12.0	4.0	4.5	8.0	1.0									9.0	11.0	4.0	6.0	1.5	7.0	6.5	4.5	
28-29	1.0		3.0	2.0	8.5	6.0										12.0		2.5	2.5		6.0			
29-30	9.0	10.5	8.5	0.5		4.0					2.5						3.0	1.0	8.5	6.5	5.0	6.5	4.5	
30-31	6.0	4.0			7.5		1.5				1.0		2.0		9.0		5.5		4.5	4.0	4.0			

	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	11.0	10.2	10.6	10.7	11.6	11.4	10.0	10.5	11.5	11.0	9.1	7.1	10.0	9.9	10.1
MIN	10.4	11.6	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12.0	12.6	12.0	9.6	8.1	12.0	10.9	11.2
RISE	2	2	1	1	2	2	3	2	2	2	2	3	1	2	2	2	3
0- 1													6.0	4.5		8.5	
1- 2	2.5		3.0										8.5			3.5	
2- 3	0.5			3.0			9.5				9.5					7.5	
3- 4				0.5	10.5				10.0					0.5		2.0	2.5
4- 5		4.0	2.0		12.5								5.5	4.0		6.0	1.0
5- 6		2.5					10.0				10.0		7.5	7.0		1.0	11.0
6- 7	2.5	1.0														5.0	
7- 8	0.5		1.0	0.5		9.0											
8- 9						10.5	10.5		9.5			10.0	5.0	3.0		4.0	
9-10						11.5							7.0	6.5		8.0	
10-11					10.0											3.0	3.0
11-12	3.0			1.0	12.0		11.0	11.5			10.5				0.5	7.0	1.5
12-13	0.5	4.0						11.0						2.5	1.0	1.5	0.0
13-14		2.5						10.5	9.0				6.5	5.5	1.5	5.5	9.5
14-15		1.0	3.0				11.5	10.0			11.0				2.0	0.5	
15-16				1.0				9.5							2.5	4.5	
16-17	3.0													1.5	3.0	8.5	
17-18	1.0		2.0		10.0		12.0		10.5			11.0	6.0	5.0	3.5	3.5	
18-19					11.5	9.5							8.0		4.0	7.5	2.0
19-20				1.5		10.5									4.5	2.0	0.5
20-21		3.5	1.0			11.5	12.0				11.5	11.5		1.0	5.0	6.5	10.0
21-22	3.5	2.0											5.5	4.0	5.5	1.0	
22-23	1.0	0.5							10.0		12.0		7.5	7.0	6.0	5.0	
23-24			0.0	2.0								12.0					
24-25					9.5						12.5			0.0		4.0	
25-26					11.0									3.0		8.0	2.5
26-27											12.0		7.0	6.5		3.0	1.0
27-28	1.5	5.0	3.5	2.0				9.5	11.0							7.0	10.5
28-29		3.5														1.5	
29-30		2.0				9.5								2.5		6.0	
30-31		0.5	2.5			10.5							6.5	5.5		0.5	

	SW	XX	AT	SW	TZ	BH	RS	ST	SW	SZ	TW	UU	UY	RW	TT	RR	XZ	DM	RW	XZ	RR	VX	AR
	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	12.0	10.8	11.2	10.6	10.7	11.0	9.3	9.1	11.2	11.0	9.6	10.7	9.9	10.6
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	12.0	12.6	12.3	10.3	10.5	12.7	12.0	10.3	11.9	10.4	11.6
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	3.5		5.0		2.5	10.5					11.0			11.0	8.0	8.0		1.0	1.0	2.5	6.0		
1- 2	0.5	8.0			6.5	8.5				12.0	12.5		11.5		11.0		7.0			1.5			
2- 3	8.5	1.0	1.0	3.5		6.5											5.5	3.0		0.5	5.5		
3- 4	5.5		7.0	1.5	5.5	4.0										2.5	4.0		3.5	11.0			
4- 5	3.0	5.5				2.0								7.0	6.5	5.0	2.5	5.5	0.5	9.5	5.5		
5- 6	0.0		3.0		4.5	11.0		1.5				0.5		9.5	9.5	7.5	1.0	2.0		8.5			
6- 7	8.0	9.5	9.0		9.0	9.0								11.5	12.5					7.5	5.0		1.5
7- 8	5.5	2.5		5.0	3.5	6.5			10.5									4.0	3.0	6.0			0.0
8- 9	2.5		5.5	3.0	8.0	4.5			11.0		10.5					2.0	7.0	0.5	0.5	5.0	4.5		
9-10		6.5		1.0	2.5	2.5			12.0		12.0				8.0	4.5	5.5	6.5		4.0	9.5		
10-11	7.5	0.0	1.5		7.0		0.0	1.0	0.0		1.0			7.5	11.0	7.0	4.0	2.5		3.0	4.5		
11-12	5.0	10.5	7.5			9.0								10.0			2.5		3.0	1.5	9.0		
12-13	2.0	4.0			6.0	7.0		12.5		11.5				12.0			1.0	5.0	0.0	0.5	4.0		
13-14			3.5	4.0		5.0				12.5					7.0	1.5		1.0		11.0	8.5		
14-15	7.0	8.0	9.5	2.0	5.0	3.0							12.0		10.0	4.0				10.0	3.5		1.5
15-16	4.5	1.5	0.0	0.0	9.0			0.5						6.0	13.0	6.5	7.0	3.5	2.5	8.5	8.5		11.5
16-17	1.5		5.5		4.0	9.5					10.0			8.0		9.0	5.5		10.5	7.5	3.5		
17-18	9.5	5.5			8.0	7.5		12.0			12.0			10.5	5.5		4.0	6.0		6.5	8.0	0.0	
18-19	6.5		2.0		3.0	5.5					0.5			12.5	8.5	1.0	2.5	2.0	5.0	5.5			
19-20	4.0	9.5	8.0	3.5	7.0	3.5									11.5	3.5	1.0		2.0	4.0	7.5		
20-21	1.0	3.0		1.5		1.0										6.0		4.5	10.0	3.0			
21-22	9.0		4.0		6.0	10.0						0.5		6.0		8.5		0.5		2.0	7.5		2.5
22-23	6.0	7.0	10.0			8.0		11.5						8.5	7.0		7.0	7.0	4.5	1.0		0.5	1.0
23-24	3.5	0.5	0.5		5.0	6.0				11.0				11.0	10.5	0.5	5.5	3.0	2.0	11.0	7.0		11.0
24-25	0.5	11.0	6.0	4.5	9.5	3.5				12.0						3.0	4.0		9.5	10.0			
25-26	8.5	4.5		2.5	4.0	1.5					11.5					5.5	2.5	5.5		9.0	6.5		
26-27	5.5		2.5	0.5	8.5	10.5			10.5		0.0	1.0			6.0	8.0	0.5	1.5	4.0	7.5			
27-28	3.0	8.5	8.0		3.0	8.5			11.0				12.5	6.5	9.0				1.5	6.5	6.5	0.5	
28-29	0.0	1.5			7.5	6.0			12.0					9.0	12.0			4.0		5.5			
29-30	8.0		4.5			4.0			0.0				11.5	11.0		2.5	7.0	0.0		4.5	6.0		2.5

	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	11.0	10.2	10.6	10.7	11.6	11.4	10.0	10.5	11.5	11.0	9.1	7.1	10.0	9.9	10.1
MIN	12.4	10.6	11.7	12.3	12.6	12.6	11.7	12.0	12.6	12.0	9.6	8.1	12.0	10.9	11.2
RISE	1	1	2	2	3	2	2	2	2	3	1	2	2	2	3
0- 1			9.0	11.5						8.0	8.5			4.5	
1- 2			11.0				9.0	11.5		13.0					
2- 3	1.5		12.5		8.0	11.5	6.5				4.0	1.5		3.5	
3- 4						11.0				8.5	6.0	5.0	0.5		0.0
4- 5						10.5					8.0		1.0	2.5	9.5
5- 6	0.5	0.0			8.5	10.0	10.5						1.5	6.5	8.0
6- 7						9.5	8.5	11.5		8.5	3.5	1.0	2.0	1.0	
7- 8			8.5	7.0		9.0					5.5	4.0	2.5	5.5	
8- 9			10.5	8.0	8.5	8.5					7.5		3.0	0.0	
9-10		0.5	12.0	9.5		8.0			9.0				3.5	4.0	
10-11				10.5		7.5	10.0					0.0	4.0		0.5
11-12				11.5	9.0		8.0	12.0			5.0	3.5		3.0	10.0
12-13										9.5	7.0				8.5
13-14		1.0												2.0	
14-15			8.0		9.5									6.0	
15-16	2.0		10.0				9.5			9.5	4.5	2.5		0.5	
16-17			12.0				7.0	12.0	9.5		6.5	5.5		5.0	
17-18					10.0						8.5				1.0
18-19	1.0			7.0				9.5	10.0	10.0				3.5	10.5
19-20				8.0							4.0	1.5			9.0
20-21				9.5	10.5		9.0		10.5		6.0	5.0		2.5	7.5
21-22			8.0	10.5			6.5	12.5		10.5	8.0			6.5	
22-23			9.5	11.5					11.0					1.5	
23-24			11.5		11.0			9.5			3.5	1.0		5.5	
24-25							10.5		11.5	10.5	5.5	4.0		0.0	
25-26						11.5	8.5				7.5		0.0	4.5	11.0
26-27					11.0	10.5		12.5	11.5				0.5		9.5
27-28						10.0				11.0		0.0	1.0	3.0	8.0
28-29			7.5			9.5		10.0	12.0		5.0	3.5	1.5		
29-30			9.0	7.0	11.5	9.0	10.0				7.0		2.0	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	12.0	10.8	11.2	10.6	10.7	11.0	9.3	9.1	11.2	11.0	9.6	10.7	10.6	11.0	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	12.0	12.6	12.3	10.3	10.5	12.7	12.0	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	5.0	5.5			6.5	2.0								4.5	5.0	5.5			3.0				11.0
1- 2	2.5		1.0	2.0	1.0	11.0						10.0		7.5	7.5	4.0	2.5	1.0	2.0	5.5	11.0		13.0
2- 3			6.5	0.0	5.5	8.5	10.5			9.5	10.5		5.0	10.5		2.5		9.0	1.0		9.5		
3- 4	7.5	3.0				6.5				9.0	11.0		9.0	7.0		0.5	5.0		11.0	5.5			
4- 5	4.5		3.0		4.5	4.5			10.5	12.5			9.5		1.5		1.0		10.0				
5- 6	2.0	7.0			8.5	2.5			11.5				11.5	6.0	4.5			1.0	9.0	5.0			7.0
6- 7		0.5		3.0	3.5	0.5			12.5					9.5	7.0		3.5	8.5	8.0				9.0
7- 8	7.0		5.0	1.5	7.5	9.0	10.0							12.5		5.5			6.5	4.5			10.5
8- 9	4.5	4.5			2.5	7.0					9.0		5.5			4.0			5.5	9.5	0.5		12.5
9-10	1.5		1.5		6.5	5.0							7.5	5.0	1.0	2.5	2.0	0.5	4.5	4.5	10.5		
10-11		8.5	7.0		1.5	3.0	12.5			9.0		13.0	10.0	8.0	3.5	0.5		8.5	3.5	9.0	9.0	12.5	
11-12	6.5	2.0			5.5	0.5				10.5			12.0	11.0	6.5		4.5		2.0	4.0			
12-13	4.0		3.5	2.5		9.5	9.5	8.5		12.0			11.5				0.5	3.0	1.0	8.5			6.5
13-14	1.0	6.0		0.5	4.5	7.5		9.5			10.0		3.5	3.5				0.0	11.5	4.0			8.5
14-15			0.0		9.0	5.5		10.0				10.5	6.0	6.5	0.5	5.5	3.0	8.0	10.0	8.5			10.5
15-16	6.0		5.5		3.5	3.0	12.0	10.5	10.0				8.0	9.5	3.0	4.0			9.0	3.5			12.0
16-17	3.5	3.5			8.0	1.0		11.0	11.0			9.5	10.5	12.5	5.5	2.5		2.5	8.0	8.0	0.5		
17-18	0.5		2.0		2.5	10.0		12.0	12.0				12.5			0.5	1.5	10.5	7.0	3.0	10.5		
18-19		7.5	7.5	2.0	7.0	8.0				8.5	10.5			5.5				7.5	5.5	7.5	9.0		
19-20	5.5	0.5			1.5	6.0				10.0			4.0	8.5	0.0		4.0		4.5	3.0			6.5
20-21	3.0		4.0		6.0	3.5	11.5			12.0			6.5	11.5	2.5			2.5	3.5	7.5			8.0
21-22	0.0	5.0			0.5	1.5							8.5		5.0	5.5		10.0	2.5	2.5			10.0
22-23			0.5		5.0	10.5							11.0	4.0		4.0	2.5		1.0	7.0			11.5
23-24	5.0	9.0	6.0	3.0	9.0	8.5								7.0		2.0			0.0	2.0		13.0	
24-25	2.5	2.0		1.0	4.0	6.0								10.0		0.5	4.5	2.0	10.5	6.5	0.0		
25-26			2.5		8.0	4.0	11.0					12.0	4.5		2.0		1.0	10.0	9.5	2.0	10.0		
26-27	7.5	6.0	8.0		3.0	2.0			9.5	8.5			6.5		4.5				8.0	6.5			6.0
27-28	4.5				7.0	11.0			10.5	10.0		11.0	9.0	5.5	7.0		3.5		7.0	1.5			7.5
28-29	2.0		4.5		2.0	8.5			11.5	11.5			11.5	8.5		5.5		1.5	6.0	6.0			9.5
29-30		3.5		2.5	6.0	6.5					9.5	10.0		11.5		4.0		9.5	5.0				11.5
30-31	7.0		1.0	0.5	1.0	4.5	10.5								1.5	2.0	2.0		3.5	6.0			



	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	10.0	10.5	11.5	11.0	9.1	7.1	10.0	9.9	10.1
MIN	12.3	12.6	12.6	11.7	12.0	12.6	12.0	9.6	8.1	12.0	10.9	11.2
RISE	2	3	2	2	2	2	3	1	2	2	2	3
0- 1	8.0	5.5	8.5	8.0		12.5	11.5					
1- 2	9.5		8.0	5.5	13.0			2.5	13.0		1.0	
2- 3	10.5	12.0	7.5				7.0	4.5	2.5			
3- 4	11.5	6.0	7.0		10.0		11.5	6.5				10.0
4- 5			6.5	9.5				8.5			4.0	8.5
5- 6		12.5	6.0	7.0			7.0	1.5				7.0
6- 7		6.5	5.5	5.0			12.0	4.0	2.0		2.5	5.5
7- 8								6.0				
8- 9		13.0			10.5		7.5	8.0			1.5	
9-10	6.0	7.0		9.0			12.5	1.0				
10-11	7.0			6.5	7.5			3.0	1.0		0.5	10.5
11-12	8.5						8.0	5.5			4.5	9.0
12-13	9.5	7.5					13.0	7.5				7.5
13-14	10.5			10.5	10.5	7.5					3.5	6.0
14-15	11.5			8.5			8.0	2.5	0.0			
15-16		7.5		6.0	7.5	8.0		4.5	3.5		2.0	
16-17								7.0				
17-18			11.5			8.5	8.5				1.0	11.0
18-19		8.0	11.0	10.0	11.0			2.0		0.0		9.5
19-20			10.5	8.0		9.0		4.0	2.5	0.5		8.0
20-21	6.0		10.0	5.5	8.0		9.0	6.0		1.5	4.0	6.5
21-22	7.0	8.5	9.5			9.0		8.5		2.0		
22-23	8.5		8.5					1.5		2.5	3.0	
23-24	9.5		8.0	9.5	11.0	9.5	9.0	3.5	2.0			
24-25	10.5	9.0	7.5	7.0				5.5			1.5	
25-26	11.5		7.0	5.0	8.0	10.0		7.5				10.0
26-27			6.5				9.5				0.5	8.5
27-28		9.5	6.0			10.5		3.0	1.0		4.5	7.0
28-29			5.5	9.0	11.5		5.0	5.0				5.5
29-30				6.5		11.0	10.0	7.0			3.5	
30-31		10.0			8.5							