

The Art and Science of Target Time

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Sail Canada | Voile Canada
Canada's National Sailing Authority | L'autorité Nationale De La Voile



Agenda

- Why target times
- 2012 Olympics target times
- What tools do you need
- Example of a target time model
- Challenges
- Options to meet the target time
- Options for different course configurations
- How to create target time models
- Sailing instruction recommendation
- Target time links

Why target times

- Meet the schedule
- Media coverage
- Setting a race length expectation for the competitors

2012 Olympics target times

Event	Target Time	Nothe target time	Mark 1 time limit	Time limit	Finish window
Men's One-Person Dinghy	60	45-60	30	90	20
Women's One-Person Dinghy	60	45-60	30	90	20
Men's Two-Person Dinghy	60	45-60	30	90	20
Women's Two-Person Dinghy	60	45-60	30	90	20
Men's Skiff	30	30	20	50	10
Women's Match Racing	18	18	None	None	5
Men's One-Person Dinghy (Heavyweight)	60	45-60	40	90	25
Men's Keelboat	60-75	-	40	115	25
Men's Windsurfer	30	30	30	50	15
Women's Windsurfer	30	30	30	50	15

Time limits and target times for Medal Races are shown in the table below.

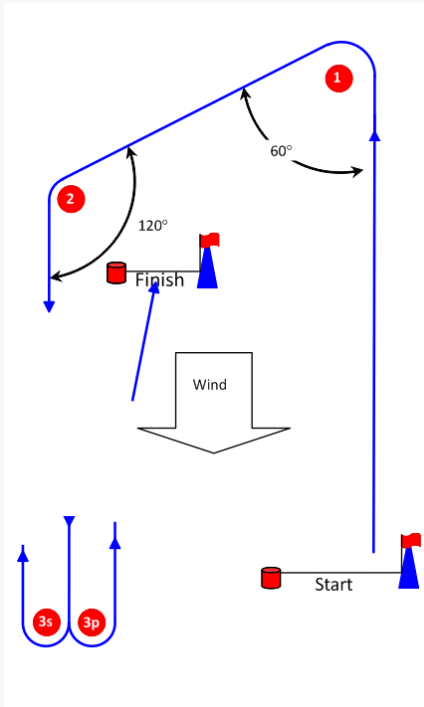
Event	Target time	Mark 1 time limit	Time limit	Finish window
All Events other than men's and women's Windsurfer	30	30	50	10
Men's Windsurfer Women's Windsurfer	20	15	50	10



What tools do you need

- Good wind instruments
- GPS's for the mark laying
- Target time models for the classes

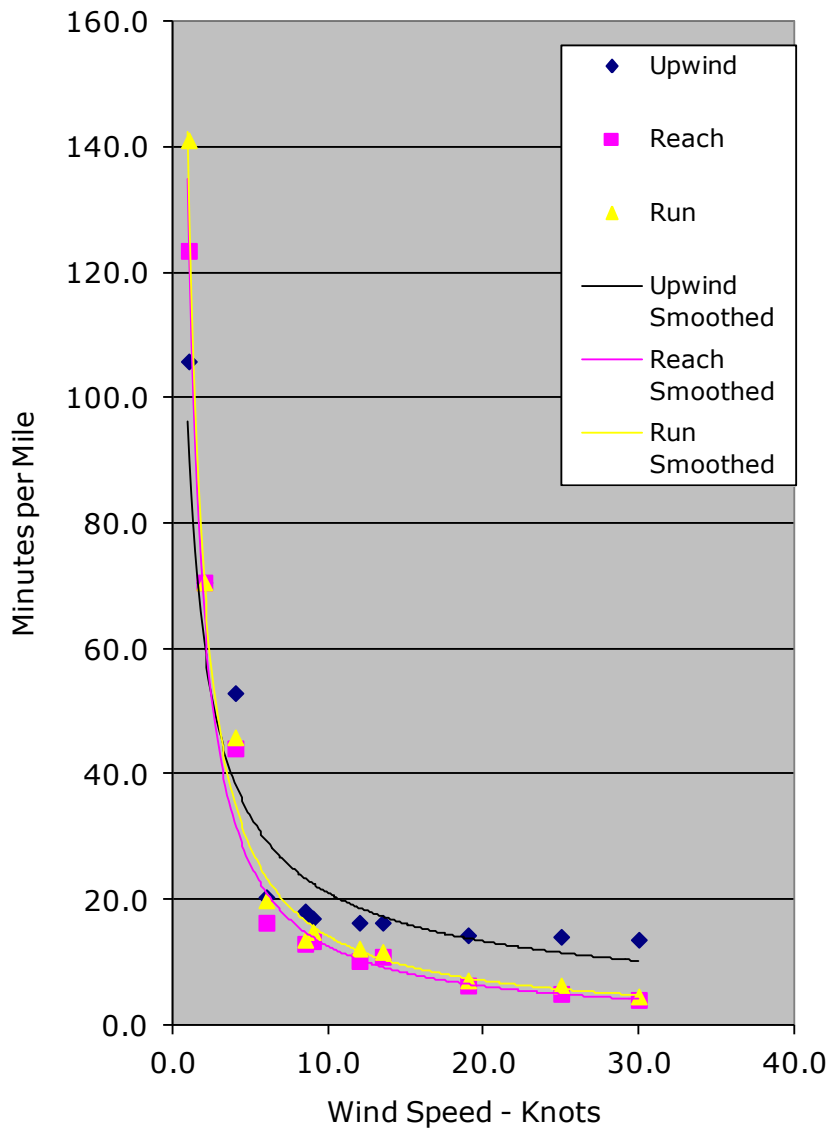
Example of a target time model



Course length	Direction	Number of boats	Wind in knots	Target time
0.82	30	70	10	50
Distance sailed between marks				
	Start -> 1	1 -> 2	2 -> 3	3 -> Finish
Distance	0.82	0.54	0.82	0.72
%	38%	25%	38%	33%
Time	17.2	6.8	11.5	15.1
%	34%	13%	23%	30%
Accumulation of the legs				
Mark	1	2	3	Finish
Distance	0.82	1.36	2.18	2.90
%	28%	47%	75%	100%
Time	17.2	24.0	35.5	50.6
%	34%	47%	70%	100%
Distance sailed in nautical miles				
	Windward	Reach	Downwind	Total
Distance	1.54	0.54	0.82	2.90
%	53%	19%	28%	100%
Total Time	32.32	6.75	11.55	50.62
%	64%	13%	23%	100%

International Optimist

Speeds



Optimist

Wind	Upwind	Reach	Run
1.0	105.8	123.5	141.1
2.0	70.6	70.6	70.6
4.0	52.9	44.1	45.9
6.0	20.4	16.3	19.9
8.5	18.1	12.9	13.6
9.0	17.0	13.3	14.8
12.0	16.3	10.2	12.2
13.5	16.3	10.9	11.6
19.0	14.3	6.3	7.1
25.0	14.0	4.9	6.3
30.0	13.6	4.0	4.5

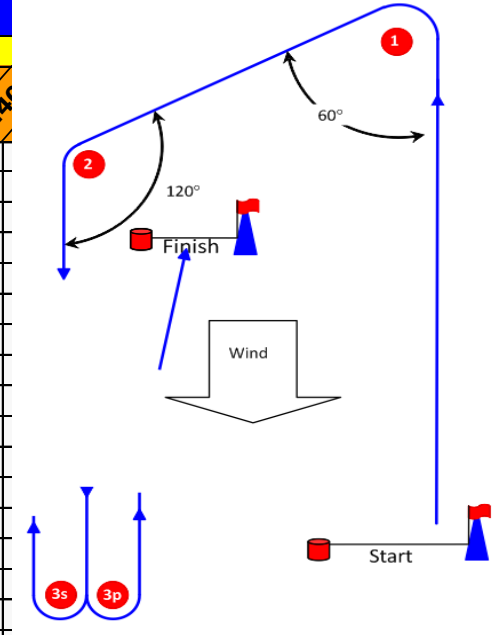
Warning - Do not change data in the boxes below.

Log Speeds Wind	Upwind	Reach	Down
0	2.0245947	2.09154149	2.14953343
0.30103	1.84850344	1.84850344	1.84850344
0.60205999	1.7235647	1.64438345	1.66141679
0.77815125	1.30859135	1.21168134	1.29786749
0.92941893	1.25743883	1.11131079	1.13250009
0.95424251	1.22941011	1.12532151	1.17028865
1.07918125	1.21168134	1.00756136	1.08457654
1.13033377	1.21168134	1.03559008	1.0655533
1.2787536	1.15477649	0.79670799	0.8499535
1.39794001	1.14722335	0.6931674	0.79670799
1.47712125	1.13250009	0.59889748	0.65537884

Regression	
Up	
-0.6613224	1.98324804
0.07515314	0.07531227
0.89587443	0.10853692
77.4340986	9
0.91219401	0.10602236
Reach	
-1.0334897	2.12958117
0.04812327	0.04822517
0.98085976	0.06950011
461.213538	9
2.22778402	0.04347239
Run	
-1.0052459	2.15387228
0.04111985	0.04120692
0.98516424	0.05938571
597.64251	9
2.10768333	0.03173996

Target time chart

		Distance from Start to Mark 1 in Nautical Miles																															
		0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40									
Wind Strength	3	51	59	68	76	84	93	101	110	118	127	135	144	152	160	169	177	186	194	203	211	220	228	236									
	4	40	47	53	60	67	73	80	87	93	100	107	114	120	127	134	140	147	154	160	167	174	180	187									
	5	33	39	45	50	56	61	67	72	78	84	89	95	100	106	111	117	123	128	134	139	145	151	156									
	6	29	34	39	43	48	53	58	63	67	72	77	82	87	92	96	101	106	111	116	120	125	130	135									
	7	26	30	34	38	43	47	51	55	60	64	68	72	77	81	85	89	94	98	102	106	111	115	119									
	8	23	27	31	34	38	42	46	50	54	57	61	65	69	73	77	80	84	88	92	96	100	103	107									
	9	21	24	28	31	35	38	42	45	49	52	56	59	63	66	70	73	77	80	84	87	91	94	98									
	10	19	23	26	29	32	35	39	42	45	48	51	55	58	61	64	68	71	74	77	80	84	87	90									
	11	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84									
	12	17	20	22	25	28	31	33	36	39	42	45	47	50	53	56	59	61	64	67	70	72	75	78									
	13	16	18	21	24	26	29	31	34	37	39	42	45	47	50	52	55	58	60	63	65	68	71	73									
	14	15	17	20	22	25	27	30	32	35	37	40	42	45	47	49	52	54	57	59	62	64	67	69									
	15	14	16	19	21	23	26	28	30	33	35	38	40	42	45	47	49	52	54	56	59	61	63	66									
	16	13	16	18	20	22	25	27	29	31	33	36	38	40	42	45	47	49	51	54	56	58	60	62									
	17	13	15	17	19	21	23	26	28	30	32	34	36	38	40	43	45	47	49	51	53	55	57	60									
	18	12	14	16	18	20	22	24	26	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57									
	19	12	14	16	18	20	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55									
	20	11	13	15	17	19	21	23	24	26	28	30	32	34	36	38	39	41	43	45	47	49	51	53									
	21	11	13	14	16	18	20	22	24	25	27	29	31	33	34	36	38	40	42	43	45	47	49	51	52	54	56	58	60	62	63	65	21
	22	10	12	14	16	17	19	21	23	24	26	28	30	31	33	35	37	38	40	42	44	45	47	49	51	52	54	56	58	59	61	63	22
	23	10	12	14	15	17	19	20	22	24	25	27	29	30	32	34	35	37	39	41	42	44	46	47	49	51	52	54	56	57	59	61	23
	24	9.8	11	13	15	16	18	20	21	23	25	26	28	29	31	33	34	36	38	39	41	43	44	46	47	49	51	52	54	56	57	59	24
	25	9.5	11	13	14	16	17	19	21	22	24	25	27	29	30	32	33	35	36	38	40	41	43	44	46	48	49	51	52	54	55	57	25
	26	9.2	11	12	14	15	17	18	20	22	23	25	26	28	29	31	32	34	35	37	38	40	42	43	45	46	48	49	51	52	54	55	26
	27	9	10	12	13	15	16	18	19	21	22	24	25	27	28	30	31	33	34	36	37	39	40	42	43	45	46	48	49	51	52	54	27
	28	8.7	10	12	13	15	16	17	19	20	22	23	25	26	28	29	31	32	33	35	36	38	39	41	42	44	45	47	48	49	51	52	28
	29	8.5	9.9	11	13	14	16	17	18	20	21	23	24	25	27	28	30	31	33	34	35	37	38	40	41	42	44	45	47	48	50	51	29



Finish time prediction charts

		Elapsed Time in Minutes																																						
		10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40								
Mark	1	29	32	35	38	41	44	47	50	53	56	59	62	65	68	71	74	77	79	82	85	88	91	94	97	100	103	106	109	112	115	118	1							
	2	21	23	25	27	30	32	34	36	38	40	42	44	46	49	51	53	55	57	59	61	63	65	68	70	72	74	76	78	80	82	84	2							
	3	14	16	18	19	20	21	23	24	26	27	29	30	31	33	34	36	37	39	40	41	43	44	46	47	48	50	51	53	54	56	57	3							
	1	2.1	1.8	1.6	1.5	1.3	1.2	1.1	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	1							
2	2.3	2.0	1.8	1.6	1.4	1.3	1.1	1.0	0.9	0.8	0.7	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.0						2								
3	3.3	2.8	2.4	2.0	1.7	1.4	1.2	1.0	0.9	0.8	0.6	0.5	0.4	0.2	0.1	0.0																3								
2	3.6	3.2	2.8	2.6	2.3	2.1	1.9	1.7	1.6	1.5	1.3	1.2	1.1	1.1	1.0	0.9	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.2	2									
3	5.6	4.9	4.3	3.7	3.3	2.9	2.6	2.3	2.1	1.8	1.6	1.4	1.3	1.1	1.0	0.8	0.7	0.5	0.4	0.3	0.2	0.1	0.1								3									
3	9.4	8.3	7.4	6.7	6.0	5.5	5.0	4.6	4.2	3.8	3.5	3.2	3.0	2.8	2.5	2.3	2.2	2.0	1.8	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.9	0.8	0.7	0.6	3									

ISAF Olympic Laser target time table

Wind Range	5 - 8 Knots					8 - 12 Knots					12 - 15 Knots					15+ Knots				
Upwind Speed	20 mins/mile			Up Time (mins)	Down Time (mins)	19 mins/mile			Up Time (mins)	Down Time (mins)	16 mins/mile			Up Time (mins)	Down Time (mins)	15 mins/mile			Up Time (mins)	Down Time (mins)
Run Speed	17 mins/mile					12 mins/mile					10 mins/mile					9 mins/mile				
Reach Speed	12 mins/mile					9 mins/mile					7 mins/mile					6 mins/mile				
Leg Length Nautical Miles	O2 / I2	O3 / I3	O4 / I4			O2 / I2	O3 / I3	O4 / I4			O2 / I2	O3 / I3	O4 / I4			O2 / I2	O3 / I3	O4 / I4		
0.3	26.4	37.5	48.6	6.0	5.1	21.4	30.6	39.7	5.6	3.6	17.3	24.8	32.3	4.7	2.9	15.9	22.8	29.7	4.4	2.6
0.4	34.6	49.4	64.2	8.0	6.8	28.1	40.3	52.5	7.4	4.8	22.7	32.7	42.7	6.2	3.8	20.9	30.1	39.3	5.8	3.4
0.5	42.8	61.3	79.8	10.0	8.5	34.8	50.1	65.3	9.3	6.0	28.1	40.6	53.1	7.8	4.8	25.9	37.4	48.9	7.3	4.3
0.6	51.0	73.2	95.4	12.0	10.2	41.5	59.8	78.1	11.1	7.2	33.5	48.5	63.5	9.3	5.7	30.9	44.7	58.5	8.7	5.1
0.7	59.1	85.0	110.9	14.0	11.9	48.2	69.6	90.9	13.0	8.4	39.0	56.5	74.0	10.9	6.7	35.9	52.0	68.1	10.2	6.0
0.8	67.3	96.9	126.5	16.0	13.6	54.9	79.3	103.7	14.8	9.6	44.4	64.4	84.4	12.4	7.6	40.9	59.3	77.7	11.6	6.8
0.9	75.5	108.8	142.1	18.0	15.3	61.6	89.0	116.5	16.7	10.8	49.8	72.3	94.8	14.0	8.6	45.9	66.6	87.3	13.1	7.7
1.0	83.7	120.7	157.7	20.0	17.0	68.3	98.8	129.3	18.5	12.0	55.3	80.3	105.3	15.5	9.5	50.9	73.9	96.9	14.5	8.5
1.1	91.9	132.6	173.3	22.0	18.7	75.0	108.5	142.1	20.4	13.2	60.7	88.2	115.7	17.1	10.5	55.9	81.2	106.5	16.0	9.4
1.2	100.1	144.5	188.9	24.0	20.4	81.7	118.3	154.9	22.2	14.4	66.1	96.1	126.1	18.6	11.4	60.9	88.5	116.1	17.4	10.2

Standard Laser Class, OPTIMIST & 2.4M

Laser 5 mark trapezoid target time
spreadsheet

OPTIMIST within Laser Trapezoid spreadsheet

49er L2-L4 target time spreadsheet

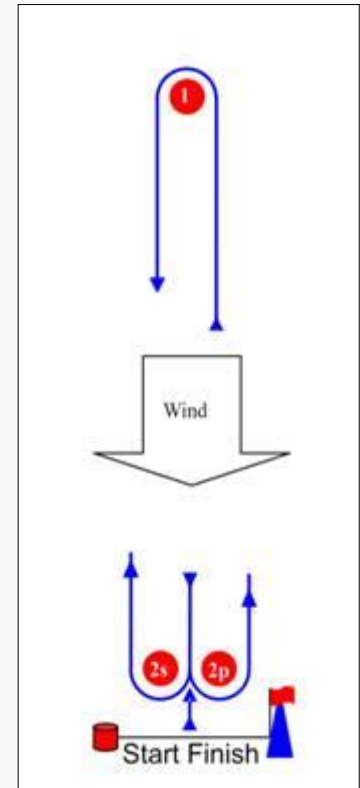
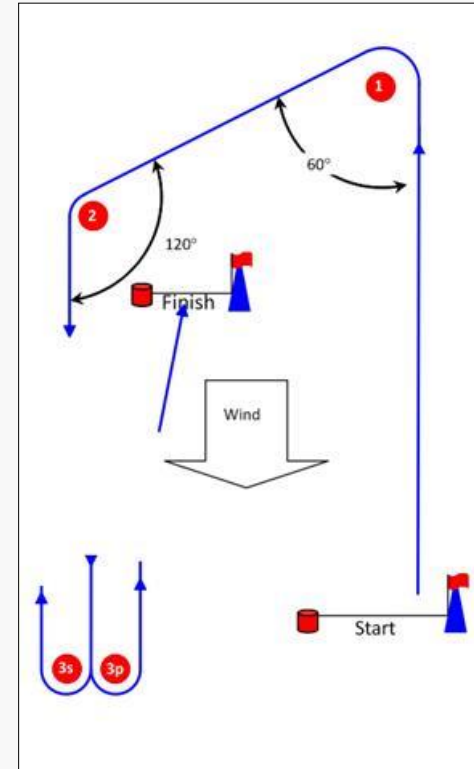
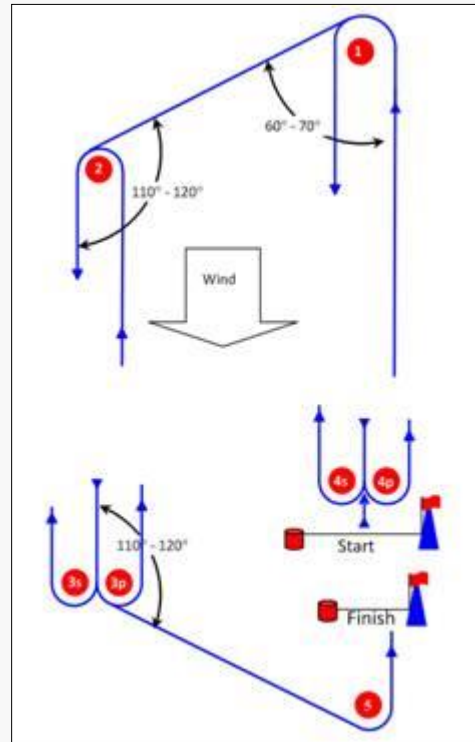
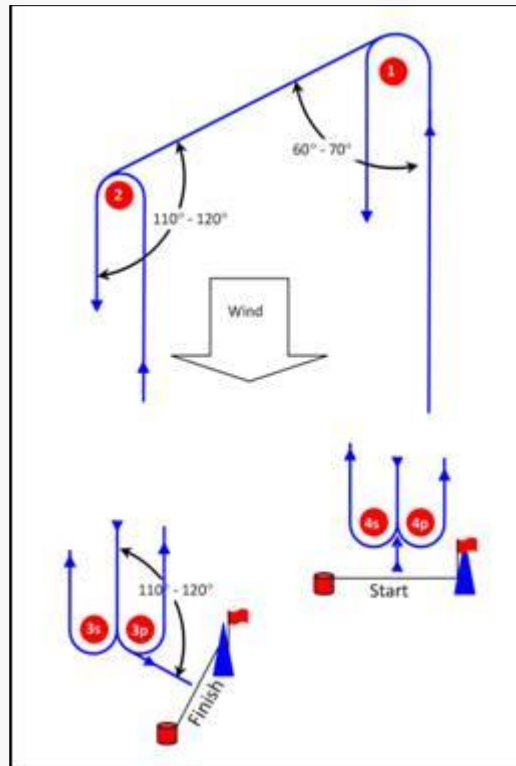
Challenges

- Wind pressure changes
- Wind direction changes
- Current
- Boat configurations (displacement vs skiffs)
- Course configurations (OPTI, Windward/Leeward vs. trapezoid)
- Competitive level of the fleet

Options to meet the target time

- Shorten the course as per RRS32.2
- Decrease or increase the leg length as per RRS33
- Be aware of the ISAF fleet racing guidelines (Olympics, SWC, etc)
 - Change in leg lengths will not be made to reduce a leg to less than 50% or increase a leg to more than 150% of original leg length.
 - The sailing instructions do not allow courses to be shortened using flag S.

Options for different course configurations



How to create target time models

- Collect data
 - Wind strength (5-10 samples per leg)
 - Mark rounding times
 - Distance between marks
- Convert to minutes per nautical mile by: upwind, reach & down wind
- Portsmouth ratings
- Create target time spreadsheet

Sailing instruction recommendation

- If you define the target time, include the following instruction:

Failure to meet the target time will not be grounds for redress. This changes rule 62.1(a).

In conclusion

- Setting and meeting target times are important for a successful race.
- It's part of your customer service.
- Tools are available to calculate course lengths based on wind strength.
- Links:

<https://www.dropbox.com/sh/jj5kszo35airma0/0BG0shzSFa>

<http://jpvm.org/Race%20Management/Sailboat%20target%20time%20spreadsheets/>

<http://jpvm.org/Race%20Management/Target%20time%20spreadsheet%20for%20Olympic%20classes%20%20by%20David%20%20Campbell-James/>