



Course Laying with a GPS

Any triangular course can be quickly & easily laid with a GPS

- with a total of two button presses on the GPS and
- an inspection of the Look-up tables in the [Appendix](#)

In essence a GPS gives you just two things, the distance and compass bearing to any known point. So given one (reference) point you can set a course without needing to do anything but read distance and bearing (on the GPS) to the one known point.

Prior to using the GPS for Course Setting

Your club needs to select say 3 (or more if necessary) points (on the water) that may be used for a bottom mark for a race (depending on the day's wind direction etc.). Go on the water, go to those points and enter them into the GPS as 3S, 1, 2. These are stored permanently and become the reference points for all courses.

On the Day of the Race.

- The race committee considers the conditions and nominates one of the 3 points as the bottom mark for today. [Scaled course cut outs placed on chart makes this easy.]
- The race committee nominates the specific course for today eg 'Port Triangle'.
- Depending on wind strength and desired race duration the race committee nominates a beat length.

The course laying boat (when on the water)

- Press the Goto button on the GPS
- Select the relevant point eg 3S
- Then use the GPS to go to that point and lay the mark. (Approach from downwind to lay mark.)
- Record the wind direction over time and decide on the wind bearing to the top mark.

Example..

Wind bearing	90 deg
Bearing to top mark (from bottom/ref mark)	90 deg
'Back Bearing' from top mark #	270 deg
# ie bearing of bottom mark from the top mark	

Still with the GSP set to 'GoTo 3S' ie the bottom mark. Drive boat in general direction of top mark (1).

Adjust (boat) course as you go so that the bearing to 3S (bottom mark) is 270 degrees. When you get to the desired beat length, drop the mark.

For the wing/gybe mark (assume port course, 45 triangle).

Wind bearing	90 deg
Bearing to wing mark (from bottom/ref mark)	90 - 45 = 45deg
'Back Bearing' from wing mark #	225 deg
# ie bearing of bottom mark from the wing mark.	

Still with the GSP set to 'GoTo 3S' ie the bottom mark. Drive boat in general direction of wing mark (2).

Drive until you the bearing to 3S (bottom mark) is 225 degrees.

Drive towards or away from bottom mark until distance = 0.7 times beat length.

Lay mark where bearing = 225 & distance is appropriate.

Same system works using Top Mark as reference. Non triangle courses involve one more step.

Back Bearing Calculation:

Use the 'plus2–minus 2' method¹, or,

use a course calculator; or

use lookup tables in the [Appendix](#)

Remember. Always

- Approach the target mark location from down-wind (Put the nose of the boat head-to-wind)
- Put the mark in the water
- Stream the mark behind the boat
- Release the anchor only when the rope is at full length.

1

The 'plus2–minus 2' method:

Examples

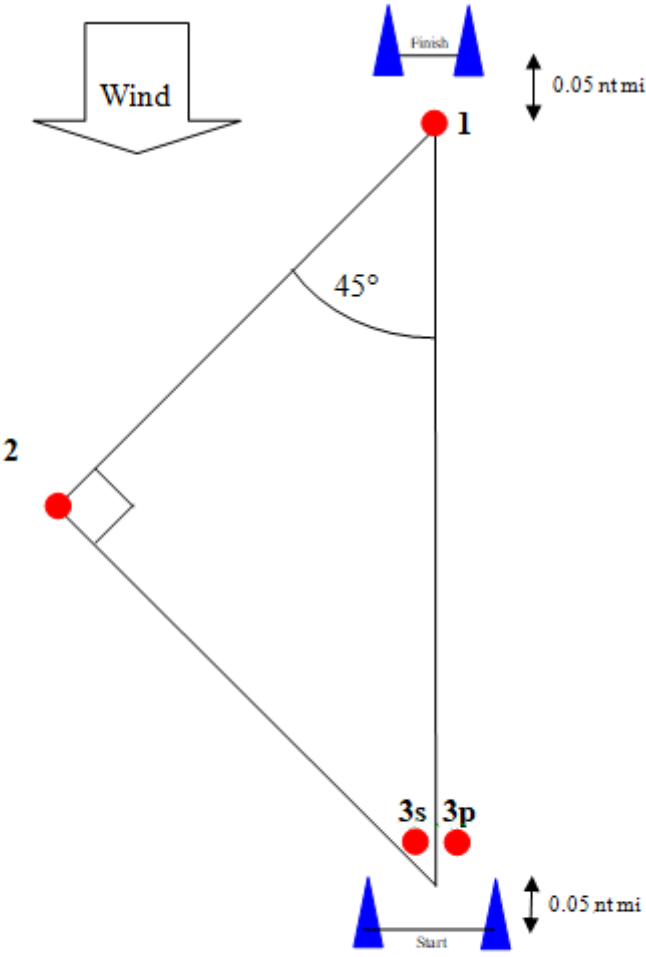
For any three-character bearing less than 180 degrees: (say 045 degrees)

- Add 2 to the first character (the zero) = 3
- Subtract 2 from the second character = 2
- The third character remains untouched. = 5
- Answer is 225

For any three-character bearing greater than 180 degrees: (say 335 degrees)

- Subtract 2 to the first character = 1
- Add 2 from the second character = 5
- The third character remains untouched. = 5
- Answer is 155

Appendix 1: Triangle Windward Leeward Course



Reference Point for laying the course is the middle of the Mark 3s/3p gate

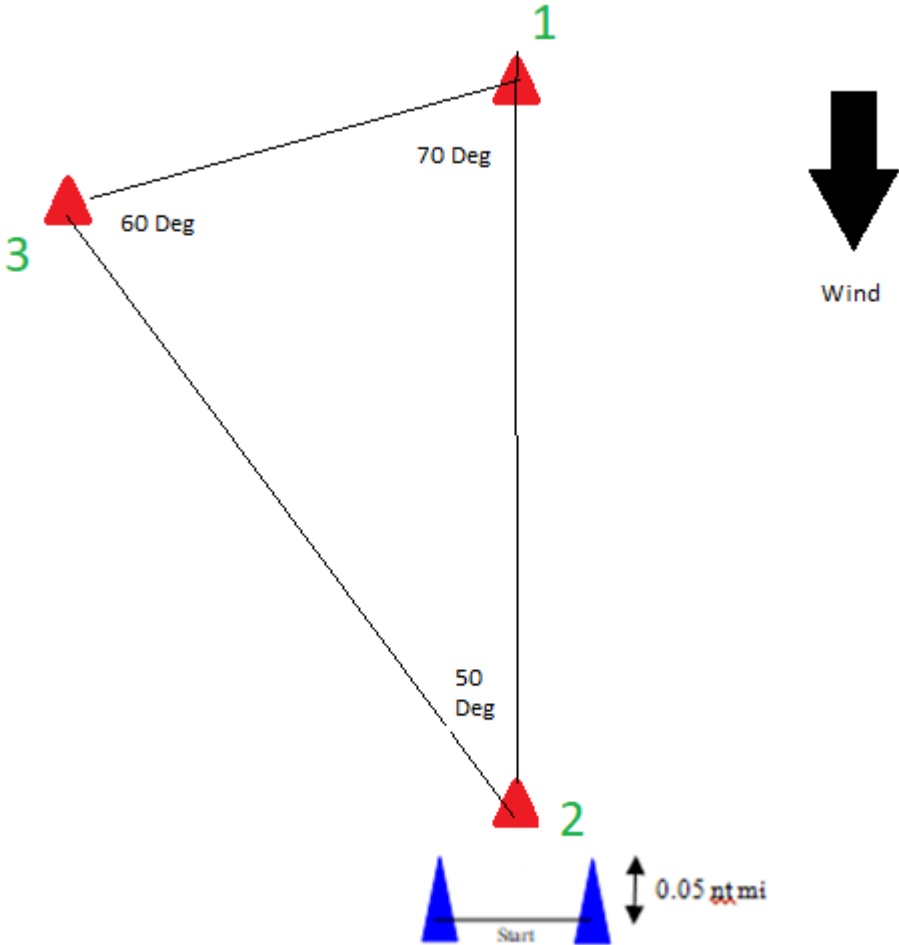
Determining the Leg Length To the Gybe Mark (1=>2 & 2=>3)

By basic Trigonometry the length can be calculated by multiplying the length of the windward leg by 0.7

Course Axis	Angles in degrees									
	Start to 1	1=>3	3=>2	2+.3	1=>2	2=>1	Start=>Pin	Pin=>Start	3=>Fin	Finish=>3
3 (3S/3P) to 1										
000	180	315	135	225	045	270	090	252	072	
005	185	320	140	230	050	275	095	257	077	
010	190	325	145	235	055	280	100	262	082	
015	195	330	150	240	060	285	105	267	087	
020	200	335	155	245	065	290	110	272	092	
025	205	340	160	250	070	295	115	277	097	
030	210	345	165	255	075	300	120	282	102	
035	215	350	170	260	080	305	125	287	107	
040	220	355	175	265	085	310	130	292	112	
045	225	000	180	270	090	315	135	297	117	
050	230	005	185	275	095	320	140	302	122	
055	235	010	190	280	100	325	145	307	127	
060	240	015	195	285	105	330	150	312	132	
065	245	020	200	290	110	335	155	317	137	
070	250	025	205	295	115	340	160	322	142	
075	255	030	210	300	120	345	165	327	147	
080	260	035	215	305	125	350	170	332	152	
085	265	040	220	310	130	355	175	337	157	
090	270	045	225	315	135	000	180	342	162	
095	275	050	230	320	140	005	185	347	167	
100	280	055	235	325	145	010	190	352	172	
105	285	060	240	330	150	015	195	357	177	
110	290	065	245	335	155	020	200	002	182	
115	295	070	250	340	160	025	205	007	187	
120	300	075	255	345	165	030	210	012	192	
125	305	080	260	350	170	035	215	017	197	
130	310	085	265	355	175	040	220	022	202	
135	315	090	270	000	180	045	225	027	207	
140	320	095	275	005	185	050	230	032	212	
145	325	100	280	010	190	055	235	037	217	
150	330	105	285	015	195	060	240	042	222	
155	335	110	290	020	200	065	245	047	227	
160	340	115	295	025	205	070	250	052	232	
165	345	120	300	030	210	075	255	057	237	
170	350	125	305	035	215	080	260	062	242	
175	355	130	310	040	220	085	265	067	247	

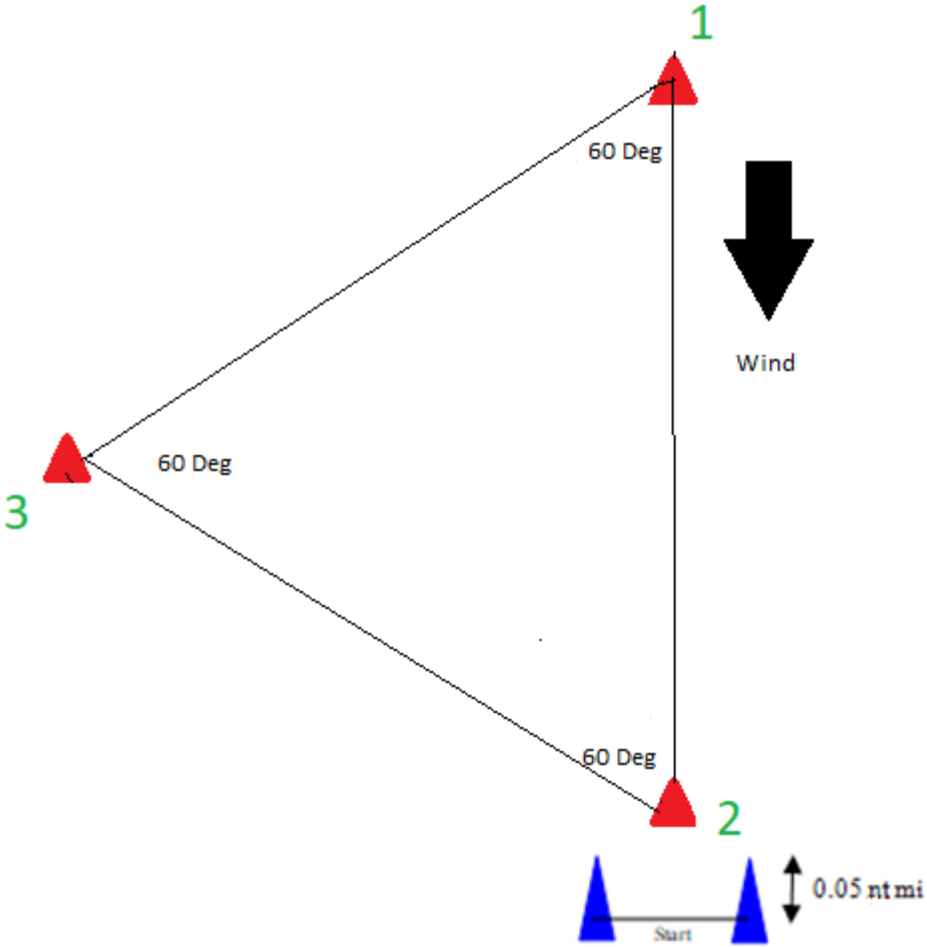
Course Axis	Angles in degrees								
	1=>3	3=>2	2+.3	1=>2	2=>1	Start=>Pin	Pin=>Start	3=>Fin	Finish=>3
3 (3S/3P) to 1									
3 to 2									
180	000	135	315	045	225	090	270	072	252
185	005	140	320	050	230	095	275	077	257
190	010	145	325	055	235	100	280	082	262
195	015	150	330	060	240	105	285	087	267
200	020	155	335	065	245	110	290	092	272
205	025	160	340	070	250	115	295	097	277
210	030	165	345	075	255	120	300	102	282
215	035	170	350	080	260	125	305	107	287
220	040	175	355	085	265	130	310	112	292
225	045	180	000	090	270	135	315	117	297
230	050	185	005	095	275	140	320	122	302
235	055	190	010	100	280	145	325	127	307
240	060	195	015	105	285	150	330	132	312
245	065	200	020	110	290	155	335	137	317
250	070	205	025	115	295	160	340	142	322
255	075	210	030	120	300	165	345	147	327
260	080	215	035	125	305	170	350	152	332
265	085	220	040	130	310	175	355	157	337
270	090	225	045	135	315	180	000	162	342
275	095	230	050	140	320	185	005	167	347
280	100	235	055	145	325	190	010	172	352
285	105	240	060	150	330	195	015	177	357
290	110	245	065	155	335	200	020	182	002
295	115	250	070	160	340	205	025	187	007
300	120	255	075	165	345	210	030	192	012
305	125	260	080	170	350	215	035	197	017
310	130	265	085	175	355	220	040	202	022
315	135	270	090	180	000	225	045	207	027
320	140	275	095	185	005	230	050	212	032
325	145	280	100	190	010	235	055	217	037
330	150	285	105	195	015	240	060	222	042
335	155	290	110	200	020	245	065	227	047
340	160	295	115	205	025	250	070	232	052
345	165	300	120	210	030	255	075	237	057
350	170	305	125	215	035	260	080	242	062
355	175	310	130	220	040	265	085	247	067

Appendix 2: Typical 70°-60° -50° Course



Wind	1=>2	2=>1	1=>3	3=>1	3=>2	2=>3	Start=>Pin	Pin=>Start
000	000	180	250	070	130	310	270	090
010	010	190	260	080	140	320	280	100
020	020	200	270	090	150	330	290	110
030	030	210	280	100	160	340	300	120
040	040	220	290	110	170	350	310	130
050	050	230	300	120	180	000	320	140
060	060	240	310	130	190	010	330	150
070	070	250	320	140	200	020	340	160
080	080	260	330	150	210	030	350	170
090	090	270	340	160	220	040	000	180
100	100	280	350	170	230	050	010	190
110	110	290	000	180	240	060	020	200
120	120	300	010	190	250	070	030	210
130	130	310	020	200	260	080	040	220
140	140	320	030	210	270	090	050	230
150	150	330	040	220	280	100	060	240
160	160	340	050	230	290	110	070	250
170	170	350	060	240	300	120	080	260
180	180	000	070	250	310	130	090	270
190	190	010	080	260	320	140	100	280
200	200	020	090	270	330	150	110	290
210	210	030	100	280	340	160	120	300
220	220	040	110	290	350	170	130	310
230	230	050	120	300	000	180	140	320
240	240	060	130	310	010	190	150	330
250	250	070	140	320	020	200	160	340
260	260	080	150	330	030	210	170	350
270	270	090	160	340	040	220	180	000
280	280	100	170	350	050	230	190	010
290	290	110	180	000	060	240	200	020
300	300	120	190	010	070	250	210	030
310	310	130	200	020	080	260	220	040
320	320	140	210	030	090	270	230	050
330	330	150	220	040	100	280	240	060
340	340	160	230	050	110	290	250	070
350	350	170	240	060	120	300	260	080
360	360	180	250	070	130	310	270	090

Appendix 3: 60°-60° -60° Course



Determining the Leg Length To the Gybe Mark (1=>2 & 2=>3)

By basic Trigonometry the length is the same as the windward leg.

Wind	1=>2	2=>1	1=>3	3=>1	3=>2	2=>3	Start=>Pin	Pin=>Start
0	0	180	240	60	120	300	270	90
10	10	190	250	70	130	310	280	100
20	20	200	260	80	140	320	290	110
30	30	210	270	90	150	330	300	120
40	40	220	280	100	160	340	310	130
50	50	230	290	110	170	350	320	140
60	60	240	300	120	180	0	330	150
70	70	250	310	130	190	10	340	160
80	80	260	320	140	200	20	350	170
90	90	270	330	150	210	30	0	180
100	100	280	340	160	220	40	10	190
110	110	290	350	170	230	50	20	200
120	120	300	0	180	240	60	30	210
130	130	310	10	190	250	70	40	220
140	140	320	20	200	260	80	50	230
150	150	330	30	210	270	90	60	240
160	160	340	40	220	280	100	70	250
170	170	350	50	230	290	110	80	260
180	180	0	60	240	300	120	90	270
190	190	10	70	250	310	130	100	280
200	200	20	80	260	320	140	110	290
210	210	30	90	270	330	150	120	300
220	220	40	100	280	340	160	130	310
230	230	50	110	290	350	170	140	320
240	240	60	120	300	0	180	150	330
250	250	70	130	310	10	190	160	340
260	260	80	140	320	20	200	170	350
270	270	90	150	330	30	210	180	0
280	280	100	160	340	40	220	190	10
290	290	110	170	350	50	230	200	20
300	300	120	180	0	60	240	210	30
310	310	130	190	10	70	250	220	40
320	320	140	200	20	80	260	230	50
330	330	150	210	30	90	270	240	60
340	340	160	220	40	100	280	250	70
350	350	170	230	50	110	290	260	80
360	360	180	240	60	120	300	270	90