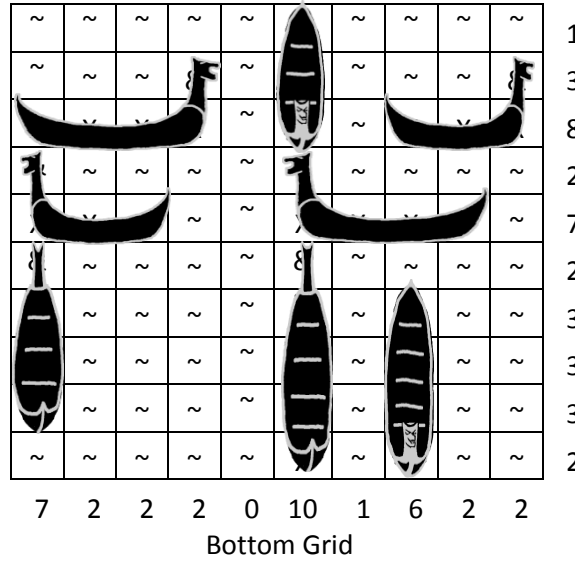
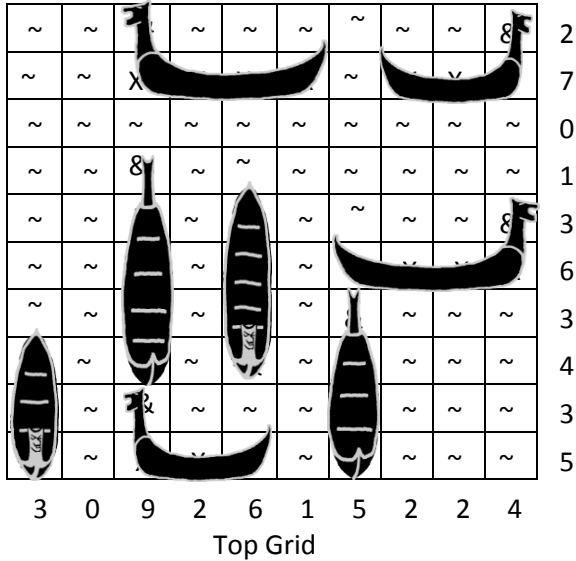


LONG BATTLESHIPS

by Jett Jones

Solved grids:



Lookup the prows in the given chart:

e	q	u	e	s	t	r	i	a	n
v	a	u	d	e	v	i	l	l	e
w	o	l	v	e	r	i	n	e	s
w	h	a	l	e	t	e	e	t	h
i	n	t	o	x	i	c	a	t	e
r	h	i	n	o	v	i	r	u	s
a	l	p	h	a	b	e	t	i	c
r	o	t	i	s	s	e	r	i	e
p	o	s	t	h	u	m	o	u	s
e	s	p	e	c	i	a	l	l	y

Underwater vessel = submarine

Step by step:

Grid 1

- fill in the zero rows with water

	~									2
	~									7
~	~	~	~	~	~	~	~	~	~	0
	~									1
	~		~							3
	~									6
	~									3
	~									4
	~									3
	~									5
3	0	9	2	6	1	5	2	2	4	

- Fill column 3
- The top left is too small for ships.

~	~	x								2
~	~	x								7
~	~	~	~	~	~	~	~	~	~	0
	~	x								1
	~	x	~							3
	~	x								6
	~	x								3
	~	x								4
	~	x								3
	~	x								5
3	0	9	2	6	1	5	2	2	4	

- Row 2 must start with a boat – fill column 3, and 4

- Row 4 is complete, with the segment in column 3.

~	~	&	~	~	~					2
~	~	x	x	x						7
~	~	~	~	~	~	~	~	~	~	0
~	~	x	~	~	~	~	~	~	~	1
	~	x	~							3
	~	x								6
	~	x								3
	~	x								4
	~	x								3
	~	x								5
3	0	9	2	6	1	5	2	2	4	

- Column 1 must contain the down facing length 3 boat.
- Possible configurations for the remaining 7 squares of column 3:
 - $4 + 3 \Rightarrow$ not possible, need exactly one horizontal boat in column 4
 - $2 + 2 + 3 \Rightarrow$ not possible, need exactly one horizontal boat in column 4, also vertical 3 is used.
 - $5 + 2 \Rightarrow$ however improbable
- Horizontal boat for column 3 must be on the bottom row, due to the given water in (4,5)

~	~	&	~	~	~					2
~	~	x	x	x						7
~	~	~	~	~	~	~	~	~	~	0
~	~	&	~	~	~	~	~	~	~	1
	~	x	~							3
	~	x	~							6
	~	x	~							3
	~	x	~							4
	~	&	~	~	~					3
	~	x	x	x						5
3	0	9	2	6	1	5	2	2	4	

9. Column 5 must have a 4 - vertical boat from row 5 to 8.

~	~	&	~	~	~					2
~	~	x	x	x						7
~	~	~	~	~	~	~	~	~	~	0
~	~	&	~	~	~	~	~	~	~	1
	~	x	~	x	~					3
	~	x	~	x	~					6
	~	x	~	x	~					3
	~	x	~	x	~					4
	~	&	~	~	~					3
	~	x	x	x						5
3	0	9	2	6	1	5	2	2	4	

10. Row 2 must contain a 4 length and 3 length boat, which forces the rightmost boat to end in column 10.

~	~	&	~	~	~	~	~	~	&	2
~	~	x	x	x			x	x	x	7
~	~	~	~	~	~	~	~	~	~	0
~	~	&	~	~	~	~	~	~	~	1
	~	x	~	x	~					3
	~	x	~	x	~					6
	~	x	~	x	~					3
	~	x	~	x	~					4
	~	&	~	~	~					3
	~	x	x	x						5
3	0	9	2	6	1	5	2	2	4	

11. row 6, must contain a horizontal boat, which must be right facing, because both left boats are used.
- so it must end in column 10, as the other rows don't have room for boat + prow.

~	~	&	~	~	~	~	~	~	&	2
~	~	x	x	x			x	x	x	7
~	~	~	~	~	~	~	~	~	~	0
~	~	&	~	~	~	~	~	~	~	1
	~	x	~	x	~	~	~	~	&	3
	~	x	~	x	~			x	x	6
	~	x	~	x	~					3
	~	x	~	x	~					4
	~	&	~	~	~					3
	~	x	x	x						5
3	0	9	2	6	1	5	2	2	4	

12. So columns 8, 9, and 10 are full, as well as row 5.

~	~	&	~	~	~	~	~	~	&	2
~	~	x	x	x			x	x	x	7
~	~	~	~	~	~	~	~	~	~	0
~	~	&	~	~	~	~	~	~	~	1
	~	x	~	x	~	~	~	~	&	3
	~	x	~	x	~			x	x	6
	~	x	~	x	~			~	~	3
	~	x	~	x	~			~	~	4
	~	&	~	~	~			~	~	3
	~	x	x	x				~	~	5
3	0	9	2	6	1	5	2	2	4	

13. Only one of the right facing ships may use column 7, so the remaining four squares are the final boat, vertical 4 from row 7 to 10.

~	~	&	~	~	~	~	~	~	&	2
~	~	x	x	x			x	x	x	7
~	~	~	~	~	~	~	~	~	~	0
~	~	&	~	~	~	~	~	~	~	1
	~	x	~	x	~	~	~	~	&	3
	~	x	~	x	~			x	x	6
	~	x	~	x	~	x	~	~	~	3
	~	x	~	x	~	x	~	~	~	4
	~	&	~	~	~	x	~	~	~	3
	~	x	x	x		x	~	~	~	5
3	0	9	2	6	1	5	2	2	4	

14. This completes row 7, so the boat in column 1 must be in the bottom three squares.

~	~	&	~	~	~	~	~	~	&	2
~	~	x	x	x			x	x	x	7
~	~	~	~	~	~	~	~	~	~	0
~	~	&	~	~	~	~	~	~	~	1
~	~	x	~	x	~	~	~	~	&	3
	~	x	~	x	~		x	x	x	6
~	~	x	~	x	~	x	~	~	~	3
x	~	x	~	x	~	x	~	~	~	4
x	~	&	~	~	~	x	~	~	~	3
x	~	x	x	x		x	~	~	~	5
3	0	9	2	6	1	5	2	2	4	

15. Dealing with ambiguity:

- row 6 needs one more square, so it must have the right facing 4.
- so row 2 contains the right facing 3, and the left facing 4
- so row 10 contains the left facing 3. (alternatively start here, because column 6 was blocked the boat in column 7)

16. The vertical boat in column 7 must be 3 up, to avoid adjacency, so column 5 contains the 4 down.

~	~	&	~	~	~	~	~	~	&	2
~	~	x	x	x	x	~	x	x	x	7
~	~	~	~	~	~	~	~	~	~	0
~	~	&	~	~	~	~	~	~	~	1
~	~	x	~	x	~	~	~	~	&	3
~	~	x	~	x	~	x	x	x	x	6
~	~	x	~	x	~	&	~	~	~	3
x	~	x	~	&	~	x	~	~	~	4
x	~	&	~	~	~	x	~	~	~	3
x	~	x	x	x	~	x	~	~	~	5
3	0	9	2	6	1	5	2	2	4	

7. Since both left facing boats are fixed, both boats in row 3 are right facing.

~	~	~	~	~	x	~	~	~	~	1
~	~	~	&	~	x	~	~	~	&	3
x	x	x	x	~	&	~	x	x	x	8
&	~	~	~	~	&	~	~	~	~	2
x	x	x	~	~	x	x	x	~	~	7
~	~	~	~	~	&	~	~	~	~	2
~	~	~	~	~	x	~	~	~	~	3
~	~	~	~	~	x	~	~	~	~	3
~	~	~	~	~	x	~	~	~	~	3
~	~	~	~	~	x	~	~	~	~	2
7	2	2	2	0	10	1	6	2	2	

8. Thus columns 2,3,4, and 10 are full.

~	~	~	~	~	x	~	~	~	~	1
~	~	~	&	~	x	~	~	~	&	3
x	x	x	x	~	&	~	x	x	x	8
&	~	~	~	~	&	~	~	~	~	2
x	x	x	~	~	x	x	x	~	~	7
~	~	~	~	~	&	~	~	~	~	2
~	~	~	~	~	x	~	~	~	~	3
~	~	~	~	~	x	~	~	~	~	3
~	~	~	~	~	x	~	~	~	~	3
~	~	~	~	~	x	~	~	~	~	2
7	2	2	2	0	10	1	6	2	2	

9. So the second boat in row 5 is length 4.

10. Column 9 is full as well.

~	~	~	~	~	x	~	~	~	~	1
~	~	~	&	~	x	~	~	~	&	3
x	x	x	x	~	&	~	x	x	x	8
&	~	~	~	~	&	~	~	~	~	2
x	x	x	~	~	x	x	x	~	~	7
~	~	~	~	~	&	~	~	~	~	2
~	~	~	~	~	x	~	~	~	~	3
~	~	~	~	~	x	~	~	~	~	3
~	~	~	~	~	x	~	~	~	~	3
~	~	~	~	~	x	~	~	~	~	2
7	2	2	2	0	10	1	6	2	2	

11. The rest of column 1 must be filled with a vertical 4 - which must be 3 up, for adjacency.

12. Row 6 is full.

~	~	~	~	~	x	~	~	~	~	1
~	~	~	&	~	x	~	~	~	&	3
x	x	x	x	~	&	~	x	x	x	8
&	~	~	~	~	&	~	~	~	~	2
x	x	x	~	~	x	x	x	x	~	7
&	~	~	~	~	&	~	~	~	~	2
x	~	~	~	~	x	~	~	~	~	3
x	~	~	~	~	x	~	~	~	~	3
x	~	~	~	~	x	~	~	~	~	3
~	~	~	~	~	x	~	~	~	~	2
7	2	2	2	0	10	1	6	2	2	

13. Finally, the rest of column 8 is the 4 down.

~	~	~	~	~	x	~	~	~	~	1
~	~	~	&	~	x	~	~	~	&	3
x	x	x	x	~	&	~	x	x	x	8
&	~	~	~	~	&	~	~	~	~	2
x	x	x	~	~	x	x	x	x	~	7
&	~	~	~	~	&	~	~	~	~	2
x	~	~	~	~	x	~	x	~	~	3
x	~	~	~	~	x	~	x	~	~	3
x	~	~	~	~	x	~	x	~	~	3
~	~	~	~	~	x	~	&	~	~	2
7	2	2	2	0	10	1	6	2	2	