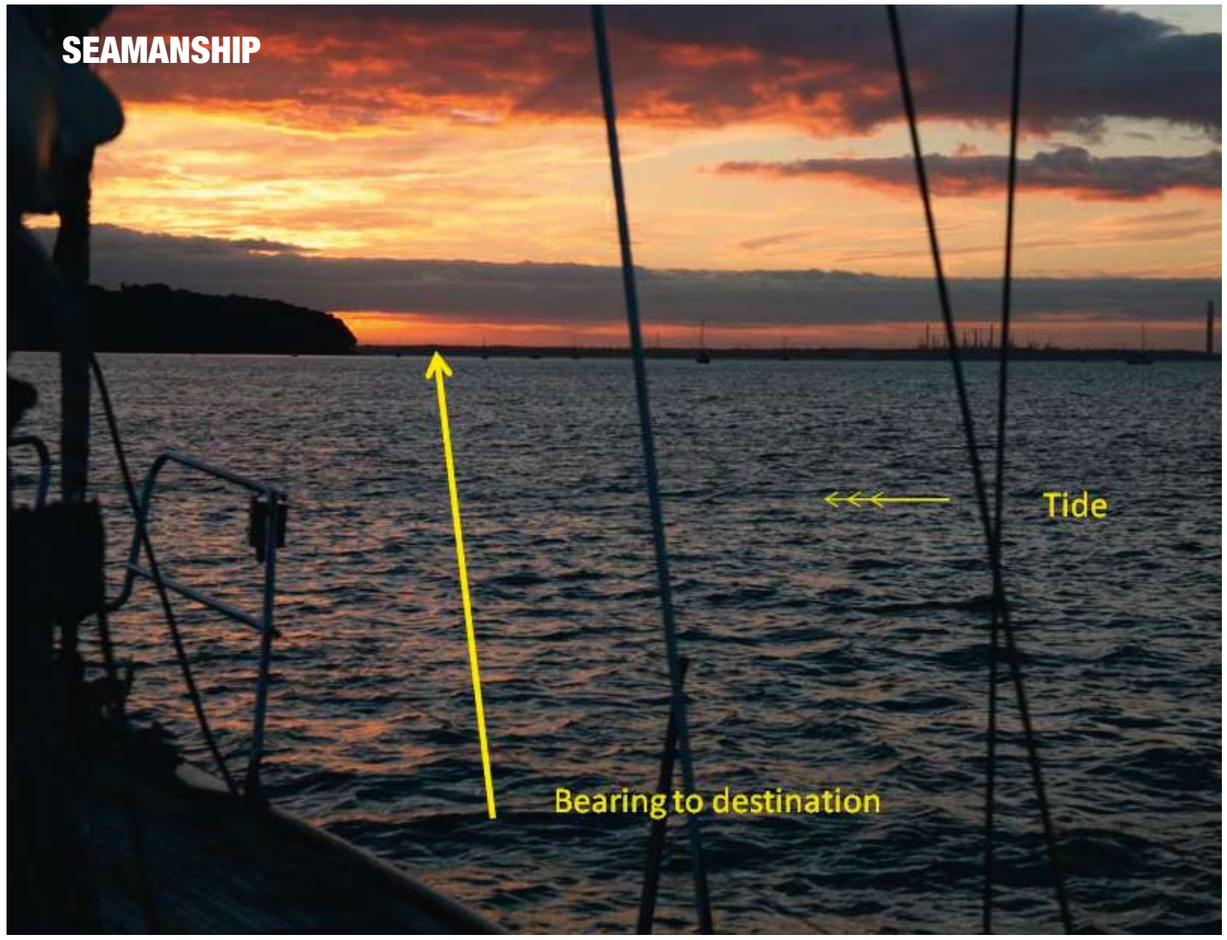


COURSE TO STEER
– in your head

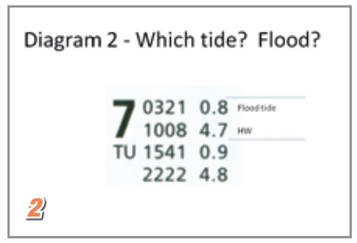
My philosophy about boating is to make everything as simple as possible. The simpler we keep things out on the water the less likely we will end up with 'Dramas'. So too with navigation. Keeping things simple we keep them manageable, Duncan Wells explains.

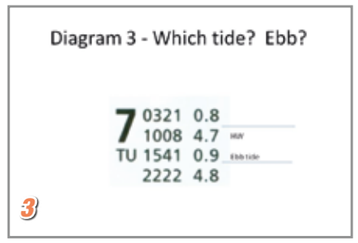
So here's a handy way of working out your Course To Steer without having to draw out a tidal vector. "A what?" I hear you cry. A tidal vector, a triangle, comprising the line of the bearing from you to your destination, the line of the effect of the tide and the line that represents your course to steer to make sure that you sail straight down the line from you to your destination **Diag 1**.

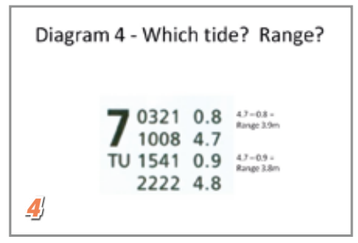
Of course this is the traditional and correct way of calculating your course to steer but there is another way that we can actually do in our heads. All I need to know is the angle of the tide to the boat, the speed of the tide and my anticipated boat speed.

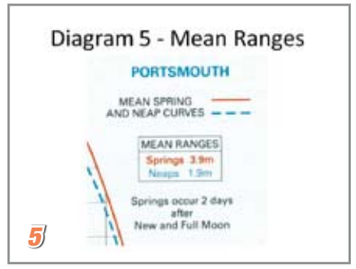
First though we need to know which hour of the tide we are sailing on. It makes no difference if we are doing our CTS the vector way on the chart or the 'in the head' way, we always need to know which tidal hour we are sailing in to find out the set (direction) and rate of the tide that will affect us.

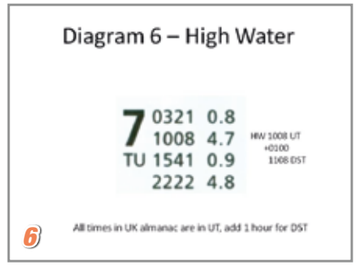
Tidal Hour is the one thing I find that students get wrong time and time again, until they have accepted that they will get it wrong and adopt my rather pedestrian approach. I work the Tidal Hour out using simple careful steps because I know that the first person to slip up will be me. So this is how we do it. We look up the time of HW for the tide we will be sailing on, in the Almanac. We note the height of HW and the height of low water. If we are sailing on the flood tide we will need the low water before the HW **Diag 2** and if we are on the ebb tide we will need the low water that comes after the HW **Diag 3**. Deducting the height of LW from the height of HW gives us the Range **Diag 4**. A check by the tidal curve in the Almanac tells if this range is Springs, Neaps or somewhere in between **Diag 5**. Now we take our time of HW and convert it to the current time where necessary. The time from the Almanac will be in the standard time zone for the country we are dealing with. In our case UT and we will need to add an hour to the HW time shown if we are in Daylight Saving Time, what we call British Summer Time, BST. Let us say that it is the 7th July and HW is 1008UT **Diag 6** and we have established that the range is Springs. Our next step is to draw a line **Diag 7**. On it we write 1108 - our UT time of 1008 with one hour added to bring it to DST - and underneath it we write DST – that is our currency. **Diag 8**. Now we draw a chevron **Diag 9** and then a horizontal line by the top part of the chevron and a horizontal line by the bottom part of the chevron **Diag 10**. Now we write in the times of half an hour either side of HW. So 1038 on the top line and 1138 on the bottom line and in between we write the legend HW **Diag 11**. 1038 to 1138 is the hour of HW, of which 1108 is the precise point of HW. Now we work our hours backwards or forwards until we get to the hour that we are sailing on **Diag 12** . It is a classic mistake to stop before you have arrived at the hour you will be travelling in. For example let us say that we will be travelling at 1338. This means that we will be travelling between 1338 and 1438 but students often draw out their tidal hour diagram most carefully, running 1138 to 1238 as HW +1 and then 1238 to 1338 as HW +2 and they stop **Diag 13** because they have arrived at 1338, forgetting that they are actually travelling from 1338 to 1438 which will put them into the hour of HW +3 **Diag 14**. Now armed with the information that we are travelling in HW +3 on a spring tide, let us say, we can make our way to the tidal diamonds or the tidal stream atlas to find out the set and rate of the tide. In the conventional manner this would then be drawn on a chart. But here's the 'in the »











Shaping a Course To Steer is important to counter our strong tides.

head' bit. If I can establish the angle that the tide will make with the boat I can tell you the course to steer.

Tide abeam

The calculation is at its simplest when the tide is beam on. If the tide were directly on the nose or directly astern we would not need to adjust our course to steer. It would either slow us down or speed us up but if the tide is on the beam it will push us off course, but there is a formula we can use to work out how to counter this.

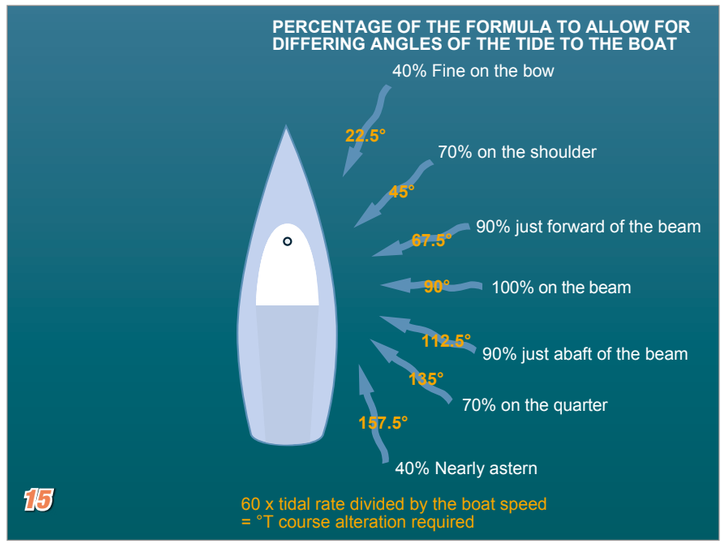
The formula is:

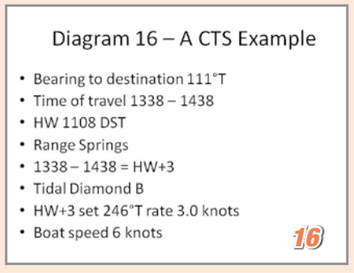
60 x speed of tide ÷ by boat speed = Course alteration required in °T

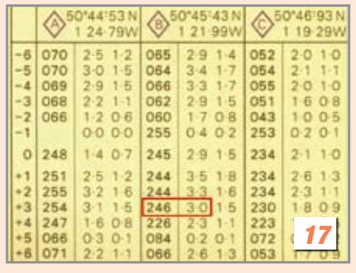
This counters the effect of the tide. Say the speed of the tide is 2 knots on the beam – at 90° to the boat – and we will be doing 6 knots. 60 x 2 (knots of tide) = 120 ÷ by 6 (knots of boat speed) = 20°. We will need to adjust our course by 20°. If the tide is pushing us to port we will need to add this 20° to our course to remain on our desired course to steer and if it is pushing us to starboard we will need to take it away.

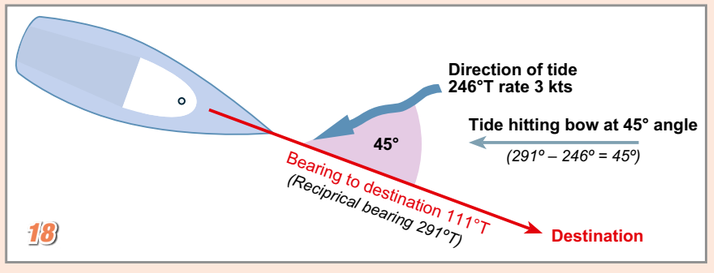
The '10, 20, 30' rule

Beam on we use	100% of the course alteration
At 67.5º we use 10% less than this	-10% = 90%
At 45.0 º we use 20% less than this	-20% = 70%
At 22.5º we use 30% less than this	- 30% = 40%









Tide not abeam

But what if the tide is not hitting us beam on? Well we can percentage the effect of the tide. In fact I have developed the '10, 20, 30' rule. I love a rule. Let's allow 3 directions from which the tide might be hitting the boat; midway between on the nose and on the beam which is 45° and then midway between 45° and the bow which is 22.5° and midway between 45° and the beam which is 67.5°. We know that when the tide is 90°to the boat we allow the full effect of the tide and when it is directly ahead or astern at an angle of 0° to the boat, we allow no sideways effect of the tide. So we can use the '10, 20, 30' rule to work out how much of the tidal drift we will need to counter to remain on course. And the same percentages apply for the same tide angles abaft the beam. Diag 15

That's the '10, 20, 30' rule. So if we allowed 100% of the tidal effect with a beam on tide and our example meant that we would have to adjust course by 20°,we would allow 80% of this with an angle of 67.5° which is 18°; 70% for an angle of 45° which is 14°and 40% for an angle of 22.5°, which is 8°. And it makes no difference if the tide is hitting you abaft the beam the angles and the percentages are the same. The bow to beam angles now become stern to beam angles.

On passage and steering a confident course.

And you can do it in your head.

Let us say the bearing to our destination is 111°T and we will be affected by tidal diamond B. We are sailing in the hour of HW +3 from 1338 to 1438, and the range is springs Diag 16 The tidal set and rate for this time Diag 17 is 246°T 3.0 knots . The angle that the tide is making with our boat is 45° to our port bow Diag 18. We estimate our boat speed will be 6 knots.

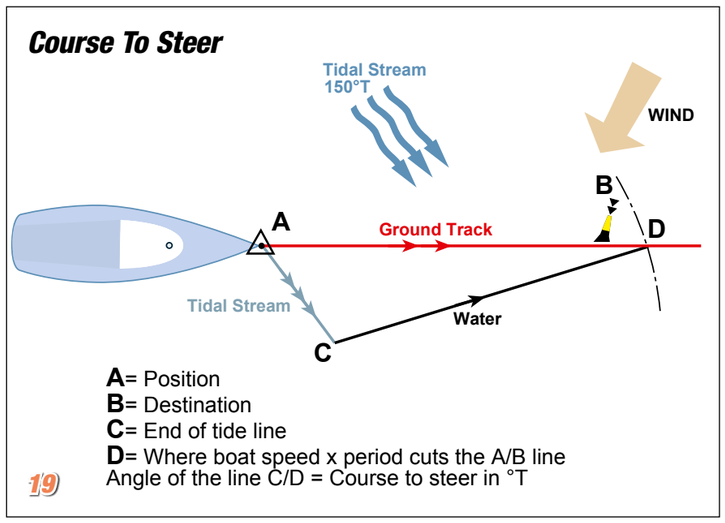
Formula; 60 x 3.0 = 180 ÷ 6 = 30° x 70% = 21°. The tide is pushing us positively round the compass – it is pushing us on our port side – and so we need to deduct it from our bearing of 111°T to get our course to steer which will now be 090°T. Don't forget to allow for Magnetic Variation and then Leeway, depending on the wind on the day and then Deviation, before giving your helmsman the course to steer in °Compass.

Here's another example. The bearing to our destination is 175°, the tidal set is 017°the rate is 2 knots. This will hit us at 22° on our starboard bow. Again we travel at 6 knots and the formula is 60 x 2 = 120 ÷ 6 = 20° x 40% = 8° which we will add to the 175°T to make 183°T to counter the effect of the tide.

Now you may be wondering how accurate this is. Well take a chart and do these examples with a proper tidal vector. Let's remind ourselves how we do a Course To Steer Diag 19. 'A' is our start position, 'B' is our destination. We measure the distance between 'A' and 'B' to establish - bearing in mind our anticipated speed - how long approximately it will take us. In the example above it will take us an hour and we will use one hour of tidal effect. Then we draw a line from 'A' to and through 'B'. From our start position 'A' we draw in the bearing of the tide for the hour and mark off down this line the distance it will take us and we call this point 'C' From 'C' we mark off the distance we will travel in the time, in this case 6 miles which is our boat speed, and where this cuts the 'A' to 'B' line at 'D', that is the angle at which we must steer, the bearing of this line 'C' to 'D' is our course to steer.

You'll find that you won't be more than 1°different between the vector method on the chart and the 'in your head' method. For greater accuracy with differing angles of tide to the boat you could use the percentages from the graph but the '10, 20, 30' percentage rule should be more than accurate enough.

Of course if you try this in an RYA Day Skipper or Yachtmaster assessment, while I will smile inside because you have demonstrated a very thorough knowledge of Course To Steer, I will still want to see the proper vector drawn on the chart, correctly marked up with the correct answer. But to keep in the back of your mind as a seasoned navigator it is a very handy ready reckoner. Of course the 'in your head' method will not tell give you your ETA as it makes no allowance for the effect of the tide pushing you along or heading you. And because of this it is not to be used for Estimated Position. It just doesn't work. But for a quick method of establishing a Course To Steer, it's a belter.

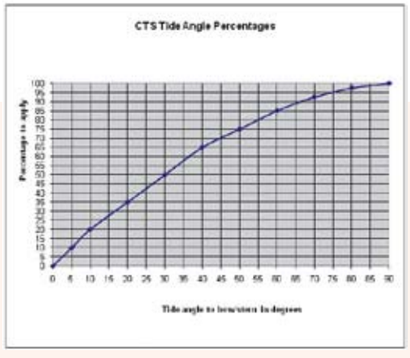


For a video tutorial on Course To Steer and other navigational topics go to www.westviewsailing.co.uk

USING THE GRAPH

Run the formula:

60 x speed of tide ÷ boat speed = Course alteration required in °T then apply the % below according to the angle of the tide to the boat. Diag 20



5°	10°	20°	22.5°	25°	30°	40°	45°	50°	55°	60°	65°	67.5°	70°	80°	90°
10%	20%	35%	40%	43%	50%	65%	70%	75%	80%	85%	88%	90%	93%	98%	100%

About the Author

Duncan Wells is an RYA instructor and Principal of Westview Sailing. For video tutorials on navigation and seamanship got to www.westviewsailing.co.uk Reading & Videos.