Outcome 1
LESSON 6
Reading the draught and taking density readings

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READING THE DRAUGHT

The following terms should be understood as they will be referred to in this section.

Forward Perpendicular (FP)

This is the vertical line of reference that intersects the Summer Load waterline at the forward edge of the stem, the ship being on an even keel.

After Perpendicular (AP)

This is the vertical line of reference that coincides with the after edge of the stern post, or, if no stern post, then the turning axis of the rudder.

Length between perpendiculars (LBP)

Is the horizontal distance between the forward and after perpendiculars. It is this length that is considered when conducting trim calculations.

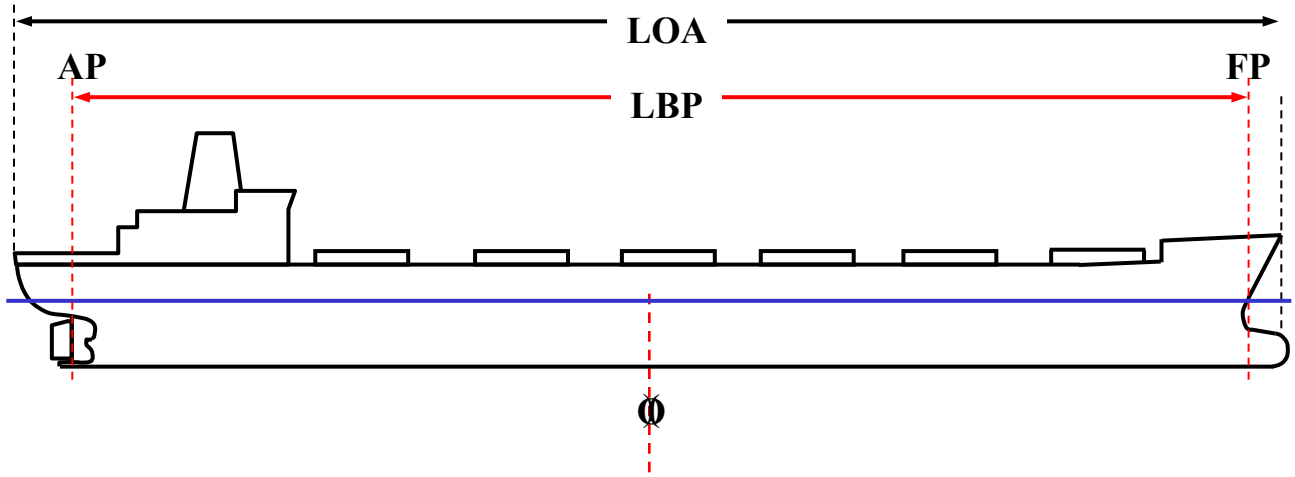
Length overall (LOA)

Is the horizontal distance between the after most part of the ship and the forward most part of the ship.

Amidships

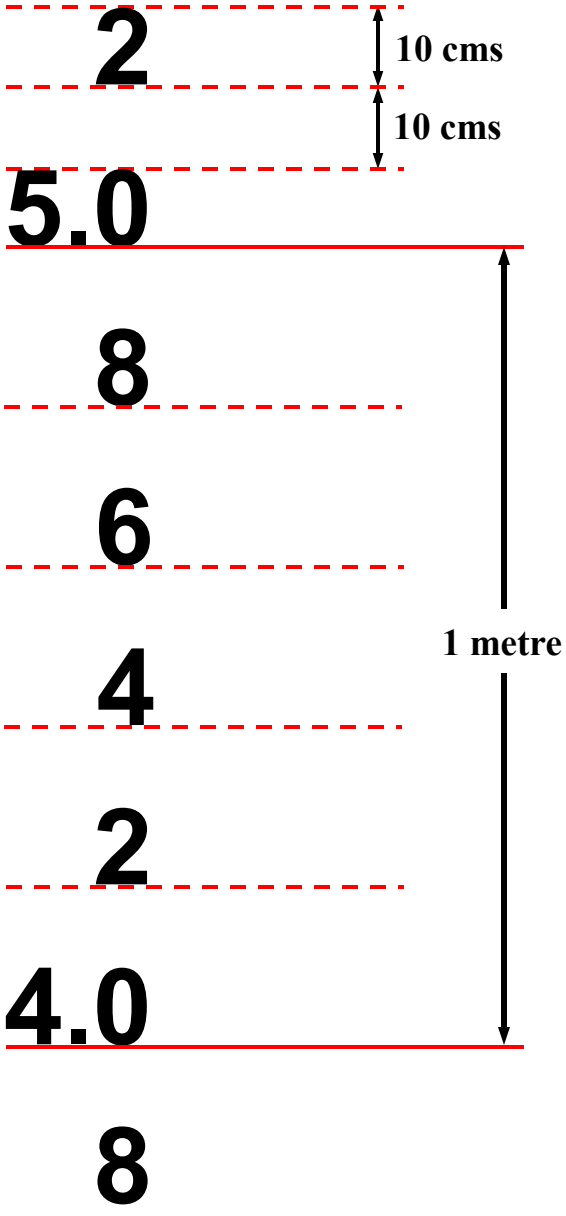
Is the mid point between perpendiculars. It is not the mid point in the length of the ship.

Consider the ship shown.

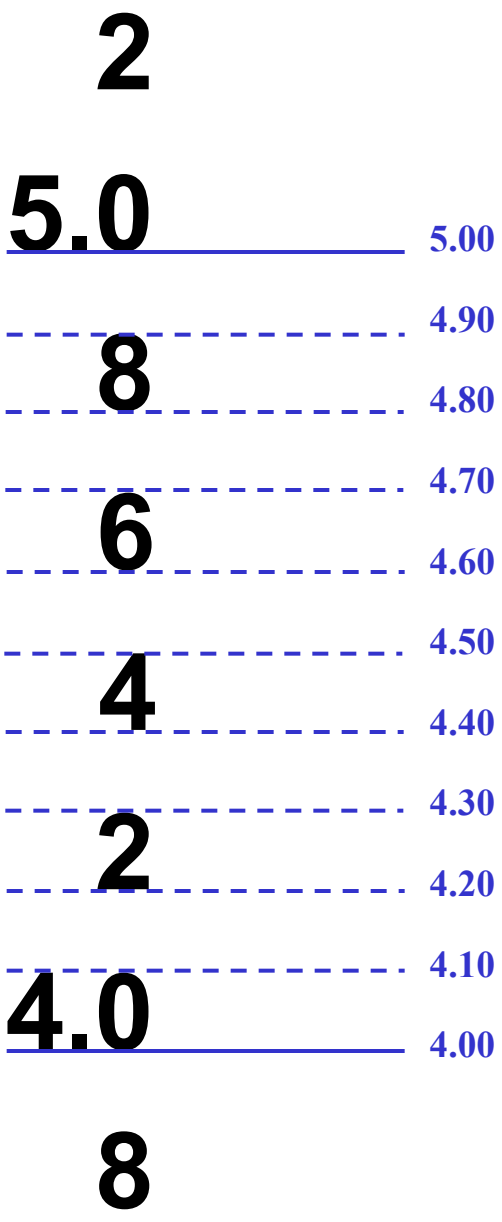

LOA
AP
FP
LBP

Draught marks and reading the draught

The draught marks on a ship should be marked at the ***Forward*** and ***Aft Perpendiculars*** on both sides.The numerals are 10 cms in height and are spaced 10 cms apart as shown.

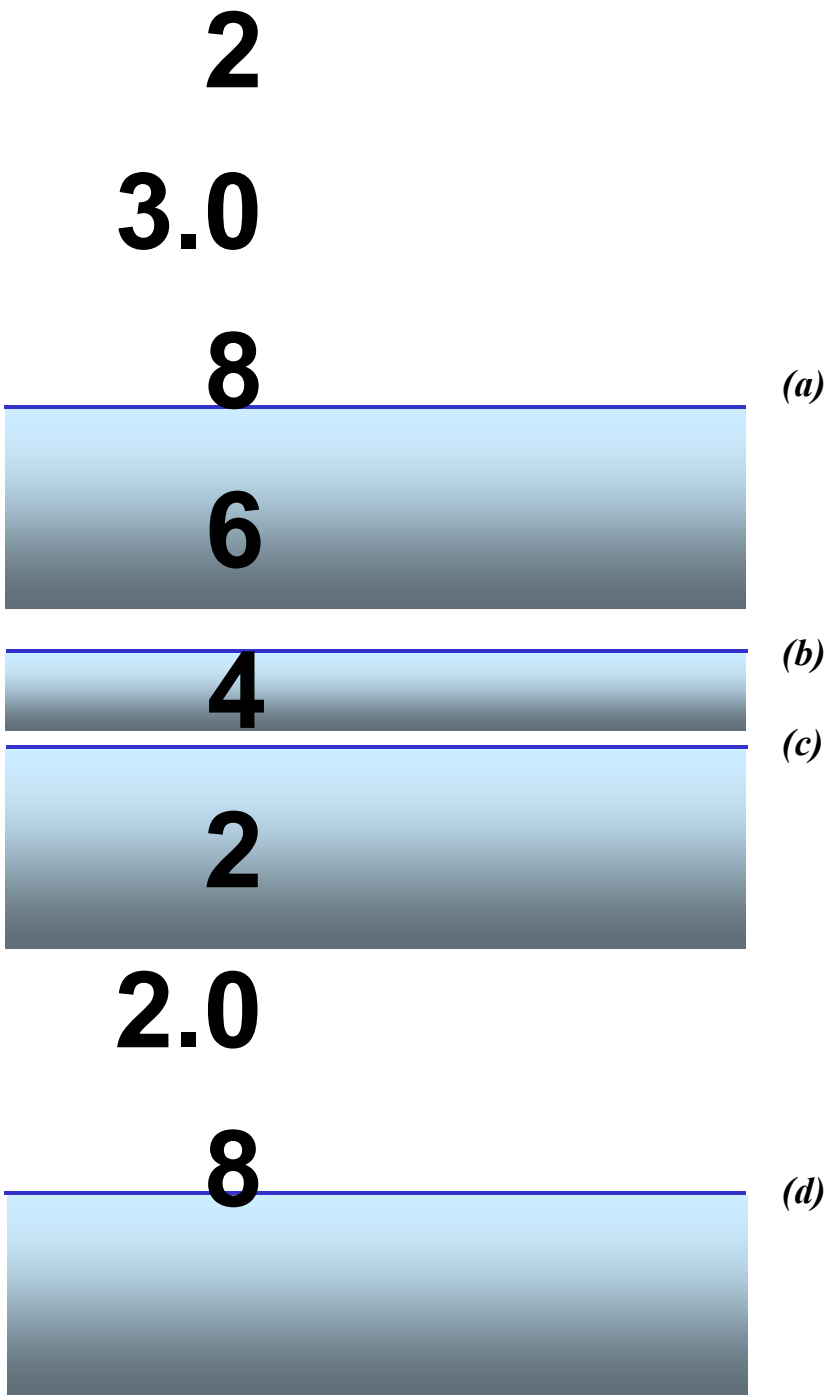


The draught is read as shown using the ***lower edge*** of the numerals. Intermediate values have to be estimated. If the water is quite choppy then great accuracy will not be possible.



SAQ

What is the draught reading for each of the waterlines shown?



Answer

(a) 2.80 m

(b) 2.50 m

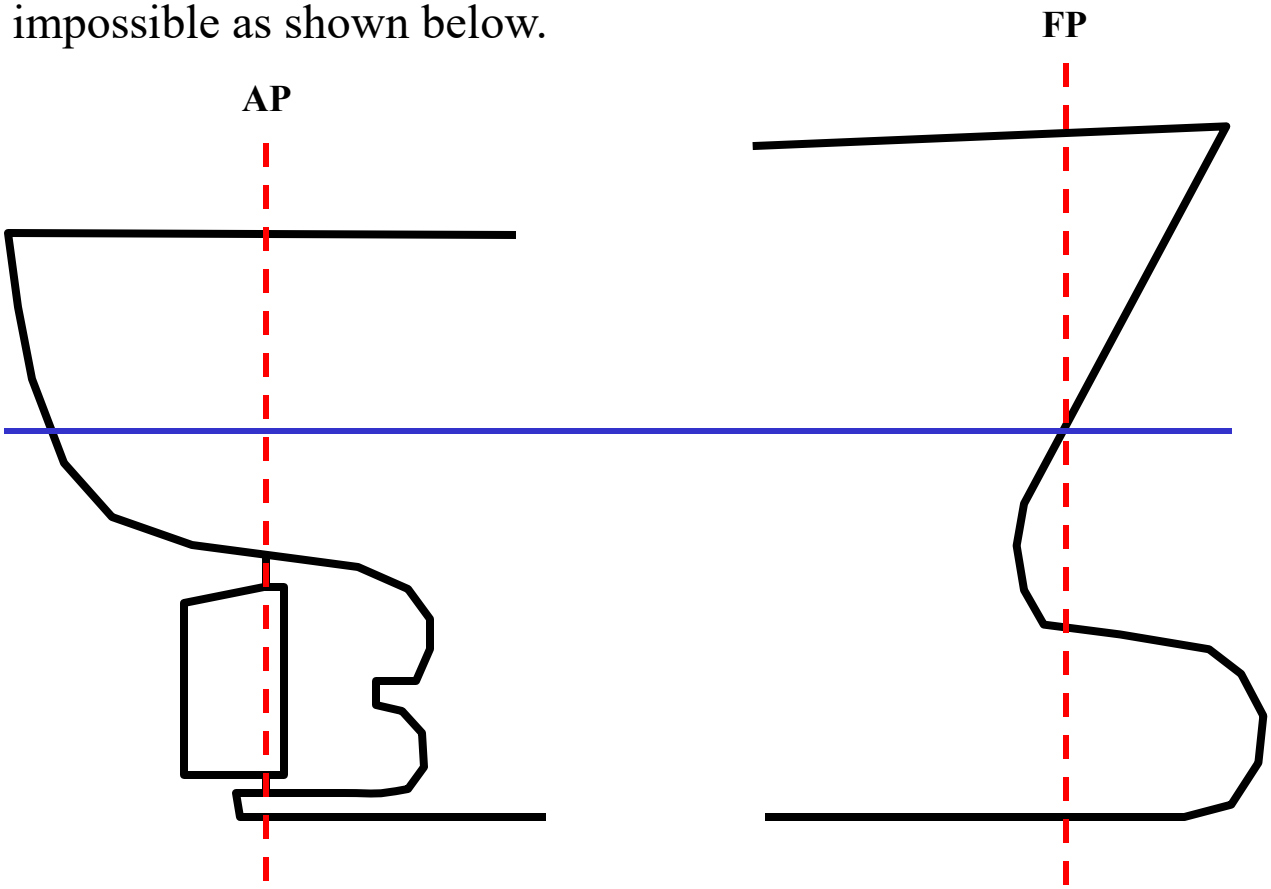
(c) Approximately 2.37 m

(d) Approximately 1.82 m

Check this one!

Ideally the draughts should be read on both sides of the ship and the mean draught forward and the mean draught aft determined. For obvious reasons this is rarely done so before the draughts are read the ship should be brought to the upright condition to eliminate errors.

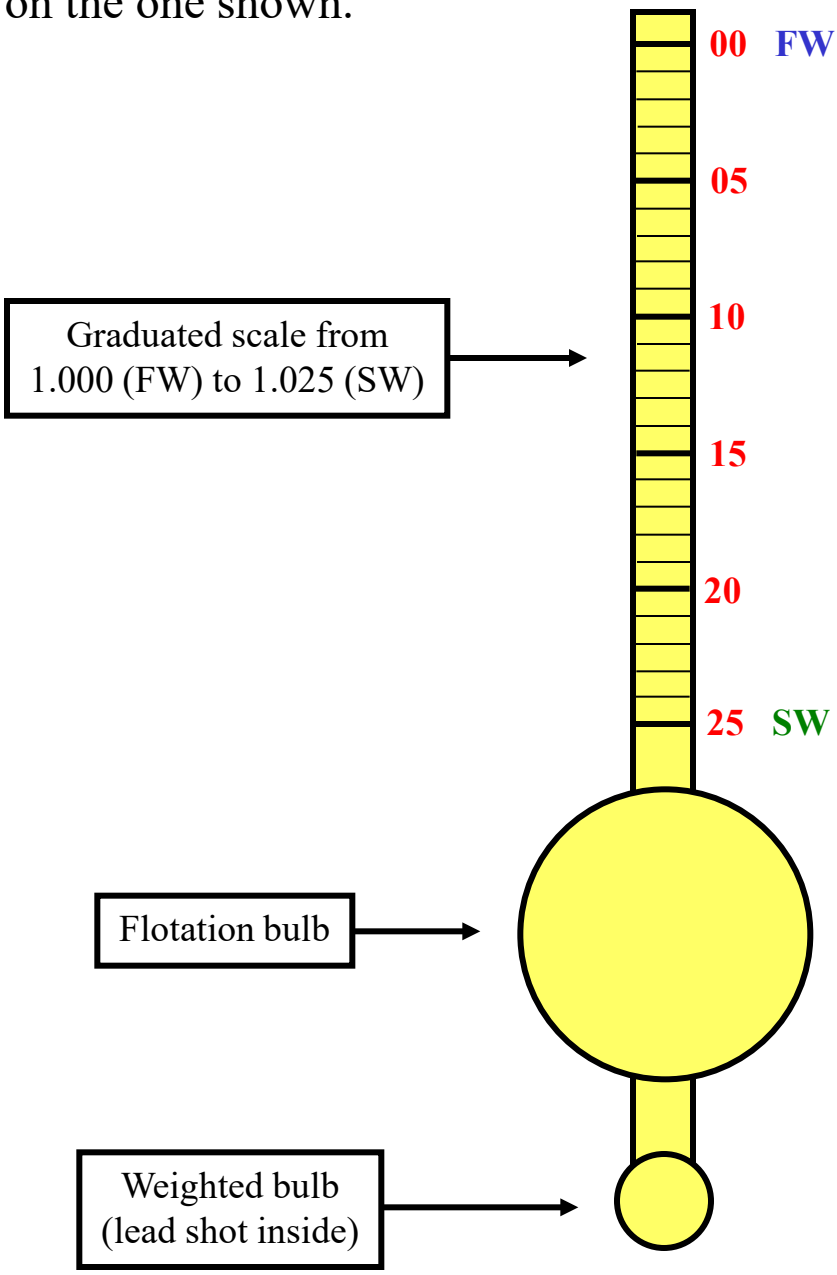
At the outset it was stated that the draught marks should be in line with the forward and after perpendiculars. This is usually impossible as shown below.



At the after end the curvature of the stern may make the draught marks difficult to see. At the forward perpendicular there is nothing to mark them on! Therefore it is usual to set them a suitable distance forward and aft of the respective perpendiculars.

Density readings

In order that the ship's displacement be accurately determined it is essential that an accurate density reading be taken. An instrument known as a ***marine hydrometer*** is used. Note the scale on the one shown.



Procedure for taking a density reading

* The hydrometer should have a certificate to verify that it is for marine use and is accurate with an appropriate scale (00 to 25) on the stem.

* Confirm that the instrument is undamaged (any dents in the flotation bulb will cause inaccurate readings).

* A dock water sample should be taken from approximate half-draught depth using a clean bucket.

* The bucket should be filled deep enough to ensure that the instrument does not touch the bottom.

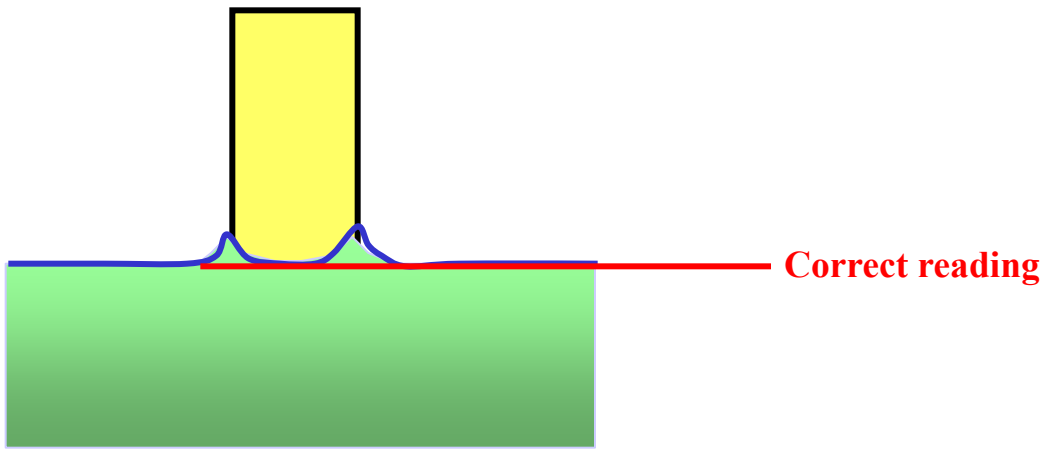
* The water samples should be taken in positions away from overboard discharges and away from floating debris/surface oil.

* Take a number of readings at different locations around the ship and obtain a mean value (forward port & starboard, amidships port and starboard and aft port and starboard).

* Once the surface of the water sample is still, float the hydrometer giving a twisting movement to break any surface tension and to release any trapped air bubbles that might have adhered to the stem.

- Before taking the reading ensure that the hydrometer is not in contact with the side of the bucket.

* When taking the reading be wary of the error that might be caused by reading the 'meniscus' level.



* When finished with, the hydrometer should be wiped dry with a clean cloth and replaced into its protective case.