

2 Questions for the Rank of Chief Mate

INTRODUCTION

Candidates who present themselves for the oral examination for Chief Mate should be aware that this rank is considered as a position of senior authority aboard the vessel. As such a higher level of responsibility over and above that of Officer of the Watch is being assessed by the Marine Examiner.

The Examiner will also be aware that the Chief Mates position aboard a vessel is considered as that of being the 'Working Boss'. As such three main areas of work are identified as being essential to such a position, namely: the **stability** of the ship, the **cargo operations** of the vessel and the **maintenance** procedures, for each and every voyage.

It is because of these topical work areas that Examiners tend to lean the questioning of candidates, towards associated activities within the Chief Officers working routine. Questions are not limited to these precise areas, but clearly the assessment must take account, that the candidate can carry out respective duties as the Ship's 1st Mate. Additionally, as with any other Certificate of Competency, a thorough knowledge of the Rule of the Road and Buoyage Systems, would also be expected.

Examiners of any senior qualification would also expect the candidate to demonstrate a level of management skill related to the nature of the work. In the case of employment within the Mercantile Marine a degree of 'Power of Command' and confidence, would also be expected qualities, that must be deemed desirable in any individual, expecting to hold a senior position.

Note: It should also be borne in mind that under the Standards of Training, Certification and Watchkeeping (STCW) guidelines persons holding an unlimited

1 st Mates, Certificate of Competency may take command of a vessel under 3000 gross registered tonnage (grt). As such questions of a Master's standing, during the oral examinations, must be considered as fair and an acceptable form of assessment for this particular grade.

CERTIFICATES AND SHIP'S DOCUMENTATION

Question 1. When joining a General Cargo ship as Chief Officer, what documents would you expect to take over from the relieved Mate?

Answer: When taking over as Chief Officer I would anticipate being supplied with the following: All ship's plans, inclusive of the Docking Plan, Plug Plan, General Arrangement, Shell Expansion, Fire Arrangement Plan, COG Plan, Load Density Plans and the Rigging Plan.

All the stability criteria, inclusive of the ship's general particulars, deadweight (dwt) scale, cross curves of stability (KN and KG), static stability information, tank capacities, ballast, fresh water and fuel arrangements. Damage stability information, together with any computer loading/discharging programmes.

All relevant working certificates such as Safety Equipment Certificate, Safety Radio Certificate, Load Line Certificate, Liferaft Certificates, Safety Ship Construction Certificate, De-Rat Exemption or De-Rat Certificate.

Note: The dates of validity would normally be noted to ensure that survey dates are not allowed to expire.

All cargo documentation including the cargo plan, cargo manifest, the Register of Cargo Handling and Lifting Appliances, The Cargo Securing Manual together with, Mates Receipts, and any Bills of Lading would also be handed over. Information on special cargoes, heavy lifts, or hazardous cargo parcels may have specific carriage or stowage instructions to consider.

Miscellaneous documents like the Log Books, tank sounding records, Crew List, Planned maintenance Schedule, etc. would normally be noted during any such handover period.

Question 2. What is the period of validity of the De-Rat or the De-Rat Exemption Certificate?

Answer: 6 months.

Question 3. Having received the cargo manifest, prior to loading a General Cargo vessel, what items in particular would you look for, as Chief Officer?

Answer: In order of priority I would note:

- Any dangerous or hazardous goods.
- Any heavy lift items.
- Any personnel effects, valuable or special cargoes, e.g. Mails.

Question 4. When your vessel is scheduled to enter Dry Dock, what documentation would you prepare, prior to entry?

Answer: The occasion for Dry Docking the vessel would require the following plans and documents to be readily available:

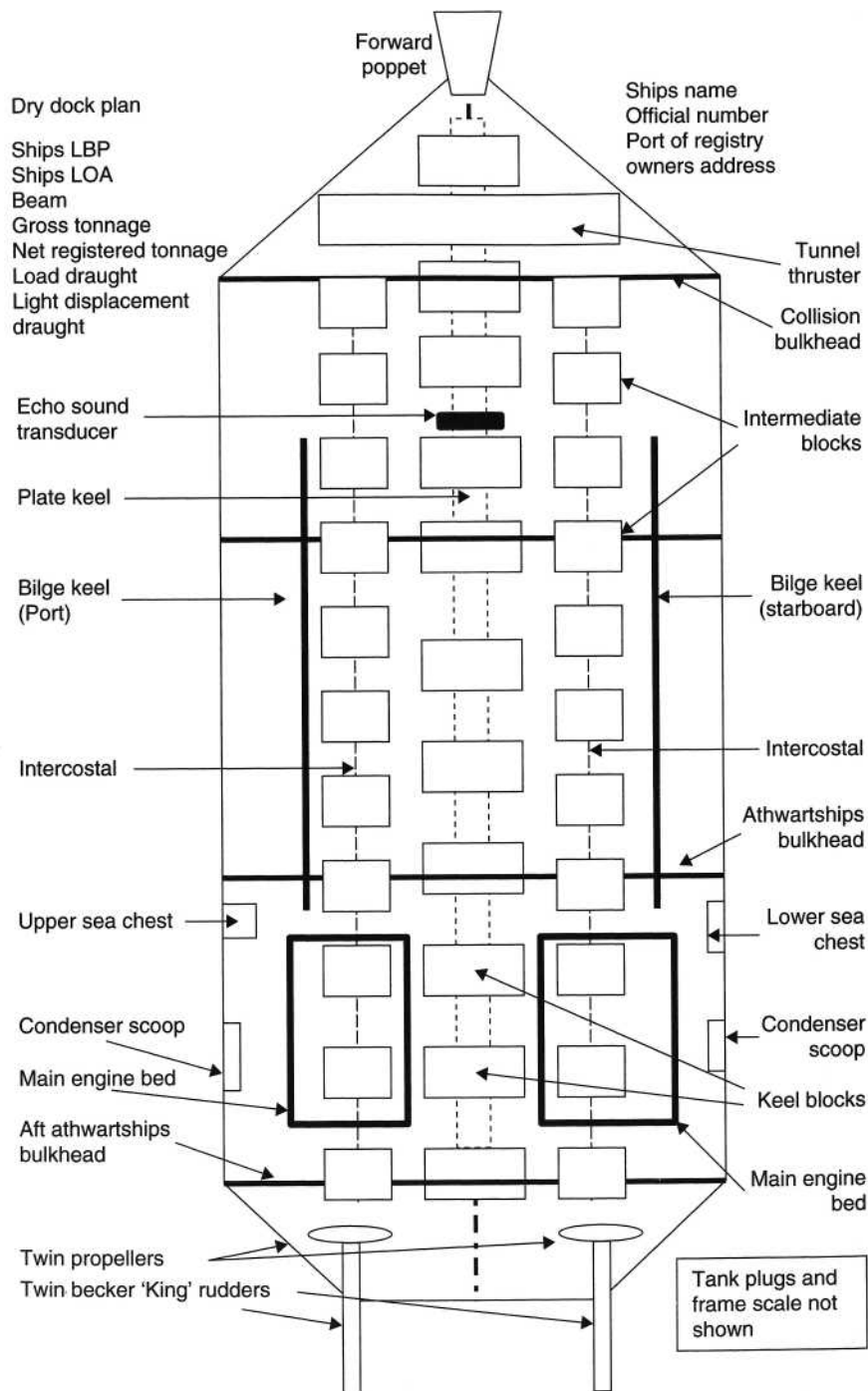
- (a) The Dry Dock Plan.
- (b) The Shell Expansion Plan.
- (c) The General Arrangement Plan.
- (d) The Chief Officer's repair list.
- (e) The Plug Plan.
- (f) The ship's fire fighting arrangement.
- (g) Tank arrangement.
- (h) Relevant stability information.
- (i) A list of the ship's general particulars.
- (j) Rigging plan.
- (k) Relevant Certificates for required surveys.
- (l) Cargo Plan (if docking with cargo on board).

Question 5. If your ship is a 'tanker' vessel, what additional and specific certificate would be required prior to entering Dry Dock?

Answer: Tankers require a 'gas free' certificate prior to entry into Dry Dock.

Question 6. What information would you expect to find on the ship's 'Dry Dock Plan'?

Answer: Dry Dock Plans contain the following information: In addition to the ship's general particulars, and the ship owner's details, measurements for the overall length, breadth and depth would be included, with the air draught.



Dry Dock Plan.

The main outline would also show the position of all Keel Blocks and docking shores, with indication of any appendages protruding from the hull.

Question 7. What information is contained in the Cargo Securing Manual?

Answer: The Cargo Securing Manual provides details on the number of lashings and securing points available on the vessel. The manual is respective to an individual vessel and will specify the distribution of lashings required per cargo space and specific weight load tests/safe working load (SWL) applicable to lashing points, pad eyes, ring bolts, etc.

Question 8. What is the Register of Cargo Handling and Lifting Appliances, and what is kept in it?

Answer: The Register is a filing system for retaining the records and certificates of all the ship's lifting apparatus, including certificates for shackles, blocks, wires, derricks, cranes, chains, hooks, etc.

Question 9. Who maintains the Register of Cargo Handling and Lifting Appliances, and who would inspect it?

Answer: The Register is kept and maintained by the Chief Officer and is liable for inspection by the cargo surveyor when carrying out a Cargo Equipment Survey. It is also liable for inspection by the External Auditor when monitoring the ship's conformity to International Safety Management (ISM) Code.

Question 10. Your vessel is about to go through a Safety Equipment Survey what documents would you prepare for use by the surveyor?

Answer: The Certificate (5-year validation with annual inspection under the Harmonised Survey System) and the 'Record of Inspection'. Liferaft and Hydrostatic Release Unit Certificates. ISM last audit report and planned maintenance schedule (if required).

Question 11. What types of entries are made in the 'Garbage Record Book'?

Answer: Any garbage disposed of should be recorded in the Record Book. The ship's position should be recorded along with the quantity of garbage disposed and the date and time of disposal.

The method of disposal and the nature of the garbage are also required. In the event that garbage is deposited at a Port Reception and/or incinerated, a receipt for the garbage must be obtained.

Question 12. What two documents represent compliance with the ISM Code?

Answer: The ship should have its own Safety Management Certificate (SMC) and will carry a 'copy' of the 'Document of Compliance (DoC).'

Note: The original Document of Compliance is held by the company, a separate DoC, for every class/type of vessel the company operates.

Question 13. What on the vessel must be compatible with the Safe Manning Certificate?

Answer: The Ship's Life Saving Appliances must satisfy the number of personnel carried aboard the vessel.

Question 14. What is the period of validity of the Liferaft Certificates and can they be extended?

Answer: The Liferaft Certificates have a period of validity of 12 months and YES, they can be extended by a period of 5 months.

Question 15. What information and details would you expect to find on the Anchor Certificate?

Answer: The Anchor Certificate will contain the following information:

- (a) The Certificate serial number.
- (b) Name of the Certifying Authority.
- (c) Name of the testing establishment.
- (d) The mark or logo of the testing establishment, if any.

- (e) Name of the Supervisor of Tests and their signature.
- (f) Weight of the anchor.
- (g) Type of anchor.
- (h) Length of the shank in millimetres.
- (i) Length of arms in millimetres.
- (j) Diameter of the 'trend' in millimetres.
- (k) Proof load applied, in tonnes.
- (l) Weight of 'stock', if applicable.

Question 16. What official publications must be carried by your ship?

Answer: In accord with Notice No. 18, of the Annual Summary of Notices to Mariners the ship must carry the following publications:

- (a) The Mariners Handbook.
- (b) The International Code of Signals.
- (c) The Weekly Notices to Mariners.
- (d) The Marine Guidance Notices (MGNs), The Merchant Shipping Notices (MSNs) and The Marine Information Notices (MINs).
- (e) List of Radio Signals.
- (f) List of Lights.
- (g) Sailing Directions.
- (h) Nautical Almanac.
- (i) Nautical Tables.
- (j) Tide Tables.
- (k) Tidal Stream Atlas.
- (l) Operating and maintenance manuals for navigational aids.
- (m) A full set of working navigational charts.

Note: The question has asked for the official publication requirements and candidates for examination, should listen to the question carefully. Most ships carry many other useful publications such as the International Aeronautical and Marine Search and Rescue (IAMSAR) Manual, Ocean Passages of the World, and Admiralty Distance Tables. But the question did not ask what a well-found ship might carry.

Question 17. Having completed a period in 'Dry Dock' what document would you expect to have to sign, prior to departing the dock?

Answer: The dock foreman would present the 'Authority to Flood' certificate, for signature by the ship's Chief Officer.

Note: This should not be signed until the Chief Officer is satisfied that all the essential work has been completed, that all bottom plugs have been replaced and that all personnel are clear of the dock floor.

Question 18. Your vessel has just completed taking bunkers. What documentation would you complete?

Answer: An entry to the effect of completing bunker operations must be made in the ship's Deck Log Book and in the vessels 'Oil Record Book'. The Oil Record Book entry, must have a double signature with the Master signing each page, and each separate entry being made by the operational officer, i.e. the Chief Officer or the Chief Engineer.

Question 19. During an external audit, the ISM inspector finds damage to a ventilator and orders repairs to be made within the next 3 months. What document would you expect to receive from the inspector?

Answer: The Auditor would issue a Notice of 'Non-Conformity'. This would usually carry a time limiting period. Provided the damage is rectified in the time period this notice would be cancelled by a future inspector.

Question 20. How are the ballast arrangements on the vessel monitored?

Answer: The movement of ballast is recorded in the ballast management record. Entries reflect the ship's position at the time of pumping or transferring ballast quantities. The date and time of operation as well as the identity of respective tanks involved.

Question 21. What is the period of validity of the 'Load Line Certificate'?

Answer: 5 years.

Question 22. What is the significance of the Chief Officers 'repair list'?

Answer: The repair list is an ongoing list of essential repairs that will be carried out at an appropriate time in the future, usually the Dry Dock period.

The list is meant to protect the owners' interests and ensure that any survey work required on the vessel is not overlooked prior to the next survey.

Question 23. A Port State Control Inspector is due to visit the vessel, what would you expect to prepare on the navigational bridge prior to this inspection?

Answer: I would anticipate that the inspector would check the Chart Folio's and the 'Chart Correction Log'. He would expect to see the 'passage plan' and records of navigation warnings together with the statutory publications. Bridge equipment and the maintenance manuals with respective 'check lists' for the testing procedure of bridge equipment.

Question 24. Following an accident to a seaman aboard your vessel, what would you do?

Answer: In the case of any accident to personnel I would order the Safety Officer to investigate the circumstances and make a report of the incident to include, witness statements and photographs if appropriate. The Safety Officer would be instructed to complete an accident report form, and an entry would be made in the Deck Log Book of the essential details.

Note: In every case which involves injury to personnel the medical provision would be the first priority.

Question 25. What is a 'Mates Receipt'?

Answer: A document signed by the ship's mate or Chief Officer to acknowledge receipt of cargo on board the vessel. It forms the basis for the final Bill of Lading.

Question 26. Under the ISM convention what certificate is initially given to a new ship and what is its period of validity?

Answer: A new ship would be issued with an 'Interim Safety Management Certificate' valid for a period of 12 months.

Question 27. What organisations issue a vessel with a Certificate of Class?

Answer: The Classification Societies, e.g. Lloyds Register, American Bureau of Shipping, Bureau Veritas, etc.

Question 28. What type of vessels must have a 'Permit to Operate' and a 'Craft Operating Manual'?

Answer: High Speed Craft.

Question 29. Fast, high speed ferries must comply with which code?

Answer: The High Speed Craft (HSC) Code 1996, revised 2002.

Question 30. What type of craft are covered by the HSC Code?

Answer: High speed ferries of Category 'A' Craft (carrying not more than 450 passengers) Category 'B' craft passenger high speed other than Category 'A' types which have the capability to navigate safely in the event of damage to essential machinery. A cargo high speed craft class other than a passenger craft.



High Speed Ferry vessel seen lying port side to the Ro-Ro terminal in Barcelona, Spain.

Examples: Air cushion, hovercraft, hydrofoils and wig craft. Cater-marans, and some Trimarans may fall into these categories.

EMERGENCIES AND DAMAGE CONTROL

Question 1. Following an incident where the ship has run aground, what actions would you expect to take as the Chief Officer of the vessel?

Answer: Following a grounding incident the Chief Officer would expect to report his intention to the Master to carry out a 'damage assessment'. This assessment would expect to address the following items:

- (a) The water tight integrity of the hull.
- (b) The condition of the engine room either 'wet or dry'.
- (c) A casualty report.
- (d) Any evidence of pollution.

Subsequent actions would also include taking a full set of tank soundings, as well as overside soundings, paying particular attention to the bow and stern areas.

It is assumed that on the outcome of the Chief Officer's damage report, the Master would open up communications with relevant interested parties.

The Chief Officer would advise the Master throughout this period to display the signals to indicate a 'vessel aground', and also recommend that the ship's anchors are walked back to prevent the possibility of accidental re-floating in a possibly damaged state.

Ballast adjustment may be necessary at some stage. It would also be prudent to deploy anchors to prevent accidentally, re-floating at an inappropriate time.

Question 2. What activities would the Chief Officer carry out, when the vessel is proceeding towards a distress, to recover survivors from the water?

Answer: The Chief Officer would order all hands to stand-by and assist in the following preparations:

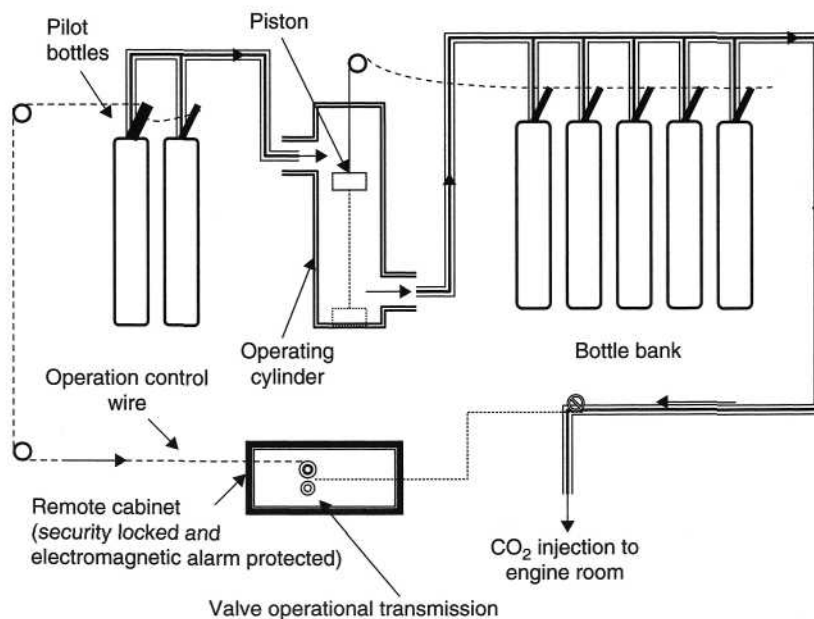
- (a) Turn out the ship's 'rescue boat' and place the boats crew on immediate stand-by to launch.
- (b) Turn out the 'accommodation ladder' to effect recovery of casualties.

- (c) Order the ship's medical room/hospital to prepare to receive casualties and be ready to treat for shock and hypothermia.
- (d) Rig a 'guest warp' to assist boat operations.
- (e) Advise the Master/Bridge Team of deck operations.
- (f) Order galley staff to prepare hot food.

Question 3. Following a fire in the ship's engine room the decision is made by the ship's Master to inject the total flood CO₂ bottle bank. Explain how the CO₂ injection system works?

Answer: The total flood system is set for immediate operation into the high risk area of the engine room. Once the decision is made to inject CO₂, the Chief Officer would be expected to shut down the boilers, fans and fuel lines and evacuate the machinery space. Following a 'roll call' of all personnel the pilot bottles would be activated by pulling the handle in the remote operating cabinet and operate the injection valve to allow ingress into the machinery space (once the cabinet is opened the alarms would be automatically activated).

This action would let CO₂ from the pilot bottles into pressurise the cylinder and push the piston downwards. The piston movement will fire the 'bottle bank' and cause CO₂ to enter the engine room.



Basic CO₂, total flood, bottle bank system.

Question 4. In the event of having to inject the total flood CO₂ into a cargo space, how would you know the amount of CO₂ to inject?

Answer: The amount of gas to inject will be defined by the CO₂ Plan, copies of which are found inside the CO₂ Bottle Room, in the Chief Officers Office and in the ship's fire fighting arrangement.

Question 5. In the event of a fire in the engine room what would be an expected line of action for the Chief Officer?

Answer: In most cases the Chief Officer is considered the On Scene Co-ordinator (OSC) and he would probably take charge of the fire party once the alarm has been sounded.

It is in the interests of all, to tackle the fire **immediately**, on the basis that large fires were initially small fires, and such immediate action could well save the day, early. In any event the function of the Chief Officer is to establish a fire party at the fire face and try to knock out the fire by conventional means.

The Chief Officer is concerned with logistics to include communication to the men at the fire face and the navigation bridge. He is also meant to keep the fire fighting activity directed towards the fire face, and this can only be achieved if fire fighters have: (a) a fire fighting medium and (b) breathing air.

To this end the organisation of establishing a back up fire party, continuing boundary cooling, ordering the vent party to close off ventilation and holding the first aid party in readiness, all go towards the Chief Officers overall management of the situation.

Should the situation deteriorate it would also be up to the Chief Officer to recommend to the Master the use of total flood systems. In such an event, the Chief Officer would order fire teams to extract themselves from the engine room, prior to total flood activation.

Question 6. What are the advantages and disadvantages of CO₂ total flood system?

Answer:

Advantages: Good knock down capability, a readily available supply of CO₂ around the world, comparatively cheap, cleaner than foam.

Disadvantages: Once fired at sea, no replenishment until arrival in port, non-breathable atmosphere, if used the ship is without motive power for an indefinite period.

Question 7. When advised of impending heavy weather, imminent, what actions would you take as the Chief Officer of the vessel?

Answer: With a heavy weather warning issued, the Chief Officer would address the following four areas: stability, cargo security, navigational safety and the overall security of the deck.

Stability Issues to Address

- (a) Improve the vessels GM, if possible.
- (b) Remove any free surface moments if possible.
- (c) Ballast the vessel down.
- (d) Check the freeboard deck seals on hatches and other openings.
- (e) Close watertight doors.
- (f) Pump out swimming pool if carried.

Cargo Security

- (a) Check and tighten all deck cargo lashings.
- (b) Tighten up lashing on General Cargo below decks if appropriate.
- (c) Trim cargo ventilation and shut down vents if not required.

Navigation Safety

- (a) Consult and advise Master regarding the aspects of re-routing.
- (b) Verify vessels position.
- (c) Update weather reports.
- (d) Plot storm position.
- (e) Update vessels position and inform shore-side authorities.
- (f) Engage manual steering.
- (g) Revise Estimated Time of Arrival (ETA).
- (h) Secure Bridge against heavy rolling.
- (i) Reduce speed in ample time to prevent 'pounding'.

Deck Security

- (a) Rig lifelines.
- (b) Check securing on, gangways, lifeboats, derricks/cranes, anchors, etc.
- (c) Reduce manpower working on deck and start heavy weather work routine.
- (d) Warn 'Heads of Departments' of impending heavy weather.
- (e) Clear decks of surplus gear.
- (f) Close weather deck doors.
- (g) Slacken down whist lanyards.
- (h) Check all Life Saving Appliances (LSA) equipment readily available.

- (i) Organise meal reliefs, if appropriate.
- (j) Organise watch structure to suit three-man watch system.
- (k) Note all preparations in the Log Book.

Question 8. While on a coastal passage, a navigation warning is received about a 'new danger' on your intended track. How would you expect a new danger to be identified?

Answer: New dangers are marked by the use of double 'cardinal marks' or double 'lateral marks'. One of these double marks would carry a 'RACON' morse 'D' reflective signature on the radar screen.

Question 9. What limitations are enforced on helicopter operations in offshore coastal regions?

Answer: Helicopter operations are restricted on 'range of operation' by the amount of fuel (aviation spirit) that their tanks can hold. This is further limited by the 'payload' that they carry. Also, progress against head winds could affect the endurance of operation.

Poor visibility would ground helicopters because of the need for a visible horizon. Also storm force winds may inhibit take off, for rotary winged aircraft.

Night flying can take place in general conditions provided the pilot is trained with Instrument Flying Rating (IFR).

Question 10. Your vessel is about to engage with a Helicopter to carry out a 'Medivac'. What deck reception preparations would you make?

Answer: The deck preparations to engage with a helicopter would include the following actions:

- (a) Clean the deck area thoroughly of all loose gear.
- (b) Lower any obstructive aerials from aloft.
- (c) Mark the deck area of operation 'H' or 'Yellow Spot'.
- (d) Display Restricted in Ability to Manoeuvre, navigation signals.
- (e) Display a wind sock, call sign flags, or white smoke, as a wind directional indicator.
- (f) Lower ship side rails, if appropriate.
- (g) Have a fire party on stand-by, but clear of the operational area.
- (h) Turn the rescue boat out board.

- (i) Designate a 'Heli-deck Landing Officer (HLO)'.
- (j) Designate a 'Hook-Handler'.
- (k) Warn department heads of ongoing activity.
- (l) Keep non-essential personnel clear of the operational area.
- (m) Prepare the casualty, with documents for evacuation.

Note: The ship's navigation requirements would be handled by the Bridge Team, under the supervision of the Master. The Search and Rescue Helicopter Hi-Line Technique is described in MGN 161 (see Appendix C).

Question 11. While holding the anchor watch aboard your vessel, you see another vessel approaching at a fast speed and closing range. What action would you anticipate taking, in the absence of the Master, if the approaching vessel was at a 2-mile range?

Answer: I would monitor the vessel closely and sound five or more short and rapid blasts on my ship's whistle. If the vessel did not take immediate action to alter her course away from my position I would order 'dead slow ahead' on the ship's engines and steam over my own ship's anchor cable.

Note: This action would take my vessel out of the line of approach and avoid the potential 'collision scenario'.

When at anchor the ship's engines are left on 'stop' and as such should be readily available for an immediate order. Alternative actions are available in this situation:

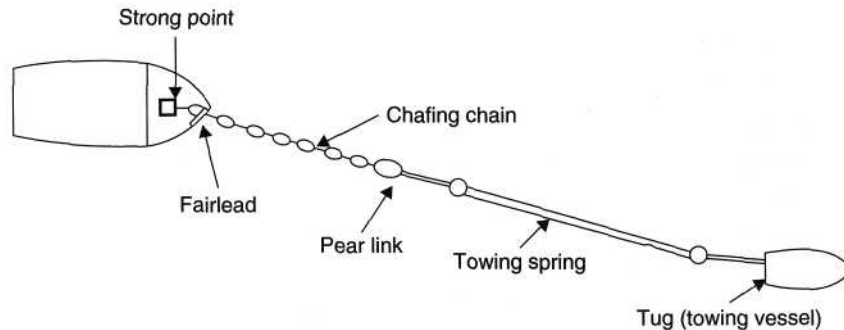
- (a) Pay out on the anchor cable and let the vessel drop back astern.
- (b) Heave in on the anchor cable and pull the vessel ahead.
- (c) Go hard over with the rudder and give the vessel a sheer.

The above alternatives will take up valuable time to execute and the closing range of the target vessel may not permit the use of these options.

Question 12. What emergency towing arrangement do you have aboard a large tanker vessel, over 20,000 ton?

Answer: Large tankers must now be fitted with emergency towing brackets in the fore and aft positions. These will generally take the form of a 'SMIT bracket' or other weight bearing anchor point. The ship is also expected to supply a chafe chain length, secured from this

anchor point to permit being towed. In the event that an abandonment of the tanker has to take place, it is anticipated that the chafe chain would be deployed prior to total abandonment to enable a tug to become attached.



Emergency towing arrangement for tanker vessels.

Question 13. When recovering your anchor cable you discover the anchor has caught up a submarine cable. What action would you take?

Answer: Once it is realised that the anchor is fouled by a submerged cable it would be imperative to inform the Bridge immediately, and in no circumstances give indication that the anchor is 'sighted and clear'.

In agreement with the Master it would be prudent to let the anchor go again, with the hope that the fouled cable will dislodge itself with this action. However, it must be realised that the anchor may not clear itself and in such circumstances one of two actions must be considered:

- (a) Walk the anchor back to the bottom. Break the cable at the next joining shackle on deck. Buoy the anchor cable and deliberately sacrifice the anchor and a limited amount of cable.
Note: It is anticipated that the cable company will recover the anchor, free of charge. The ship would be considered unseaworthy without two working bow anchors and this situation would require the spare anchor to be secured for the vessel to retain her classification.
- (b) If the foul can be rectified simply, without incurring damage it may be possible to bight a soft mooring rope about the foul

cable. Walk the anchor chain back to clear the obstruction, then heave the anchor home. Release the bight of rope and jettison the cable.

Question 14. While tied up alongside, working cargo, smoke is sighted coming out of the No. 2 hatch of a General Cargo vessel. The Cargo Watch Officer has raised the fire alarm. What would you do as the ship's Chief Officer?

Answer: It would be normal practice to muster the fire party and proceed to the scene of the fire. However, as the fire incident is in port, members of crew could well be ashore and this could leave the fire party deficient.

The Chief Officer would be expected to take immediate control of the situation using the manpower and the resources available and his orders and actions could expect to include any or all of the following:

Once the Alarm Has Been Sounded

- (a) Stop all cargo operations aboard the vessel.
- (b) Call in the local fire brigade, via the port and harbour control on very high frequency (VHF) radio, requesting immediate assistance.
- (c) Remove all non-essential personnel from the ship, e.g. stevedores (check with ship's foreman that the workers are all clear).
- (d) Batten down the cargo hatch which is seemingly on fire.
- (e) Order the engineers to put water on deck and pressurise the fire main.
- (f) Commence boundary cooling on as many sides of the cargo hatch as possible.
- (g) Post a Chief Officers messenger at the head of the gangway to meet the local fire brigade on arrival.
- (h) Make ready a fire envelope to include the cargo plan and the ship's fire arrangement.
- (i) Have the 'International Shore Connection' readily available. (j) Instruct Chief Engineer to make ready CO₂ for cargo hold flooding.
- (k) Carry out a head count of all ship's personnel on board. (l) Make notes of any injuries as they occur. (m) Move up breathing apparatus to the scene, together with fire fighters, (n) Tend fire wires fore and aft.

- (o) Lift gangway clear of quayside. (p)
Place engine room on stand by.

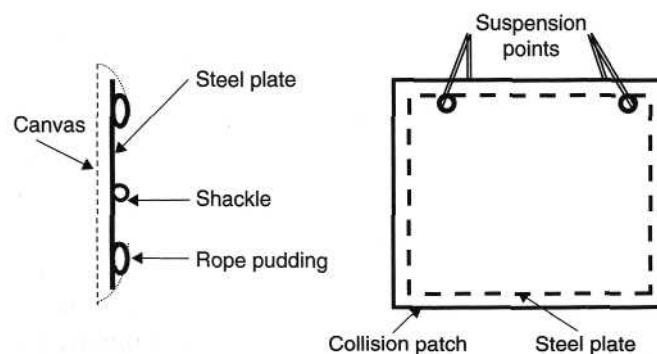
Once the brigade has arrived it would be common practice to agree the desired method of attacking the fire with the view to bring it under control. Appropriate entries would be made into the ship's Log Book as required.

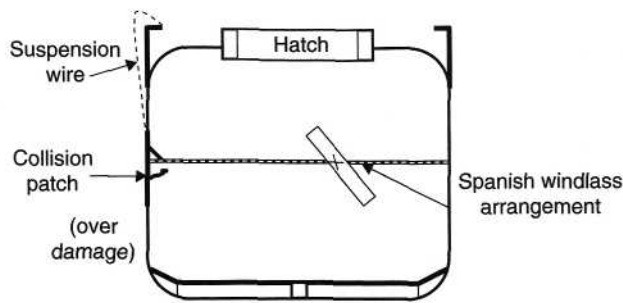
Note: No emergency scenario can expect to take account of each and every detail because each situation will be governed by a different set of circumstances. The above answer is meant only as a general guide.

Question 15. After striking a floating object, your vessel sustains damage on the waterline and a loss in watertight integrity is observed. The Master lists the vessel over and orders you to establish a collision patch over the damaged area. How would you do this?

Answer: Assuming that the vessel is not equipped with designated damage control materials, the Chief Officer would be expected to improvise to establish the patch. This could be carried out by various means and the following is a suggested method:

- (a) Bolt steel bottom plates together (obtained from the engine room) and staple a rope pudding around the perimeter of the joined plates.
- (b) Drill the centre of the plates to accommodate a shackle and drill the upper edge to fit suspension shackles.
- (c) Cover the outer surface and inner edge with canvas.
- (d) Lower the patch over the gunwale on suspension wires to cover the damaged area of the hull.
- (e) Brace the patch in, by means of a 'Spanish Windlass' from the opposing side of the hold, if the cargo load permits.





Question 16. What would be the expected duties of the Chief Officer, in the event of his ship being involved in a collision at sea?

Answer: It would be anticipated that the Master would take the 'conn' of the vessel, if he is able. As such the Chief Officer would probably be ordered to obtain an immediate damage assessment to assess the following:

- (a) Watertight integrity of the hull.
- (b) The state of the engine room, either wet or dry.
- (c) A casualty list to include nature of injuries.
- (d) Pollution incurred, and from which tanks.

Subsequent actions would include a detailed set of internal soundings of all the ship's tanks. Damage control parties would be formed to restore any damaged shipboard systems.

As soon as practical, the stability of the vessel would need to be assessed taking into account the 'damaged stability' criteria.

Note: Clearly the types of ships involved in the collision will affect the nature of the required actions. Also the state of weather at the time, together with the severity of the contact between the two ships will influence considerably individual actions.

Question 17. As a Chief Officer, describe how you would pass a tow-line astern, to a stricken vessel, which has suffered engine failure, when in heavy weather?

Answer: Heavy weather conditions would no doubt restrict the ship drawing too close to the stricken vessel. In such an incident it would be prudent to fire a rocket line over the target. This would subsequently allow a messenger to be attached to the rocket line. Once the messenger is passed then a 'Towing Hawser' could be secured to the messenger and

subsequently passed to the distressed vessel for securing to a towing strong point.

Question 18. What do you consider the term 'risk assessment' means?

Answer: Risk assessment is a detailed and careful assessment of potential harmful factors that are contained within the nature of an operation. It is expected to classify the work and identify high, low and tolerable risk elements to personnel within the working environment. It is meant to provide an action plan which would permit ongoing operations to within limits of a tolerable risk. Check lists are employed to assess the Initial Risk and subsequent detailed parameters effecting the overall final assessment, prior to commencement of the work.

Question 19. If the need arose to abandon your vessel, what additional equipment would you order to be placed into the lifeboats, if time permitted?

Answer: Additional equipment would probably be in the form of communication items and life support gear, namely:

- (a) Search and Rescue Transponder (SART).
- (b) Emergency Position Indicating Radio Beacon (EPIRB).
- (c) Two-way VHF walkie-talkie radio.
- (d) Extra food.
- (e) Blankets.
- (f) Water and medical supplies.

Question 20. Having anchored your cargo vessel overnight, the windlass controls are found to have suffered massive corrosion and the ship is without spares to instigate repairs. How would you attempt to recover your anchor?

Answer: Being a cargo vessel I would investigate the possibility of improvising the cargo winches to provide the power to recover the anchor.

This could be carried out by one or more of the following:

- (a) Establishing a friction drive between the No. 1 hatch cargo winch and the windlass drum by means of a mooring rope turned up on both warping drums.

- (b) Employing the topping lift of No. 1 derrick to engage in short hauls on the bight of cable at the hawse pipe. Free wheeling the gypsy to feed the cable into the locker.
- (c) Employing a direct pull from a cargo winch or stores winch, to provide a direct pull on the cable via a heavy duty block and tackle arrangement. This would necessitate the rigging of an overhauling tackle to reduce the time element of the exercise.

Note: In all the above options, it would be anticipated that the ship's engines are used 'ahead' to ease the weight load on the cable when effecting recovery.

Question 21. What orders and procedures would you expect to be contained within an emergency check list, to effect an abandonment of the ship?

Answer: An emergency checklist to abandon the vessel would probably contain the following items:

- (a) Obtain the ship's position and transmit a distress alert message.
- (b) Instruct crew/passengers of the order to abandon and to don warm clothing and put on life jackets.
- (c) Directing them to the emergency boat stations.
- (d) Turn out survival craft and prepare for immediate launch.
- (e) Launch the rescue boat with crew in immersion suits.
- (f) Order additional life support items to be placed into boats if time permits.
- (g) Check that all lifeboat painters are stretched forward and launch survival craft when fully loaded.
- (h) Brief coxswains of survival craft to remain in close proximity to the mother ship.

Question 22. UK passenger vessels and passenger vessels, passing through UK waters are required to have a Search and Rescue (SAR) emergency response plan available for operational use (Reference: MSN 1761 M). What are the objectives of this plan?

Answer: The objectives of the SAR plan for passenger vessels are:

- (a) To provide early and effective contact between the passenger vessel and the SAR services. Such contact will also take into account

communications with the ship's owners and associated emergency response organisations. It will include regular communication updates to all interested parties as to the state and progressive condition of the emergency.

- (b) To provide essential information, relevant to the SAR services, inclusive of voyage details and passenger numbers.
- (c) To provide the vessel with relevant details of the local SAR service system, inclusive of emergency services that are available to assist with decision-making and emergency planning.
- (d) To provide support and useful information in the event that the passenger vessel has to take up the role of OSC in an SAR operation.

Question 23. What are the two functions of a 'rescue boat' during the action of abandoning a ship?

Answer: The rescue boat has two functions during an abandonment:

- (a) Recover persons from the water, preferably in a horizontal manner.
- (b) Marshall survival craft upwind and clear of toxics or the dangers associated with capsize of the parent vessel.

Question 24. Following a minor collision a ship is proceeding towards a port of refuge when it is realised that the fore end of the vessel is flooding and that the collision bulkhead is in danger of collapse. What action would you take if you had no means or materials to shore up the collision bulkhead?

Highlight any hazards that may be associated with your solution?

Answer: Few modern merchant ships carry sufficient damage control equipment to be capable of shoring up a bulkhead. Even if employing improvised equipment like derricks or crane jibs, neither is the manpower to handle such items usually readily available.

If flooding is a feature on one side of the bulkhead it may be prudent to deliberately partially flood the next compartment aft. This would have the effect of putting an opposing pressure on the bulkhead and possibly prevent the bulkhead collapsing.

Such action will, however, increase any free surface moments affecting the ship's positive stability. Therefore, such action should simultaneously be accompanied by any improvement to the 'GM', e.g. pressing up double bottom ballast tanks.

Question 25. While on your evening watch the vessel enters known ice limits of the North Atlantic. It is during the peak of the ice season for icebergs and you have been advised by reports from the International Ice Patrol, that dangerous ice is ahead on your vessels track. What actions would you expect to take?

Answer: Such conditions would dictate that I would advise the Master of the relevant details. Although the final decision would be the Masters, I would advise him/her, in order to comply with the Safety of Life at Sea (SOLAS) requirements the ship would be expected to only proceed at a moderate speed at night, when ice is reported ahead of the vessels intended track.

A prudent Master, being aware that ice formations generally make very poor radar targets, would probably stop the vessel during the hours of darkness when inside such hazardous limits, waiting until daylight before proceeding.

A statement to this effect would also be entered into the ship's Log Book.

Note: This may seem to a candidate that this is a Master's example question but it is pointed out that Chief Officers (with unlimited Chief Mates Certificates) may take command of vessels less than 3000 grt under the current STCW Regulations.

Question 26. Following an engine room incident in open waters, while you are acting as Chief Officer aboard a dry cargo vessel, the Master requires the services of a tug. You are ordered to make preparations for the vessel to be towed. What preparations and actions would you carry out and what type of towline would you employ?

Answer: It would probably not be practical to rig a towing bridle and as such a composite towline would be employed. Such a towline being constructed with the ship's own anchor cable and the combined use of the tugs towing spring. The arrangement could be established in two ways:

- (a) by hanging the anchor off at the break of the foc'stle head and baring the end of the cable to secure to the towing spring, or
- (b) by leaving the anchor on and securing the towing spring to the Anchor Crown 'D' shackle once walked out clear of the hawse pipe.

The first method requires extensive labour to 'hang the anchor off and would require a level of rigging expertise and good weather conditions. While the second method is not as labour intensive and the anchor, left on the chain, would act to damp down movement of the cable and reduce any yawing, during the towing operation.

Prior to activities taking place for either method a risk assessment would be carried out. The windlass would be greased and checked beforehand and any rigging gear made ready in ample time. Rigging equipment for hanging an anchor off, would have to be of adequate safe working load and such stresses would need to be assessed.

Question 27. When carrying out a damage assessment after the vessel runs aground you observe one of the oil tanks has fractured and is leaking. What actions would you consider appropriate to reduce the effects of the pollution?

Answer: Assuming a double bottom oil tank, it would be considered prudent to seal the upper deck scuppers to prevent oil being forced on deck by water pressure and going over the ship's side. It is assumed that the Master would contact the Designated Person Ashore (DPA) and as the Chief Officer you would recommend that Barrier/boom gear and dispersal chemicals are despatched to the vessel immediately via the ship's agents. It must be anticipated that all items of the Ship's Oil Pollution Emergency Plan (SOPEP) are carried out.

If possible, internal transfer of oil from fractured tanks into sound tanks would be carried out, as soon as practical. Similarly, external transfer from damaged tanks into a storage oil barge or shore side holding, would be arranged when available. Dispersal chemicals could be applied immediately to any oil pockets on the ship's decks. Local permission to use chemicals overside would also be sort.

Relevant entries would need to be made in the Deck Log Book, the Official Log Book, and the Oil Record Book.

Question 28. The chief engineer informs you that a valve in the cofferdam requires routine maintenance. As the ship's Chief Officer what would you do?

Answer: Such a task inside a cofferdam must be considered as an enclosed space activity and would necessitate the space to be prepared and checked. Further, a permit to work for enclosed space entry must

be issued and a risk assessment carried out, before any work could be sanctioned.

Once the space is adequately vented, illuminated and atmosphere tested, personnel could be briefed to carry out the task following all precautions as listed within the content of the permit to work. A standby man would be designated outside the space while the engineers are actively engaged.

Checks would also be made that this task does not overlap with other ongoing work in the same vicinity, which may lead to a conflicting hazard.

Question 29. While on passage across the North Atlantic your vessel strikes a floating log and the number one cargo hold is bilged. What action would you take as Chief Officer?

Answer: It would be necessary to consult the 'damage stability data' and obtain the list and the ship's revised GM. Once these facts are known prudent ballast movement could be carried out to remove the list and still retain a positive GM. If the compartment contains cargo at the time of the incident, account must be taken of the permeability of the cargo.

It may be prudent to rig a collision patch over the damaged area, assuming that the damage sustained, is at, or near the water line, from the floating object.

If the damaged area can be sealed then pumping of the bilged compartment could be carried out. In any event the Master would be expected to report the incident and inform owners to make arrangements for the vessel to be repaired. A 'port of refuge' with repair facilities may be the most immediate requirement as well as being the safest option.

Question 30. While on a voyage across the Pacific Ocean, the Master of the ship suffers a heart attack and dies. What is the expected action of the Chief Officer?

Answer: The Chief Officer would immediately assume command of the vessel and inform senior officers and the crew of the death and the change of command. An entry into the Official Log Book would be made to this effect, stating the reason why the Chief Officer has assumed command. An entry would also be made in the Log Book under the heading of Births and Deaths on board the ship, to reflect the death of the Master.

The Master's body must be isolated in a cool storage place and the ship's owners must be Informed of the incident and the current status of the vessel. Company instructions would be expected to advise on subsequent action to the Officer in Charge of the vessel. Any witness statements and photographic evidence should be retained for future enquiries.

SHIP HANDLING AND ANCHOR PRACTICE

Question 1. How would you prepare and pass a slip wire to a mooring buoy?

Answer: Assuming that the bow is secured by soft eye mooring ropes, the slip wire would be run to the buoy on the bight.

The eye of the slip wire would have been reduced by seizing and a messenger rope would be lowered to the mooring boat with the wire. It would be normal practice for the boat men to take some slack on the wire and on the messenger to ensure smooth operations.

Once at the buoy, a boat man, in a lifejacket, would 'jump the buoy' and pass the reduced eye through the ring of the buoy, then secure the messenger to the slip wire. This is then heaved back to the parent vessel and both parts of the slip wire can be turned up on bitts.

Note: The messenger should not be passed through the ring of the buoy as this would probably cause the reduced eye to 'jam' at the buoy ring, when being hauled back by the messenger.

Slip wires are set, as last out, last in moorings, to give the vessel the ability to let itself go from mooring buoys, without the assistance of wharf men.

Question 2. When intending to tie the vessel up on a tidal berth, what would you consider as an appropriate mooring pattern?

Answer: Assuming that the weather forecast is not adverse and the range of tide is not excessive, normal practice would be to secure the vessel with:

- four (4) headlines
- four (4) Stern lines

- a breast line each end, and
- a spring wire plus nylon pennant at each end.

Question 3. What do you understand by the term 'Snub Round'?

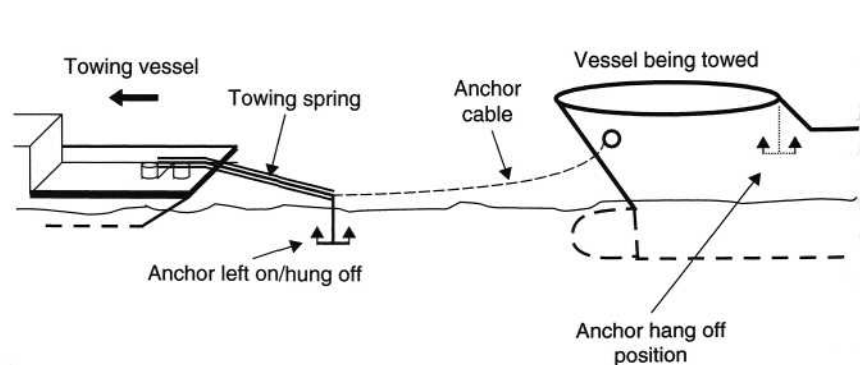
Answer: The term refers to the turning of the vessel smartly, by means of letting an anchor go, at short stay. Use of helm movement towards the same side as the anchor has been used would effectively turn the vessel through 180°.

It is necessary where sea room is limited and an elliptical or short round is not an option. However, caution must be used to ensure that no underwater obstructions are shown where the anchor is to be used.

Question 4. If your vessel found it had to take a tow in mid-ocean how would you rig up a 'composite towline'?

Answer: The 'composite towline' is established by use of the ship's anchor cable, being secured to a towing spring from the towing vessel. In order to connect the two, it may be necessary to hang the anchor off and bare the end of cable. The anchor can be 'hung off in the hawse pipe by its own securing devices, if the vessel is fitted with a 'centre lead' in the bows. Alternatively, with no centre lead the anchor could be 'hung off at the shoulder, from the break of the foc'stle head.

The Master may decide not to hang the anchor off at all but leave it *in situ*. This would then provide a steep catenary to the towline and could provide a dampening effect and reduce yawing movement of the towed vessel.



Composite towline.

Question 5. What are the advantages and disadvantages of carrying out a Mediterranean Moor?

Answer: The advantages of the Mediterranean Moor are:

- That more vessels can berth with restricted quay space.
- Cargo ships can work both port and starboard sides into barges.
- Tanker vessels can load/discharge through stern manifolds.
- Roll on-Roll off (Ro-Ro) vessels can operate stern ramps.

The disadvantages are:

- The vessel is exposed from the shore.
- Cargo ships are denied the use of shore side cranes.
- Loading and discharge must take place into barges.
- A boat is required to go ashore.



Ferries moored stern to the quayside in Mediterranean Moor style in the Greek Island of Rhodes.

Question 6. What is the advantage and disadvantage of using two anchors to moor the vessel?

Answer: Use of two anchors to moor the vessel is carried out to increase the holding power and prevent the vessel from dragging from

her anchored position. Where a designated moor, like a running moor is executed its single purpose is to reduce the swinging room.

In any situation where two anchors are employed the disadvantage is that the risk of a 'foul hawse' is ever present.



The 'Seaward', Class 1, passenger cruise ship, seen moored at anchor with both port and starboard anchors deployed.

Question 7. A vessel moored with two anchors experiences a wind change during the night. In the morning it is realised that the cables have crossed into a foul hawse. What are the terms to describe if the cables have:

- (a) Crossed once?
- (b) Crossed twice?
- (c) Crossed three times?

Answer:

Crossed once is termed ... 'A Cross'.

Crossed twice is termed ... 'An Elbow'.

Crossed three times is termed ... 'A Cross and Elbow'.

Note: If the vessel turned again this would be known as a 'round turn'.

Question 8. Your vessel is under orders to moor to buoys by means of mooring ropes aft, and the anchor cable forward. How would you do this?

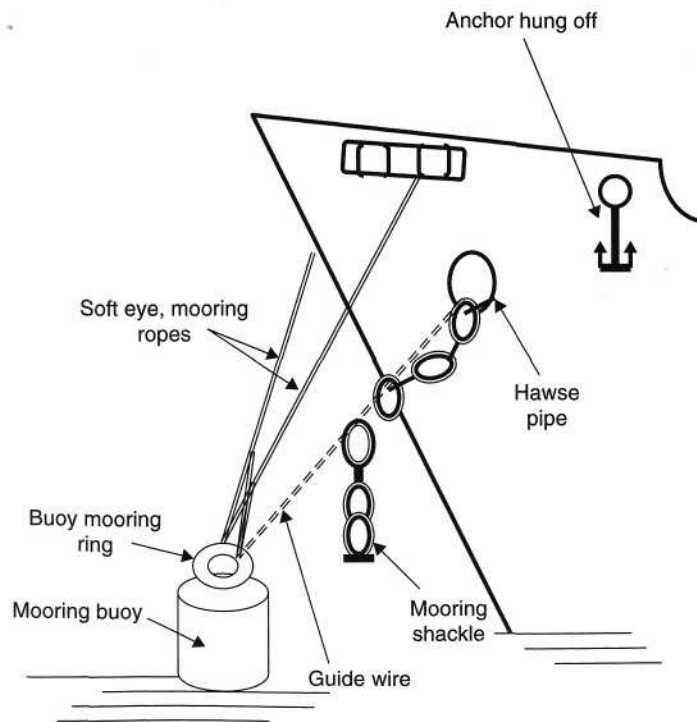
Answer: Initially, the vessel would secure by the use of mooring ropes both fore and aft. Once the vessel is secured to the buoys in this manner, the anchor would be hung off either at the shoulder, or in the hawse pipe, if the vessel has a centre lead 'bullring'.

Once the anchor is cleared from the cable, the bare end of the cable is flaked on deck with enough slack cable to run to the buoy. A mooring shackle would be secured to the bare end of cable, ready to secure to the ring of the buoy.

A guide wire would be passed through the cable with three or four links kept clear. Once the cable is lowered clear of the lead the guide wire from the buoy can be tensioned. The cable can be walked back to slide down towards the ring of the buoy.

A buoy jumper, with lifejacket, would then be able to secure the mooring shackle joining the bare end to the buoy ring.

The ship's bow is first secured by mooring ropes. The guide wire is then passed and the cable is walked back to slide down the guide wire to the buoy.



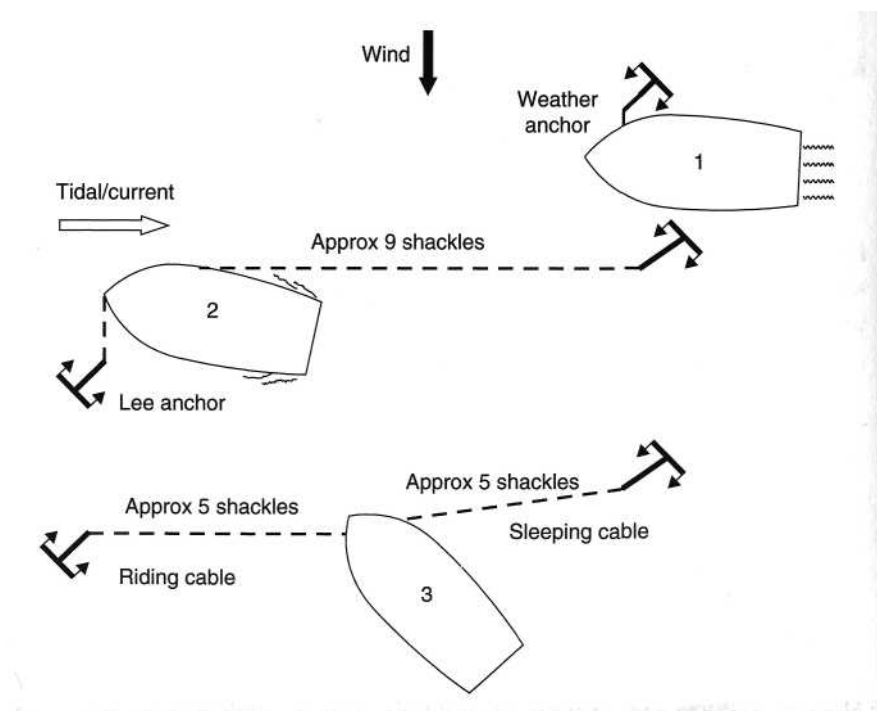
Mooring to Buoys – by means of Anchor Cable (use of 'guide wire').

Question 9. How would you moor your vessel in a tidal river, with reduced swinging room?

Answer: The vessel could be moored by either a 'running moor' or a 'standing moor', operation. If the choice is available, the running moor would be carried out because it generally provides positive control to the ship handler.

Question 10. How would you carry out a 'running moor'?

Answer: The vessel would initially stem the tidal flow and have both anchors walked back and held on the brakes of the windlass. Having previously made up an anchor plan, the ship would be manoeuvred to a position approximately five (5) shackles length, behind the designated mooring position. With engines on slow ahead, the weather anchor should be let go and the cable allowed to run, to lay out about nine (9) shackles, from this advance position stop the engines and engage the weather anchor cable in gear. Let go the second, lee anchor and provide astern propulsion. This anchor will become the riding cable as the vessel drops back astern, heaving short on the cable of the weather anchor.



Question 11. While on anchor watch, laying to a single anchor, it is observed that the vessel is sheering about and in danger of breaking the anchor out. What would you probably recommend to the Master?

Answer: In order to control any sheering motion on the vessel, it could be recommended to lower a second anchor under foot.

Question 12. Your vessel is in transit down a long river and the helmsman reports that the steering is sluggish and slow to respond to his wheel movements. What would you surmise from this and what could you do?

Answer: Depending on the circumstances, the underkeel clearance can be expected to be somewhat reduced and as such the vessel may be experiencing excessive 'squat'. If this is the case, it might be prudent to reduce the vessel's speed as squat has been shown to be directly related to speed².

Question 13. If you are required to anchor your vessel in deep water, how would you proceed?

Answer: In every case of anchoring, I would expect to carry out a complete anchor plan. In the case of deep water anchoring it would be expected to walk back the anchor, in gear, all the way to the sea bottom and under no circumstances 'let go' the anchor.

Question 14. Your vessel is under repair in a port in the Far East when a tropical revolving storm is forecast as being imminent. Under normal circumstances you would let go your lines and run for the open sea. What are your options in this case?

Answer: With a disabled vessel my options would be restricted to one of two:

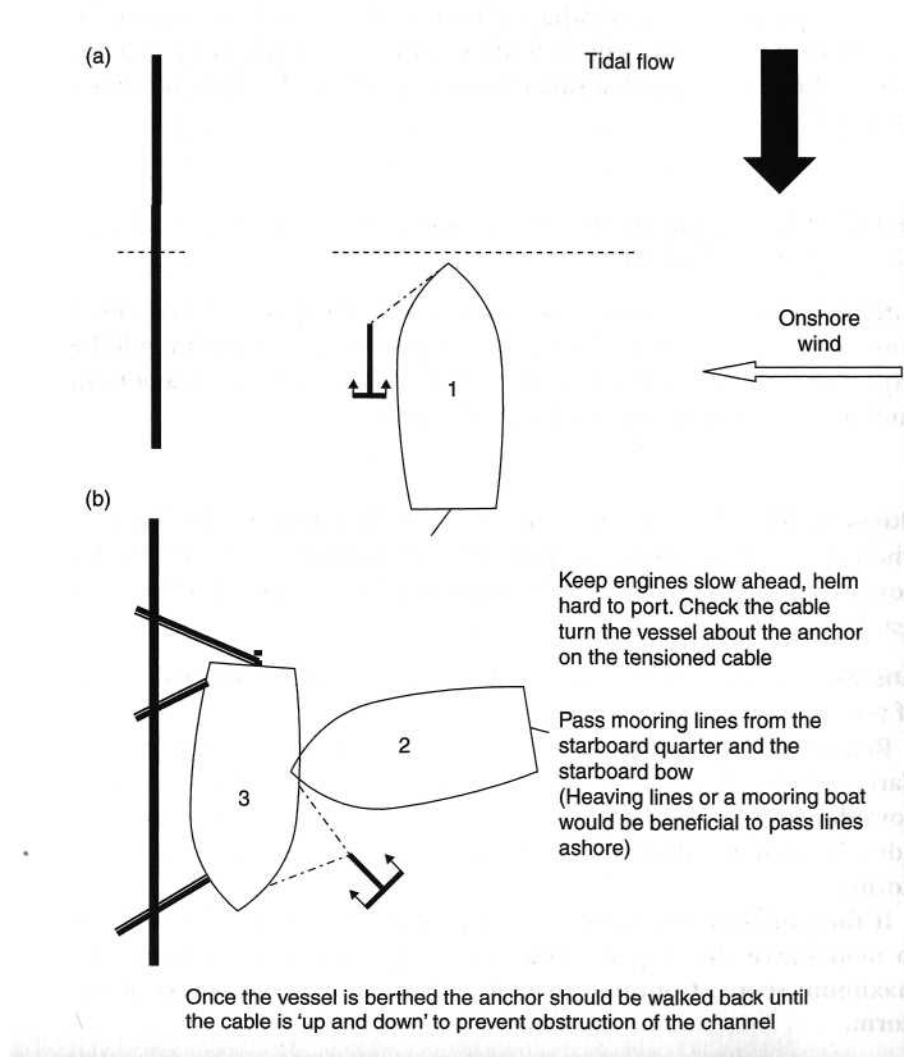
Remain tied up alongside. Set extra moorings out both fore and aft. Carry out and lay anchors with the assistance of tug(s) Batten the ship down for heavy weather, clear of shore side cranes and any other quay-side obstructions. Plot and continue to monitor the progress of the storm.

If the port has a sheltered storm anchorage tugs may be available to manoeuvre the ship into the anchorage. Lay both anchors with maximum scope. Continue to plot and monitor the progress of the storm.

Note: In both cases continue to expedite engine repairs and return the ship to a full manoeuvring status.

Question 15. How would you berth your vessel starboard side to, with a strong onshore wind, currently on your own starboard side and the tidal current ahead?

Answer: With the ship stemming the tidal flow you should advance parallel to the berth at a distance off, of approximately one ship's length. When the vessel's bow is in a position at a mid-point of the berth I would let the port, inshore anchor go at short stay and turn the vessel hard to port using maximum helm.



Question 16. What are the controls and their significance, which are fitted to the auto-pilot?

Answer: The auto-pilot, has several steering modes and each can be set to suit the needs of the ship handler as required.

- *Auto/manual:* Allows the user to select between the manual steering or automatic steering modes.
- *Tiller control:* An override which allows direct control of the helm and overrides the Auto control (off course alarm will activate unless cancelled before use).
- *Follow-up/non-follow-up:* Automatic return in follow-up mode. Whereas counter helm action is required in the non-follow-up mode.
- *Off course alarm:* Auto-pilots are fitted with an off course alarm system which can usually be set to operate at either 5° or 10° off the ship's desired heading.

Rudder control: This setting determines the angular measure to be given to the rudder.

Counter rudder: This control determines the amount of counter rudder to apply to be given once the vessel has started swinging, in order to check the swing to attain the correct course heading.

Permenant helm: A control used only if a constant external influence like from a beam sea is experienced. It provides helm to counteract the offset.

Weather: A counter control to compensate for the effect of weather or sea conditions which may cause adverse movement like 'yawing'.

Question 17. Where would you not engage automatic steering?

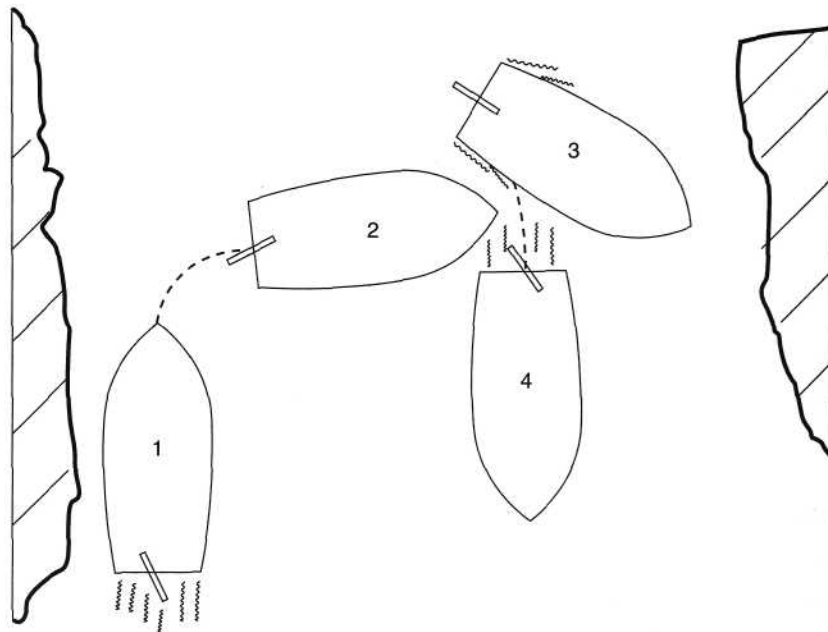
Answer: Auto-pilot must not be used in restricted waters or in conditions of poor visibility. Neither must it be employed when entering or leaving ports and harbours or other hazardous navigational area (Reference: Merchant Shipping (Automatic Pilot and Testing of Steering Gear) Regulations 1981. Additional Reference: Chapter 5, SOLAS).

Note: As the auto-pilot is interfaced with the gyro compass then manual steering should be adopted in the event of a malfunction to the gyro compass.

Question 18. How would you turn a vessel 'short round' in a restricted channel, when the ship is fitted with a right-hand fixed propeller and no bow thrust unit?

Answer: Alter the ship's head to move to the port side of the channel, as this would gain the greatest advantage when operating astern from transverse thrust, during the turn.

- (a) Dead slow ahead on engines and order the helm hard to starboard.
- (b) Stop engines, wheel midships.
- (c) Full astern, wheel amidships, until the vessel gathers sternway, then stop engines. The effect of transverse thrust would generate a tendency for the bow to move to starboard and the stern to move to port.
- (d) Wheel hard to starboard, engines full ahead to achieve the reverse heading.



The objective of the short round is to effect a tight turn within the ships own length or as near as possible to within its own length.

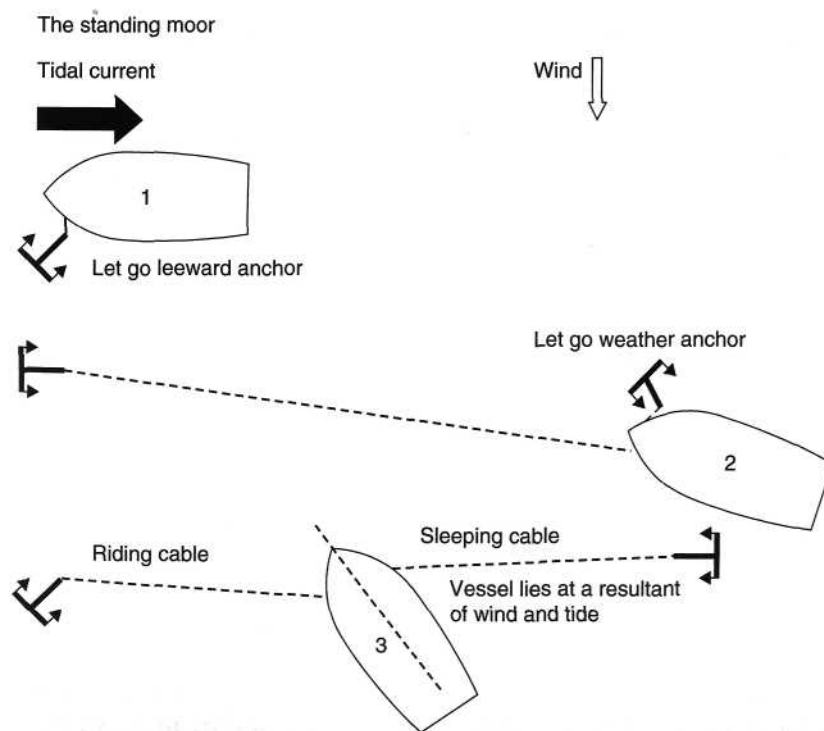
Question 19. How would you carry out a 'standing moor' operation?

Answer: To carry out a standing moor, an anchor plan would be devised, and the vessel would be manoeuvred to stem the tide and pass the intended position of mooring by an approximate length of five (5) shackles of cable.

This position is approached with both anchors walked back clear of the hawse pipes. At position 1, take all way off the vessel, let the leeward anchor go and allow the vessel to drop back astern with the flow of the tidal stream, paying out the cable, to about nine (9) shackles on what will become the riding cable.

At position 2, check the ship's astern motion and place the leeward anchor in gear, prior to heaving away to shorten cable. Let go the weather anchor and use engine (if available) to move the vessel ahead while at the same time recovering cable on the riding cable and paying out on the weather anchor cable (sleeping cable).

At position 3, stop the vessel over the ground and apply the brakes to both anchor cables leaving each cable with about five shackles paid out.



Question 20. When making tugs fast what safety precautions and aspects would you take into consideration?

Answer: Engaging with tugs must always be considered as a high risk area of work and as such the following points would go some way to making the task as safe as possible:

- (a) Clarify beforehand the method of engagement as to whether the tugs line is to be used or the ship's line and which 'lead' is intended.
- (b) All persons involved in the operation should be adequately kitted out in protective clothing and briefed as to the nature of the activities involved.
- (c) Adequate communications, tested beforehand, should be available between towing stations to the bridge and the towing vessel if appropriate.
- (d) If the tugs line is to be used, this should be inspected to be free of defects and be seen to be of adequate strength.
- (e) Throughout the operation all personnel should be advised to keep clear of bights in wires/ropes.
- (f) The eye of the towline should not be placed on the 'bitts' but the wire should be set in a figure '8', turns, around the bollards. The top turns should be lightly lashed to prevent accidentally jumping off.
- (g) Non-essential personnel should be kept well clear of towlines and the towing area.

Question 21. When arriving in port after a deep sea passage what instructions would you carry out regarding the mooring decks at the fore and after ends of the vessel?

Answer: As the ship's Chief Officer, I would order the deck areas to be washed down and thoroughly cleaned prior to approaching the port. It would be necessary to order the mooring lines to be coiled down from their stowage area in the rope lockers, at the respective deck stations.

All stoppers, heaving lines and fenders would be positioned and seen to be in good condition. Communications fore and aft and bridge would be tested.

The windlass would be inspected and turned over, oiled and greased as appropriate. All lights, shapes and signals would be made ready for

use if required and the Master would be kept informed of the preparations made.

Question 22. What do you understand by the term 'kedging'?

Answer: The operation of 'kedging' is a stern movement of the vessel by means of an anchor layed astern of the vessel. Some ships are equipped with a stern anchor with capstan or small windlass to handle a short length of chain combined with an anchor warp.

Other vessels are known to carry a designated lighter anchor than that of the bower anchors, known as a 'kedge anchor'. These would usually lend to being carried out by the ship's boats.

Kedging is the act of dragging the vessel astern towards the kedge anchor and would usually be considered to re-float a vessel after taking the ground. The practice has been largely superseded with the advent of the more versatile tug which can be far more effective when re-floating a vessel aground.

Question 23. Your vessel receives orders to berth alongside another vessel to lighten ship. What actions and precautions would you take?

Answer: When expecting to berth alongside another vessel, the following actions are suggested:

- (a) Ensure that the vessel is correctly identified and communications have been established.
- (b) Advise the other vessel of the date/time of berthing to ensure reception for mooring lines and gangway.
- (c) Make sure that the ship's side is well protected by fenders down its entire length.
- (d) Walk back the offshore anchor to be ready to hold the vessel off and check the rate of approach.
- (e) Moorings would be passed to the vessel alongside as the two vessels are drawn together. The moorings being set to include springs to prevent ranging.
- (f) Once all fast it would be the duty of the offshore (outside) vessel to supply the gangway access, or alternatively this would be supplied by the vessel with the highest freeboard.
Note: When two vessels are lying alongside it is anticipated that mutual co-operation would prevail in the provision of a safe access.
- (g) Carry out a security assessment and determine a suitable security level.

Question 24. What is synchronised rolling and what is synchronised pitching? What action would you take if either condition presented itself while you were on watch?

Answer: Synchronised rolling is when the roll period of the vessel equals the period of encounter of the waves. This is considered a highly dangerous condition and should be destroyed immediately by altering the vessels course.

Synchronised pitching is when the period of the vessel pitching, equals the period of encounter of the waves from either ahead or astern.

It must be considered extremely dangerous especially if in an area of abnormal waves. It can be overcome by reducing the ship's speed and changing the period of encounter.

Question 25. Your vessel is under orders to moor to a buoy by means of its anchor cable. How would you hang your anchor off to bare the end of cable, if the ship is fitted with a centre lead, bullring in the eyes of the foc'stle head?

Answer: If the vessel was not fitted with a bullring, it would be necessary to hang the anchor off at the shoulder. A laborious task even with the facility of a shore side crane.

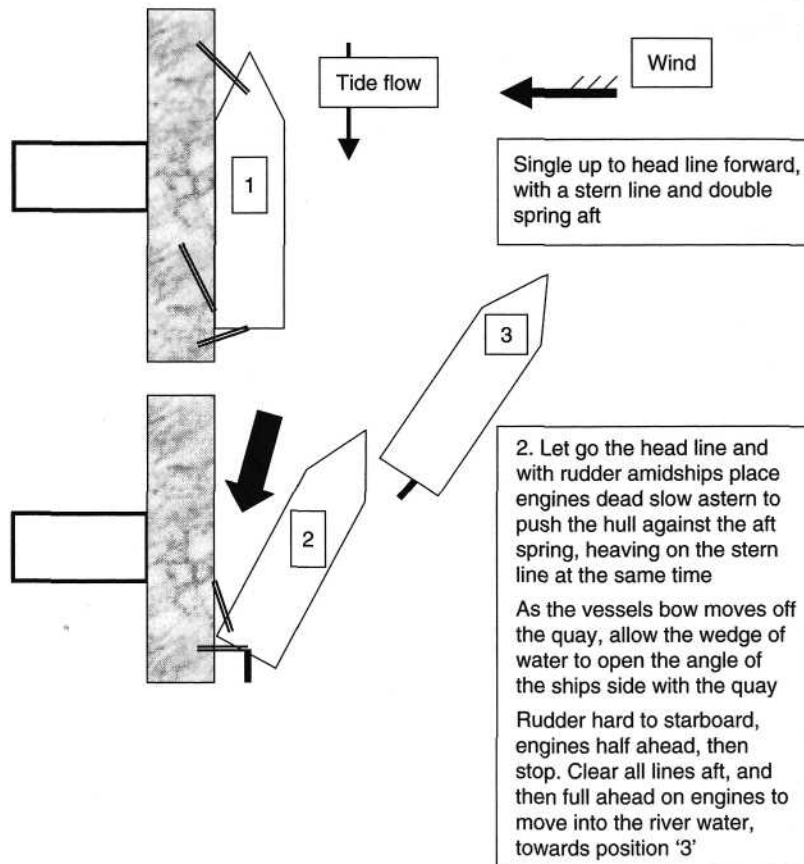
The benefit of the bullring would allow the anchor to be hung off in the hawse pipe. This task is comparatively easy, because it utilises the anchors own securing devices, like the bow stopper, devils claw and additional cable lashing points.

The cable can be broken at the first joining shackle forward of the windlass position and the bare end walked back to pass through the bullring.

Question 26. A tanker with a right-hand fixed propeller is berthed, port side to a 'T'-shaped jetty with the tidal direction from ahead and the wind on its starboard side. If there is deep water at each end of the jetty, describe how the vessel would come off the berth into the river if no tug assistance is available?

Answer: The weight of water which forms the 'wedge of water' between the ship and the jetty will have greater power than the effect of the onshore wind. Once angled away from the jetty use of rudder and engines can be employed to move the ship in towards the open river waters.

Note: Engines should be brought to a stop while clearing the stern moorings to reduce the risk of fouling a rope in the propeller.



Taking a vessel off the berth, against the wind.

Question 27. What are the main concerns when making a transit of a river or canal, where ships are moored against the banks of the waterway?

Answer: The main concerns in a narrow waterway are from the forces of interaction, inclusive of squat. If the ship is on passage at too high a speed the moored ships on the bank sides may even start to 'range' on their moorings. In the event that these mooring are slack to start with, the moored ships may even part their lines because of this ranging motion.

The wash from the movement of your own vessel will expect to travel along the canal or river banks, not only will this cause bank

erosion but it may cause accidents to persons on the bank areas, e.g. Fishermen.

Other concerns would be with reliability of steering gear and main engine propulsion.

Question 28. When taking a ship into Dry Dock, why do the dock authorities usually request the ship to be trimmed by the stern?

Answer: It is normal practice to have a stern trim for entering Dry Dock for several reasons:

- (a) The ship tends to handle and steer better with a stern trim.
- (b) The declivity of the dock bottom is compatible with the trim angle.
- (c) The 'Sole Piece' is an aft strength member and will be the first part of the vessels structure to make contact with the blocks. Achieved with a stern trim.

Question 29. When conducting turning circle trials with a single right-hand fixed propeller, would you expect the vessel to turn faster and tighter to port or to starboard? (Assuming calm weather, same conditions for both port and starboard turns.)

Answer: Right-hand fixed propeller ships generally turn faster and tighter to port, than to starboard.

Question 30. When mooring to buoys, how would you secure the moorings to the ring of the buoy?

Answer: There are several methods to secure the ropes to the buoy rings employed around the Maritime nations. Any one of the following could expect to be used:

- (a) Soft eye mooring rope or wire with a 'bow'-shaped mooring shackle.
- (b) Four metre manila lashing attached to a rope eye. The eye is passed through the ring and the two parts of the eye are secured together under the standing part. The lashing is usually completed by a slip knot for quick release.

- (c) Rope eye and toggle secured under the standing part. A popular method also employs the bight of a rope (or wire) passing through the buoy ring. (In the case of a wire this could be used as a slip wire.)

CARGO WORK AND LIFTING GEAR

Question 1. What do you understand by the term 'proof load' as applied to derricks?

Answer: The proof load is that tonnage which is applied during the testing of the derricks capacity. Derricks are routinely tested at 5-year intervals by a cargo surveyor. The test imposed on the lifting gear will be the proof load and for derricks of:

Less than 20 ton SWL	Proof load = 25% in excess of the SWL
Between 20 and 50 ton SWL	Proof load = 5 ton in excess of SWL
Over 50 ton SWL	Proof load = 10% in excess of SWL

Question 2. Where would you find details of the ship's cargo handling and lifting appliances?

Answer: Register of Cargo Handling and Lifting Appliances, the Rigging Plan and marked on the appliance itself.

Question 3. When carrying out the annual inspections of derricks what would a Chief Officer expect to pay particular attention to?

Answer: An annual inspection of derricks would include a thorough visual inspection of the boom particularly the underside where contact is made with the 'crutch', as corrosion is known to occur in this region. The inspection would also note the condition of the 'spider band' and the attached 'lugs'. However, the main weight bearing components are contained in the 'blocks' and the 'gooseneck arrangement'. All the blocks would be overhauled, namely the heel block, head block and span blocks. The bushes and the axle bolts would be withdrawn from each and closely inspected for rust, corrosion, pitting or hairline cracks. The gooseneck would be drawn as being the main element of the derrick. This would be cleaned of all old grease and given a detailed inspection for any sign of corrosion or deformity. If the units

are found satisfactory they would be re-greased and assembled and returned to situation.

A record of the inspection would be made in the Register of Lifting Appliances, and in the planned maintenance schedule.

Question 4. How would you make up a loading plan for a bulk carrier?

Answer: The modern ship is equipped with a 'loadicator' or customised computer programme. The order, distribution and quantities of cargo, stores, fresh water and ballast would all be included in order to determine the overall loaded condition.

Question 5. What information is provided by the 'loadicator'?

Answer: Following the input of cargo quantities and weights, the output from the programme would supply stress values comparable against acceptable parameters. These would include the bending moments, shear force and effects on the 'GM'.

Question 6. When scheduled to load a heavy lift, what type of checks and precautions would you make?

Answer: As the Chief Officer I would ascertain the total weight and overall size of the load and ensure that it is within the SWL capacity of the ship's heavy lift derrick/crane (if the load is being made from a floating crane or shore side facilities over and above the ship's loading capability then it would be necessary to also check the facilities and capability at the port of discharge).

Once the size and weight of the load are known the Load Density Plan would be checked to ensure that the space for designated stowage is capable of accepting the load with regard to both size and deck weight capacity.

The stability checks would include the calculation of the maximum angle of 'heel' if using ship's gear. The GM would also be ascertained for all stages of the lift, from hoisting to landing.

The GM may need to be improved by adding water ballast to double bottom tanks, in order to compensate for any expected loss of apparent GM.

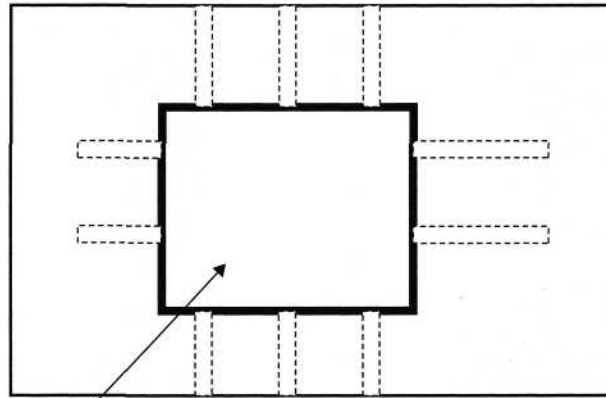
Slings the load or any special lifting apparatus which it is intended to use, would warrant inspection and may become a consideration for

leaving with the load for the purpose of discharge (often heavy loads are incorporated with a raft or cradle for transportation purposes).

Question 7. If the load concentration of a heavy lift, exceeded the tonnes per square metre, as stipulated by the 'Load Density Plan', what would you do?

Answer: The deck area for the intended stowage space can be laid with timber bearers in order to spread the load over a greater square area. If the intended stowage is in a tween deck additional under deck supports in the form of temporary additional pillars may need to be constructed. Failing this an alternative stowage position should be sought.

Example – load density plan
Permitted load = 6 ton/m²



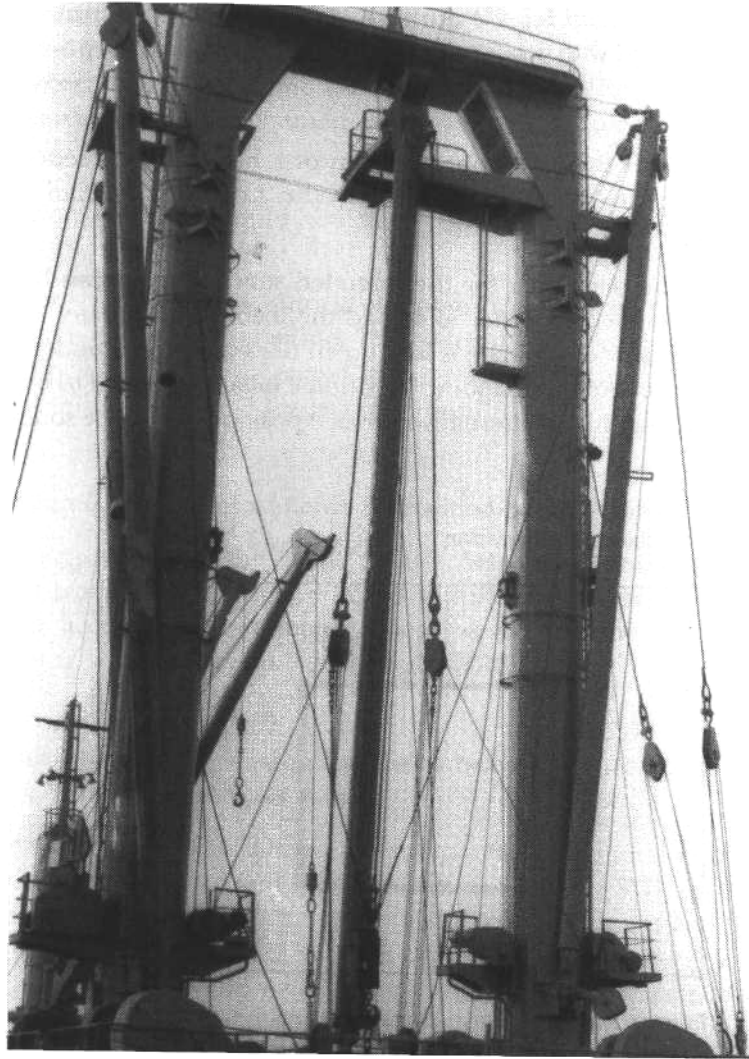
Example load 3 m × 4 m = coverage of 12 m²
Total weight = 120 ton
Tonnes/m² = 10 ton (deck is overloaded)

By placing the load on bearers the deck area occupied by the load is increased to 5 m × 7 m = coverage of 35 m²

Tonnes/m² = $\frac{120}{35} = 3.43$ ton (less than the designated plan load and therefore acceptable)

Question 8. Describe the operation of loading a 60 ton bulldozer, with a conventional heavy lift, 'Jumbo derrick'?

Answer: The derrick rig would be checked thoroughly and all blocks and purchases would be seen to be overhauling and any additional

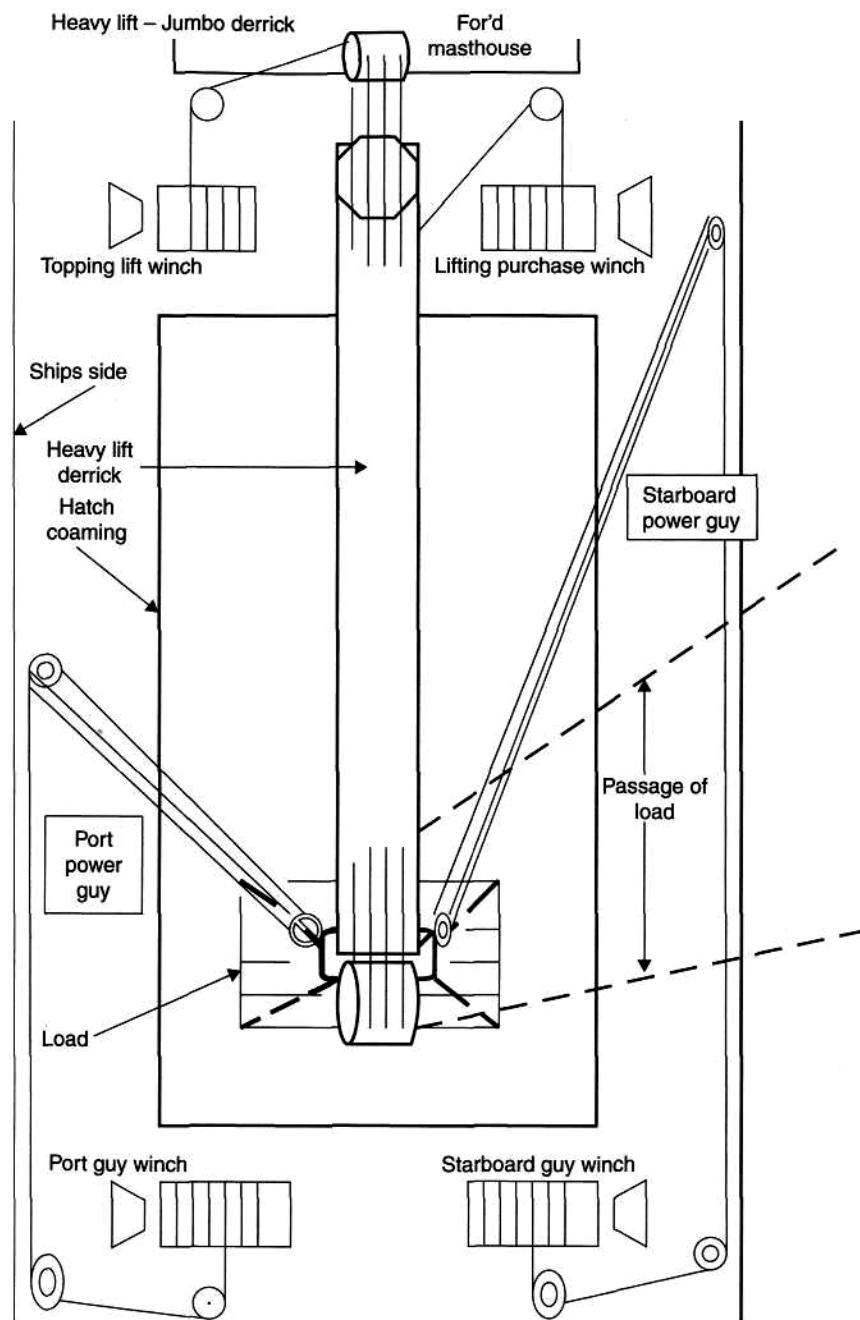


Heavy lift 'Jumbo' conventional derrick. A conventional 60 ton SWL, Jumbo derrick stowed in the upright between the Samson Post structure. Smaller 10 ton derricks are sited on either side for working lighter cargo parcels.

rigging such as Preventer Back Stays would be secured as per the •
'Rigging Plan'.

The stability check would have been completed and the maximum angle of heel would have been calculated. Any free surface moments would have been eliminated where possible.

The gangway would be lifted clear of the quayside and moorings would be tended during the period of lift. Winch drivers (four) would



Heavy lift - Jumbo derrick.

be experienced men operating the winches in double gear and taking their instructions from the 'Hatch Foreman'.

Adequate size slings would be secured to the load at the correct lifting points. A spreader or lift bridle may be used if appropriate. Steadying lines would be secured to the lift and manned, in order to control any oscillations on the load during the hoist and landing of the heavy lift. It may prove necessary to deliberately turn the load in transit and these lines should be of adequate strength as to be able to provide positive control.

The deck stowage position would have been prepared and adequate timber bearers would be in position to provide a non-skid surface and spread the load to be within acceptable limits of the Load Density Plan.

When all was ready the derrick would be turned out to plumb the load, and the maximum angle of heel at the extreme outreach would be checked against the ship's inclinometer. Provided the conditions are acceptable, the load would be lifted, smartly, to avoid any lateral drag movement, of the load.

Note: Most Chief Officers would note the heavy lift on the cargo manifest and made time to visit the cargo warehouse to check the documentation, markings, listed weight and overall size of the load prior to commencing lift operations.

Question 9. If you were on a bulk carrier, loaded with 'iron ore' what stresses would you anticipate, which may occur during the passage?

Answer: Iron ore or other similar heavy cargoes must be loaded in proportion and in a manner conducive to the fore and aft length of the vessel. The loading plan should take account of the effects that may be incurred due to: racking stresses, bending moments, shear forces and torsional stresses.

Question 10. Why do tanker vessels engage in Tank Cleaning and what methods do they employ?

Answer: Tank cleaning is carried out to:

- (a) Prevent inter-grade contamination.
- (b) Permit subsequent gas freeing for entry.

- (c) Provide additional ballast space.
- (d) Remove solid residues and sludge.

Three methods of tank cleaning are common:

- (1) Flushing with water or cargo.
- (2) Seawater washing employing tank cleaning machines.
- (3) Crude Oil Washing (COW).

Question 11. After washing tanks what do you do with the dirty residues?

Answer: The slops are discharged into a barge or to shore side reception facilities.

Question 12. What procedures would you adopt to load a full cargo of coal aboard a bulk carrier?

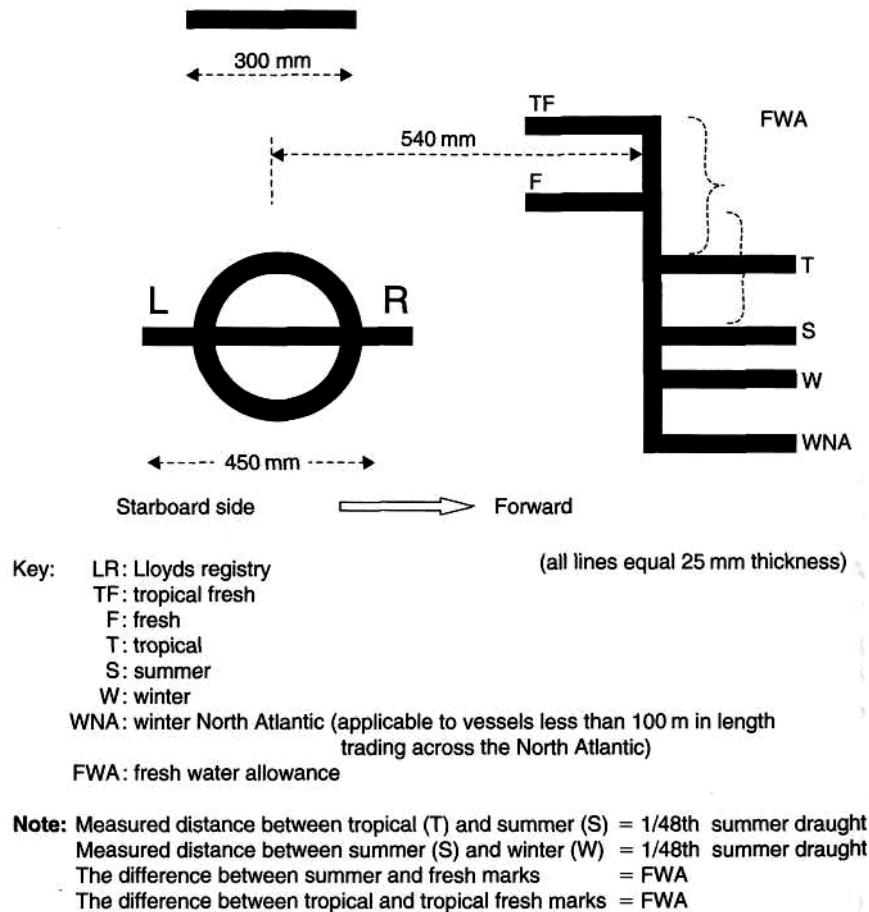
Answer: Having obtained the cargo details (grades, quantities, voyage details, etc.) from the Charterer, it would be usual practice to prepare a loading plan to take account of the ports of discharge. The holds would be cleaned and inspected before commencing any cargo operation.

The following points would then also be assessed:

- (a) The stability criteria for all conditions of loading and discharging.
- (b) The distribution of grades in specific holds.
- (c) Shear force and bending moments are within permissible limits.
- (d) Minimum trim and air draught maintained within acceptable parameters.
- (e) Ballasting and deballasting sequence to suit loading schedule.
- (f) Safety procedures for coal checked and adhered to, i.e. explosion risk, spontaneous combustion and gas accumulation.
- (g) Final trimming of cargo to ensure that the vessel completes in the upright condition.

Question 13. Draw a load line mark, state which side of the ship and which direction is forward?

Answer: Freeboard mark at the uppermost continuous deck. 300 mm.



Question 14. Which vessels must carry a Certificate of Fitness?

Answer: All tanker vessels, gas carriers and chemical carrying vessels must have a 'Certificate of Fitness'. It is issued by the Maritime and Coastguard Agency (MCA) and subject to annual survey, normally carried out by a Classification Society. Period of validity is 5 years with no extension permitted.

INTERNATIONAL LOAD LINE CERTIFICATE

ISSUED UNDER THE PROVISIONS OF THE

INTERNATIONAL CONVENTION ON LOAD LINES, 1966
AS MODIFIED BY THE PROTOCOL OF 1988 RELATING THERETO

UNDER THE AUTHORITY OF THE GOVERNMENT OF

(name of the State)

(Surveyor, American Bureau of Shipping)

Particulars of Ship

Name of Ship	Distinctive Number or Letters	Port of Registry	Length (L) as defined in Article 2(8) (in meters)	IMO Number ¹

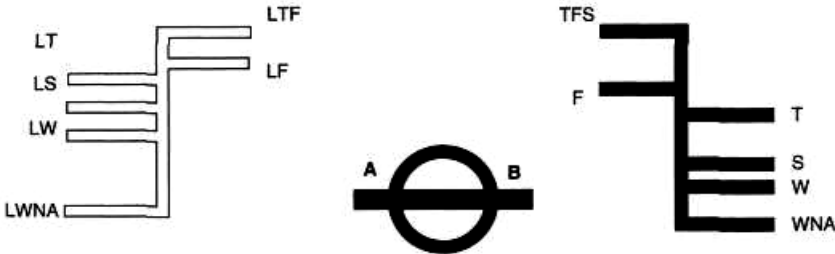
Freeboard assigned as: * { A new ship
An existing ship

Type of Ship: * { Type 'A'
Type 'B'
Type 'B' with reduced freeboard
Type 'B' with increased freeboard

*Delete whatever is inapplicable

	Freeboard from Deck Line	Load Line
Tropical	mm (T)	mm above (S)
Summer	mm (S)	Upper edge of line through center of ring
Winter	mm (W)	mm below (S)
Winter North Atlantic	mm (WNA)	mm below (S)
Timber tropical	mm (LT)	mm above (LS)
Timber summer	mm (LS)	mm above (S)
Timber winter	mm (LW)	mm below (LS)
Timber winter North Atlantic	mm (LWNA)	mm below (LS)
Allowance for freshwater for all	mm	
Freeboards other than timber		
For timber freeboards	mm	

The upper edge of the deck line from which these freeboards are measured is: OPPOSITE TOP OF STEEL UPPER deck at side.



¹In accordance with the IMO Ship Identification Number Scheme, adopted by resolution A.600 (15).

Question 15. When loading fully to the ship's marks in dock water, by how much can you submerge the load line?

Answer: The ship may continue to load cargo up to the equivalent of the Dock Water Allowance.

Question 16. What is the Dock Water Allowance and how do you obtain its value?

Answer: The Dock Water Allowance (DWA) is the measured value that the summer load line disc can be submerged. Once the vessel passes from the density of the dock water into seawater the ship would rise an equivalent amount equal to the DWA. The amount the disc can be submerged is found by formula:

$$\text{DWA} = \frac{1025 - \text{density of dock water (Hydrometer Number)}}{25} \times \text{FWA}$$

Note: Examiners may give example figures and expect candidates to work the DWA.

$$\begin{aligned}\text{DWA} &= \frac{1025 - 1010}{25} \times 150 \text{ mm} \\ &= \frac{15}{25} \times 150 \\ &= 90 \text{ mm}\end{aligned}$$

Assume: Hydrometer = 1010 FWA = 150 mm
--

To determine the cargo to load, this value in centimetres, can be multiplied by the tonnes per centimetre (TPC).

Question 17. What are the main dangers associated with bulk cargoes?

Answer: Bulk cargoes depending on the type, have associated hazards from the onset of loading. They include structural damage during loading and discharging periods as well as during distribution and/or trimming, to prevent shifting in a seaway.

Incorrect distribution of bulk cargoes could incur dangerous 'bending moments' and excessive 'shear forces' which could directly effect the ship's structure.

The reduction and loss of positive stability during the voyage either by cargo shift or liquefaction is a possibility with many types of cargoes, shifting being a result of bad weather and improper trimming or securing. While liquefaction of certain cargoes could be stimulated as a result of vibration and ship's motion, e.g. cargoes: fine grained materials, inclusive of fine coal if shipped in a damp condition.

Other dangers can arise from 'chemical reactions' which may give rise to either toxic or explosive gases. Other cargoes like coal, could also give rise to spontaneous combustion.

Question 18. What precautions would be taken when loading and carrying a full cargo of 'wood pulp'?

Answer: A cargo of 'wood pulp' would be loaded in accordance with the advice given in 'MSN 107' which recommends that the cargo compartments are clean and dry. Wood pulp expands considerably when wet and therefore all: air pipes and ventilation shafts should be effectively blanked off to prevent any accidental admission of water.

Question 19. What products are classed as 'Grain Cargoes' and how would you load grain in a General Cargo vessel?

Answer: Grain is denned as wheat, maize, oats, rye, barley, rice, pulses, seeds and processed forms of the above, which may behave in a similar manner.

Prior to loading grain the ship's hatches should be prepared. This would incorporate a thorough cleaning with all sweepings and residuals removed and seen to be in a dry condition throughout. The bilges should be tested and sweetened to be free of taint. These would be sealed with burlap or other similar material. The spar ceiling would be removed from the hold and stowed clear of cargo spaces. The holds would be surveyed by a cargo surveyor prior to the commencement of loading.

Grain would be loaded in accord with International Maritime Organisation (IMO) Grain Rules. These rules require a demonstration by calculation that at all times, during the state of the voyage, that the vessel will have sufficient intact stability. Sufficient to provide adequate residual dynamical stability after taking account of the adverse heeling

effects caused by an assumed shift of grain, into void spaces, lying directly above the grain surfaces.

Note: Value of residual dynamical stability found from the area under the Ships Righting Lever (GZ) curve.

Stability

The grain rules specify a minimum level of acceptable stability when carrying grain products with an initial metacentric height (GM) of 0.3 m, angle of heel due to assumed shift of 12° and residual dynamical stability.

Ship's stability can be improved by removing free surface moments present with slack tanks, either press up or pump out. Additionally, fill double bottom tanks to lower 'G' to effectively increase GM.

Cargo Measures

Where the compartment is full, rig a temporary longitudinal subdivision (shifting board) or using bagged grain to form a saucer on top of the grain surface.

Where the compartment is partially full, trimming the grain flat and laying a dunnage platform over the surface, then overstowing with bagged grain or other suitable cargo.

Question 20. Where could you obtain information on specialist types of cargoes if you lack any experience of the commodity?

Answer: Depending on the nature of the goods a variety of publications exist for reference and I would first check these out inclusive of MGNs, MSNs, The International Maritime Dangerous Goods (IMDG) Code, various IMO specified publications, Thomas's Stowage and other reputable cargo publications.

Additional sources would be via the ship's agents, direct to the shipper, the manufacturer of the goods, the Port Superintendent and the Departments of Health and Safety, and/or Environment.

Question 21. While working cargo by derricks, a cargo runner breaks. How would you replace this runner in minimum time, without causing the vessel to suffer excessive down-time?

Answer: The boatswain would be ordered to break out a new runner wire from the stores. A heaving line would be bent-on to the broken

wire then the turns on the winch would be run off. Once the broken wire is clear of the winch it can be pulled back clear of the derrick rig leaving the heaving line in place.

The new runner could then be flaked on deck and the reduced eye bent onto the heaving line. By pulling the heaving line back through the blocks, the eye of the new runner can be clamped to the barrel of the winch and run on.

Note: This method can be carried out quickly without lowering the derrick from its working position.

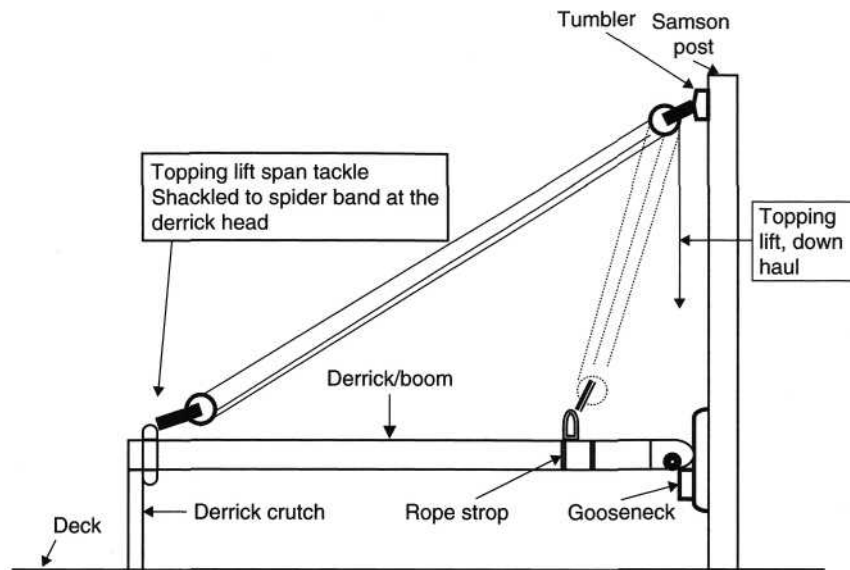
Question 22. When engaged on a Ro-Ro, vehicle ferry what checks are made to ensure that the vessel retains water tight integrity, once the vessel has completed loading, prior to sailing?

Answer: Once all cargo units are on board it would be normal practice to close up the stern ramp/door, and the bow visor together with the forward cargo door. The majority of these features are closed up by hydraulics, by the duty officer. Once sealed and locked they are monitored by a 'tell tale' light display on the navigation bridge. All openings into the hull, inclusive of 'shell doors', are fitted with sensors to indicate to the bridge whether they are open or closed (closed = green light, red light = open). All such openings are also monitored by closed-circuit television (CCTV). Also shown on the bridge.

These checks are meant to show that the vehicle decks of the lower hull are all closed and sealed and that the ship has watertight integrity. These features would also be communicated to the ship's Master by word of mouth, as and when they occur.

Question 23. When carrying the annual inspection on the ship's derricks describe how you would inspect the 'gooseneck'?

Answer: The annual inspection of lifting gear would include a thorough examination of all the blocks, shackles, wires, etc., associated with the derrick rig. The main component of the inspection would be the weight bearing, gooseneck arrangement. This would need to be drawn to expose all the moving parts for detailed inspection. The gooseneck could be drawn by use of chain blocks suspended from the underside of the 'mast table' but this method is dated and cumbersome. It is probably more practical to leave the derrick in the 'crutch', and employ the topping lift to hoist the gooseneck at the heel of the derrick.



Maintenance of the gooseneck.

In order to expose the gooseneck for regular inspection and maintenance, the derrick must first be lowered into the stowed position, to rest in the crutch. Any crutch securing should be released. A rope stop should be positioned around the heel of the derrick boom and shackled onto the transferred topping lift.

Note: The topping lift is detached from the derrick head spider band and moved to the heel/stropped position.

The down haul of the topping lift is then led to a winch to hoist the derrick heel upwards and draw the elements of the gooseneck/heel block clear for inspection.

Question 24. When engaged in overhauling and inspecting cargo blocks what instructions would you give to the boatswain, and what would you look for during your inspection?

Answer: In order to carry out a detailed inspection it would be necessary to strip the cargo blocks down completely and expose the sheave, the

bush and the axle bolt. To do this the distance piece at the arse of the block should be removed and the axle bolt withdrawn. This will allow the cheek plates to move from the binding and permit the extraction of the sheave.

Once the sheave is clear, the bush (bearing) can be removed.

The inspection would follow the removal of all old grease from the grease recesses, inside the centre of the sheave and in the centre of the bush. Any rust, pitting or visible corrosion on or around the steelwork, would indicate potential problems with the block. If the corrosion elements are extensive, then the block should be condemned.

The bush would be tested with fluid to detect the presence of hair-line cracks in the bearing. If none are found and the bearing is free of corrosive signs, then it should be re-greased and re-assembled prior to deploying the block in its previous position.

A note should be made in the record of the planned maintenance to the effect that the block and derrick rigging had had an annual inspection. The number and SWL should be left visible on the block, stamped on the binding and the block with its shackle should be checked and compared with the Rigging Plan.

Once re-assembled the overall condition of the block should be seen to be sound and the moving parts inclusive of the crown swivel and the sheave, should be seen to be free to rotate. The securing shackles would be moused and the rig could be returned to service.

Note: Where a block or shackle is found to be defective it should be replaced. Chief Officers are advised that the certificates for items replaced must be extracted from the 'Register of Ships Lifting Appliances and Cargo Handling Gear' and the new equipment certificate logged in its place.

Question 25. What is the principle and operational practice of a design built heavy lift ship?

Answer: These vessels are used for 'project cargo' of an exceptional nature and work on a principle similar to that of a 'floating dock'. The ship is essentially a tank system built beneath a reinforced platform deck.

Once the vessels tanks are full the vessels upper cargo deck is submerged. This allows the heavy lift, usually on a raft arrangement, to be floated over the ship. Once in position the ship's tanks are emptied and the ship rises picking up the rafted heavy lift.



The heavy lift vessel 'Sea Servant 3' engaged in the transport of the crane barge, 'Al-Baraka 1'.

Question 26. Cargo parcels of goods listed in the IMDG Code are loaded on board your vessel at the beginning of a voyage. After several days at sea these packages are seen to be leaking. What action can you legally take?

Answer: If 'dangerous goods' are not packaged and properly marked or if shipped without the knowledge or consent of the carrier then the goods can be landed, jettisoned, destroyed or rendered innocuous by the carrier at any time before discharge.

If the goods have become a danger to the ship or other cargo they may be dealt with in a similar manner without any liability to the carrier (Reference: Carriage of Goods at Sea Act).

Question 27. While engaged as Cargo Officer aboard a Ro-Ro vessel, a cargo tank unit, identified as carrying a hazardous chemical is observed to be leaking. What action would you take?

Answer: Emergencies of such a nature must be dealt with in accord with the IMO publications *Emergency Procedures for Ships Carrying*

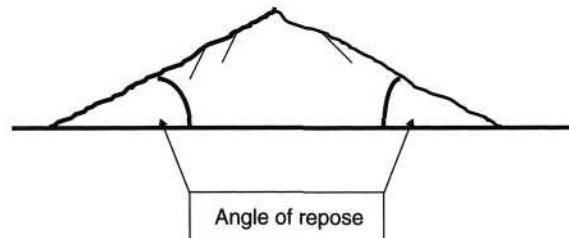
Dangerous Goods (only for vessels carrying dangerous goods), and the Medical First Aid Guide contained in the supplement to the IMDG Code.

Assuming that the tank unit had been given a correct stowage position it would be accessible to the actions of an emergency party. The nature of the commodity would be checked to ascertain the correct chemical name, UN Number and relevant associated dangers. The ship's course may well need to be altered to allow vapour emissions to be blown overside. The product may need damping down with hose action or may not be compatible with water at all, so any action by hoses should be held off until confirmation of handling methods is acknowledged.

Communications with shore-side shippers, and/or manufactures may be desirable.

Question 28. What do you understand by the term 'angle of repose'?

Answer: The angle of repose refers to bulk cargoes and is that natural angle between the cone slope and the horizontal plane when a bulk cargo is emptied onto this plane.



An angle of repose of 35° is taken as being the dividing line for bulk cargoes of lesser or greater shifting hazard.

Question 29. The IMO has recently made recommendations for bulk carriers over 20,000 dwt and above to fit specialised equipment to facilitate the safe carriage of dry cargoes in bulk. What is this recommended equipment?

Answer: Effected 'bulk carriers' are now recommended to be fitted with:

- (a) Hull Stress Monitoring Systems.
- (b) Water Ingress Monitoring Systems.

Question 30. What do you understand by the term 'Segregated Ballast Tank'?

Answer: This means a water ballast tank which is completely separated from the cargo oil and fuel oil systems. It is permanently allocated to the carriage of water ballast or cargoes other than oil or noxious substances.