

# SEAFARER TRAINING RECORD BOOK

FOR

MARINE ENGINEER CLASS 6 (MEC 6)  
Certificate of competency



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# PERSONAL DETAILS

Family name.....

Attach passport photo

Given name(s).....

Date of birth.....

Place of birth.....

Home address.....

.....

Telephone..... Mobile.....

Email address.....

*The information recorded in this book is a true and correct account of the matters referred to. I understand that knowingly providing false information, or withholding relevant information, is an offence under section 406 of the Maritime Transport Act 1994 and a conviction may result in fines or imprisonment, and may have consequences for the maritime documents that I hold or apply for.*

Signature.....

Date.....

## Marine Engineer Class 6 (MEC 6) Certificate of competency

MEC 6 is an operational certificate of competency designed to facilitate entry into the maritime industry. Training has been amended to address some of the barriers to entry, such as long periods of sea service required to gain an entry certificate and the lack of means to ensure quality sea service is gained.

Short name	Marine Engineer Class 6 (MEC 6)
Replaces	The previous MEC 6
Operational limit	Enclosed, inshore, coastal, offshore, unlimited
Privileges	<ul style="list-style-type: none"> <li>• Engineer on any vessel up to 750kW with specific operating area and machinery limitations applying</li> <li>• Second engineer on fishing ships up to 750kW in any operating area</li> </ul>
Minimum age	18 years
Minimum service	Duration: 200 hours Vessel type: Any powered vessel (this can be a recreational vessel)
Training and supplementary certificates	<ul style="list-style-type: none"> <li>• Completion of training record book</li> <li>• Practical assessment if sea service obtained aboard non-commercial vessel</li> <li>• Attendance at a training course</li> <li>• Safety oral examination</li> <li>• Current first aid certificate</li> </ul>

Career progression	With 12 months' sea service aboard vessels of at least 100kW, to MEC 5 With 24 months' sea service aboard vessels with 250kW or more, operating beyond restricted limits, to MEC 4
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# Privileges and career pathways

The entry path to a MEC 6 certificate is through completion of an evidence-based training and record book within a minimum sea service of 200 hours aboard any type of powered vessel. (Please refer to “important notes regarding vessel type” in this book, and to Maritime New Zealand (MNZ) guidance for the relevant sea service requirements.) If sea service has been acquired aboard a non-commercial vessel, this will be followed by a practical assessment aboard a vessel to verify that the tasks covered in the task book have been satisfactorily achieved.

A training course will also be required to achieve the knowledge components of the competency framework. This will be followed by a final oral examination. The practical assessor, training provider and the final examiner will have access to the training and record book.

MEC 6 is an engineering certificate that covers passenger, non-passenger and fishing vessels. Attaining this certificate of competency allows the holder to sail as second engineer on fishing ships up to 750kW in any operating area, or chief engineer on any vessel up to 750kW with specific operating area and machinery limitations applying.

## Progression

While holding MEC 6, 12 months’ sea service as engineer on vessels of at least 100kW is required toward a MEC 5 certificate, and 24 months’ sea service on vessels of at least 250kW operating outside restricted limits is required toward a MEC 4 certificate. Other requirements for these certificates will still apply as described in MNZ guidelines.



# General overview

## Introduction to this seafarer training record book

This training record book has been developed to assist candidates for a Marine Engineer Class 6 (MEC 6) certificate of competency to obtain practical skills and competencies in a workplace environment to complement required shore-based training that must be undertaken prior to the MNZ final examination. The focus of the book is upon attainment and demonstration of some of the practical competencies required to be a marine engineer holding a MEC 6 certificate of competency.

All of the competencies required for MEC 6 can be attained through a combination of completion of the tasks in this training record book (these tasks can be completed while serving aboard a commercial, non-commercial or military ship) and attendance at a recognised seafarer training course. The training record book should be completed before commencing a block training course, and may be completed before or during a modular training course.

The completed training record book and accompanying assignment work or supporting evidence for tasks will be made available to a practical assessor (recreational vessels), training providers and the approved MNZ examiner for a final examination. The final examination must be passed before a certificate of competency can be issued by MNZ. After successful completion of the final examination, the completed training record book must be sent to MNZ for verification of sea service, along with any other required information, before a certificate of competency as MEC 6 can be issued.

## Benefits of using a training record book

Completion of this training record book will:

- encourage the accrual of high quality experience aboard commercial or recreational vessels
- provide for the delivery of competency-based training and assessment
- provide employers with qualified crew of high standards through a skills acquisition process
- provide the candidate with a greater exposure to a variety of tasks with flexibility in gaining experience
- allow candidates to gain hands-on experience required for issue of a MEC 6 certificate and gaining employment
- enable new entrants to the maritime industry to gain certification as a possible first step in their career progression.

On receipt of the training and record book:

- familiarise yourself with the layout of the book
- read all the instructions carefully
- enter all of your personal details in the book
- establish a plan of how you will complete the book in a timely manner.

## Responsibility

The primary responsibility for completion of the tasks detailed in this book rests with the holder of the book. You should treat the training seriously and responsibly. You should take all opportunities to visit other vessels, shipyards and workshops in order to gain as much knowledge and exposure to the maritime industry as possible to enable you to complete all the tasks listed. Please keep this book in a safe place. It is highly recommended that you keep a copy of the sections you have completed, along with the associated evidence as appropriate.

## Important notes regarding vessel type

Maritime Rule Part 32 states that sea service toward a MEC 6 certificate of competency can be gained on a motor ship of any kind. However discretion should be applied when choosing the vessels on which to work toward this qualification.

“Motor ship” is defined as a ship with **diesel** main propelling machinery, and although there are no minimum power requirements given, it is important that you select appropriate vessels for your sea service.

It is recommended that before commencing sea service, the MEC 6 candidate reads through this training record book thoroughly and understands the nature of the tasks and assignments included. Take note of the type of documentation, machinery and systems with which you will be expected to work and gain competence, and make sure that you will be able to achieve this on your intended vessel or vessels. (It is acknowledged that your vessel(s) may not carry all the equipment necessary to complete every single task, but you should be able to do a large number of them.) In any case, you will have to get uncompleted tasks signed off during your training course before the final examination can be taken.

If you gain sea service on non-commercial vessels, you will need to undertake a practical assessment of your competency while on board. You must pass this assessment and complete the training course before sitting the final examination.

## Completion of tasks and assignments

MNZ requires the candidate to complete all tasks possible appropriate to the vessels on which they serve. If a task or assignment cannot be completed due to the relevant equipment or machinery being unavailable on board, then the candidate must gain knowledge and understanding through their own research, which may include vessel or shipyard visits, and training course attendance. Candidates will still be assessed on competency of all record book topics irrespective of the type of vessel or equipment experienced during sea service.

This training record book is an evidence-based training programme. Successful completion depends upon the availability of satisfactory evidence to support completion of tasks.

Sections 1 to 5 of this training record book require completed tasks to be signed off either by the candidate or by the chief engineer (meaning the most senior engineer) on board the vessel, depending on the category of task (refer to signing off tasks). Completion of these tasks should be supported where possible by evidence in the form of photographs, written notes or sketches, copies of check sheets or log book entries. Some tasks are required to be done more than once to gain adequate experience. These are indicated **in bold**. All signatories and signatory details should be recorded in Table 2.

All signatories of tasks must verify that the trainee has personally completed the task, has completed it satisfactorily, followed best practice, and is able to repeat the task.

Assignment sheets 1 to 17 require the candidate to produce their own **original** written work, drawings or diagrams as indicated. (For example if a description or explanation is asked for, this may be produced in handwritten or printed form, but the words must be the candidate's own.) Each section of the assignment sheet must be signed off by the chief engineer to verify that the work is that of the candidate (verification). These assignments may still be supported with photographs or copies of vessel documentation and manuals to assist explanations or descriptions.

This record book is an integral part of your training and certification process. It allows you to build on skills and knowledge gained during time spent in the workplace and provides a solid foundation to perform your on-board duties and for attainment of higher certificates.

**SAFETY FIRST – IF YOU HAVE ANY DOUBT ABOUT THE SAFETY OF ANY ACTIVITY WITH WHICH YOU ARE INVOLVED:  
SEEK GUIDANCE IMMEDIATELY – NEVER TAKE RISKS!**



**Table 2: Information about signatories**

	Signatory's* full name	Position held on vessel / at training institution	Certificate held	Date of issue	Certificate number	Telephone contact, email and postal address
1						
2						
3						
4						
5						
6						

\*A signatory must either be the chief engineer of the vessel or a maritime lecturer from a training provider.

*The signatories below, who have supervised the required tasks in this book, hereby certify that the information in this book is to the best of their knowledge true and accurate in all respects. Knowingly providing false information or withholding relevant information may constitute an offence under section 406 of the Maritime Transport Act 1994. Conviction of an offence under this section may result in fines, imprisonment, and may have consequences for any maritime documents held currently or applied for in the future.*

## Signing off tasks – instructions for candidates

The tasks in this training record book have been carefully selected to ensure that you get effective practical experience in a variety of fields under different conditions and demonstrate a satisfactory level of achievement and ability in performing those tasks. There must be evidence, where required, of completion of tasks. MNZ requires that all tasks be signed off as they are completed, with the correct date entered.

Tasks are divided into two categories: **Self-declaration (S)** and **Guidance and confirmation (G)**. These categories are described below:

### Self-declaration (S)

Some of the tasks contained in this training record book are quite simple and can be done by someone with limited experience. Completion of these tasks **does not require assistance** from someone with extensive maritime experience or a certificate. For example, one task might require you to list the location of the lifejackets on board. Such tasks require a self-declaration. When you complete such tasks, marked **(S)**, you must initial/sign the box for that task in the table.

### Guidance and confirmation (G)

The second type of task requires **supervision, guidance or assistance** from an appropriately experienced or certificated crew member who has good knowledge and expertise in the task that you are required to complete. These tasks must be signed off by the vessel's chief engineer once your competency has been satisfactorily demonstrated. The chief engineer may get confirmation of your competency from an appropriate supervising crew member if he or she is not personally able to witness performance of a task.



**Important**

Do not attempt any category **G** task unless you have been instructed that it is safe to do so and you have appropriate supervision. It is recognised that some tasks may not be able to be performed during sea service on board your vessel due to operational or safety concerns. In such cases, completion of tasks in a simulated working environment is acceptable. Such an environment may be a workshop used by your vessel's operator or the facilities of a recognised training establishment, but the tasks must be signed off by the chief engineer or a qualified instructor as appropriate. If tasks cannot be performed on board, you must provide a written summary of the reason why.

The examples below explain how tasks are to be signed off. If tasks are unable to be completed on the vessel, then the relevant competencies must be confirmed on the training course and signed off by an appropriately qualified person.

Tasks shown as "Complete assignment sheet X..." can be signed off by the trainee once they have completed all of the required assignments. However, the individual tasks on each assignment sheet need to be signed off by the chief engineer to verify that the work was done by the holder of the training and record book.

**Examples are shown below.**

In the example below, the holder of the training record book may complete the tasks and sign them off, but should still seek guidance or assistance if they need it.

LOCATE THE FOLLOWING DOCUMENTS :					
Task	Comments	Name of signatory	Signature	Date	Category
Safety management certificate			<i>T. Rainee</i>		<b>S</b>
Safety management manual			<i>T. Rainee</i>		
Oil record book			<i>T. Rainee</i>		

In the example below, the person who provided guidance or assistance must sign off the tasks, and have his/her name and details entered in Table 2: information about signatories. MNZ may contact the signatories and make queries about the tasks completed under their guidance and supervision.

Task	Comments	Name of signatory	Signature	Date	Category
<b>Fuel system</b>					
Carry out engine pre-start fuel oil system checks on <b>at least five occasions</b> , including levels and valve positions		Colin Rankshaft	<i>C Rankshaft</i>		<b>G</b>
Bleed air from the fuel system <b>on at least one</b> occasion		“ “	<i>C Rankshaft</i>		
Transfer fuel oil between tanks as required		“ “	<i>C Rankshaft</i>		
Complete <i>Assignment sheet 4: Fuel systems</i>			<i>T. Rainee</i>		<b>S</b>

## Task summary chart

To assist you in the management of tasks, a chart is included below. Mark each task with an X as you complete it. Tasks in **bold** are assignment sheets.

Task	Task	Task	Task	Task	Task	Task	Task	Task	Task	Task	Task	Task	Task	Task	Task	Task	Task	Task	Task	Task	Task
1.1	1.15	3.1	3.15	4.10	4.24	4.38	<b>4.52</b>	5.9	5.23	5.37	<b>5.51</b>										
1.2	1.16	3.2	3.16	<b>4.11</b>	4.25	4.39	4.53	5.10	5.24	5.38	<b>5.52</b>										
1.3	1.17	3.3	3.17	4.12	4.26	4.40	4.54	5.11	5.25	5.39											
1.4		3.4	3.18	4.13	4.27	4.41	4.55	5.12	5.26	5.40											
1.5	2.1	<b>3.5</b>		<b>4.14</b>	4.28	4.42	4.56	5.13	5.27	5.41											
1.6	2.2	3.6	4.1	4.15	<b>4.29</b>	4.43		5.14	5.28	<b>5.42</b>											
1.7	2.3	3.7	4.2	4.16	4.30	4.44	5.1	5.15	5.29	5.43											
1.8	2.4	3.8	4.3	4.17	4.31	4.45	5.2	5.16	5.30	5.44											
1.9	2.5	<b>3.9</b>	4.4	<b>4.18</b>	4.32	4.46	5.3	5.17	5.31	5.45											
1.10	2.6	3.10	4.5	4.19	<b>4.33</b>	<b>4.47</b>	5.4	5.18	5.32	5.46											
1.11	<b>2.7</b>	3.11	4.6	4.20	4.34	4.48	5.5	5.19	5.33	5.47											
1.12	2.8	3.12	4.7	<b>4.21</b>	4.35	4.49	5.6	5.20	5.34	5.48											
1.13	2.9	3.13	4.8	4.22	4.36	4.50	5.7	5.21	5.35	<b>5.49</b>											
1.14		3.14	4.9	4.23	<b>4.37</b>	4.51	5.8	5.22	5.36	<b>5.50</b>											

## Section 1: Vessel familiarisation

**VESSEL FAMILIARISATION**

Task	Comments	Name of signatory	Signature	Date	Category
<b>LOCATE THE FOLLOWING DOCUMENTS:</b>					
1.1	Safety management certificate				<b>S</b>
1.2	Safety management manual				
1.3	Oil record book				
1.4	Engine room log book				
1.5	Vessel log book				
<b>LOCATE THE FOLLOWING EQUIPMENT (as fitted):</b>					
1.6	Main propulsion engine(s)				<b>S</b>
1.7	Generator(s)				
1.8	Steering gear				
1.9	Fuel and fresh water tanks and filling lines				
1.10	Switchboard and distribution boards (for both AC and DC supply)				
1.11	Bilge and ballast pumps				

1.12	Refrigeration equipment (including air conditioning and ventilation)					<b>S</b>
1.13	Sewage treatment plant					
<b>LOCATE THE FOLLOWING SAFETY EQUIPMENT:</b>						
1.14	Distress signalling equipment <ul style="list-style-type: none"> <li>• EPIRB</li> <li>• pyrotechnics</li> <li>• VHF radio</li> </ul>					<b>S</b>
1.15	Life saving appliance <ul style="list-style-type: none"> <li>• lifejackets</li> <li>• buoyant apparatus</li> <li>• lifebuoys</li> <li>• life rafts</li> <li>• vessel plans</li> </ul>					
1.16	Fire-fighting appliances <ul style="list-style-type: none"> <li>• fire detection system</li> <li>• fixed fire-fighting installation</li> <li>• fire blankets</li> <li>• fire extinguishers</li> <li>• fire pump(s)</li> <li>• hydrants and hoses</li> <li>• fire outfits</li> <li>• vessel plans / fire plans</li> </ul>					
<b>EMERGENCY PREPAREDNESS</b>						
1.17	Locate the muster stations					<b>S</b>

## Section 2: Vessel operations

**VESSEL OPERATIONS**

Task	Comments	Name of signatory	Signature	Date	Category
<b>Stability</b>					
2.1	Locate the vessel's stability data book				<b>S</b>
2.2	From the stability data book identify the following: <ul style="list-style-type: none"> <li>• weathertight doors and closures</li> <li>• watertight doors and closures</li> </ul>				
2.3	Demonstrate the correct closure of the weathertight doors				<b>G</b>
2.4	Demonstrate the correct closure of the watertight doors				
2.5	Inspect the freeing ports and scupper drains on the vessel				
2.6	Conduct an internal inspection of the above in one heavy weather event, to monitor and prevent free surface developing				
2.7	Complete <i>Assignment sheet 1: Stability</i>				<b>S</b>



Deck operations – manoeuvring the vessel						
2.8	Become familiar with the following deck operations by observing and discussing with relevant personnel: <ul style="list-style-type: none"> <li>• stopping and turning the vessel</li> <li>• approaching a buoy or object in the water</li> <li>• berthing the vessel</li> <li>• departure from the berth</li> <li>• use of back-up engine and steering controls system (if fitted)</li> <li>• anchoring the vessel</li> </ul>					<b>G</b>
2.9	Discuss the effect of control delay / failure of steering and propulsion on the vessel with relevant personnel. Gain an understanding of these effects on the handling ability and capability of the vessel					

## Section 3: Vessel safety and compliance

**Vessel safety and compliance**

Task	Comments	Name of signatory	Signature	Date	Category
<b>SAFETY MANAGEMENT</b>					
3.1	Read and become familiar with the contents of the safety management manual				<b>S</b>
<b>Safety Equipment</b>					
3.2	Locate the safety equipment sheet				<b>S</b>
3.3	Conduct inspections of life saving apparatus on <b>at least three occasions</b>				<b>G</b>
<b>Accident and incident reporting</b>					
3.4	Read and discuss with the vessel master two of the reports held in this section. Emphasis is to be on future prevention of this type of occurrence				<b>G</b>
3.5	Complete <i>Assignment sheet 2: Safety management</i>				<b>S</b>

ENCLOSED SPACE ENTRY						
3.6	Identify (but do not enter) enclosed and confined spaces on your vessel, confirming these with appropriate vessel personnel					<b>G</b>
FIRE PREVENTION AND FIRE FIGHTING						
3.7	Participate in the inspection of fire-fighting equipment on <b>at least five occasions</b>					<b>G</b>
3.8	Participate in <b>at least five fire drills</b> on your vessel. Include: <ul style="list-style-type: none"> <li>• use of fixed fire-fighting installation (if fitted)</li> <li>• use of fire hoses</li> <li>• use of different types of fire extinguisher</li> <li>• use of a fire blanket</li> <li>• use of breathing apparatus or other protective equipment (as available)</li> </ul>					<b>G</b>

3.9	Complete <i>Assignment sheet 3: Fire-fighting</i>					<b>S</b>
<b>SIGNALS</b>						
3.10	Identify all methods for signalling distress on your vessel					<b>S</b>
<b>MAN OVERBOARD</b>						
3.11	Identify on your vessel the precautions taken to prevent a man overboard situation					<b>S</b>
<b>EMERGENCIES</b>						
3.12	Participate in <b>at least two</b> of the following emergency drills: <ul style="list-style-type: none"> <li>• collision</li> <li>• grounding</li> <li>• water ingress</li> </ul>					<b>G</b>
3.13	Identify the methods used on the vessel to control the ingress of water due to an emergency situation					
<b>DRILLS</b>						
3.14	Participate in <b>at least three</b> fire drills held in accordance with the vessel's safety management plan					<b>G</b>

3.15	Participate in <b>at least three</b> man overboard drills held in accordance with the vessel's safety management plan					<b>G</b>
3.16	Participate in <b>at least three</b> abandon ship drills held in accordance with the vessels safety management plan					
3.17	Participate in <b>at least two</b> other safety drills held in accordance with the vessels safety management plan including grounding, collision, loss of steering, loss of engine propulsion					
<b>HAZARDS</b>						
3.18	Locate the hazard register aboard your vessel (See also <i>Assignment 2: Safety management</i> )					<b>S</b>

## Section 4: Vessel machinery and systems – operation

**Operation of Vessel Machinery and Operations**

4.1	Task	Comments	Name of signatory	Signature	Date	Category
<b>Vessel</b>						
4.2	Help prepare vessel for sea on <b>at least five</b> occasions. Checks are to include: <ul style="list-style-type: none"> <li>• spares</li> <li>• tools</li> <li>• lubricants</li> <li>• fuel</li> <li>• fresh water</li> <li>• completion of documentation (eg check sheets, log book entries)</li> </ul> Complete the above checks in accordance with the vessel's safety management plan					<b>G</b>
<b>Propulsion engine</b>						
<b>Propulsion engine general</b>						
4.3	Perform general external engine pre-start checks of V-belts, hoses and other equipment as fitted on <b>at least five occasions</b> . Include securing arrangements of hoses, manifolds, engine mountings etc. <i>(Other checks are included in</i>					<b>G</b>



	<i>separate tasks)</i>					<b>G</b>
4.4	Participate in the start up of engines and auxiliary equipment in accordance with the vessel's checklist on <b>at least five occasions</b>					
4.5	Inspect vessel's engines while in operation and report condition on <b>at least five occasions</b>					
4.6	Participate in the shutdown of engines and auxiliary equipment in					

	accordance with the vessel's checklist on <b>at least five occasions</b>					
4.7	Complete your vessel's daily engine room log book, if used, on <b>at least five occasions</b>					<b>G</b>
<b>Fuel system</b>						
4.8	Carry out engine pre-start fuel system checks on <b>at least five occasions</b> including levels and valve positions					<b>G</b>

						<b>G</b>
4.9	Bleed air from the fuel system on <b>at least one occasion</b>					
4.10	Transfer fuel between tanks as required					
4.11	Complete <i>Assignment sheet 4: Fuel systems</i>					<b>S</b>
<b>Lubricating oil system</b>						
4.12	Carry out engine pre-start oil lubrication checks on <b>at least five occasions</b> , including levels and valve positions					<b>G</b>
4.13	Carry out daily oil lubrication checks on <b>at least five occasions</b>					<b>S</b>

						S
4.14	Complete <i>Assignment sheet 5: Oil lubrication system</i>					S
<b>Air and exhaust systems</b>						
4.15	Check engine exhaust system and air system securing arrangements					G
4.16	While engine is running, carefully check engine exhaust and air system for leaks using a safe procedure					
4.17	If possible, check running engine air system for moisture and drain excess moisture from system					
4.18	Complete <i>Assignment sheet 6: Air and exhaust systems</i>					S
<b>Cooling systems</b>						
4.19	Carry out engine pre-start cooling system checks on <b>at least five occasions</b> , including levels and valve positions					G

						<b>G</b>
4.20	Carry out engine cooling system checks on <b>at least five occasions</b> while vessel is underway					
4.21	Complete <i>Assignment sheet 7: Cooling systems</i>					<b>S</b>

Other equipment and systems						
Auxiliary generator						
4.22	Carry out pre-start checks for auxiliary generator (general, fuel oil, lubricating oil, cooling water) on <b>at least five occasions</b>					<b>G</b>
4.23	Start generator and connect to vessel's electrical power system on <b>at least five occasions</b>					
4.24	If your vessel uses shore power while alongside, switch between shore and					

	vessel power on <b>at least two occasions</b>					<b>G</b>
4.25	Conduct vessel battery checks as described in your vessel manual					
4.26	Operate electrical breakers on <b>at least three occasions</b>					
4.27	Replace electrical fuses <b>on at least one occasion</b>					
4.28	Operate AC and DC electrical switchboards and distribution boards as required during normal vessel operation. Make use of earth testing or indicating equipment if it is fitted to these boards					
4.29	<i>Complete Assignment sheet 8: Electrical systems</i>					<b>S</b>

Drive systems and steering gear						
4.30	Conduct gear box checks on <b>at least five occasions</b>					<b>G</b>
4.31	Conduct steering gear checks are on <b>at least five occasions</b>					
4.32	Use the emergency/back-up steering gear on <b>at least three occasions</b>					



4.33	Complete <i>Assignment sheet 9: Drive systems and steering gear</i>					<b>S</b>
<b>Outboard motors</b>						
4.34	Conduct pre-start checks of the outboard motor on <b>at least two</b> occasions					<b>G</b>
4.35	Monitor the running of the outboard motor to maintain efficiency of operation on <b>at least two occasions</b> . Include inspection of vulnerable components such as fuel lines and hoses					
4.36	Check and replenish outboard motor engine and gearbox oil levels					
4.37	Complete <i>Assignment sheet 10: Outboard motors and systems</i>					<b>S</b>

Systems and machinery operation						
4.38	Monitor vessel auxiliary systems and associated machinery during operation on <b>at least five occasions</b> , demonstrating safe working practices while doing so. These systems may include, for example: <ul style="list-style-type: none"> <li>• hydraulics</li> <li>• black water</li> <li>• domestic water</li> <li>• fuel transfer</li> </ul>					<b>G</b>
Bunkering						
4.39	Participate in bunkering operations on <b>at least three occasions</b> and include the following tasks (4.40 to 4.46):					<b>G</b>
4.40	Locate the bunker checklist (if used) and use it during bunkering preparation and operations					
4.41	Measure fuel tank contents before, during and after bunkering					
4.42	Prepare vessel and equipment for bunkering as necessary					

4.43	If necessary, agree fuel quantity and pumping arrangements with supplier before bunkering begins					<b>G</b>
4.44	Ensure you know the location of pollution prevention equipment and applicable fire-fighting equipment, and how to use this. Make any necessary arrangements for actions in the event of a spill or emergency					
4.45	Connect fuel filling line securely and monitor connection and pipes for leaks during bunkering					
4.46	At completion of bunkering disconnect the fuel line safely and without spillage, firstly taking all necessary precautions					
4.47	Complete <i>Assignment sheet 11: Bunkering</i>					<b>S</b>
<b>Fire and bilge system operation</b>						
4.48	Bilge pumping equipment is operated according to vessel operating procedures on <b>at least five occasions</b>					<b>G</b>

4.49	Operate the emergency or back-up bilge system on <b>at least two occasions</b>					<b>G</b>
4.50	Fire-fighting pumps are operated according to vessel operating procedures on <b>at least five occasions</b>					
4.51	Operate the emergency or back-up fire main system on <b>at least two occasions</b> (if fitted)					<b>S</b>
4.52	Complete <i>Assignment sheet 12: Bilge and fire systems</i>					
<b>Lifting equipment</b>						
4.53	Locate the items of lifting equipment on board your vessel (both in machinery spaces and on deck) and find the safe working load of each					<b>S</b>
4.54	Participate in the checking of lifting equipment on <b>at least one occasion</b>					<b>G</b>

Deck machinery						
4.55	Locate and become familiar with the items of deck machinery on board your vessel including: <ul style="list-style-type: none"> <li>• winches</li> <li>• capstans</li> <li>• anchor windlass and anchors</li> <li>• davits and cranes</li> </ul>					<b>S</b>
Materials and stores						
4.56	Demonstrate the safe handling and securing of stores safely and in the appropriate location, including spares, materials and chemicals					<b>G</b>

## Section 5: Vessel machinery and systems – maintenance

**Maintenance of vessel machinery and operations**

Task	Comments	Name of signatory	Signature	Date	Category
<b>Operational maintenance</b> (Never commence work on vessel machinery or systems until equipment is isolated in accordance with safe operating procedures)					
<b>Propulsion machinery and systems</b>					
<b>Diesel engine</b>					
5.1	Repair or replace mechanical engine or system components to allow continued safe operation of the vessel				<b>G</b>
5.2	Demonstrate the ability to diagnose various mechanical faults in a diesel engine. As necessary, isolate equipment and carry out component repair or replacement. Do this in accordance with your vessel's safe operating procedures. This may include the following faults (5.2-5.11):				
5.3	Change in oil pressure (engine or gearbox)				
5.4	Overheating				
5.5	Lack of fuel				

5.6	Discolouration of exhaust					<b>G</b>
5.7	Uneven running					
5.8	Leakages					
5.9	Unusual noises					
5.10	Failure to operate					
5.11	Fault indicating light or alarm					
5.12	Other					
<b>Outboard motor</b>						
5.13	Maintain outboard motor, including as necessary cleaning, lubrication, greasing, electrics and storage					<b>G</b>
<b>Machinery and systems</b>						
5.14	Demonstrate the ability to diagnose mechanical faults in auxiliary machinery and systems. As necessary, isolate equipment and carry out component repair or replacement. Do this in accordance with your vessel's safe operating procedures. Faults may include (5.15-5.22):					<b>G</b>



5.15	Leakages					<b>G</b>
5.16	Unusual noises					
5.17	Failure of materials					
5.18	Damage or wear					
5.19	Electrical failure					
5.20	Failure to start					
5.21	Fault indicating light or alarm					
5.22	Other					
<b>Electrical maintenance</b>						
5.23	Isolate electrical equipment for testing or maintenance in accordance with vessel's safe operating procedures					<b>G</b>
5.24	Participate in the removal and replacement of electrical components as required (these might include relays, contactors, instrument displays, switches or other items)					
5.25	Check resistance to earth with the use of a resistance meter					

5.26	Perform checks or fault finding on electrical equipment with the use of an electrical test meter. Faults might include a broken circuit, faulty switch or component, failed power supply or other defects					<b>G</b>
5.27	Demonstrate the ability to diagnose electrical system faults including at <b>least one of the following faults</b> (5.28-5.30):					
5.28	Failure to start					
5.29	Fault indicating light or alarm					
5.30	Other					

## Scheduled maintenance

(Never commence work on vessel machinery or systems until equipment is isolated in accordance with safe operating procedures)

### General

5.31	Conduct machinery maintenance checks and complete the check sheets on <b>at least five occasions</b>					<b>G</b>

### Diesel Engine

5.32	Check and adjust engine valve clearances					<b>G</b>
5.33	Check and adjust drive belt tensions					
5.34	Change fuel filters (primary or secondary) on <b>at least one occasion</b>					
5.35	Perform a lubricating oil change					
5.36	Change lubricating oil filters					

5.37	Perform lubricating oil tests to determine condition of oil					<b>G</b>
5.38	Change or clean engine air filters as required					
5.39	Replace a flexible impeller in a cooling system on at least one occasion					
5.40	If used on your vessel, carry out cooling water tests and treatment					
5.41	Test engine alarms on <b>at least three occasions</b> in accordance with the manufacturer's operating instructions or vessel procedures					
5.42	Complete <i>Assignment sheet 13: Engine operation and maintenance</i>					<b>S</b>
<b>General</b>						
<b>Participate in the inspection and maintenance of the following systems. (Sign off as many as possible):</b>						
5.43	Refrigeration plant (See also <i>Assignment sheet 15: Refrigeration systems</i> )					<b>G</b>
5.44	Hydraulic system including: <ul style="list-style-type: none"> <li>• pumps and motors</li> <li>• piping</li> <li>• control and other valves</li> <li>• filters</li> </ul>					

	<ul style="list-style-type: none"> <li>• header tanks</li> <li>• piping</li> </ul> (See also <i>Assignment sheet 16: Hydraulic systems</i> )					<b>G</b>
5.45	Deck machinery including: <ul style="list-style-type: none"> <li>• winches</li> <li>• capstans</li> <li>• anchor windlass and anchors</li> <li>• davits and cranes</li> </ul>					
5.46	Sewage treatment plant					
5.47	Vessel systems pumps, valves and pipework					
5.48	Freshwater supply and treatment					
5.49	Complete <i>Assignment sheet 14: Scheduled maintenance</i>					<b>S</b>
5.50	Complete <i>Assignment sheet 15: Refrigeration systems</i>					
5.51	Complete <i>Assignment sheet 16: Hydraulic systems</i>					
5.52	Complete <i>Assignment sheet 17: Slipway operations</i>					

## Appendix 1: Assignment sheets

### ASSIGNMENT 1: STABILITY

TASK	COMMENTS	DATE	VERIFICATION
Identify and list areas of likely water ingress and flooding on the vessel. Consider water ingress from above and below the vessel waterline, as well as water or other liquids escaping from the vessel's tanks			
State the procedures to prevent the above situations occurring, and describe how any change in conditions is monitored			
Identify areas that may cause or potentially contribute to free surface effect on your vessel			
State the procedures to prevent the above situations occurring, and describe how any change in conditions is monitored			
Describe the features and equipment on board your vessel that contribute to maintaining stability. These should include any related documents, tank usage procedures, vessel structural designs and features, and any other vessel equipment or items that may be used to maintain (or regain) stability			

## ASSIGNMENT 2: SAFETY MANAGEMENT

TASK	COMMENTS	DATE	VERIFICATION
<b>Use the Safe Ship Management Manual or Safe Operating Procedures Manual to complete the following tasks:</b>			
<b>Emergency procedures and equipment</b>			
List the emergency procedures that are in the safety management manual			
Describe the process for updating these procedures as equipment and/or situations change			
<b>Describe two examples</b> of operating procedures from your vessel's safety management system			
List the life saving appliance (LSA) and MOB (man overboard) equipment on board your vessel			
List the fire detection and fire fighting equipment on board your vessel			
Describe the process if a defect with any safety equipment is found on your vessel			
<b>Hazard management</b>			
Describe the procedure for reporting a new hazard on your vessel			
Describe how the hazard is recorded			
Describe the action to be taken after a new hazard is discovered			
List two examples of hazards that are recorded in your register on board and the steps that have been taken to manage them			



<b>Accident and incident reporting</b>			
Using your vessel's safety management procedures fill in an MNZ Accident and Incident Report form about an imaginary occurrence.			
<b>Garbage management</b>			
Describe the procedure used to manage garbage on your vessel			
<b>Waste oil</b>			
Describe what is done with waste engine oil and contaminated bilge water waste from your vessel			
<b>Sewage management</b>			
Describe the procedure to manage sewage (black water) on your vessel			
<b>Other documentation</b>			
State the purpose of the following certificates: <ul style="list-style-type: none"> <li>• Load Line Certificate</li> <li>• Minimum Safe Crewing Certificate</li> <li>• Fit for Purpose Certificate</li> <li>• Safe Ship Certificate</li> </ul>			
<b>Duties of the master and chief engineer</b>			
State the duties and responsibilities of the following on board your vessel: <ul style="list-style-type: none"> <li>• master</li> <li>• chief engineer</li> </ul>			

<b>Operating limits</b>			
State the operating limits of your vessel			
<b>Emergency preparedness</b>			
Using the safety management manual, identify and describe the emergency procedures for the following: <ul style="list-style-type: none"> <li>• collision</li> <li>• grounding</li> <li>• water ingress</li> <li>• engine failure</li> <li>• steering gear failure</li> </ul>			

### ASSIGNMENT 3: FIRE FIGHTING

TASK	COMMENTS	DATE	VERIFICATION
<b>Fire prevention</b>			
Describe the precautions for prevention of fire on your vessel			
<b>List three fire hazards</b> and state the actions to prevent these causing a fire			
State the methods for detection of fire in each separate compartment of your vessel			
State the procedure on your vessel upon discovery of fire			
<b>Fire fighting</b>			
List the types of fire-fighting equipment found on your vessel (see below for specific types of extinguisher)			
List the types of extinguishers found on your vessel and describe: <ul style="list-style-type: none"> <li>• how they are deployed</li> <li>• what fires they are suitable for use for</li> <li>• the precautions to take in their use</li> </ul>			
Explain why certain air vents are closed off in the event of a fire			
Explain how air vents on your vessel are closed off in the event of a fire			
Describe how fuel can be isolated in the event of a fire			
Describe the hazards you predict when fighting a fire on a vessel			

Describe with the aid of a sketch a typical fixed fire-fighting installation that may be fitted to a vessel, including the extinguishant used			
Describe the procedure for operating the above system			
Name one other extinguishant used in a fixed installation on board a vessel, beside that of the system described above			

### ASSIGNMENT 4: FUEL SYSTEMS

TASK	COMMENTS	DATE	VERIFICATION
<b>Fuel system</b>			
Trace the fuel system through your vessel from fuel tank to propulsion engine and draw a piping diagram to illustrate its path and components. Make sure you label and include (as applicable) : <ul style="list-style-type: none"> <li>• tank fittings</li> <li>• fuel lines</li> <li>• primary filters</li> <li>• secondary filters</li> <li>• lift pump</li> <li>• HP fuel pump</li> <li>• HP fuel lines</li> <li>• injectors</li> <li>• spill return lines</li> </ul> (If your vessel has a common rail fuel system, draw and describe this system)			
Describe with the aid of sketches the cycle of events for both 2 and 4 stroke diesel engines			
Describe the checks and maintenance that are done on the fuel system. These should be in your vessel's maintenance manual			

Describe the most likely sources of water contamination in the fuel on your vessel. What has been done to prevent such contamination?			
Describe a method of inhibiting bacteria contamination of diesel fuel			
Briefly describe the construction, location and fittings of your vessel's fuel tanks. Use sketches or diagrams if necessary			
Explain the importance of having a drain valve fitted to the base of a fuel tank			
State the spares and tools carried for the support of the fuel system			
What could you do if you suddenly found your vessel short on fuel while at sea?			

### ASSIGNMENT 5: ENGINE LUBRICATION SYSTEM

TASK	COMMENTS	DATE	VERIFICATION
<b>Oil lubrication systems</b>			
Trace the lubricating oil system for your vessel's engine and complete a drawing to illustrate its path, indicating direction of flow and labelled components. Include the internal oil path of the engine			
List the daily checks on the oil lubrication system that are done before start-up			
If there is a priming system for lubricating oil on your vessel's engine(s), describe its operation and explain its purpose			
For a propulsion engine of your vessel, state the initial oil pressure on starting, the idling oil pressure when the engine is up to temperature, and the oil pressure when hot at full RPM			
State the engine running hours at which the lubricating oil and filters are changed			
Describe carrying out an engine lubricating oil change, including all steps taken			
Describe carrying out an engine lubricating oil filter change, including all steps taken			
List the possible causes of a drop in lubricating oil pressure, and any actions that may prevent or minimise these occurrences			

Explain the importance of knowing the type of lubricating oil used in your vessel's engines with regard to replenishment			
What are the dangers of fuel contaminating the lubrication oil?			
State what is done with waste lubrication oil and oily rags to prevent fire hazard and pollution to the environment			
State the spares and tools carried to support the oil lubrication system			



## ASSIGNMENT 6: AIR AND EXHAUST SYSTEMS

TASK	COMMENTS	DATE	VERIFICATION
<b>Air and exhaust systems</b>			
Trace the air induction system on your vessel. Make a drawing of this system and label all components. Describe the purpose of the components including (if fitted): <ul style="list-style-type: none"> <li>• engine room fans</li> <li>• engine air filters</li> <li>• air box drains</li> <li>• intercooler</li> <li>• turbocharger</li> <li>• blowers</li> <li>• air flaps (2 stroke engines)</li> </ul>			
Describe the principles of forced air induction and methods used			
Draw a simple cross section of a turbocharger and label the main components			
List examples of what could affect turbocharger performance			
Trace the exhaust system on your vessel. Make a drawing of this system and describe the purpose of the parts including, if fitted: <ul style="list-style-type: none"> <li>• manifold cooling</li> <li>• water injection points</li> <li>• mixing boxes</li> <li>• anti-siphon devices</li> <li>• expansion joints</li> </ul>			

<ul style="list-style-type: none"> <li>• dry stack</li> <li>• waterlock</li> <li>• silencer</li> </ul>			
Describe the relationship of engine exhaust colour to engine running efficiency and give examples of exhaust colour diagnosis			
State the spares and tools carried to support the air and exhaust system			

### ASSIGNMENT 7: COOLING SYSTEMS

TASK	COMMENTS	DATE	VERIFICATION
<b>Cooling systems</b>			
Trace the cooling system on your vessel and draw a piping diagram including flow paths. Label all components including (as applicable): <ul style="list-style-type: none"> <li>• sea strainers</li> <li>• sea valves</li> <li>• raw water pump</li> <li>• impeller</li> <li>• drive belts</li> <li>• heat exchanger</li> <li>• header tank</li> <li>• thermostat</li> <li>• sacrificial anodes</li> <li>• overboard discharge</li> <li>• exhaust injection arrangement</li> <li>• anti-siphoning valves</li> <li>• keel cooling fins</li> <li>• keel cooling circulation pump</li> <li>• enclosed circuit (freshwater) water pump</li> </ul>			
Describe the function of the above cooling system components that are present on your vessel's system			
Describe the location and purposes of a pressure cap on a cooling system			

List the daily cooling system checks that you do before starting the engine, and the checks once the engine is running. (You may need to refer to your vessel's maintenance manual)			
List the maintenance required by your vessel's cooling system. This could be monthly, six-weekly, six-monthly or even yearly			
Describe two problems that could occur on your vessel's cooling system and what you are able to do about them when at sea			
Describe the process for inspecting and topping up the cooling water in an enclosed fresh water cooling circuit. Describe the procedure for testing and treating the water. State the additives used and their purpose			
Explain the importance of knowing the type of coolant additive used in your vessel's engines with regard to replenishment			
List the spares and tools that are carried on your vessel that support the cooling system			

## ASSIGNMENT 8: ELECTRICAL SYSTEMS

TASK	COMMENTS	DATE	VERIFICATION
<b>Electrical systems</b>			
List the components of the electrical system on board your vessel including (as applicable): <ul style="list-style-type: none"> <li>• batteries</li> <li>• starting systems</li> <li>• glow plugs</li> <li>• alternators</li> <li>• charging system</li> <li>• distribution boards</li> <li>• circuit breakers</li> <li>• fuses</li> </ul>			
Draw a simple diagram or diagrams of the AC and DC electrical systems on your vessel, including the components you have listed	:		
State the function of each of the included components			
Explain how circuit breakers are selected with regard to the appliance they serve			
If your vessel uses shore power supply while alongside, describe how the change-over process between shore and vessel power is performed			
List the main items powered by your vessel's generator			
Describe how power for emergency lighting is supplied			

Referring to your vessel's safety management plan, describe how electrical equipment is safely isolated before any checks or maintenance commenced			
Describe the checks done on your vessel to keep the AC and DC electrical systems safe and serviceable, including those done by shore-based personnel.			
List the types of batteries you have on your vessel and describe their locations and what they power			
When operating or checking batteries, state the precautions that you have to follow. These should be listed in your vessel's maintenance or safety manuals			

## ASSIGNMENT 9: DRIVE SYSTEMS AND STEERING GEAR

TASK	COMMENTS	DATE	VERIFICATION
<b>Drive system</b> (If your vessel uses jet drive units, adapt the assignments to suit this).			
Make a labelled drawing of your vessel's drive system showing the layout of the components including (as applicable): <ul style="list-style-type: none"> <li>• propulsion engine mounts</li> <li>• gear box</li> <li>• propeller shaft</li> <li>• intermediate bearings</li> <li>• flexible couplings</li> <li>• stern glands</li> <li>• propeller</li> </ul>			
State the function of each of the above components			
Describe the checks made to the drive system before starting			
Describe the checks to be made to the drive system while the vessel is underway			
State whether the gearbox oil on your vessel is checked while stopped or running, giving reasons			
Describe the maintenance required by your drive system			
Describe the method of reversing on your vessel			

<b>Steering system</b>			
Make a labelled drawing of the steering system on board your vessel, showing clearly how the rudder is activated from the steering position. Include all main system components.			
Describe the checks made to this system			
Describe the operation of the back-up steering system with the aid of a labelled drawing			
Describe the maintenance required by your vessel's steering system			



### ASSIGNMENT 10: OUTBOARD MOTORS

TASK	COMMENTS	DATE	VERIFICATION
<b>Outboard motors and systems</b>			
Describe, using sketches if necessary, outboard motor fuel systems and components including: <ul style="list-style-type: none"> <li>• integral/portable/built-in fuel tanks</li> <li>• differences of 2 and 4 stroke engines</li> <li>• fuel system venting</li> <li>• effects of stale fuel and dirty filters.</li> <li>• carburettor (including jets, floats)</li> </ul>			
Describe outboard motor lubrication systems for 2 and 4 stroke engines (if not included above)			
Describe, using sketches if necessary, outboard motor water cooling system operation and hazards including: <ul style="list-style-type: none"> <li>• water passage</li> <li>• flushing</li> <li>• cooling tell-tale</li> <li>• impeller overheating</li> <li>• salt build up</li> </ul>			
Identify and describe battery and electrical equipment for outboard motors including: <ul style="list-style-type: none"> <li>• ignition systems and spark plugs</li> <li>• trim tabs</li> <li>• starter motor</li> <li>• emergency starting</li> <li>• kill switch and kill-cord</li> <li>• stop button</li> </ul>			

Describe the use of sacrificial anodes with regard to electrolysis and saltwater corrosion			
Describe outboard motor routine maintenance on board your vessel			

## ASSIGNMENT 11: BUNKERING

TASK	COMMENTS	DATE	VERIFICATION
<b>Bunkering</b>			
List the oil pollution prevention equipment (spill kit) on board your vessel, including locations			
Describe the fuelling procedure on your vessel. Include all spill prevention and safety measures taken, from initial preparation through to completion of bunkering			
State the actions to take in the event of a fuel spill on your vessel			
State the reporting and recording that is required in the event of a fuel or oil spillage into the sea			
State where you record the amount of fuel that you have taken on board after completion of bunkering			
State the type of fuel used on your vessel and its characteristics, such as density, viscosity, sulphur content, flash point, or any other information that can be gained from the available documentation			

## ASSIGNMENT 12: BILGE AND FIRE SYSTEMS

TASK	COMMENTS	DATE	VERIFICATION
<b>Bilge systems</b>			
Trace the bilge system on your vessel, taking note of the types and location of pumps, valves and filters. Include any emergency bilge system pipework and components. Ensure that you understand how to set up the system for emergency operation			
Draw a clearly labelled diagram of the vessel's complete bilge system, including the types of valves and other components			
Describe both normal operation and emergency operation of the bilge system			
Look at your vessel compartment by compartment and identify where water may enter. Include vents, hatches, stern tubes or hull fittings. List what you find under the different compartment headings. (It is important to know where the risks lie, as you are then able to monitor them)			
List the reasons that might affect the bilge system's ability to function normally, including a bilge system that has a common manifold. It is good to predict these, as it may assist in quicker fault finding in an emergency			

Air ingress into the bilge system might affect the pump's ability to gain suction. Describe how you might find the cause of such ingress and effect a remedy			
Describe the dangers of back flooding of the bilge system and the measures taken to prevent this			
Describe the planned maintenance of your bilge system			
<b>Fire systems</b>			
Trace the vessel's fire main system taking note of the following: <ul style="list-style-type: none"> <li>• sea valves and strainers</li> <li>• isolating valves</li> <li>• fire pumps</li> <li>• hydrants</li> <li>• hoses</li> <li>• nozzles</li> </ul> Observe the types and location of all components, bearing in mind necessity of ease of access in an emergency			
Draw a clearly labelled piping diagram of the vessel's fire main system, naming all components and stating particular characteristics such as pump and valve types. Include any emergency or back-up system			
Describe the operation of the system			
Describe the checks and maintenance of the system			

### ASSIGNMENT 13: ENGINE OPERATION AND MAINTENANCE

TASK	COMMENTS	DATE	VERIFICATION
<b>Engine inspection</b>			
Describe a complete pre-start external inspection of your vessel's propulsion engine, stating the items you would check and <b>five possible problems</b> you might find.			
In the course of inspecting a running engine while the vessel is in operation, you might find a condition that would require the engine to be stopped for investigation or maintenance. Describe <b>two such possible conditions</b>			
<b>Engine starting</b>			
Describe, with the aid of sketches, the starting systems for the engines on board your vessel			
<b>Maintenance safety precautions</b>			
Describe the procedure for isolation and lock out, along with other safety precautions you would take before commencing maintenance on any of your vessel's engines			
<b>Engine valve clearances</b>			
State the recommended hourly intervals between valve clearance checks on your vessel's propulsion engine. State where this information is found and who is normally designated to perform this job			

Describe how engine inlet and exhaust valve clearances are checked and adjusted, giving the reasons for doing so (including the possible consequences of incorrect valve clearances)			
<b>Engine drive belts</b>			
State the items of equipment that are driven by belts on your vessel's engines			
State the recommended hourly intervals for drive-belt inspection and adjustment on your vessel's propulsion engine			
Describe what you would look for when inspecting drive belts on your vessel's engines			
Describe the procedure for checking and adjusting drive-belt tension, and the possible consequences of belts having incorrect adjustment			
Explain the importance of keeping engine room air vents clear with regard to engine operation			

### ASSIGNMENT 14: SCHEDULED MAINTENANCE

TASK	COMMENTS	DATE	VERIFICATION
<b>Scheduled maintenance</b>			
Describe the document that outlines the scheduled or planned maintenance on your vessel, and explain why such maintenance is so important			
Explain why the safe isolation of machinery and systems is essential before any work is commenced, and give examples of how to isolate the following equipment, referring to vessel manuals. State any particular hazards for each: <ul style="list-style-type: none"> <li>• diesel engine</li> <li>• engine freshwater cooling system</li> <li>• engine fuel system</li> <li>• compressed air system</li> </ul>			
Describe how equipment is tested prior to return to service ( <b>choose two items of equipment</b> , and explain why such testing is necessary)			
Describe the recording procedures after completing checks and maintenance on your vessel			



### ASSIGNMENT 15: REFRIGERATION SYSTEMS

TASK	COMMENTS	DATE	VERIFICATION
<b>Refrigeration systems</b>			
Draw a line diagram of a simple refrigeration system including gas and liquid flow paths. Label all main components			
Briefly describe the operation of the system and the function of components			
List the types of refrigerants used on your vessel			
Describe <b>two hazards</b> associated with refrigerant gases			

## ASSIGNMENT 16: HYDRAULIC SYSTEMS

TASK	COMMENTS	DATE	VERIFICATION
<b>Hydraulic systems</b>			
Draw a line diagram of a simple hydraulic system including oil flow paths. Label all main components (pumps, filters, valves etc)			
Explain the reasons and methods of maintaining cleanliness of the hydraulic oil			
Describe the dangers associated with hydraulic oil systems and the precautions taken before maintenance can take place			

### ASSIGNMENT 17: SLIPWAY OPERATIONS

TASK	COMMENTS	DATE	VERIFICATION
<b>Slipway operations</b>			
Describe the preparation that needs to be carried out before slipping the vessel			
Describe precautions to keep the vessel stable when going up or coming off the slipway			
List the normal checks, maintenance and surveys carried out when the vessel is on the slipway			
Describe any corrosion prevention system fitted to the hull of your vessel, briefly explaining the principles involved. Describe the checks to this system undertaken while on the slipway			

## Extra tables

EXTRA TASKS						
Task		Comments	Name of signatory	Signature	Date	Category

# Notes