

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

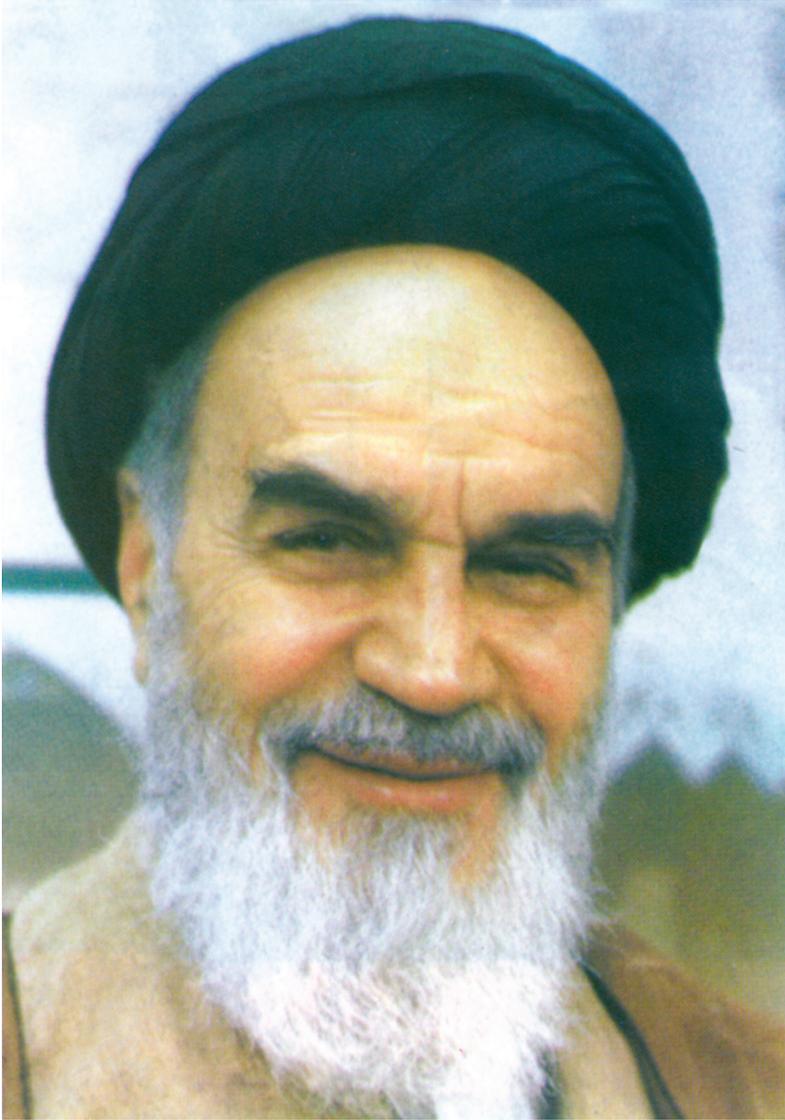
زبان تخصصی

رشتهٔ ناوبری

زمینهٔ صنعت

شاخهٔ آموزش فنی و حرفه‌ای

شمارهٔ درس ۲۹۶۰



پیشتر به زبان (خارجی) احتیاج نبود. امروز احتیاج است. باید زبان‌های زنده دنیا جزو برنامه تبلیغات مدارس باشد... امروز مثل دیروز نیست که صدای ما از ایران بیرون نمی‌رفت. امروز ما می‌توانیم در ایران باشیم و در همه جای دنیا با زبان دیگری تبلیغ کنیم.

امام خمینی «قدس سرّه الشریف»

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مقدمه

ابزار برقراری ارتباط بین افراد شاغل در رشته‌هایی که به دلیل ماهیت‌شان نیازمند به تبادل اطلاعات هستند، اهمیت ویژه‌ای دارد. اهمیتی بیش از سایر رشته‌ها می‌یابد. از جمله این رشته‌ها می‌توان به «ناوبری دریایی» اشاره کرد. در این رشته نیاز به برقراری تماس با مردمی که به زبان‌های گوناگون سخن می‌گویند ضروری و غیرقابل اجتناب است.

بی‌شک درک نادرست برخی از مفاهیم تخصصی در این رشته که ممکن است از برداشت‌های متفاوت مخاطبان از گفتار یا نوشتار واحدی صورت گیرد، می‌تواند به فاجعه‌های بزرگی، اعم از مادی و انسانی منجر شود که گاه جبران‌ناپذیر است. از این‌روست که «سازمان بین‌المللی دریانوردی»^۱ زبان انگلیسی را به‌عنوان زبان استاندارد رشته ناوبری دریایی انتخاب کرده و به تصویب رسانده است. علاوه بر آن در ناوبری دریایی، مانند دیگر زمینه‌های بین‌المللی، برای انتقال هر مفهوم، ساختار و واژگان ویژه‌ای تعریف شده است تا برداشت‌های نادرست از گفته‌ها و نوشته‌ها به حداقل برسد.

هدف از نگارش کتاب «زبان تخصصی ناوبری» نیز از همین نیاز و ضرورت ناشی شده است. به‌عبارت دیگر، در این کتاب تلاش بر آن است که هنرجویان با اصطلاحات مهم این رشته آشنایی پیدا کنند و قادر باشند مفاهیم بیان شده را، چه به‌صورت نوشتار و چه به‌صورت گفتار، به‌درستی درک نمایند و مفاهیم اولیه موردنظر خود را به زبان انگلیسی بیان کنند.

ملاک انتخاب متون در این کتاب میزان اهمیت موضوع در درجه اول و سپس فراوانی مواجهه هنرجویان با آنها در سفرهای دریایی پس از اشتغال به کار بوده است.

با آگاهی از وجود لغزش‌ها و کمبودهای کتاب، گروه مؤلفان چشم به راه انتقادات و نظرات ارزشمند و سازنده همه استادان و صاحب‌نظران گرامی، هنرآموزان محترم و هنرجویان عزیز است تا برای اصلاح کتاب در چاپ‌های بعد راهنمای ایشان قرار گیرد.

گروه مؤلفان

هدف کلی :

آشنایی هنرجویان با زبان تخصصی مربوط به رشته‌های علوم و فنون دریایی

UNIT ONE

THE SHIP AND SHIPBOARD TERMS

The terms we will discuss here are part of the language or jargon used by many of those who “**man**” the merchant ships of the world. To the great extent, the same “**terms**” are used by English-speaking navies.

Since many maritime and naval traditions have been greatly influenced by the traditions and language of the British Navy, English has become the international language of the seas. Every seaman should be familiar with nautical terms and definitions that will be discussed in the following paragraphs.

A ship is a seagoing vessel capable of making extended ocean trips. A boat is smaller and is normally designed for short trips in protected areas.

“Welcome aboard” is the phrase that traditionally greets anyone boarding a ship for the first time.

A deck is that portion of a ship on which one stands or walks, corresponding to the floor of a building. When one crosses the brow and goes through the gangway, he steps onto the main deck.

Brow or Gangplank is a short, straight, flat piece of equipment with one end



Gangplanks

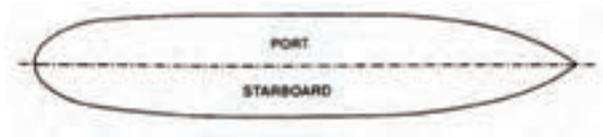
on the ship, the other end on land.

Gangway is an opening in the side of a ship that allows one to go on or off; it sometimes refers to the entire entranceway, including the brow.

Walking toward the front or bow of the ship, one is walking forward; walking toward the rear or stern of a ship, he is walking aft. Amidships refers to the middle of a ship.



Standing on the deck, facing toward the bow, on the right is the starboard side of the ship, and on the left is the port side of the ship.



Some types of stairways are called ladders. They might resemble ladders with rungs and rails, or they might be like conventional stairways with steps and handrails or chains. Descending a ladder, one goes below, and climbing a ladder, one goes topside.



A ladder



A pilot ladder

Cabins are individual rooms in a ship. The walls are called bulkheads; the ceiling is usually called the overhead. There are various openings in a ship such as doors, hatches, portholes, manholes, windows, etc.

Passageways run fore and aft in a ship, connecting spaces; these can also run from one side of the ship to the other, or athwartships.



Two types of hatch covers for cargo ships



Some types of doors



Portholes

Exercise 1

Match the words on the left with definitions on the right according to this unit.

1. Brow or Gangplank	a) Left side of the ship.
2. Bow or stem	b) The back portion of a ship
3. Forward	c) An opening in the deck
4. Stern	d) A short, straight, flat piece of equipment with one end on the ship, the other end on land.
5. Aft	e) Right side of the ship
6. Amidships	f) The front part of a ship
7. Starboard side	g) The direction toward the stern
8. Port side	h) Ladder
9. Hatch	i) The area between the front and back of the ship
10. stairway	j) The direction toward the bow or front of a ship

Exercise 2

Complete the following sentences with the appropriate word or phrase.

Example: The rear of a ship is calledstem.....

1- A boat is smaller than a

2- A cargo hatch is normally found on the main

3- is the phrase that traditionally greets anyone boarding a ship for the first time.

4- The back portion of a ship is called

5- The direction toward the stem or bow is called

Exercise 3

Choose the best answer:

1. In maritime language, “Welcome aboard” means welcome to the
 - a) class room
 - b) ship
 - c) sea
2. How can I get to the, I need to wash my hands.
 - a) water
 - b) deck
 - c) head
3. In order to board a ship you have to go from the pier onto the
 - a) deck
 - b) cruiser
 - c) gangway
4. “Man” used in the second line of the text means.....
 - a) not a woman
 - b) a strong sailor
 - c) supply crew for a ship
5. What does “term” in the third line of the text mean?
 - a) time
 - b) word
 - c) language
6. A “deck” refers to
 - a) the area between the front and back of the ship
 - b) the front part of a ship
 - c) the part of the ship on which we can stand or walk.

7. When one faces towards the bow, his right side and left side are called and sides respectively.

- a) starboard – port
- b) aft – fore
- c) stem – amidships

8. Where do sailors sleep?

- a) In manholes
- b) In cabins
- c) In bulkheads

9. Which of the following is not considered as a synonym for “descending”?

- a) Ascending
- b) Downward
- c) Degressive

10. The spaces of a ship are connected by

- a) portholes
- b) passageways
- c) hatches

STRUCTURES:

Imperatives

Instructions. *We can use the imperative to give instructions.*

Remove the bolts on the back lid of the pump.

Go forward and then turn to the port side.

Take a port and then starboard turn.

First disconnect the electricity,
then remove the old light bulb,
next screw in the new light bulb,
finally switch on the light bulb.

We can also give instruction using words like "must, should, may, etc."

You must first report to the chief officer.

You should go through the gangway, into the ship.

You may take a walk on the deck after your work time.

Orders. We can use the imperative to give a direct order.

Alter your course to starboard!

Don't enter the engine room!

Stop/Avoid interrupting a transmission!

Repeat your distress message please!

Exercise 1

Put the words in order to make complete sentences:

1) instructions/ please/ the/ first/ read.

.....

2) to/ turn/ get/ port/ finally/ to/ the/ cabins/ to/ the/ side.

.....

3) not/ control room/ do/ enter/ the.

.....

4) life/ avoid/ in/ putting/ your/ danger .

.....

5) should/ to/ calls/ you/ respond/ always/ distress.

.....

6) must/ up/ the/ get/ second/ you/ climb/ to/ ladder/ to/ deck/ the

.....

Exercise 2

Match the two halves of the sentences:

- | | |
|----------------------|-------------------------------------|
| 1) You must | a) the exam in one hour . |
| 2) Please help | b) after you are done watching . |
| 3) Stop | c) put your things in the cabin . |
| 4) You should finish | d) me replace this light bulb . |
| 5) Finally report | e) interrupting the chief officer . |
| 6) You may rest | f) to the chief officer . |

Exercise 3

Complete the following sentences with the proper imperative form of the verbs in parentheses.

1. Avoid (interrupt) the chief officer.
2.(not/enter) the chief officer's cabin.
3. Everybody should (respect) their superior.
4. Please(try) to remember all the places in the ship.
5. In order to board the ship,(pass) through the gangplank.

Sustainable Development

Sustainable development is a means of meeting present needs in ways that do not impair the future generations and other species from meeting their needs. Because the environment is essential to satisfying the needs of present and future generations, environmental protection is a key to its success.



UNIT TWO

TYPES OF SHIPS

Ships are broadly classified in three groups: naval ships, merchant ships, and sailing ships.

Naval Ships are either warships or auxiliary ships. Warships can be further classified under type and class. The term type distinguishes between ships built for different purposes, e.g. destroyers and frigates. Class distinguishes between different ships of the same type, e.g. Jamaran class destroyer. Auxiliary ships are designed to support warships at sea, e.g. Kharg auxiliary ship.



Jamaran class destroyer



Kharg Auxiliary Ship

Merchant Ships can be classified by their type, e.g. general cargo ships, container ships and tankers. Different types of ships can be recognized by certain distinctive features in their general appearance because the design of a ship depends mainly on the work “she” is required to perform.

Merchant ships are more difficult to classify than naval ships because one type of ship may often be used for different purposes. Generally they belong to one of the following main types:

Passenger Ships:

With the growth of air travel the role of the passenger liner providing a regular service between nominated ports has virtually disappeared except for passenger/car ferries. These ships vary in size and displacement (weight).

Cargo Ships:

1– General cargo ships: These vessels are designed to carry all types of general dry cargo between all ports of the world.

2– Reefer ships (Refrigerated Ships): Some cargo, such as fruit and meat, require refrigeration to maintain their condition during transit. The stowage compartments of ships built for this trade are insulated and refrigerated to the optimum temperature for the particular cargo.

Container Ships:

The container ship has a high freeboard and her super structure is either right aft or three quarters aft. The deck has no sheer or camber, so containers can

be stowed upon it as well as in the holds.

Bulk Carriers:

These are ships specifically designed for the transport of bulk cargo such as grain, sugar, industrial salt, etc., which is stowed in holds having large hatches for access of loading machinery.

OBO Ships (Oil/Bulk/Ore):

To “overcome” the problem of bulk carriers making long return journeys in ballast, a multi– purpose ship has been developed. The OBO ship’s hull is subdivided so that the bulk–cargo holds are flanked by liquid–cargo tanks. The OBO can be distinguished from the bulk carrier by more complex deck–fittings, oil pipes and tank vents, and by the hose derricks amidships.

Tankers:

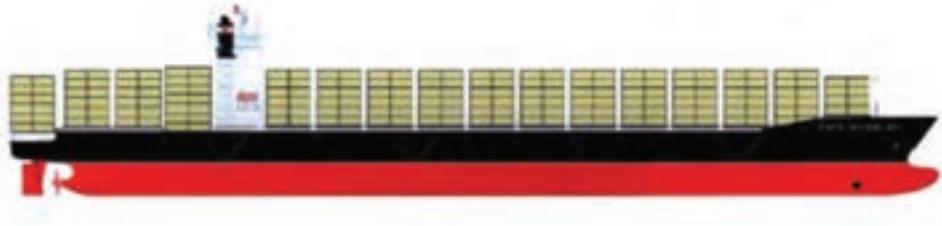
These are ships used to transport crude oil from the oil terminals or used to transport refinery products to commercial ports for distribution to the consumer.

The general classification of the tanker covers a wide variety of vessels which fall into four categories:

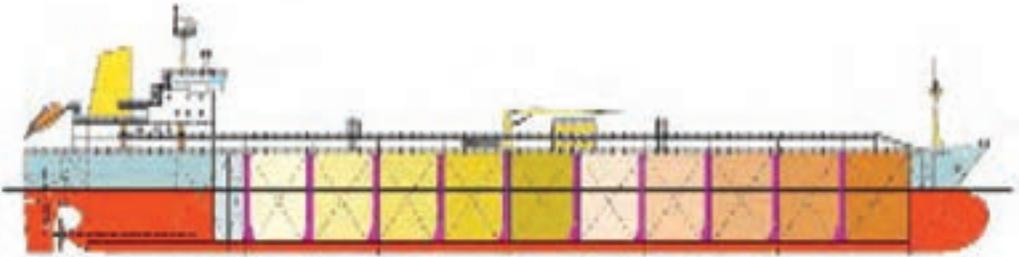
- Crude carriers are built to transport cargo up to 175,000 deadweight tons;
- (VLCC) Very Large Crude Carriers are designed to carry cargo from 175,000 to 350,000 deadweight tons;
- (ULCC) Ultra Large Crude Carriers are capable of carrying cargo over 350,000 deadweight tons;
- Product carriers are normally smaller than crude carriers and are used to carry refinery products. Their sizes depend on types of products and the distance they travel between the departure and destination ports.



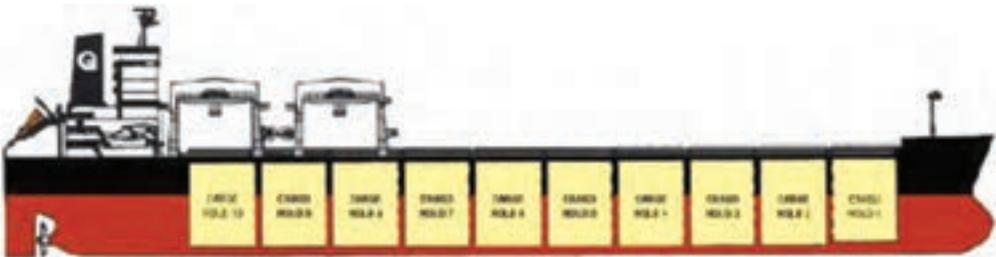
A Multi–purpose Vessel



A Container Vessel



An Oil Tanker



A Bulk Carrier

Exercise 1

Match the words on the left with definitions on the right.

1. Bulk carriers	a) These are ships used to transport refinery products
2. General cargo ships	b) These are ships used to transport crude oil from the oil terminals
3. Very large crude carriers	c) The ships designed for the transport of grain, cement, sugar, ...

4. Ultra large crude carriers	d) This term distinguishes between ships built for different purposes
5. Products carriers	e) This term distinguishes between different ships of the same type
6. Class	f) Tankers from 175,000 to 350,000 deadweight tons
7. Crude carriers	g) These ships are designed to carry fruit and meat
8. Type	h) Tankers over 350,000 deadweight tons
9. Reefers	i) These ships are designed to carry all types of general dry cargo

Exercise 2

Complete the following sentences with the appropriate word or phrase.

Example: ...Merchant ships... are more difficult to classify than naval ships.

1- Warships can be classified underand

2-ship has a high freeboard and the super structure.

3- The design of a ship depends mainly on the work she is required to

4- General cargo ships vary considerably

5- The first Jamaran class is built by Islamic Republic of Iran Navy (IRIN).

Exercise 3

Choose the best answer.

1. According to the text, It is not easy to classify merchant ships because they

- a) perform different works.
- b) are made in different sizes.
- c) are different from naval ships.

2. What are auxiliary ships designed to do?

- a) They're designed to carry passengers and cars.
- b) They're built to support warships at sea.
- c) They're specifically designed for the transport of bulk cargo.

3. Naval ships can be classified into two types . What are these two types?
 - a) Merchant ships and sailing ships
 - b) Warships and passenger ships
 - c) Warships and auxiliary ships
4. What does “she” refer to in the third paragraph?
 - a) A passenger
 - b) A ship
 - c) A sailor
5. What does “overcome” mean in paragraph 9?
 - a) To succeed in dealing with or controlling a problem.
 - b) To be affected by something.
 - c) To defeat somebody.
6. doesn’t have any sheer or camber .
 - a) Bulk carriers
 - b) OBO ships
 - c) Container ships
7. Why are OBO ships built?
 - a) To transport crude oil from the oil terminals more easily
 - b) To deal with the problem of bulk carriers making long return journeys
 - c) To transport all types of bulk cargo
8. Crude carriers are than product carriers .
 - a) bigger
 - b) smaller
 - c) more effective
9. What are product carriers used to carry?
 - a) Large cargo
 - b) Auxiliary weapons
 - c) Refinery products
10. What do product carriers’ sizes mainly depend on?
 - a) Types of products carried by these kinds of carriers

b) The distance between ports

c) Both a and b

STRUCTURES:

Quantifiers

A quantifier is a word or phrase which is used before a noun to indicate the amount or quantity:

‘some’, ‘many’, ‘a lot of’ and ‘a few’ are examples of quantifiers.

Some quantifiers can be used with both countable and uncountable nouns.

Examples:

There are some engineers working here.

He’s got only a few personnel in the engine room.

How much money have you spent on your last travel?

There is a large quantity of fish in this river.

He’s got more friends than his brother.

Some important quantifiers:

With Uncountable Nouns

- Much (in negative and interrogative sentences)
- a little/little/very little *
- a great deal of
- a large amount of
- a large quantity of

With Countable Nouns

- many (in negative and interrogative sentences)
- a few/few/very few **
- a number (of)
- several
- a large number of
- a great number of

- either/ neither (Nouns with either and neither have a singular verb)
- each/ every ***
- both

With Both Countable and Uncountable Nouns

- all
- enough (enough+ a noun/ an adj.+ enough)
- more/most
- less/least
- no (with an affirmative verb)
- none of ****
- not any
- any (in negative and interrogative sentences)
- a lot of (in affirmative, negative and interrogative sentences)
- lots of (in affirmative sentences)
- plenty of (in affirmative sentences)

NOTES:

* little, very little mean that there is not enough of something. a little means that there is not a lot of something, but there is enough.

** few, very few mean that there is not enough of something. a few means that there is not a lot of something, but there is enough.

*** We use every or each with a singular noun to mean all:

e.g. Every navy personnel has to wear a uniform.

**** None is a pronoun and doesn't need a noun. It can be used for zero quantity in short answers. e.g.

– How much money do you have?

–None.

–How many people attended the meeting?

– None.

EXERCISE 1

In the following sentences, fill in the blanks with one of the quantifiers in parentheses.

1. I am having of trouble repairing this oil pump. (a lot – most – some – many)
2. Bulk carriers can carry (many – much – large numbers of – large amounts of) bulk cargo such as grain.
3. With the growing role of air travel, there are (much – most – little – a large quantity of) passenger ships providing regular service between ports.
4. We're close to the project's deadline, but there is still (much – enough – several – many) time left.
5. Although there are (a little – a few – a large quantity of – a large number of) brilliant seamen working aboard, some others are giving service ashore.
6. Seaman Ghavam and Seaman Fardid have taken (plenty of – a lot of – much – a great deal) of navigation courses, but they have not taken (much – some – any – more) engineering ones.
7. I'm sorry, I can't buy those shoes, I have (little – less – few – a little) money with me.
8. Our ship has got (a little – little – much – enough) space for hundreds of passengers.
9. There isn't (much – a little – more – little) fuel left in the fuel oil tank.
10. Seamen get (a little – little – enough – much) money to live comfortably.

EXERCISE 2

Are the following sentences right or wrong? Correct the wrong sentences.

- a) The chief officer shook hands with every seamen.
- b) Both my parents work full time.

- c) There are a little seamen still working on the deck.
- d) My brother doesn't spend much money on clothing.
- e) Neither of the books contains what I need to know to perform my duty.
- f) If you've got a few time, I can show you how this engine works.
- g) I have few interest in geography.
- h) There have been several officers working in this type of ship recently.
- i) We don't have enough of information about bulk carriers.
- j) How many gallons of paint do we have in the stowage?
- None of.
- k) You'd be surprised how many types of general dry cargo these ships
can carry.
- l) We want every officers to report to the deck officer by tomorrow
morning.

EXERCISE 3

Choose the best answer.

- a) There is need to be worried about tomorrow's test.
 - no
 - none
 - any
- b) He has time to study.
 - few
 - little
 - many
- c) I have to work aboard, at least fourteen hours a day.
 - much
 - a lot
 - a lot of

d) –Do you speak French?

–Yes,

- a little
- a few
- many

e) There are for the crew .

- Compartments enough
- enough compartments
- enough cabins

f) –How many seamen work with you?

(-)

- Any
- None
- Much

g) Can you give me books for the exam?

- a couple of
- a bit of
- a lot

h) When we got there, ships had left the jetty .

- both
- both of
- the both

i) Can you give me advice?

- an
- some
- many

Recycling

Recycling is the process of gathering and reusing discarded or waste materials. We throw away a great amount of scrap or waste material. Many of these materials can be recycled. They include metals, plastics, glass and paper. Recycling gives manufacturers another valuable resource for raw materials. Recycled waste can be processed using less energy than required to process new raw materials.



a) Linear Production System



b) Cyclic Production System: The industrial ecosystem

UNIT THREE

NAVIGATION

Marine navigation blends both science and art. Methods of navigation have changed throughout history. One of the most important judgments the navigator must make involves choosing the best methods to use. Navigation can be divided into six classifications: dead reckoning (DR), piloting, celestial navigation, radio navigation, radar navigation and satellite navigation.

Dead Reckoning (DR): The term is derived from the “deduced reckoning” of sailing ships, which was abbreviated as “dead reckoning”. Dead reckoning (DR) determines position by advancing a known position for courses and distances. A position so determined is called dead reckoning (DR) position. In basic application of dead reckoning, projections are made from planned courses and speeds without allowance for wind or current. Correcting the DR position for leeway, current effects, and steering errors result is an estimated position (EP).

Courses are determined from the magnetic or gyro compass, and distance is taken from a log, a count of engine revolution, or a multiplication of speed and time. The plot of DR positions can be done either manually or by dead reckoning tracer that automatically analyzes directions and distances and plots a continuous track.

Piloting: Piloting involves navigating in restricted waters with frequent or constant determination of position relative to nearby natural land features and structures and other objects ashore. The specific aids to navigation such as lights, buoys, day beacons, and fog signals; and measurement of the water depth also guide the mariners for piloting. Under normal circumstances, piloting will

establish a vessel's position with precision and accuracy.

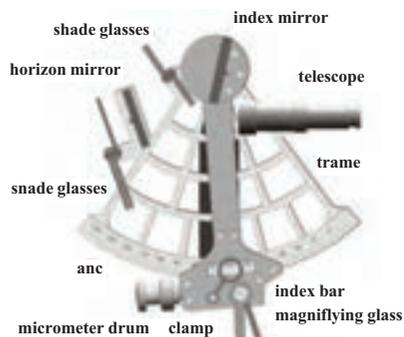
Celestial Navigation: celestial navigation is the determination of position by observing the celestial bodies– the sun, the moon, planets, and stars. Navigators, recognizing the “deficiencies” of dead reckoning when carried on for days without knowing the effects of wind and current, soon developed the techniques for observing heavenly bodies. The angle of elevation above the horizon for a heavenly body is first measured with an observational instrument which is called sextant. The observed angle is then compared with a mathematical calculation of that angle for the position of that heavenly body at that time. The difference between the observed angle and the mathematical angle is used to determine the location of the observer.

Radio Navigation: Radio navigation uses radio waves to determine the position through a variety of electronic devices.

Radar Navigation: Radar navigation uses radar to determine the distance from or bearing of objects whose position is known. This process is separate from radar's use in collision avoidance.

Satellite Navigation: Satellite navigation uses radio signals from satellite for determining position, for example GPS and GLONASS.

Although the study of navigation is the learning of how to measure and use position, direction, distance, time, and speed, the practice of navigation, in any of its forms, is the application of this knowledge to ensure the safe and “expeditious” passage of a vessel.



A Sextant



A Gyro Compass



Two Types of Radars

Exercise 1

Match the words on the left with definitions on the right.

1. Radar navigation	a) Navigating in restricted waters with frequent or constant determination of the position relative to nearby natural land features.
2. Celestial navigation	b) The projection of a present position, from a previous known position
3. Piloting	c) Using radio signals from satellite for determining position

4. Sextant	d) Using the radar to determine the distance from or bearing of objects whose position is known
5. Satellite navigation	e) Determination of position by observing the celestial bodies
6. DR	f) Determining the position through a variety of electronic devices.
7. Radio navigation	g) An observational instrument for measuring the angle of elevation above the horizon for a heavenly body.

Exercise 2

Complete the following sentences with the appropriate word or phrase.

Example: ...Celestial navigation... is the determination of position by observing the celestial bodies.

1– The study of is the learning of how to measure and use position, direction, distance, time, and speed.

2– Courses are determined from the, magnetic or gyro.

3– The angle of elevation above the horizon for a heavenly body is first measured with

4– The sun, the moon, planets, and stars are bodies.

5– The plot of DR positions can be done either manually or by
..... tracer.

Exercise 3

Choose the best answer:

1. How does dead reckoning (DR) determine position?

- By making use of specific aids of navigations such as fog signals.
- By advancing a known position for courses and distances.
- By measuring the depth of water.

2. How can we determine courses?
 - a) With making use of a log.
 - b) By multiplying time and speed.
 - c) With the help of a magnetic or gyro compass.
3. What does an automatic dead reckoning tracer analyze?
 - a) Direction and distance
 - b) Direction and speed
 - c) Direction and time
4. Piloting involves ...
 - a) navigating in restricted waters with continuous determination of position of natural land features.
 - b) navigating in unrestricted areas with frequent estimating of position of near land features.
 - c) navigating in restricted waters without determination of position of nearby land features.
5. Which kind of navigation uses sextant to measure the angle of elevation above horizon for a heavenly body?
 - a) Radio navigation
 - b) Satellite navigation
 - c) Celestial navigation
6. In order to determine the position, mariners use different kinds of to study radio waves.
 - a) satellites
 - b) electronic devices
 - c) radars
7. What kind of navigation can we use when the positions of objects are known?
 - a) Piloting
 - b) Celestial navigation
 - c) Radar navigation

8. Choose a proper synonym for deficiency:
- shortage
 - sufficiency
 - adequacy
9. GPS and GLONASS are the examples of
- Dead Reckoning
 - Satellite navigation
 - Piloting
10. "expeditious" in the last line of text means
- fast and efficient
 - slow
 - safe

STRUCTURES:

Prepositions

A preposition comes before a noun (or a pronoun) to show the noun's relationship to another word in the sentence.

Prepositions of Time

English prepositions	Usage	Example
on	days of the week	<ul style="list-style-type: none"> ■ on Monday
in	months / seasons time of day year after a certain period of time (when?)	<ul style="list-style-type: none"> ■ in August / in winter ■ in the morning ■ in 2006 ■ in an hour
at	for night for Weekend a certain point of time (when?)	<ul style="list-style-type: none"> ■ at night ■ at the weekend ■ at half past nine
by	in the sense of at the latest up to a certain time	<ul style="list-style-type: none"> ■ I will be back by 6 o'clock. ■ By 11 o'clock, I had read five pages.

Prepositions of Place (Position and Direction)

English prepositions	Usage	Example
in	room, building, street, town, country book, paper etc. car, taxi picture, world	<ul style="list-style-type: none"> ■ in the kitchen, in London ■ in the book ■ in the car, in a taxi ■ in the picture, in the world
at	meaning next to, by an object for table for events place where you are to do something typical (watch a film, study, work)	<ul style="list-style-type: none"> ■ at the door, at the station ■ at the table ■ at a concert, at the party ■ at the cinema, at school, at work, at sea
on	being on a surface for a certain side (left, right) for a floor in a house, ship for public transport for television, radio	<ul style="list-style-type: none"> ■ on the table, the picture on the wall ■ on the left ■ on the first floor, on the main deck ■ on the bus, on a plane, on a ship ■ on TV, on the radio
by, next to, beside	left or right of somebody or something	<ul style="list-style-type: none"> ■ He is standing by / next to/ beside the car.
under	on the ground, lower than (or covered by) something else	<ul style="list-style-type: none"> ■ The bag is under the table
over	covered by something else meaning more than getting to the other side	<ul style="list-style-type: none"> ■ put a jacket over your shirt ■ over 16 years of age ■ walk over the gangplank
above	higher than something else, but not directly over it	<ul style="list-style-type: none"> ■ I sleep on the bunk over yours.
through	movement from one side and out of the other	<ul style="list-style-type: none"> ■ walk through the passageway
to	movement to person or building movement to a place or country	<ul style="list-style-type: none"> ■ go to the port ■ go to Tehran / Iran
into	enter a room / a building	<ul style="list-style-type: none"> ■ go into the kitchen / the house

Exercise 1

Put in the proper preposition. (There might be more than one correct answer.)

1. We live Noshahr.
 2. Would you like to go the port now?
 3. No, thanks. I was the port yesterday.
 4. We are going a holiday next week.
 5. There are many paintings..... my wall.
 6. Who is this person the picture?
 7. Come my cabin, we want to practice tying different knots.
 8. The first officer is the one standing the wheel.
 9. How far is it from here the port.
 10. A bird flew the cabin a porthole.
 11. He stepped the table to remove the old light bulb.
 12. I am going to see one of my friends Friday
- 10:30.
13. Kharg is one of the largest auxiliary ships the world.
 14. Everybody has to finish the test an hour.
 15. This merchant ship will be back the port next month.

Exercise 2

Look at the pictures below and complete the following statements. (There might be more than one correct answer.)

- a) You have to pass
the manhole, down the ladder
..... the second deck
and walk aft.



b) You can sleep
the bunk mine.



c) There is a picture
..... the wall and
a book the coffee
table.



d) the cabins of a cruise, there are two bunks, curtains, a sofa,
a chair, a dresser, and a mirror.

e) There is a big sofa the bunk the right.

f) There are six officers
standing this
submarine.



Recycling Saves Energy

Recycling is an important way of reducing energy consumption. Recycling takes scrap materials and reprocesses them to make new materials. Many manufacturing industries, especially the producers of standard metals, plastics, and glass, recycle to reduce energy costs. The amount of energy saved by recycling can be very dramatic. For example, making steel from raw materials uses almost four times as much electricity as making steel from scrap.

Making steel from	Electricity used
Raw materials, Ores	2/700 Kilowatt – hours
Scrap steel	700 Kilowatt – hours

UNIT FOUR

GLOBAL POSITIONING SYSTEM (GPS)

The Global Positioning System (GPS) network we all use is called Navstar and is paid for and operated by the US Department of Defence. The system was originally developed by the US government for military navigation, but now anyone with a GPS device, can receive the radio signals that the satellites broadcast. Before 1983, accuracy for civilian users was "intentionally" degraded to +/- 100 m, but this was eliminated in May 2000.

The Global Positioning System (GPS) is a network of about 30 satellites orbiting the Earth at an altitude of about 20,000 km in six different orbital paths. There are at least 24 operational GPS satellites at all times plus 6 spare satellites. The satellites, orbit with a period of 12 hours (two orbits per day), traveling at speed of 3.9 km/s or 14,000 kph. Ground stations are used to precisely track each satellite's orbit.

Each satellite weighs approximately 1000 Kg and is about 5 meters across with the solar panels extended. Each satellite transmits on two frequencies. These are designated as L1 and L2. A Civilian GPS uses the L1 signal frequency (1575.42 MHz) in the UHF band. The signals travel by line of sight, meaning they will pass through clouds, glass, plastic, etc. but will not travel through solid objects such as buildings and mountains.

Each satellite is expected to last approximately 10 years. Replacements are constantly being built and launched into orbit.



The Satellite Network

The GPS satellites transmit signals to GPS receivers. Each one transmits information about its position and the current time at regular intervals. All GPS satellites synchronize operations so that these repeating signals are transmitted at the same instant. These signals, traveling at the speed of light, are intercepted by GPS receivers. The distance to the GPS satellites can be determined by estimating the amount of time it takes for their signals to reach the receiver. When the receiver estimates the distance to at least four GPS satellites, it can calculate its position in three dimensions.

The GPS receivers passively receive satellite signals; they do not transmit and require an unobstructed view of the sky, so they can only be used effectively outdoors. GPS operations depend on a very accurate time reference, which is provided by atomic clocks on board the satellites. These atomic clocks keep accurate time.

The accuracy of a position determined with GPS depends on the type of receiver. Most receivers have an accuracy of about $\pm 10\text{m}$. Other types of receivers use a method called Differential GPS (DGPS) to obtain much higher accuracy. DGPS requires an additional receiver fixed at a known location nearby. Observations made by the stationary receiver are used to correct positions recorded by the receivers, producing an accuracy greater than 1 meter.

The GPS system works in all weather conditions and this is one of the biggest benefits of this system. Wherever you are on the planet, at least four GPS satellites are ‘visible’ at any time. It means we can receive satellite signals anywhere in the world, at any time. It is no matter what our application is, when we need it the most, when we’re most likely to get lost, our GPS receiver will keep right on working, showing right where we are.



Exercise 1

Match the words on the left with definitions on the right.

1. The number of operational GPS satellites	a) 3/9 km/s or 14,000kph
2. The number of GPS satellites	b) 24 satellites
3. GPS satellites signals traveling at the speed	c) 30 satellites
4. The number of spare GPS satellites	d) of light
5. The GPS satellites traveling at speed of	e) 6 satellites

Exercise 2

Complete the following sentences with the appropriate word or phrase.

Example: The ...GPS satellites... are referred to as NAVSTAR satellites.

1– Each satellite weighs 1000 Kg and is about meters across with the solar panels extended.

2 – The Global Positioning System (GPS) is a network of about 30 satellites the Earth at an altitude of about 20,000 km in six different paths.

3 – Each satellite transmits information about its and the current time at regular

4 – Each satellite transmits on two

5 – The GPS system works in all conditions.

Exercise 3

Choose the best answer.

1. When was accuracy degraded to +/- 100 m for civilian users?
 - a) in 1983
 - b) after 1983
 - c) before 1983
2. What does “intentionally” mean in paragraph 1?
 - a) seriously
 - b) deliberately
 - c) basically
3. There are satellites orbiting the earth in the Global Positioning System.
 - a) 30
 - b) 24
 - c) 26
4. The satellites orbit the earth in different orbital paths.
 - a) 4
 - b) 6
 - c) 8
5. There are 24 operational GPS satellites at all times plus 6 satellites.
 - a) main
 - b) reference
 - c) spare

6. Satellites on two frequencies L1 and L2.
 - a) transmit
 - b) move
 - c) orbit
7. Signals are not able to travel through
 - a) clouds, glass, and plastic
 - b) solid objects
 - c) liquids
8. How long does each satellite last?
 - a) about 10 years
 - b) about 15 years
 - c) about 20 years
9. What do GPS operations depend on?
 - a) accurate orbit
 - b) accurate position
 - c) accurate time reference
10. What is the most important benefit of GPS?
 - a) It works in all weather conditions.
 - b) It transmits the radio waves to other ships.
 - c) It is able to calculate our positions accurately.

STRUCTURES:

Indirect Questions:

Direct questions are the “normal” questions that we can ask friends, family members, and people that we know well.

Example of a direct question: “Where’s the engine room?”

Indirect questions are a little more formal and polite. We use them when talking to a person we don’t know very well, or in professional situations. Indirect questions are formed in a different way.

Example of an indirect question:

“Could you tell me where the engine room is?”

You may use the following patterns to begin indirect questions:

- Could you tell me...?
- Do you know...?
- I was wondering...
- Do you have any idea...?
- I'd like to know...
- Would it be possible...?
- Is there any chance...?

Like direct questions they demand a response, but they are expressed as declarations without the formal characteristics of a question. That is, they have no inversion, no interrogative words, and no special intonation.

- In indirect questions with is/are, the verb (is) comes after the subject.
- In indirect questions, we don't use the auxiliary verbs do/does/did.
- Again, there is no auxiliary verb did in the indirect question.
- For direct questions with can, we can use the phrase “would it be possible...”

to make it indirect.

• “Is there any chance...” is another option for forming indirect questions with can.

• The auxiliary verbs have and has can be used in both the direct and indirect questions – but in the direct question, “has” comes before the subject, and in the indirect question, “has” comes after the subject.

For instance:

- (Direct Question) What time is it?
– (Indirect Question) Do you know what time it is?
- (Direct Question) Who is the ship owner?
– (Indirect Question) I don't know who the ship owner is.

- (Direct Question) Where can I find the master?
 - (Indirect Question) Can you tell me where I can find the master?
- (Direct Question) How has he managed to perform so many duties?
 - (Indirect Question) Do you have any idea how he's managed to perform so many duties?

* Be careful with do/does/did questions (simple present and past). We say:

- (Direct Question) What time does the container vessel arrive?
 - (Indirect Question) Do you know what time the container vessel arrives?
- (Direct Question) How did you survive that heavy hurricane?
 - (Indirect Question) I wonder how you survived that heavy hurricane.
- (Direct Question) Where do the cadets sleep?
 - (Indirect Question) Can you tell me where the cadets sleep?

Exercise 1

Make indirect questions. (There maybe more than one correct answers.)

- 1) How can I get to the deck?
.....
- 2) What does a thermometer measure?
.....
- 3) What does a fire extinguisher do?
.....
- 4) When was this tanker built?
.....

Exercise 2

Correct the following sentences.

- 1) Can you remember when did the vessel leave the port?
.....

- 2) I wonder why did the deck officer react angrily?

- 3) Do you know where is the nearest dock?

- 4) Could you tell me what is the chief engineer responsible for?

Exercise 3

Order the words to make indirect questions:

- 1) the / capable / do / what / carpenter / of / know / is / you / doing ?

- 2) who / can / ship / the / is / you / charge / tell / of / me / in ?

- 3) most / to / could / me / you / carry / tankers / what / tell / designed / are ?

- 4) means / know / what / aft / you / do.

NOTE

Use if or whether where there is no other question word (what, why, etc.):

e.g. Did anybody see you?

Do you know if (whether) anybody saw you?

Use the following sentences to make indirect questions:

1. Are there 6 or 26 spare satellites orbiting the Earth?
 Do you have any idea.....
2. Are the satellites that orbit the Earth very heavy?
 I wonder
3. Did the seamen understand the instructions on using GPS receivers?
 I don't know

4. Have you ever travelled in a passenger ship?
I'd like to know
5. Can I work in a passenger ship to travel if I don't have the money to buy a ticket?
I am wondering
6. Do sailing boats have an engine or are they pushed by the wind.
Do you know
7. Could you help me find our position using the GPS?
I wonder
8. Do receivers work efficiently only outdoors?
Can you tell me

Wetlands in Danger

Wetlands – swamps, marshes, bogs, fens, estuaries and tidal flats– covering about six percent of the surface of the Earth– are among the most common and productive ecosystems of the world. They support biodiversity, by providing habitats for thousands of species of plants and animals, and serve as important regulators of climate and the water cycle. Wetlands also have a remarkable capacity to filter and clean up water pollutants, by the use of the so-called self purification capacity. The many valuable assets of wetlands are not fully understood or appreciated. They are either drowned or drained and used intensively for various human activities. About half of the world's swamps and marshes have been estimated to have been lost.



SAFETY ONBOARD

Safety onboard ships is an important issue. Normally at sea and often very far from any possible assistance, there is nobody who can be called upon for help. Of course, the ship should be of good design, well maintained and in seaworthy condition with sufficient stability, watertight and weather tight and properly equipped.

Prevention through recognition, rectification and avoidance of unsafe actions and/or situations at all times and at all places on board by all personnel and passenger, is of utmost importance.

Courses and regular drills are held in order to ensure that the crew is safety-conscious. The crew is trained to use the right equipment in case of emergency.

To work professionally with all equipment, the ship's crew needs to be educated and everyone must have certificate of competency. This certificate can only be obtained when the individual is in possession of the proper diplomas, sufficient sea service and a number of certificates obtained after fulfilling certain safety courses.

Safety clothing: It is a legal requirement that you wear the proper safety clothing and footwear in those parts of the ship where certain hazards exist. Hard (safety) hats and proper protective (safety) shoes are the minimum for working on external decks. Inflatable (working) lifejackets are supplied in the Laboratory and will also be required to be worn in certain situations when working at or near the ship's side or stern. In addition to working lifejackets, certain operations will require safety harnesses to be worn if the master deems it necessary.

Manual handling: The motion of a ship will increase the risk of slips, falls and muscular injuries. Relatively simple tasks may require two people so always ask for assistance if in doubt. Always undertake a risk assessment prior to lifting or moving anything on board the vessel.

Electrical safety: Ship's power supplies may look similar to shore systems, but have subtle and potentially dangerous differences. Do not attempt to interfere with any electrical supplies or fittings on board at any time.

Lifesaving Appliances:

Lifeboats: Lifeboats have to be installed on each side of the ship. The boat/ boats on each side shall be capable of accommodating everybody on board.



Life Rafts: Inflatable life rafts are located on each side for the whole complement.



Life Jackets: Life jackets are provided for everybody on board. They must have a light and whistle. They are usually stored in the cabins, but sometimes in boxes near the lifeboats.



Life Buoys: A number of Life buoys, depending on the ship's length are positioned around the vessel and hooked on the handrails. On both bridge wings there has to be a life buoy, that when released, drops by gravity into the sea. Attached to these buoys are a floating smoke light and a light signal.



Immersion Suit: An immersion suit has to be worn together with a life jacket. The insulating quality of the immersion suits has to be such that the body temperature does not drop more than 2 degrees Celsius after 6 hours in water with a temperature between 0 and 2 degrees Celsius.



Safety Signs Onboard Ship

Safety signs on board ship alert the crew to hazards, equipment, escape routes, etc. Signs identifying enclosed spaces play a part in reducing accidents in these areas. In the marine industry, signs on ships now serve a vital function but it was not always so.

What have been mentioned above are the main safety measures, but there are a lot more for your safety. However if you have a problem, you should contact an officer who deals with the matter.

Some safety signs onboard ships are as below:

Hazard



Explosive hazard

Safety Equipment



Stretcher

Fire fighting



Fire alarm

Mandatory

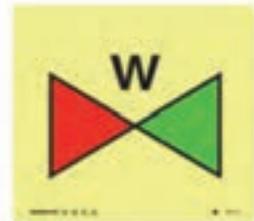


Wear ear protection

Prohibition



No Entry



Fire main section valve



Life buoy

Exercise 1

Match the words on the left with definitions on the right.

1. Lifeboats	a) A number of this appliance, depending on the ship's length are positioned around the vessel and hooked on the handrails.
2. Immersion suit	b) These inflatable appliances are located on each side for the whole complement.
3. Life jackets	c) These indicators on board ship alert the crew to hazards, equipment, escape routes, etc
4. Life buoys	d) These appliances have to be installed on each side of the ship, each capable of accommodating everybody onboard.
5. Safety signs	e) This lifesaving appliance has to be worn together with a life jacket.
6. Life rafts	f) These lifesaving appliances are provided for everybody on board. They must have a light and whistle.

Exercise 2

Complete the following sentences with the appropriate word or phrase.

Example: ...Lifeboats... have to be installed on each side of the ship, each capable of accommodating everybody on board.

1- on board the ships is an important issue.

2- To work professionally with all, the ship's crew needs to be educated and everyone must have certificate of competency.

3- Any seaman should wear the correct clothing and footwear in those parts of the ship where certain hazards exist.

4- The motion of a ship will increase the of slips, falls and muscular injuries.

5- Safety signs on board ship alert the crew to, equipment, escape routes, etc.

Exercise 3

Choose the best answer.

- 1– What does “water-tight” mean?
 - a) Capable of resisting the passage of water.
 - b) Capable of admitting the passage of water.
 - c) Capable of making the ship dry.
- 2– Prevention of danger might be done through unsafe actions and situations.
 - a) confronting
 - b) facing
 - c) keeping away from
- 3– According to the text, courses are held and regular drills are given to make sure the crew
 - a) is familiar with ship’s spare parts.
 - b) is familiar with safety rules.
 - c) is familiar with the organization of the ship.
- 4– It is important for the crew to use in case of emergency.
 - a) the proper uniform
 - b) the suitable instruction manuals
 - c) the right equipment
- 5– When an individual gets the proper diploma, enough sea service and certain safety courses; he can obtain
 - a) certificate of seamanship knowledge.
 - b) certificate of profession.
 - c) certificate of competency.
- 6– Crew shall wear at least and on external decks.
 - a) hard hats– safety shoes
 - b) proper equipments– foot wear
 - c) life jackets– harness

7- The risk of slips, falls and muscular injuries can be increased by

.....

- a) repairing the engine.
- b) the use of heads.
- c) the motions of the ship.

8- Where are the lifeboats installed?

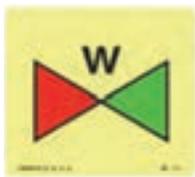
- a) On the port side of the ship.
- b) On each side of the ship.
- c) On the starboard side of the ship.

9- What does the following sign mean on board ship?



- a) Explosive hazards
- b) Stretcher
- c) Fire main section valve

10- Which one of the signs below means “ life buoy”?



a)



b)



c)

STRUCTURES:

PREFIXES AND SUFFIXES

Adding affixes to the existing word (the base or root) to form new words is common in English. Prefixes are added to the front of the base (like → dislike), whereas suffixes are added to the end of the base (active → activate). Prefixes usually do not change the part of speech of the base word, but suffixes usually do change the part of speech of the word.

Prefixes:

prefix + verb → verb

Prefix	Meaning	Examples
re-	again or back	restructure, rewrite, reappear, rebuild, reread
dis-	reverses the meaning of the verb	disappear, disagree, disarm, disconnect, discontinue
un-	reverses the meaning of the verb	unbend, uninstall, unfasten
mis-	badly or wrongly	mislead, misunderstand, misidentify
co-	together	co-exist, co-operate, co-act

Prefixes added to nouns

prefix + noun → noun

Prefix	Meaning	Examples
anti-	against	antibiotic, anticancer, antioxidant
auto-	self	autobiography, autopilot
co-	joint	co-founder, co-owner, co-writer
dis-	opposite	discomfort, dislike
mis-	wrong	misconduct, mislead, mismanagement
re-	again	re-organization, re-assessment, re-examination
ultra-	beyond	Ultrasound, ultraviolet

Negative prefixes added to adjectives:

negative + adjective → adjective

Prefix	Examples
un-	unfortunate, uncomfortable, unjust
im-/in-/ir-/il-	immature, impatient, improbable, inconvenient, irreplaceable, illegal
non-	non-fiction, non-political, non-neutral
dis-	disloyal, dissimilar, dishonest

Exercise 1

According to the given meaning, use proper prefixes for the following nouns, adjectives, and verbs:

- 1) Possible: (negative meaning)
- 2) Management:(negative meaning)
- 3) Appear:(negative meaning)
- 4) Biography:(self)
- 5) Honest:(negative meaning)
- 6) Estimate:(opposite meaning)
- 7) Work:(too much)
- 8) Reliable:(negative meaning)
- 9) Comfort:(negative meaning)
- 10) Comfortable:(negative meaning)
- 11) Understand:(negative meaning)
- 12) Build:(again)
- 13) Similar:(negative meaning)
- 14) Operation:(joint)
- 15) Sound:(beyond)
- 16) Climax:(against)

Suffixes:

Suffixes used to form verbs with the meaning “cause to be”.

Suffix	Example
* -ise, ize	stabilise, characterise, symbolise, visualise, specialise
-ate	differentiate, liquidate, pollinate, duplicate, fabricate
-fy	classify, solidify, simplify, justify
-en	awaken, fasten, shorten, moisten

Suffixes added to form nouns:

Suffix	Meaning	Examples
-ity	state or quality of being A	ability, similarity, responsibility, curiosity
-ness	state or quality of being A	darkness, preparedness, consciousness
-cy	state or quality of being A	urgency, efficiency, frequency

Suffixes added to verbs and nouns:

Suffix + verbs or nouns → adjective

Suffix	Example
-al	central, political, national, optional, professional, mechanical
-ent	different, dependent, excellent
-ive	attractive, effective, imaginative, repetitive
-ous	continuous, dangerous, famous
-ful	beautiful, peaceful, careful
-less	endless, homeless, careless, thoughtless
-able	drinkable, countable, avoidable
-ance	guidance, assistance, importance

Exercise 2

Match the following words with a proper suffix:

- | | |
|--------------|--------------|
| a) Beauty | 1. -able |
| b) Assist | 2. -ity |
| c) Fast | 3. -ful |
| d) Simple | 4. -ance |
| e) Avoid | 5. -en |
| f) Curious | 6. -fy |
| g) Effect | 7. -ous |
| h) Conscious | 8. -ise/-ize |
| i) Liquid | 9. -less |
| j) Thought | 10. -ive |
| k) Stable | 11. -ness |
| l) Fame | 12. -ate |

Exercise 3

Write the correct form of the words in parentheses in the provided spaces.

- You should walk more while the deck is wet. (careful)
- The first thing he looked at was the (local) of the ship.
- It is(legal) not to wear the proper safety clothing and footwear in those parts of the ship where certain hazards exist.
- You need to use the right (equip) in case of emergency.
- Hard hats and (protect) shoes are needed while working on external decks.
- Don't hesitate to ask for (assist) when you don't know how to do something.
- (inflate) working lifejackets are to be worn while working in the Laboratory or near the ship's side and stern.
- The ship should be in seaworthy condition with sufficient (stable).

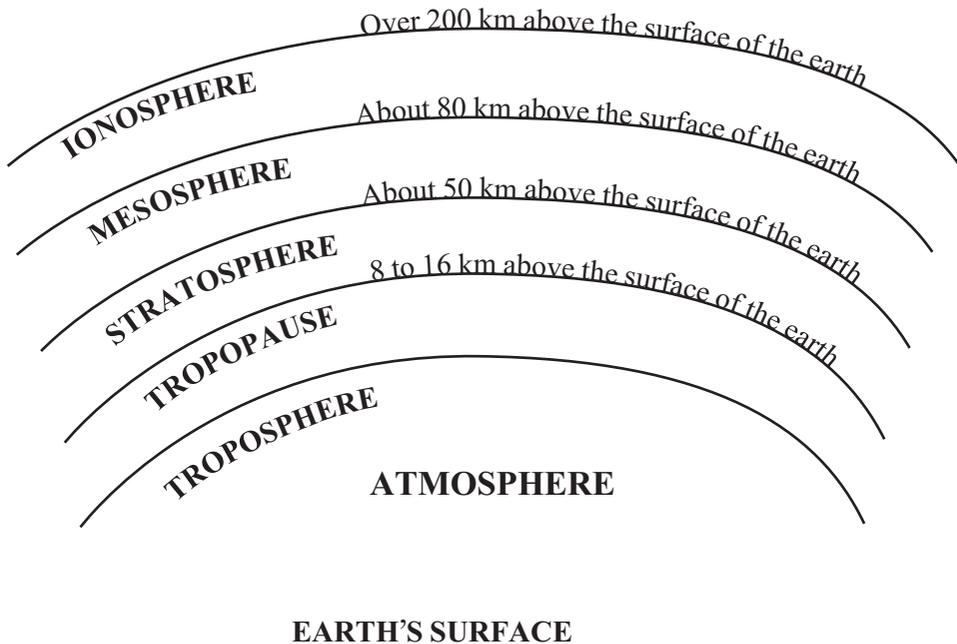
Sea Pollution

Until recently, pollution of the seas has been regarded as only a local environmental threat. However, pollution distributed around coastlines of most continents is now beginning to threaten also the open seas. It is evident that enclosed and isolated seas are the most vulnerable. The most well-known examples include the Aral Sea, the Mediterranean, the Black Sea and the Baltic. Looking at the sea as a pollutant recipient, it receives polluting inputs from atmospheric fallout, land-based discharges, ship dumping of industrial and municipal waste and sludge and from offshore gas and oil production. All these sources contribute almost all types of known pollutants and an increasing number of reports serve as warnings of the gradual deterioration of the oceans.



THE ATMOSPHERE

The air around the earth is called the atmosphere and extends to over 200 kilometers above the surface of the earth. The atmosphere consists mainly of Nitrogen (about 78%) and Oxygen (about 21%). Different layers of the atmosphere are called by different names. In ascending order they are troposphere, stratosphere, mesosphere and ionosphere.



Nearly all of the weather changes occur, and nearly all of the water vapor of the atmosphere is contained in the troposphere which extends to a height of about 8 km above the poles and about 16 km above the equator.

The area of separation between troposphere and the stratosphere is called the tropopause.

Stratosphere is the second layer which extends upwards from the tropopause to about 50 km. It contains much of the ozone in the atmosphere. The increase in temperature with height occurs because of absorption of ultraviolet (UV) radiation from the sun by this ozone.

The other layers of the atmosphere are not as important in navigation as these two layers are.

Temperature of the Atmosphere:

*S. I. units of air temperature are degrees Celsius (or centigrade) and degrees Kelvin. Freezing temperature of water is 0 degrees Celsius or 273 degrees Kelvin. Boiling temperature of water is 100 degrees Celsius or 373 degrees Kelvin. In the troposphere, atmospheric temperature normally falls steadily as height increases. In the stratosphere, the air temperature remains fairly steady around -56.5 degrees Celsius (216.5 degrees Kelvin).

It has been observed that atmospheric temperature reaches its maximum at about 1400 hours local time and reaches its minimum at about half an hour after sunrise. Since this happens once per day, it is called diurnal variation of atmospheric temperature and the difference between the maximum and minimum values is called the diurnal range of atmospheric temperature.

Diurnal range of air temperature over land is large (as much as 20 C) whereas over sea, it is very small (less than 1C) for the following reasons:

Over land

1– Land, being a solid, has a low value of specific heat and so heats up or cools very quickly.

2– Heat received from the sun is retained by the top layer of land (only a few centimeters deep) as land is a poor conductor of heat.

3– Negligible evaporation.

*The international system of units

Over sea

1– Sea, being a liquid, has a higher value of specific heat and so heats up or cools slowly.

2– Heat received from the sun is distributed over a large mass of water by convection currents.

3– Evaporation of water during day causes weather cooling which balances some of the heat received from the sun.

The temperature of the land surface therefore varies greatly between day and night. Consequently the air in contact with it has a large diurnal range. Since the temperature of the sea surface does not vary much between day and night, the air in contact with it has a practically negligible diurnal range.

It is interesting to note that the minimum ground temperature may be only a few degrees below the air temperature, but the maximum ground temperature can be even 40 degrees higher than air temperature.

Exercise 1

Match the words on the left with definitions on the right.

1. Stratosphere	a) 8 to 16 km above the surface of the earth
2. Troposphere	b) The air around the earth
3. Mesosphere	c) About 80 km above the surface of the earth
4. Ionosphere	d) The area of separation between troposphere and the stratosphere
5. Atmosphere	e) About 50 km above the surface of the earth
6. Diurnal range of atmospheric temperature	f) Over 200 km above the surface of the earth
7. Tropopause	g) The difference between the maximum and minimum of atmospheric temperature

Exercise 2

Complete the following sentences with the appropriate word or phrase.

Example: Different layers of the ...atmosphere... are called by different names.

1. It has been observed that temperature reaches its maximum at about 1400 hours local time.
2. In the, atmospheric temperature normally falls steadily as height increases
3. In the, the air temperature remains fairly steady around -56.5 degrees Celsius.
4. Land being a solid, has a low value ofheat and so heats up or cools very quickly.
5. Heat received from the sun is over a large mass of water by convection currents.

Exercise 3

Choose the best answer.

1. The atmosphere consists of and
 - a) Nitrogen (about 80%) and Oxygen (about 20%)
 - b) Oxygen (about 78%) and Nitrogen (about 21%)
 - c) Nitrogen (about 78%) and Oxygen (about 21%)
2. In which layer, do all of the weather changes occur?
 - a) Tropopause
 - b) Troposphere
 - c) Stratosphere
3. How far does the troposphere extend?
 - a) 8 km above the pole and 16 km above the equator
 - b) 16 km above the pole and 8 km above the equator
 - c) 13 km above the pole and 11 km above the equator

4. What is the area of separation between Troposphere and Stratosphere called?
 - a) Stratopause
 - b) Tropopause
 - c) Mesopause
5. Which layer contains much of the ozone in the atmosphere?
 - a) Ionosphere
 - b) Mesosphere
 - c) Stratosphere
6. How does the atmosphere temperature of Troposphere change as height increases?
 - a) It doesn't change at all.
 - b) It increases as well.
 - c) It falls down.
7. In what layer, does the air temperature remain steady as height increases?
 - a) Mesosphere
 - b) Stratosphere
 - c) Ionosphere
8. What is the difference between the maximum and minimum values called?
 - a) Diurnal range of atmospheric temperature
 - b) Diurnal variation of atmospheric temperature
 - c) Diurnal difference of atmospheric temperature
9. Since land is solid, it has a value of specific heat and gets hot and cold

 - a) low– slowly
 - b) high– quickly
 - c) low– quickly

10. The minimum ground temperature can be the air temperature.
 - a) a few degrees higher than
 - b) a few degree lower than
 - c) the same as

STRUCTURES:

Future with “will”

We use “will”:

- To talk about the future or to say what we believe will happen(predictions)

e.g.

I'll **be** late for the meeting.

It **will be** rainy today.

I think the ship **will arrive** at 6 p.m.

- To talk about what people decide to do or are willing to do

e.g.

A: I'm really hungry.

B: I'll **make** some sandwiches.

We'll **see** you tomorrow at the meeting.

I'll **show** you different parts of the ship.

- To make promises and offers

e.g.

(promise) Don't worry. I'll **be** careful while working in the engine room.

I'm really sorry. I promise I **won't be** late again.

(offer) A: These ropes are really heavy.

B: I'll **give** you a hand.

A: This exercise is really hard.

B: Ask your brother. He **will help** you with it.

Note.

Contractions: 'll=will; won't= will not

The future of there is/are = there will be

The future of I can= I'll be able to

Exercise 1

Write sentences and questions with will/won't. Use contractions where you can.

1. Watching a ship/ be difficult tonight (-)
2. Tomorrow/ be foggy (?)
3. You/ can find a good job in Navy (+)
4. I / get a glass of water for you (+)
5. He/ get the job (?)
6. They/ arrive on time (-)

Exercise 2

Complete the conversations below.

1. A: Remember to turn off the lights when you leave your own cabin.
B: Don't worry, I (not forget) to turn them off.
2. He needs some help to carry those heavy bags.
B: I (give) him a hand.
3. A: The floor got very dirty.
B: Some cleaners (clean) it.
4. A: I left my book at home.
B: I (lend) you mine.
5. A: It's really dark in here.
B: I (get) a torch.

Exercise 3

Put in will or won't.

- a) It rain, so you don't need an umbrella.
- b) The ship leave the port in five minutes.
- c) I don't feel well tonight. I be able to work tomorrow.
- d) I show you how to work with all these controls.
- e) Many sailors attend the meeting.
- f) There be a lot of seamen left on the ship when we get to the port.

Tankers and the Environment

The tanker industry has had some serious and very conspicuous accidents over the past few years, which have dramatically emphasized risks inherent in transporting oil by sea. Even if total cargo losses are relatively small compared to the enormous quantities being moved, and even if there are other activities which are more destructive to the environment, this industry must be prepared to accept its responsibilities for protection of the environment, and to meet higher expectations and more severe environmental protection requirements in the future.



UNIT SEVEN

FUNDAMENTALS OF FIRE

Fire is the rapid oxidation of any combustible material. It is a chemical reaction involving fuel, heat, and oxygen. These three components commonly referred to as the fire triangle, in the right proportions, will always produce a fire. Remove any one side of the triangle and the fire will be extinguished. Scholars have also introduced a 4th component in the equation, known as the uninhibited chain reaction, thereby giving the fire chemical reaction an additional side. This is referred to as the tetrahedron.

The followings are the typical fire triangle and the fire tetrahedron which illustrates the relationship between components:



There are two important factors to remember in preventing and extinguishing a fire:

- i) If any of these components are missing, then a fire cannot start.
- ii) If any of these components are removed, then the fire will go out.

It is important to have a clear understanding of these components and their inter-reactions in a fire.

Fuel

Fuel is necessary to feed a fire, and without fuel, the combustion process will terminate. The fuel molecules involved in a fire must be in the vapor (gas) state. However, the initial fuel source may be in a solid (paper, wood, etc.), liquid (fuel oil, lubricating oil, etc.) or gaseous state (any kind of combustible gas), and it is the first side of fire triangle. Many examples of each type of these fuels can be found onboard a vessel.

Oxygen

Because the combustion process involves the oxidation of the fuel molecules, the availability of oxygen is vital for the process to exist. Accordingly, the second side of the fire triangle refers to the oxygen content in the surrounding air. Air normally contains about 21% oxygen, 78% nitrogen and 1% other gases, principally argon, and therefore, sufficient oxygen is typically available unless some type of controlled atmosphere (i.e., inerted, etc.) is involved.

Heat

For fuel molecules to undergo the oxidation process and result in a self-supporting fire, the molecules must be at elevated temperatures (i.e., ignition temperature). Without this elevated temperature, there will be no rapid oxidation or combustion of the fuel molecules. Further, the generation of additional fuel vapors is largely dependent upon feedback radiant heating of the fuel, except for gaseous fuels.

Therefore, heat is the third side of the fire triangle. The production of energy from the initial reaction tends to raise the temperature of other molecules to the necessary elevated temperatures and tends to create the self-supporting nature of fire.

Chain Reaction:

Research has added a fourth side to the fire triangle concept resulting in the development of a new model called the 'Fire Tetrahedron'. The fourth element involved in the combustion process is referred to as the 'chemical chain reaction'. Specific chemical chain reactions between fuel and oxygen molecules are essential to sustain a fire once it has begun.

Classes of Fire:

The classification of fire depends mainly upon the fuel involved. There are four classes of fire.

CLASS "A" – These fires are fueled by ordinary combustible materials, such as wood, cloth, paper, and many plastics. This type of fire burns with an ember, leaves an ash, and is best extinguished by removing the heat side of the triangle.

CLASS "B" – These fires are fueled by flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols and flammable gases. This type of fire burns on the surface of the fuels, and is best extinguished by a blanketing or smothering action. A fire of this type is fast-spreading and capable of engulfing a large area in a very short time.

CLASS "C" – These fires occur in energized electrical equipment, where the electrical non-conductivity of the extinguishing media is of importance. Blanketing or smothering this type of fire with a non-conducting extinguishing agent is of prime importance. Water, or solutions containing water, is never to be used on a Class "C" fire.

NOTE: If possible, shut off the source of electricity as soon as possible.

Generally the extinguishing agent is referred to as DRY CHEMICAL.

CLASS "D" – These fires involve combustible metals, such as magnesium, titanium, zirconium, sodium, lithium and potassium. Generally the extinguishing agent is referred to as DRY POWDER

Exercise 1

Match the words on the left with definitions on the right.

1. Fuel	a) The Second side of the fire triangle
2. Combustion process	b) The third side of the fire triangle
3. Radiant heat	c) The first side of fire triangle
4. Oxygen	d) The rapid oxidation of millions of fuel molecules in the vapor form
5. Heat	e) The heat that radiates back to the fuel
6. Radiation feedback	f) The heat released by the oxidation of the fuel molecules

Exercise 2

Complete the following sentences with the appropriate word or phrase.

Example: The combustion process, or burning, is in fact the rapid ... oxidation... of millions of fuel molecules in the vapor form.

1- Fuel is necessary to feed a fire, and without fuel, the process will terminate.

2- The fuel molecules involved in a fire must be in theor..... state.

3- The burning vapor produces, which releases and ignites more vapor.

4- When there is less fuel vapor available to oxidize, less heat is produced and the process begins to die out.

5- Air normally contains about 21%, 78% and 1% other gases.

Exercise 3

Choose the best answer.

1. The three elements of fire are,, and

- a. fuel – oxygen – chain reaction
- b. oxygen – fuel – fire
- c. oxygen – heat – fuel

2. is the fourth element of fire.
 - a. Tetrahedron
 - b. Triangle
 - c. Combustion
3. Fuel can be found in the form of
 - a. solid, liquid or gas
 - b. paper. Wood or plastic
 - c. oil, petrol or gas
4. If one of the elements of fire is removed, then the fire will.....
 - a. start
 - b. go out
 - c. go on
5. is necessary for starting a fire because the combustion process involves oxidation of fuel molecules.
 - a. Oxygen
 - b. Nitrogen
 - c. Ignition
6. Elevated temperature is also referred to as
 - a. radiant heating
 - b. ignition temperature
 - c. energy production
7. If clothes and shoes are on fire, the fire that is formed is class.....
 - a. A
 - b. B
 - c. C
8. To extinguish class D fires, one has to use
 - a. non-conducting agents
 - b. dry material
 - c. dry powder

9. In class.....fire, extinguishing agents must not be conductive .
- A
 - C
 - D
10. Class B fire is fueled by flammable liquids and leaves no.....
- flame
 - ash
 - smoke

STRUCTURES:

Conditionals

First, Second, and Third types of Conditional

Conditional clause	Main clause
1. If + Present Tense ,	will + infinitive / present tense / imperative
a. If you face toward the bow (if + pres), you will find starboard on the right. (will + infinitive) b. If the sum of the digits of a number is divisible by three, the number is divisible by three (Pres. tense) c. If you want to find the cabins, go below the ladders. (Imperative).	
2. If + Past Tense ,	would + infinitive
If wishes were horses,	beggars would ride.
3. If + Past Perfect Tense ,	Would/could/might have + past participle
If you had been more careful,	you could have saved many lives.
We do not normally use <u>will</u> or <u>would</u> in the conditional clause, they are used only in the main clause.	

NOTES:

- When the main clause comes at the beginning of the sentence, no comma is used between the two clauses.

Example:

You will find starboard on the right if you face toward the bow.

- In conditional type two, we normally use were instead of was.

Example:

I wouldn't enter into the officer's room without permission if I were you.

Exercise 1

Put in the correct forms of the verbs.

- If there is enough heat, oxygen and fuel molecules, burning
(continue)
- The process of burning will terminate if there(be) no oxygen.
- If the firemen had not extinguished the fire in time, it(expand)
to the whole ship.
- we wouldn't have been able to fight the fire if we(take) the fire
course.

Exercise 2

Fill in the blanks with the proper forms of the verbs used in conditional type three.

- I you if you me. (help/ ask)
- If you more careful, the compartments
..... on fire. (be/ not be)
- You the captain if you
two minutes earlier. (see/ arrive)
- If they the fire extinguisher earlier, they
..... put out fire. (find/ be able to)

Exercise 3

Match the sentences with the ones in the box.

- If my brother had studied harder, he

- b) We wouldn't have been able to survive that heavy storm if we
- c) If he had known how to use a life raft, he
- d) You would have answered this question correctly if you

1. wouldn't have been drowned.
2. had known the difference between a ship and a boat
3. would have been a chief engineer
4. hadn't had such a competent captain.

Exercise 4

Find and correct the mistakes in the sentences below.

- a) If I had known that he was the chief officer, I wouldn't talked to him like that.
- b) I wouldn't have fallen down if the ladders weren't wet.
- c) He would be able to sail properly if it hadn't been stormy.
- d) If the container had been strong enough, the cargoes wouldn't be broken.

Exercise 5

Complete the following sentences.

- a) The fire started because you did not notice the safety signs.
If you....., the fire.....
- b) The officer punished the seaman because he did not wake up in time.
The officer..... the seaman if he.....in time.
- c) The ship sank because it crashed against the iceberg.
If the ship, it
- d) He wasn't injured in the crash because he was wearing a seat belt.
.....

Oceans Oil Pollution

Shortly after the turn of the century, as oil began to replace sail and steam as the principal energy source for the ship propulsion, and because of the increased demand for transportation of oil, raw materials and goods to support the industrialization process, the potential for the pollution of the oceans was recognized. Every year, approximately 3,5 million tonnes of oil are released into the world's oceans, representing one metric tonne of oil soiled for every thousand tonnes of oil extracted. Oil gets into the sea in natural and man-induced ways. Oil releases can be divided about equally between land-based sources and sea-based sources. Land based sources could be managed by coastal states via regulatory actions. Sea-based pollution, on the other hand, is linked mainly to maritime transportation and requires international action.



UNIT EIGHT

GENERAL ORGANIZATION OF A SHIP

Here is a diagram of a ship's organization:



As you can see, there is a master in charge of the ship and three departments working under his responsibility. Let's examine them one by one:

Captain/Master

The captain or master is the ship's highest responsible officer. The captain is legally responsible for the day-to-day affairs of the ship as he is in command. It is his responsibility to ensure that all the departments under him perform legally to the requirements of the ship's owner.

Deck Department

Chief Officer/Chief Mate: The chief officer/first mate is the head of the deck

department on a merchant vessel, second-in-command after the ship's master. The chief mate's primary responsibilities are the vessel's cargo operations, its stability, and supervising the deck crew. The chief mate is responsible for the safety and security of the ship, as well as the welfare of the crew on board. Additional duties include maintenance of the ship's hull, cargo gears, accommodations, the life saving appliances and the firefighting appliances.

Second Officer/Second Mate: The second officer (or second mate) of a merchant vessel is usually in charge of navigation and is the next licensed position above third officer and below chief officer as third-in-command, after the captain and first/chief mate. The second mate is typically the navigation officer aboard in a ship.

Third Officer/Third Mate: The third officer (or third mate) of a merchant vessel is primarily charged with the safety of the ship and crew. The third mate also generally serves as the ship's Chief Safety Officer.

Deck Cadet: A Deck Cadet is an officer under training in much the same way as in a military context. His or her role as a trainee is to observe and learn.

Boatswain: A boatswain is spelled and pronounced bosun, is the most senior among the deck ratings.

Able Seaman: An Able Seaman (AB) is a member of the deck department and must possess a merchant mariner's document.

Ordinary Seaman: An Ordinary Seaman (OS) is an entry-level position in a ship's deck department.

Engineering Department

Chief Engineer: The chief engineer on a merchant vessel is the official title of someone qualified to oversee the engine department. The Chief Engineer commonly referred to as "The Chief", or just "Chief", is responsible for all operations and maintenance that have to do with all engineering equipment throughout the ship.

Second Engineer/First Assistant Engineer: The second engineer or first

assistant engineer is the officer responsible for supervising the daily maintenance and operation of the engine department.

Third Engineer/Second Assistant Engineer: The third engineer or second assistant engineer is junior to the Second Engineer/First Assistant Engineer in the engine department.

Fourth Engineer/Third Assistant Engineer: The fourth engineer or third assistant engineer is junior to the second assistant engineer/third engineer in the engine department.

Engineering Cadet: A trainee engineer officer normally reports to the second engineer. His role as trainee is to observe and learn.

Steward's Department

Chief Steward: The chief steward directs, instructs, and assigns personnel performing such functions as preparing and serving meals; cleaning and maintaining officers' quarters and steward department areas; and receiving, issuing, and inventorying stores.

Chief Cook: The chief cook directs and participates in the preparation and serving of meals; inspects galley and equipment for cleanliness and proper storage and preparation of food.

It should be noted that in addition to the three departments mentioned above, there used to be a fourth one responsible for radio communication that nowadays does not exist. The function of the radio department is performed by the ship's master.

Exercise 1

Match the words on the left with definitions on the right.

1. Engineering Cadet	a) is the most senior among the deck ratings.
2. Ordinary Seaman	b) A trainee engineer officer normally reports to the second engineer

3. Chief Officer/Chief Mate	c) is the ship's highest responsible officer
4. Boatswain	d) is typically the navigation officer aboard in a ship.
5. Second engineer	e) is an entry-level position in a ship's deck department.
6. Captain /Master	f) is the head of the deck department on a merchant vessel, second-in-command after the ship's master.
7. Second mate	g) is the officer responsible for supervising the daily maintenance and operation of the engine department.

Exercise 2

Complete the following sentences with the appropriate word or phrase.

Example: The captain or... master... is the ship's highest responsible officer.

1- The captain is legally for the day-to-day affairs of the ship as he is in command.

2- An Able Seaman is a member of the and must possess a merchant mariner's document.

3- A is an officer under training in much the same way as in a military context.

4- The chief engineer on a merchant vessel is the official title of someone qualified to oversee thedepartment.

5- The chief mate's primary responsibilities are the vessel's cargo operations, its stability, and the deck crew.

Exercise 3

Choose the best answer.

1- Who is able to make sure that all the departments legally meet the ship owner's needs?

- a) Chief mate
- b) Second mate

- c) Master
- 2- The chief officer is the head of
 - a) Engineering Department
 - b) The deck Department
 - c) Steward's department
 - 3- The is commonly responsible for navigation.
 - a) second officer
 - b) third officer
 - c) boatswain
 - 4- What is the third officer mainly in charge with?
 - a) The safety of the ship.
 - b) Training a deck cadet.
 - c) Possession of a merchant mariner's document.
 - 5- A/An has the lowest position in a ship's deck department?
 - a) deck cadet
 - b) Able Seaman (AB)
 - c) Ordinary Seaman (OS)
 - 6- It is the responsibility of to check and see if every operation and equipment in the engine department is properly working.
 - a) the ordinary seaman
 - b) the chief engineer
 - c) the deck officer
 - 7- Second engineer is responsible for the daily
 - a) maintenance of the engine department.
 - b) affairs of the ship
 - c) observing and learning in the engine department
 - 8- Engineering cadets are under the supervision of.....
 - a) first assistant engineer
 - b) the chief engineer
 - c) second engineer

9– Giving instruction on serving meals is the responsibility of.....

- a) the chief cook
- b) the chief steward
- c) the trainee officer

10– The kitchen is inspected by

- a) the chief steward
- b) the meals man
- c) the chief cook

STRUCTURES:

Modal Verbs

Modals are verbs that combine with other verbs to show obligation or necessity, probability or possibility, ability, permission, etc.

Modal verbs must be followed by an infinitive without “to”.

They have no tense and no person, so they never change.

The most important modals are:

Can, Could, Must, May, Might, Shall, Should

Here are some frequently used modals and the way we use them:

MOOD	MODAL	EXAMPLES
Possibility	Can	This exercise can't be right. All the choices are wrong.
	Could	The situation is bad. But it could be worse.
	Must	It is snowing, so it must be very cold outside.
	May	It may rain tomorrow.
	Might	I might take a tour to Makran beaches next month.
Permission	Can	Can we swim in the lake?
	Could	Could I leave early today?
	May	May I go to the port to do some shopping?

Ability	Can Could	He can speak six languages. I couldn't sleep last night because the sea was stormy.
Obligation (Necessity)	Must Shall(a legal term)	Students must do their homework. You shall abide by the law.
Advice	Should	You should ask the captain's permission.
Invitation/ Offer	Can Could	Can I help you? You could join us for dinner tonight.
Request	Could	Could you tell me the way to the head please?
Offers and suggestions with "I" and "we"	Shall	What shall I do next? Shall we begin the meeting now?

Notes

To offer or invite, we use "would you like....?"

- Would you like a cup of coffee?

"I would like...." is a polite way of saying what you want.

- I'd like to try on this life jacket, please.

"Can't help + verb + ing" means "Not able to avoid a situation, or stop something from happening".

I can't help biting my nails when I am nervous.

I can't help remembering the things you did.

I can't help working all the time.

Exercise 1

Choose the correct answer.

1. here? "sure."
 - a) Will I sit
 - b) Do I sit
 - c) May I sit
 - d) Can I to sit
2. in deck department but I'm not sure.
 - a) He will be
 - b) He won't be
 - c) He shall be
 - d) He can be
3. You worked 14 hours today. You exhausted.
 - a) must be
 - b) would be
 - c) will be
 - d) shall be
4. some coffee or tea? "Tea please."
 - a) Will you like
 - b) Do you like
 - c) Would you like
 - d) Shall you like
5. It's a great book about navigation. You buy it. It's worth reading.
 - a) might
 - b) should
 - c) would
 - d) may
6. It's a nice day. go for a walk at the port?
 - a) Will we

- b) Can we
 - c) Shall we
 - d) Must we
7. We're having a meeting next week, but some officers
- a) couldn't come
 - b) can't come
 - c) wouldn't come
 - d) shall not come
8. Before those Indian sailors came to Iran, they Persian.
- a) wouldn't speak
 - b) couldn't speak
 - c) might not speak
 - d) shouldn't speak
9. you excuse me for a minute?
- a) Would
 - b) Should
 - c) Must
 - d) Shall
10. I have your call sign please?
- a) Will
 - b) Can
 - c) Should
 - d) Might
11. Since our bags are identical, you have taken mine by mistake.
- a) can
 - b) will
 - c) shall
 - d) could

12. I don't believe it. It be true.

- a) can't
- b) won't
- c) shouldn't
- d) shan't

Exercise 2

Choose the right modal verb.

- a) He had been working for more than 11 hours. He (would/ must) be tired after such hard work. He (may/ can) prefer to get some rest.
- b) I (should/ could) speak Chinese fluently when we lived in China. But after we moved back to Iran, I was very little exposed to the language and forgot almost everything I knew. Now, I (can/ could) only say a few things in Chinese.
- c) (Shall/ May) we use the radio to announce approaching the port?
- d) Take an umbrella. It (would/ might) rain later.
- e) (May/ will) I ask a question? Yes, of course.
- f) If you want to be a great seaman, you (must/ can) work pretty hard.
- g) (Will/ Can) you swim professionally?
- h) (Can/ May) you please give me some more information about radio department?
- i) Let's go shopping at the port, (can/ shall) we?
- j) Before he passed the test, he had proved that he (could/ must) work at his both current and higher rate perfectly. So he (should/ might) get a promotion.
- k) They (may/ must) work harder if they are to succeed.

Exercise 3

Use the proper form of the verbs in the box to complete the sentences below .

Think/ go running/ leave/ take a rest/ ask

- a) He can't help this book after reading two chapters.
- b) I can't help in the park every morning.
- c) I can't help too many questions about the organization of different ships when I meet my superior .
- d) We can't help about tomorrow's final exam .
- e) He can't help after such hard work .

Coastal Pollution

Many beaches are littered with garbage and wastes that are brought in by the tide. Many townships must regularly clean their beaches during the tourist season. These, in large part, are the result of an unsustainable view that the ocean is a convenient receptacle, a garbage bin, for our industrial effluents. Also, some people believe that the ocean's capacity for accepting human refuse and for self-cleansing is limitless. It is not. The coastal ocean has a finite, natural capacity that in many cases has been exceeded.



MAIN ENGINES

There are four principal types of marine engine: the diesel engine, the steam turbine, the gas turbine and the marine nuclear plant. Each type of engine has its own particular application, and their individual characteristics change with technological advances and improvements and economic factors such as the change in oil prices.

The diesel engine is a form of internal combustion engine similar to that used in a bus. Its power is expressed as brake horsepower (bhp). This is put out by the engine. Effective horsepower is the power developed by the piston in the cylinder, but some of this is lost by friction within the engine. The power output of a modern marine diesel engine which is expressed by brake horsepower, is about 100,000 brake horsepower. This is now expressed in kilowatts. By comparison the engine of a small family car has an output of about 80 bhp. Large diesel engines turn at relatively slow speed of about 108 rpm. These are known as slow-speed diesel engines. They can be connected directly to the propeller without gearing.

Although higher power could be produced by higher revolutions, this would reduce the efficiency of the propeller, because a propeller is more efficient the larger it is and the slower it turns. These large slow running engines are used in the larger merchant ships, particularly in tankers and bulk carriers. Some of the large merchant vessels are being powered by medium-speed diesel engines. These operate between 150 and 450 rpm, therefore they are connected to the propeller by gearing.

In steam turbines high pressure steam is directed into a series of blades or vanes attached to a shaft, causing it to rotate. This rotary motion is transferred to the propeller shaft by gears. Steam is produced by boiling water in a boiler,

which is fired by oil. Recent development in steam turbines which have reduced fuel consumption and raised power output have made them more attractive as an alternative to diesel power in ships. They are 50 percent lighter and on very large tankers some of the steam can be used to drive the large cargo oil pumps. Turbines are often used in container ships, which travel at high speeds.

Gas turbines differ from steam turbines in that gas rather than steam is used to turn a shaft. These have also become more suitable for use in ships. Many naval vessels are powered by gas turbines and several container ships are fitted with them. A gas turbine engine is very light and easily removed for maintenance. It is also suitable for complete automation.

Nuclear power in ships has mainly been confined to naval vessels, particularly submarines and aircraft carriers. A nuclear-powered ship differs from a conventional turbine ship in that it uses the energy released by the decay of radioactive fuel to generate steam. The steam is used to turn a shaft via a turbine in the conventional way.



Exercise 1

Match the words on the left with definitions on the right.

1. Effective horsepower	a) is a form of internal combustion engine similar to that used in a bus.
2. Gas turbine	b) In this type of engine high pressure steam is directed in to a series of blades or vanes attached to a shaft, causing it to rotate
3. Nuclear-powered ship	c) Is the power developed by the piston in the cylinder, but some of this is lost by friction within the engine
4. Steam turbines	d) These engines can be connected directly to the propeller without gearing
5. Diesel engine	e) This ship differs from a convenient turbine ship in that it uses the energy released by the decay of radioactive fuel to generate steam.
6. Slow-speed diesel engines	f) This type of engine is very light and easily removed for maintenance.

Exercise 2

Complete the following sentences with the appropriate word or phrase.

Example: The power output of a modern ...marine diesel... engine is about 40,000 brake horsepower.

1- in ships has mainly been confined to naval vessels.

2- In steam turbines steam is directed into a series of blades or vanes attached to a shaft, causing it to rotate.

3- Steam is produced by in a boiler, which is fired by oil.

4- Gas turbine is suitable for complete

5- Turbines are often used in ships, which travel at high speeds.

Exercise 3

Choose the best answer.

1. Engine characteristics are affected by technological
 - a. spare parts
 - b. changes
 - c. background
2. is the unit of effective power that an engine puts out.
 - a. Effective horsepower
 - b. Expressed horsepower
 - c. Brake horsepower
3. Theengine is an internal combustion engine.
 - a. diesel
 - b. turbine
 - c. nuclear
4. The efficiency of a propeller is higher if it is and it turns.
 - a. larger / faster
 - b. smaller / slower
 - c. larger / slower
5. Some of the large tankers and bulk carriers use engines.
 - a. medium speed diesel
 - b. high speed diesel
 - c. medium speed turbine
6. is a container for hot (boiling) water and produces steam.
 - a. An engine
 - b. A boiler
 - c. A turbine
7. In turbine engines, the blades on a shaft turn by the power of
 - a. oil or steam
 - b. steam or gas
 - c. fuel or gas

8. Gas turbine engines are mainly used in
 - a. diesel powered ships
 - b. steam powered ships
 - c. naval vessels and container ships
9. Using nuclear power is not very common in
 - a. naval ships
 - b. merchant ships
 - c. aircraft carriers
10. Medium–speed diesel engines are connected to the propeller by gearing because they turn than the propeller.
 - a. faster
 - b. with less power
 - c. with more power

Structure:

PASSIVE FORMS

We use the passive when we are interested in the object or when we do not know who caused the action.

Example: Appointments are required in such cases.

We can form a passive sentence from an active sentence when there is an object in the active sentence.

Form

to be + past participle

In order to form a passive sentence:

- Object of the “active” sentence becomes subject in the “passive” sentence.
- Verb “to be” is used in the same tense.
- Past participle of the verb is used after “to be”.
- Subject of the “active” sentence becomes “object” in the “passive” sentence placed after by (or is left out).

Active:	Naval architects	design	ships.
Passive:	Ships	are designed	by naval architects.

Examples

Active	Naval architects	are designing	ships.	Present Progressive
Passive:	ships	are being designed	by Naval architects.	

Active:	Naval architects	were designing	ships.	Past Progressive
Passive:	ships	were being designed	by Naval architects.	

Active:	Naval architects	have designed	ships.	Present Perfect
Passive:	ships	have been designed	by Naval architects.	

Active:	Naval architects	can design	ships.	Modals
Passive:	ships	can be designed	by Naval architects.	

Exercise 1

Rewrite the sentences in the passive.

- a) A computer controls the amount of heat.
.....
- b) The ship builder built the tanker in a year.
.....
- c) The Engineers and technician will fit out and complete the ship.
.....
- d) You can find your cabin right down this passageway.
.....
- e) The classification society has approved the drawings.
.....
- f) The second engineer is repairing the generator tonight.
.....
- g) My alarm clock didn't wake me up this morning.
.....
- h) The officers were discussing the problems in the meeting.
.....

Exercise 2

Complete the following sentences with proper form of the verbs.

- a) This door (not lock) this week.
- b) The ship (launch) yesterday.
- c) All the instructions (write) in English.
- d) Most children (educate) in public schools then.
- e) The personnel working in the engine room last week (not give permission) to sleep for about 3 days.
- f) Don't worry, when you wake up tomorrow morning, the port (see) from your porthole.

- g) Your lunch.....(may serve) in the restaurant or in your bunk.
 h) With the growth of mechanical and electronic equipment in near future,
 the role of human skills(be) limited.

Exercise 3

Put the words in the right order to make complete sentences.

- a) have / fruit / in / reefer / been / and / carried / meat / ship / this.

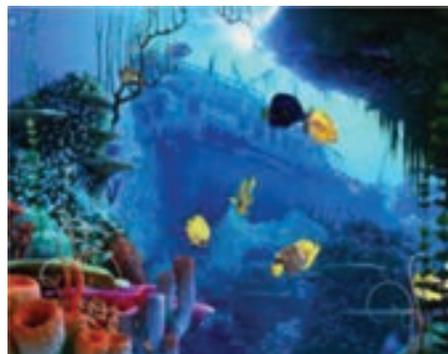
- b) to / cargo / cargo / general / ships / designed / of / general / carry / types /
 are / all / dry.

- c) is / carriers / dry / bulk / carried / cargo / bulk / in

- d) year / this / bridge / until / will / river / a / over / next / be / new / built.

Coral Reefs

Coral reefs are found in relatively warm and shallow waters in the tropics or nearby regions. A coral reef consists of calcium carbonate or limestone produced by various species of algae and by colonies of organisms. Coral reefs are the aquatic equivalent of the tropical rain forest. They are home to a dazzling variety of organisms, many of which are colorful beyond imagination.



Auxiliary Machinery

Besides running and maintaining the main propulsion of the ship, the engineer officer has a great deal of auxiliary machinery to look after. Auxiliary machinery covers everything mechanical onboard ship except the main engines and boilers. It includes almost all the pipes and fittings and the equipment needed to carry out a number of functions. These functions may be summarized as follows:

- To supply the needs of main engines and boilers. Air compressors are used to supply compressed air for starting engines. Coolers are used for cooling either oil or water. Water for the boilers is also heated before being admitted into boiler by feed water heaters. This increases the efficiency of the boiler.

- To keep the ship dry and trimmed. This is done through the bilge and ballast pumping systems. The former removes water which has gathered in machinery, cargo and other spaces. The later pumps water into and out of ballast tanks. In general cargo ships, “these systems” are usually interconnected and served by the same pumps. In tankers and other bulk carriers, these systems are entirely separate, because these ships may need to ballast at 12,000 tonnes/hour and therefore need larger pumps.

- To supply domestic needs such as fresh water from distillation plant, sanitation from stowage plant and heating and ventilation from heaters and air-conditioners.

- To apply the main power of the engines for propulsion and maneuvering. The engine power is transmitted to the propeller by a line of steel shafting. This is made up of thrust shaft; intermediate shafts and the propeller shaft.

- Steering gear is also necessary to operate the rudder for maneuvering.
- To supply the ship with electrical power and lighting. This is done by steam or diesel-powered generators.
- To moor the ship and handle cargo. Deck machinery is extensive and varied. It can be divided into anchor-handling machinery—windlass and capstans, mooring machinery—winches and capstans, and cargo-handling machinery— winches and cranes. It also includes cargo oil pumps.
- To provide for safety, firefighting and fire detection equipment, lifeboat engines and launching gear also included.

Responsibility for auxiliary machinery is often delegated to individual engineer officers, each one taking responsibility for the efficient working of certain items. “A lot of equipment” is duplicated, so that for example, one generator can be overhauled without cutting off the supply of electricity to the ship. Engineer officers on tankers are also involved in operating the cargo pumping machinery, although the pump rooms themselves are often manned by officers from the deck department.



Marine Diesel Generators



Two Types of Marine Air Compressors

Exercise 1

Match the words on the left with definitions on the right.

1. Air compressors	a) Machinery covers everything mechanical on board ship except the main engines and boilers.
2. Deck machinery	b) This gear is also necessary to operate the rudder for maneuvering.
3. Auxiliary machinery	c) These systems are used to supply compressed air for starting engines.
4. To keep the ship dry and trimmed	d) This machinery can be divided into anchor-handling machinery—windlass and capstans, mooring machinery—winches and capstans, and cargo-handling machinery—winches and cranes.
5. Steering gear	e) This is done through firefighting and fire detection equipment, lifeboat engines and launching gear also included.
6. To provide for safety on board ships,	f) This is done through the bilge and ballast pumping systems.

Exercise 2

Complete the following sentences with the appropriate word or phrase.

Example: The engineer officer has a great deal ofauxiliary machinery to look after.

1– Water for the boilers is also heated before being admitted into boiler by feed water heaters.

2– To moor the ship and handle cargo, deck machinery is and varied.

3–To apply the main power of the engines for propulsion and maneuvering, the engine power is transmitted to the propeller by a line

4– Engineer officers on tankers are also involved in operating the cargo

.....machinery.

5- for auxiliary machinery is often delegated to individual engineer officers.

Exercise 3

Choose the best answer.

1. Which of the following are not considered auxiliary machinery:
 - a. the coolers
 - b. the main engines
 - c. the air compressors
2. Engines are started by
 - a. heated oil or water
 - b. boilers
 - c. compressed air
3. To increase the efficiency of the boiler,
 - a. the air is compressed
 - b. the water is heated
 - c. the boiler is cleaned
4. Distillation plants are auxiliary machines used for supplying
 - a. fresh water
 - b. ventilation
 - c. sanitation
- 5.....pumping system removes water which has gathered in machinery.
 - a. Ballast
 - b. Hot water
 - c. Bilge
6. "These systems" in paragraph 3 of the text refers to
 - a. bilge pumping systems
 - b. ballast pumping systems

- c. bilge and ballast pumping systems
7. Steam or diesel– powered provide the ship with electricity.
 - a. engines
 - b. motors
 - c. generators
 8. “A lot of equipment is duplicated...” in the last paragraph of the text means:
 - a. Only one equipment of the kind exists on board.
 - b. A spare equipment exists on board.
 - c. The equipments need to be copied by the engineers on board.
 9. The machinery can be easily repaired because
 - a. They are not connected to the main engine.
 - b. They are separate from the main engine.
 - c. They are duplicated.
 10. Which of the following is not the function of auxiliary machinery?
 - a. To moor the ship.
 - b. To operate lifeboat engines.
 - c. To man the pump room.

STRUCTURES:

REFLEXIVE PRONOUNS

We use a reflexive pronoun when we want to refer back to the subject of the sentence or clause. Reflexive pronouns end in “-self” (singular) or “-selves” (plural).

There are eight reflexive pronouns:

reflexive pronoun	
singular	myself yourself himself, herself, itself
plural	ourselves yourselves themselves

Look at these examples:

the <u>underlined</u> words are NOT the same person/thing	the <u>underlined</u> words are the SAME person/thing
<u>Ali</u> saw <u>me</u> .	<u>I</u> saw <u>myself</u> in the mirror.
Why does <u>he</u> blame <u>you</u> ?	Why do <u>you</u> blame <u>yourself</u> ?
<u>Reza</u> sent <u>him</u> a copy.	<u>Reza</u> sent <u>himself</u> a copy.
<u>Reza</u> sent <u>her</u> a copy.	<u>Maryam</u> sent <u>herself</u> a copy.
<u>That</u> cat hurt <u>the mouse</u> .	<u>The</u> cat hurt <u>itself</u> .
<u>We</u> blame <u>you</u> .	<u>We</u> blame <u>ourselves</u> .
Can <u>you</u> help <u>my children</u> ?	Help <u>yourselves</u> ?
<u>They</u> cannot look after <u>the babies</u> .	<u>They</u> cannot look after <u>themselves</u> .

Intensive pronouns

We can also use these pronouns to emphasize the subject. Look at these examples:

- I made it myself. OR I myself made it.
- Have you yourself seen it? OR Have you seen it yourself?
- The President himself promised to decrease the inflation.
- She spoke to me herself. OR She herself spoke to me.
- The exam itself wasn't difficult, but the exam room was horrible.
- Never mind. We'll do it ourselves.
- They recommend this book even though they themselves have never read it. OR They recommend this book even though they have never read it themselves.

NOTE

How and What like

We generally use how to ask about things that change– for example people’s moods and health.

We prefer what ... like to ask about things that do not change– for example people’s character and appearance:

- How is the captain? He’s very well.
- What’s the captain like? He’s quiet and a bit serious.
- How’s the weather today? It is windy. / It is snowy. / It is foggy. / It is hot and humid.
- What’s the weather like in Istanbul? It is quite agreeable.
- What is your new teacher like? He is really intelligent and nice to everyone.
- What is your new cabin like? It is really spacious.

EXERCISE 1

Complete the sentences with a proper reflexive pronoun.

- a) He looked at in the mirror.
- b) I’m not angry with you. I’m angry with
- c) This light is automatic. It turns on and off by
- d) You work too hard. You never have any time for (one person)
- e) I cut while I was working with the knife.
- f) We’d like to know more about your job background. Please tell us about(one person)
- g) She never thinks about other people. She only thinks about
- h) Take care of (two people)
- i) We had a good cruise. We enjoyed
- j) Many people talk to when they’re alone.
- k) I blame for the accident. It was all my fault.
- l) He fell off the ladder but fortunately he didn’t hurt

EXERCISE 2

Put in How or What ... like.

- a) was the film you saw last night?
- b) is the food in the ship you work in?
- c) What's the weather in your hometown?
- d) is the food like in this restaurant?
- e) is the chief mate today?

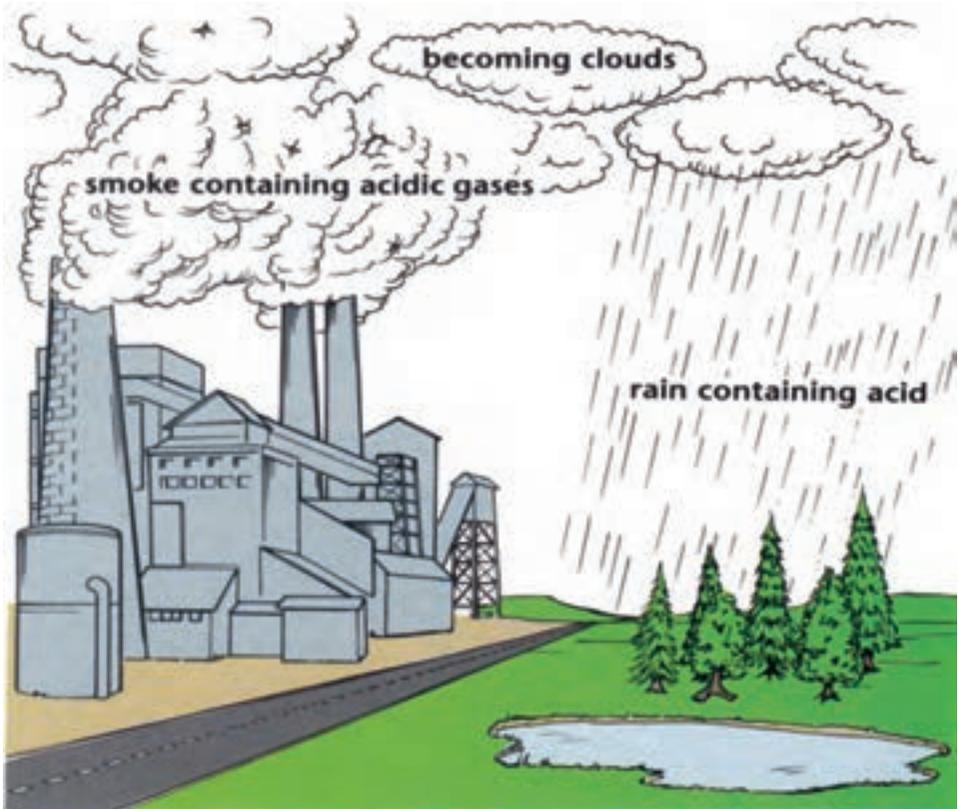
EXERCISE 3

Put in myself, yourself, ourselves, ... or me, you, us, ...

- a) We had a great cruise. We enjoyed
- b) It's not my fault. You can't blame
- c) What I did was really bad. I'm ashamed of
- d) We've got a problem. I hope you can help
- e) This lifejacket is not my size. Can you give another one, please?
- f) Don't worry about us. We can take care of
- g) Don't worry about the passengers. I can take care of
- h) I gave them a key to our house so that they could let in.

Acid Rain

Some of the main gases produced by power stations and ships are sulphur dioxide, nitrogen dioxide, and carbon dioxide. They are made when the fossil fuels coal, gas and oil are burnt. When these gases rise in the air they are blown around by the wind. They dissolve in water. When they dissolve in water, they make water acidic. When it rains the rainwater falls as “acid rain”. These gases are sometimes called acidic gases.



GLOSSARY

Unit One:	درس ۱ :
Aft	عقب کشتی - به سمت پاشنه (پاشنه سو)
Athwartships	در راستای عرض کشتی
Bow	سینه کشتی
Bulkhead	دیواره کشتی
Cabin	خوابگاه کشتی - اتاق استراحت خدمه کشتی
Chain	زنجیر
Deck	عرشه کشتی
Descending	نزولی
Forward	جلوی کشتی - به سمت سینه (سینه سو)
Gangplank=Brow	پله ورود و خروج کشتی
Gangway	پلکان ورود به کشتی
Handrail	زده یا دستگیره اطراف عرشه و پلکان
Hatch	گذرگاه افقی در کشتی
Head	سرویس بهداشتی
Jargon	زبان تخصصی
Ladder	نردبان

Manhole	دریچه آدم رو
Overhead	سقف
Passageway	محل عبور - گذرگاه
Port side	سمت چپ کشتی
Porthole	پنجره کشتی
Rail	نرده
Rung	پله نردبان
Starboard side	سمت راست کشتی
Stern	پاشنه
Vessel	یگان شناور
Unit Two:	درس ۲ :
Amidships	وسط کشتی
Auxiliary ships	کشتی تدارکاتی
Ballast	آب توازن کشتی
Bulk cargo	کالای فله
Camber	قوس عرشه
Commercial ports	بنادر تجاری (بازرگانی)
Container ships (carrier)	کشتی کانتینربر
Derrick	جرثقیل کشتی
Destroyer	ناوشکن
Displacement	وزن جابه‌جایی کشتی (بر اساس قانون اول ارشمیدس وقتی کشتی در آب شناور است وزن مقدار حجم آب جابه‌جا شده برابر وزن کل کشتی می‌باشد).
Ferry	قایق یا کشتی که در مسیر منظمی مسافر یا کالا حمل می‌کند.

Freeboard	برد آزاد، ارتفاع آزاد
Frigate	پاسور، ناو اسکورت
General cargo ships	کشتی کالای عمومی
Merchant ships	کشتی تجاری
Naval ships	کشتی نظامی (ناو)
Reefer ships	کشتی یخچالی
Refinery products	فراورده‌های پالایش شده
Sailing ships	کشتی بادبانی
Sheer	شیب طولی عرشه در سینه و پاشنه
Stowage compartment	بخش بارچینی
Tank vent	هواکش مخزن
Tanker	نفتکش
Weight	وزن
Unit Three:	درس ۳:
Ashore	به سوی ساحل، در ساحل
Beacon	علامت دریایی
Buoy	بویه یا شناوه (ف)
Celestial navigation	ناوبری نجومی
Collision	تصادم
Course	راه کشتی
Dead reckoning	ناوبری تخمینی
Distance	مسافت
Fog signals	سیگنال‌های مه (علائم صوتی که کشتی‌ها در زمان ورود به مه باید استفاده کنند)

Heavenly body	جرم سماوی (خورشید - ماه - ستارگان - سیارات)
Leeway	لغزش و سرخوردن کشتی روی سطح آب به خاطر وزش باد
Magnetic or gyro compass	قطب‌نمای مغناطیسی یا الکتریکی
Navigation	ناوبری
Piloting	ناوبری ساحلی، راهنمایی کشتی
Radar navigation	ناوبری راداری
Radio navigation	ناوبری رادیویی
Restricted water	آب‌های محدود
Satellite navigation	ناوبری ماهواره‌ای
Sextant	سکستانت (وسیله‌ای در ناوبری نجومی برای اندازه‌گیری زاویه بین اجرام سماوی از افق)
Unit Four:	درس ۴ :
Frequency	فرکانس - بسامد
Launched	به فضا پرتاب شده
Operational	عملیاتی (قابل استفاده)
Orbiting	در حال چرخش
Spare	ذخیره، یدک
Transmit	ارسال کردن
Unit Five:	درس ۵ :
Certificate of competency	گواهی‌نامه شایستگی
External deck	عرشه‌ی بیرونی
Fire main section valve	شیر لوله آب آتش‌نشانی اصلی
Hard (safety) hats	کلاه‌های محکم (ایمنی)
Harness	کمر بند ایمنی

Inflatable	قابل باد کردن
lifejacket	جلیقه نجات
Lifeboat	قایق نجات
Lifebuoy	حلقه نجات
Life raft	قایق نجات (بدون موتور)
Mandatory	اجباری - الزامی
prohibition	ممنوعیت
Protective (safety) shoes	کفش‌های محافظ (ایمنی)
Recognition	شناسایی
Rectification	تصحیح
Safety onboard	ایمنی در کشتی
Stability	پایداری
Water-tight	ضد نفوذ آب، آب نفوذ ناپذیر
Weather-tight	ضد نفوذ هوا، هوا نفوذ ناپذیر
Unit Six:	درس ۶:
Absorption	جذب
Ascending	صعودی، بالا رونده
Atmosphere	جو، کره هوا
Conductor	رسانا
Consequently	در نتیجه، بنابراین
Consist	شامل بودن
Contact	تماس، تماس یافتن، برخورد
Contain	محتوی بودن، دارا بودن، دربرداشتن
Convection	انتقال گرما از طریق همرفت (جابه‌جایی)

Current	جریان
Distribute	پخش کردن، تعمیم دادن، توزیع کردن
Diurnal change	تغییر روزانه
Diurnal variation	نوسان روزانه
Equator	خط استوا
Evaporation	تبخیر
Extend	طول دادن، ادامه داشتن
Fairly	به طور مساعد، منصفانه
Increase	افزایش، رشد
Layer	لایه
Liquid	مایع
Mainly	بیشتر، اساساً، اصلاً
Negligible	ناچیز، جزئی، بی اهمیت، قابل فراموشی
Observe	مشاهده
Occur	رخ دادن، واقع شدن، اتفاق افتادن
Order	ترتیب، رتبه، مرتب کردن
Pole	قطب
Radiation	تابش
Reach	رسیدن به، نائل شدن به
Remain	ماندن، اقامت کردن
Retain	نگاه داشتن، از دست ندادن، حفظ کردن
S. I. units	یکاهای «اس. آی.» (یکان های بین المللی)
Separation	جدایی، تفکیک
Solid	جامد

Steadily	به طور پیوسته و یکنواخت، با سعی و کوشش
Sunrise	طلوع خورشید
Surface	سطح
the Earth	زمین، کره زمین
Ultraviolet	ماوراء بنفش، فرابنفش
Upwards	روبه بالا، روبه ترقی، به طرف بالا
Value	ارزش
Vapor	بخار
Vary	فوق داشتن
Weather	آب و هوا
Unit 7:	درس ۷:
Accordingly	بنابراین، از این رو، بر طبق آن
additional	اضافی
Ash	خاکستر
Availability	قابلیت استفاده، دسترسی، فراهمی
Blanketing	با پتو و یا جلد پوشاندن، پوشاندن
Chain reaction	واکنش زنجیره‌ای
Chemical	شیمیایی
Classification	طبقه‌بندی، رده‌بندی
Combustible	سوختمنی، قابل اشتعال، قابل احتراق
Combustion	سوختن، اشتعال، احتراق
Commonly	به طور عادی، معمولاً
Component	اجزاء، سازه
Concept	مفهوم

Elevated	مرتفع، بلند مرتبه
Ember	خاکه زغال نیم‌سوز، خاکستر گرم
Energize	انرژی دادن، نیرو دادن
Equation	معادله، برابری
Essential	ضروری، اساسی
Extinguish	خاموش کردن، فرونشاندن
Feedback	بازخور
Flammable	قابل اشتعال، قابل سوختن، آتش‌گیر
Fuel	سوخت
Fundamental	بنیادی، اساسی، عمده، مهم
Generation	تولید، تولید نیرو
Go out	خاموش شدن، دست کشیدن از، بیرون رفتن
Grease	گریس، روغن، چربی
Ignition	احتراق، آتش‌گیری، اشتعال
Illustrate	نشان دادن، به تصویر کشیدن، شرح دادن
Initial	نخستین، اصلی، ابتدایی
Inter-reaction	واکنش داخلی
Introduce	معرفی کردن، آشنا کردن، مطرح کردن
Involve	درگیر شدن، سر و کار داشتن
Lacquer	لاک الکل
material	ماده، مواد
Media	رسانه‌ها، واسطه‌ها
Miss	از دست دادن، گم کردن، نداشتن، فاقد بودن
Petroleum	نفت خام، نفت، مواد نفتی

prevent	جلوگیری کردن، پیش‌گیری کردن، ممانعت کردن
produce	تولید کردن
proportion	سهم، تناسب، نسبت
Radiant	تابان، تابناک، تابشی
Raise	بالا بردن، بالا کشیدن، برافراشتن
Reaction	واکنش
Relationship	ارتباط، رابطه
Remove	برداشتن، بردن، زدودن
Researcher	محقق، پژوهشگر
Scholar	پژوهشگر، دانش پژوه، محقق
Self-supporting	خود پشتیبان
Shut off	مسدود کردن، قطع کردن، بستن
Smothering	خفه کردن، خاموش کردن
Solvent	حلال
Source	سرچشمه، منبع، منشأ
Sufficient	بسنده، کافی
Surrounding	احاطه کننده، مجاور
Sustain	متحمل شدن، تحمل کردن
Terminate	به پایان رساندن، خاتمه دادن، محدود کردن
Tetrahedron	جسم چهار سطحی، چهار ضلعی، چهار وجهی
Triangle	سه ضلعی، مثلث
Uninhibited	مانع نشده
Unit Eight:	درس ۸ :
Able seaman(AB)	ملوان با تجربه

Affair	امر، کار و بار
Appliance	اسباب، وسیله
Boatswain	سرملوان
Bosun	سرملوان
Cadet	دانشجوی دانشکده دریایی (ملیس به یونیفرم)
Captain	فرمانده کشتی، ناخدا، ناو خدا (در ناوگان سنتی ایران)
Chief cook	سر آشپز
Chief engineer	سر مهندس، مدیر ماشین
Chief mate, chief officer	افسر اول کشتی
Communication	مخابرات، ارتباطات
Context	فضا، زمینه، مفهوم
Crew	کارکنان
Deck department	رسته عرشه، گروه عرشه، کلیه افسران و کارکنانی که وظیفه ناوبری و ملوانی کشتی را بر عهده دارند.
Department	بخش، قسمت، دپارتمان
Duty	خدمت، مأموریت، وظیفه
Engineering department	رسته موتورخانه، گروه موتورخانه، کلیه افسران و تکنسین ها و کارکنان موتورخانه کشتی.
Ensure	مطمئن ساختن، تضمین کردن
Examine	آزمایش کردن، امتحان کردن
Fourth engineer	افسر مهندس چهارم کشتی
Head	رئیس
Hull	بدنه کشتی
In charge of	مسئول

Inspect	سرکشی کردن، بازرسی کردن، رسیدگی کردن
Inventory	موجودی، دارایی
Legally	قانونی، شرعی
Maintenance	نگهداری و تعمیر
mariner	ملوان، دریانورد
Master	رئیس، فرمانه کشتی
Military	نظامی
Official	اداری، رسمی
Operation	عملیات
Ordinary seaman(OS)	ملوان مبتدی، ملوان ساده
Organization	سازمان
Oversee	سرکشی کردن به، سرپرستی کردن
participate	شرکت کردن،
Possess	دارا بودن، داشتن
Primary	ابتدایی، مقدماتی، اصلی
Qualified	شایسته، دارای شرایط لازم
Quarter	ناحیه پاشنه کشتی (در حالت جمع به معنای خوابگاه در کشتی می باشد.)
Rating	درجه و شغل خدمت در کشتی
Requirement	نیازمندی، نیاز، احتیاج
Responsibility	مسئولیت
Safety officer	افسر ایمنی
Second engineer	افسر مهندس دوم کشتی
Second mate (officer)	افسر دوم کشتی

senior	ارشد، بالاتر، بالاتر به
Stability	پایداری
Steward department	رسته تدارکات، گروه تدارکات، کلیدی افسران و کارکنان تدارکات کشتی
Supervising	نظارت کردن، رسیدگی کردن
Third engineer	افسر مهندس سوم کشتی
Third mate (officer)	افسر سوم کشتی
Trainee	کارآموز
Typically	به طور نمونه
Unit Nine:	درس ۹ :
Advances	پیشرفت‌ها
Application	کاربرد، استفاده
Blade	پره توربین
Brake horsepower (bhp)	توان مفید
Characteristic	مشخصه، ویژگی
Comparison	مقایسه، برابری
Confine	محدوده، محدود کردن، منحصر کردن
Consumption	مصرف، سوختن
Decay	از بین رفتن، ضعیف شدن، پوسیدن، پوسیدگی
Effective horsepower	توان مؤثر
Efficiency	اثر بخشی
Gas turbine	توربین گاز
Gearing	لوازم، به طور کلی وسایل شخصی افراد کشتی یا تجهیزات کشتی، چرخ دنده

Improvement	بهبود، رشد، پیشرفت
Nuclear plant	نیروگاه اتمی، نیروی رانش اتمی
Output	تولید، محصول، بازده
Principal	اصلی، عمده
Propeller	پروانه کشتی
Relatively	نسبتاً، به نسبت
Revolution	دور، دوران کامل
Rotary motion	حرکت دایره‌ای
Steam turbine	توربین بخار
Transfer	انتقال، انتقال دادن
Vane	پره توربین
Unit Ten:	درس ۱۰:
Anchor handling	کار با لنگر
Auxiliary	پشتیبانی، تدارکاتی
Capstan	دوار عمودی، چرخ عمودی طناب یا زنجیر (معمولاً موتوری) دوار در زیر عرشه کشتی قرار می‌گیرد
Crane	جرثقیل
Delegate	محول کردن
Distillation	تقطیر
Extensive	پهنای، وسیع، بزرگ
Feed water heater	گرم کننده آب تغذیه دیگ بخار
Include	شامل شدن، دربرداشتن
Interconnected	به هم پیوسته، به هم وصل شده
Intermediate shaft	محور (شفت) میانی پروانه کشتی

Man	گماردن نفرات
Moor	مهيار کردن
Over-haul	تعمير اساسی
Propulsion	رانس، نیروی محرکه
Rudder	تیغهٔ سکان کشتی
Sanitation	بهداشت
Steering gear	ماشین‌آلات سکان کشتی، مجموعه ماشین‌آلات مکانیکی و الکتریکی که تیغهٔ سکان را به راست و چپ هدایت می‌کند.
Thrust shaft	بخشی از محور(شفت) پروانه کشتی که از بلوک اصلی (تراست) می‌گذرد.
Transmit	مخابره کردن، فرستادن
Ventilation	تهویه
Winch	دوار، وسیله‌ای که ممکن است دستی، برقی، هیدرولیکی باشد و از آن برای تخلیه و بارگیری و... استفاده گردد.
Windlass	دوار لنگر

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