SEAFARERS TRAINING CENTER INC

RATING FORMING PART OF A NAVIGATIONAL WATCH

In accordance to the standard of training, Certification and Watchkeeping for Seafarers 1978, as amended

SCOPE

This course aims to provide the training for candidates ***RATING FORMING PART OF A NAVIGATIONAL WATCH,*** in accordance with the Regulation II/4, Section A-II/4 and Table A-II/4 of the STCW 78 Convention, as amended.

OBJECTIVE

This is the minimum standards of competence in ***RATING FORMING PART OF A NAVIGATIONAL WATCH***, a trainee will be competent to take appropriate measures for the safety of personnel and of the ship and to use fire appliances correctly. The trainee will also have a knowledge of ***RATING FORMING PART OF A NAVIGATIONAL WATCH***.

ENTRY STANDARS

The course is open to all seafarers. All trainees must be certified by a doctor to be in good health.

COURSE CERTIFICATE

Completion of the course and demonstration of competence, a document will be issued certifying that the holder has met the standard of competence.

COURSE INTAKE LIMITATIONS

The maximum number of trainees attending each session will be 25 persons.

Practice will be done on board a ship or simulator

Staff requirements

COURSE	MODEL IMO	LOAD TIME	INSTALLATION	EQUIPMENT	INSTRUCTOR
RATINGS FORMING PART OF A NAVIGATIONAL WATCH	Rule II/4, Sección A-II/4 y Tabla A-II/4	30 hours	Installation for theoretical and practice	Ship For practice or simulator	1. Course rating forming part of a navigational watch. 2. IMO Model Course Instructor 6.0.9

COURSE OUTLINE

COURSE OUTLINE	APRPROXIMATE TIME (HOURS)
KNOWLEDGE, UNDERSTANDING AND PROFICIENCY.	**LECTURE, DEMOSTRATIONS AND PRACTICAL EXERCISES.**
1. Introduction	2.0
2. Modern Navigation	6.0
3. Types of vessels	4.0
4. The Nautical Flag	4.0
5. Navigation Lights	4.0
6. Bridge equipment	4.0
5. Navigation (practice)	6.0
Total	**30.0**

COURSE TIME TABLE

This course has a 30 hours. In this course there are 6 practical hours.

PERIOD/ Day	**1rst. PERIOD (2.0 Hours)**	**2nd. PERIOD (2.0 Hours)**	**3rt. PERIOD (2.0 Hours)**	**4th. PERIOD (2.0 Hours)**
Day 1	Introduction	Modern navigation methods	Modern navigation methods.	Modern navigation methods.
Day 2	Types of vessels	Types of vesssels	The nautical Flag	The nautical Flag
Day 3	Navigation lights	Navigation Lights	Bridge equipment	Bridge equipment
Day 4	Navegation (Practice)	Navegation (Practice)	Navegación (Practice)	

MANUAL

1. INTRODUCTION

Navigation

Navigation is the process of reading, and controlling the movement of a craft or vehicle from one place to another. It is also the term of art used for the specialized knowledge used by navigators to perform navigation tasks. The word *navigate* is derived from the Latin "navigate", which is the command "sail". All navigational techniques involve locating the navigator's position compared to known locations or patterns.

Basic concepts

Latitude

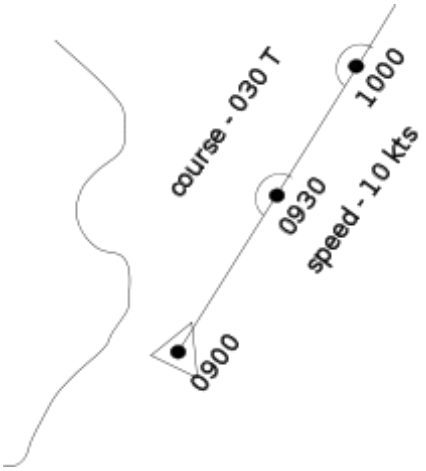
The latitude of a place on the Earth's surface is the angular distance north or south of the equator.[2] Latitude is usually expressed in degrees (marked with °) ranging from 0° at the Equator to 90° at the North and South poles.The latitude of the North Pole is 90° N, and the latitude of the South Pole is 90° S. Historically, mariners calculated latitude in the Northern Hemisphere by sighting the North Star Polaris with a sextant and sight reduction tables to take out error for height of eye and atmospheric refraction. Generally, the height of Polaris in degrees of arc above the horizon is the latitude of the observer.

Longitude

Similar to latitude, the longitude of a place on the Earth's surface is the angular distance east or west of the prime meridian or Greenwich meridian.Longitude is usually expressed in degrees (marked with °) ranging from 0° at the Greenwich meridian to 180° east and west. Sydney, Australia, for example, has a longitude of about 151° east. New York City has a longitude of about 74° west. For most of history, mariners struggled to determine precise longitude. The problem was solved with the invention of the marine chronometer. Longitude can be calculated if the precise time of a sighting is known.

2. MODERN NAVIGATION

Dead reckoning



The navigator plots his 9am position, indicated by the triangle, and, using his course and speed, estimates his position at 9:30am and 10am.

Dead reckoning is the process of estimating present position by projecting course and speed from a known past position. It is also used to predict a future position by projecting course and speed from a known present position. The DR position is only an approximate position because it does not allow for the effect of leeway, current, helmsman error, compass error, or any other external influences.

The navigator uses dead reckoning in many ways, such as:

- to determine sunrise and sunset,
- to predict landfall, sighting lights and arrival times,
- to evaluate the accuracy of electronic positioning information,
- to predict which celestial bodies will be available for future observation.

The most important use of dead reckoning is to project the position of the ship into the immediate future and avoid hazards to navigation.

The navigator carefully tends the DR plot, updating it when required, and uses it to evaluate external forces acting on the ship. The navigator also consults the DR plot to avoid navigation hazards. A fix taken at each DR position will reveal the effects of

current, wind, and steering error, and allow the navigator to stay on track by correcting for them.

The use of DR when an Electronic Charts Display and Information System (ECDIS) is the primary plotting method will vary with the type of system. An ECDIS allows the display of the ship's heading projected out to some future position as a function of time, the display of waypoint information, and progress toward each waypoint in turn.

Until ECDIS is proven to provide the level of safety and accuracy required, the use of a traditional DR plot on paper charts is a prudent backup, especially in restricted waters.

Before the development of the lunar distance method or the marine chronometer, dead reckoning was the primary method of determining longitude available to mariners such as Christopher Columbus and John Cabot on their trans-Atlantic voyages.

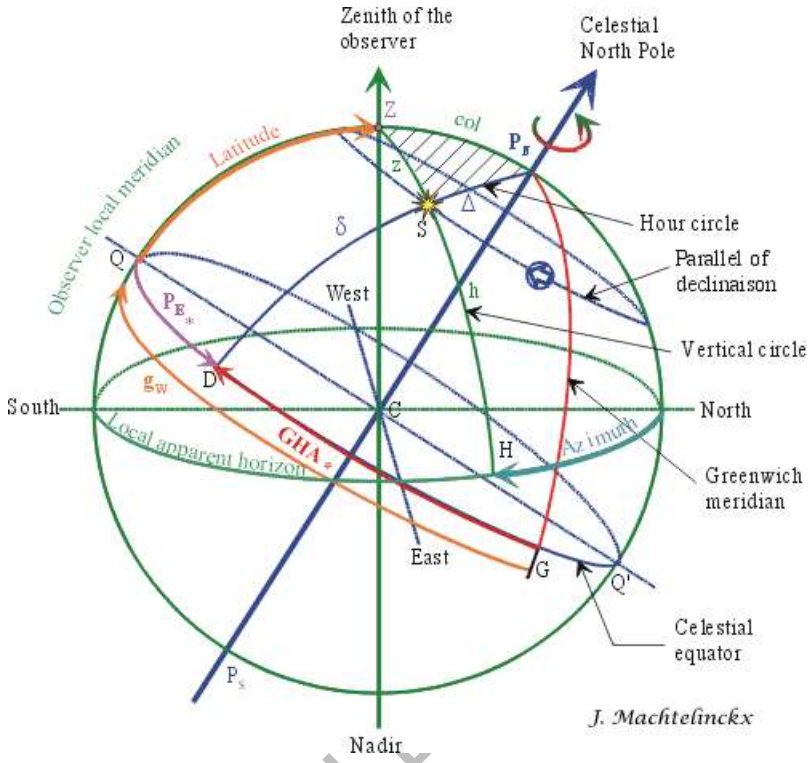
Piloting

Piloting (also called pilotage) involves navigating a vessel in restricted waters and fixing its position as precisely as possible at frequent intervals. More so than in other phases of navigation, proper preparation and attention to detail are important. Procedures vary from vessel to vessel, and between military, commercial, and private vessels.

A military navigation team will nearly always consist of several people. A military navigator might have bearing takers stationed at the gyro repeaters on the bridge wings for taking simultaneous bearings, while the civilian navigator must often take and plot them himself. While the military navigator will have a bearing book and someone to record entries for each fix, the civilian navigator will simply pilot the bearings on the chart as they are taken and not record them at all.

If the ship is equipped with an ECDIS, it is reasonable for the navigator to simply monitor the progress of the ship along the chosen track, visually ensuring that the ship is proceeding as desired, checking the compass, sounder and other indicators only occasionally. If a pilot is aboard, as is often the case in the most restricted of waters, his judgment can generally be relied upon, further easing the workload. But should the ECDIS fail, the navigator will have to rely on his skill in the manual and time-tested procedures.

CELESTIAL NAVIGATION



A celestial fix will be at the intersection of two or more circles.

Celestial navigation systems are based on observation of the positions of the Sun, Moon, Planets and navigational stars. Such systems are in use as well for terrestrial navigating as for interstellar navigating. By knowing which point on the rotating earth a celestial object is above and measuring its height above the observer's horizon, the navigator can determine his distance from that sub point. A Nautical almanac and a chronometer are used to compute the sub point on earth a celestial body is over, and a sextant is used to measure the body's angular height above the horizon. That height can then be used to compute distance from the sub point to create a circular line of position. A navigator shoots a number of stars in succession to give a series of overlapping lines of position. Where they intersect is the celestial fix. The moon and sun may also be used. The sun can also be used by itself to shoot a succession of lines of position (best done around local noon) to determine a position.

Marine chronometer

A traditional marine chronometer.

In order to accurately measure longitude, the precise time of a sextant sighting (down to the second, if possible) must be recorded. Each second of error is equivalent to 15 seconds of longitude error, which at the equator is a position error of .29 mile, about the accuracy limit of manual celestial navigation.

The spring-driven marine chronometer is a precision timepiece used aboard ship to provide accurate time for celestial observations. A chronometer differs from a spring-driven watch principally in that it contains a variable lever device to maintain even pressure on the mainspring, and a special balance designed to compensate for temperature variations.

A spring-driven chronometer is set approximately to Greenwich mean time (GMT) and is not reset until the instrument is overhauled and cleaned, usually at three-year intervals. The difference between GMT and chronometer time is carefully determined and applied as a correction to all chronometer readings. Spring-driven chronometers must be wound at about the same time each day.

Quartz crystal marine chronometers have replaced spring-driven chronometers aboard many ships because of their greater accuracy. They are maintained on GMT directly

from radio time signals. This eliminates chronometer error and watch error corrections. Should the second hand be in error by a readable amount, it can be reset electrically.

The basic element for time generation is a quartz crystal oscillator. The quartz crystal is temperature compensated and is hermetically sealed in an evacuated envelope. A calibrated adjustment capability is provided to adjust for the aging of the crystal.

The chronometer is designed to operate for a minimum of 1 year on a single set of batteries. Observations may be timed and ship's clocks set with a comparing watch, which is set to chronometer time and taken to the bridge wing for recording sight times. In practice, a wrist watch coordinated to the nearest second with the chronometer will be adequate.

A stop watch, either spring wound or digital, may also be used for celestial observations. In this case, the watch is started at a known GMT by chronometer, and the elapsed time of each sight added to this to obtain GMT of the sight.

All chronometers and watches should be checked regularly with a radio time signal. Times and frequencies of radio time signals are listed in publications such as Radio Navigational Aids.

The marine sextant

The marine sextant is used to measure the elevation of celestial bodies above the horizon.

For more details on this topic, see Sextant.

The second critical component of celestial navigation is to measure the angle formed at the observer's eye between the celestial body and the sensible horizon. The sextant, an optical instrument, is used to perform this function. The sextant consists of two primary assemblies. The frame is a rigid triangular structure with a pivot at the top and a graduated segment of a circle, referred to as the "arc", at the bottom. The second component is the index arm, which is attached to the pivot at the top of the frame. At the bottom is an endless vernier which clamps into teeth on the bottom of the "arc". The optical system consists of two mirrors and, generally, a low power telescope. One mirror, referred to as the "index mirror" is fixed to the top of the index arm, over the pivot. As the index arm is moved, this mirror rotates, and the graduated scale on the arc indicates the measured angle ("altitude").

The second mirror, referred to as the "horizon glass", is fixed to the front of the frame. One half of the horizon glass is silvered and the other half is clear. Light from the celestial body strikes the index mirror and is reflected to the silvered portion of the horizon glass, then back to the observer's eye through the telescope. The observer manipulates the index arm so the reflected image of the body in the horizon glass is just resting on the visual horizon, seen through the clear side of the horizon glass.

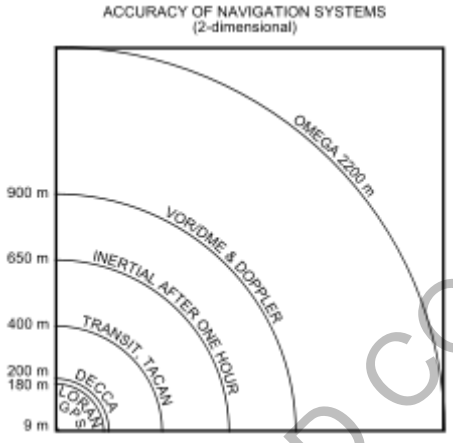
Adjustment of the sextant consists of checking and aligning all the optical elements to eliminate "index correction". Index correction should be checked, using the horizon or more preferably a star, each time the sextant is used. The practice of taking celestial observations from the deck of a rolling ship, often through cloud cover and with a hazy horizon, is by far the most challenging part of celestial navigation.

Inertial navigation

Inertial navigation is a dead reckoning type of navigation system that computes its position based on motion sensors. Once the initial latitude and longitude is established, the system receives impulses from motion detectors that measure the acceleration along three or more axes enabling it continually and accurately to calculate the current latitude and longitude. Its advantages over other navigation systems are that, once the starting position is set, it does not require outside information, it is not affected by adverse weather conditions and it cannot be detected or jammed by the enemy. Its disadvantage is that since the current position is calculated solely from previous positions, its errors are cumulative, increasing at a rate roughly proportional to the time since the initial position was input. So inertial navigation systems must be corrected frequently with a location 'fix' from some other type of navigation system. The US Navy developed a Ships Inertial Navigation System (SINS) during the Polaris missile program to insure a safe, reliable and accurate navigation system for its missile submarines. Inertial

navigation systems were in wide use until satellite navigation systems (GPS) became available.

Electronic navigation



Radio navigation

A radio direction finder or RDF is a device for finding the direction to a radio source. Due to radio's ability to travel very long distances "over the horizon", it makes a particularly good navigation system for ships and aircraft that might be flying at a distance from land.

RDFs works by rotating a directional antenna and listening for the direction in which the signal from a known station comes through most strongly. This sort of system was widely used in the 1930s and 1940s. RDF antennas are easy to spot on German World War II aircraft, as loops under the rear section of the fuselage, whereas most US aircraft enclosed the antenna in a small teardrop-shaped fairing.

In navigational applications, RDF signals are provided in the form of *radio beacons*, the radio version of a lighthouse. The signal is typically a simple AM broadcast of a morse code series of letters, which the RDF can tune in to see if the beacon is "on the air". Most modern detectors can also tune in any commercial radio stations, which is particularly useful due to their high power and location near major cities.

Decca, OMEGA, and LORAN-C are three similar hyperbolic navigation systems. Decca was a hyperbolic low frequency radio navigation system (also known as multilateration) that was first deployed during World War II when the Allied forces needed a system which could be used to achieve accurate landings. As was the case with Loran C, its primary use was for ship navigation in coastal waters. Fishing vessels were major post-war users, but it was also used on aircraft, including a very early (1949) application of moving-map displays. The system was deployed in the North Sea and was used by helicopters operating to oil platforms.

The OMEGA Navigation System was the first truly global radio navigation system for aircraft, operated by the United States in cooperation with six partner nations. OMEGA was developed by the United States Navy for military aviation users. It was approved for development in 1968 and promised a true worldwide oceanic coverage capability with only eight transmitters and the ability to achieve a four mile accuracy when fixing a position. Initially, the system was to be used for navigating nuclear bombers across the North Pole to Russia. Later, it was found useful for submarines.[1] Due to the success of the Global Positioning System the use of Omega declined during the 1990s, to a point where the cost of operating Omega could no longer be justified. Omega was terminated on September 30, 1997 and all stations ceased operation.

LORAN is a terrestrial navigation system using low frequency radio transmitters that use the time interval between radio signals received from three or more stations to determine the position of a ship or aircraft. The current version of LORAN in common use is LORAN-C, which operates in the low frequency portion of the EM spectrum from 90 to 110 kHz. Many nations are users of the system, including the United States, Japan, and several European countries. Russia uses a nearly exact system in the same frequency range, called CHAYKA. LORAN use is in steep decline, with GPS being the primary replacement. However, there are attempts to enhance and re-popularize LORAN. LORAN signals are less susceptible to interference and can penetrate better into foliage and buildings than GPS signals.

Radar navigation

Radar ranges and bearings can be very useful navigation.

When a vessel is within radar range of land or special radar aids to navigation, the navigator can take distances and angular bearings to charted objects and use these to establish arcs of position and lines of position on a chart. A fix consisting of only radar information is called a radar fix.

Types of radar fixes include "range and bearing to a single object," "two or more bearings, "tangent bearings," and "two or more ranges."

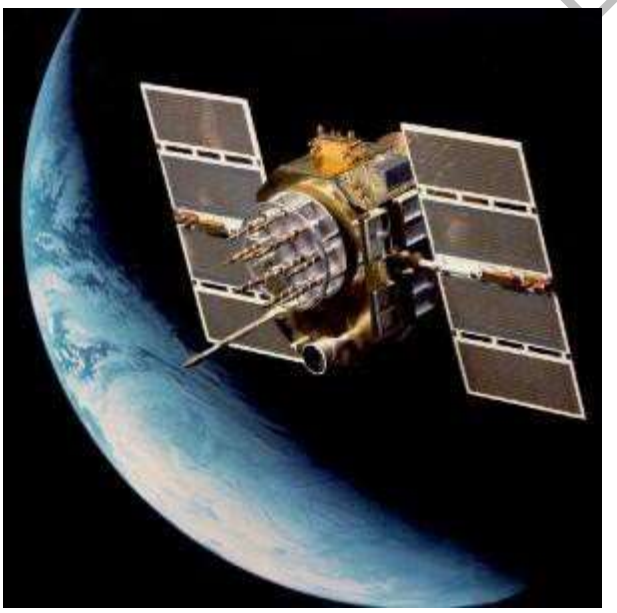
Parallel indexing is a technique defined by William Burger in the 1957 book *The Radar Observer's Handbook*. This technique involves creating a line on the screen that is parallel to the ship's course, but offset to the left or right by some distance. This parallel line allows the navigator to maintain a given distance away from hazards.

Some techniques have been developed for special situations. One, known as the "contour method," involves marking a transparent plastic template on the radar screen and moving it to the chart to fix a position.

Another special technique, known as the Franklin Continuous Radar Plot Technique, involves drawing the path a radar object should follow on the radar display if the ship

stays on its planned course. During the transit, the navigator can check that the ship is on track by checking that the pip lies on the drawn line.

Satellite navigation



Global Navigation Satellite System or GNSS is the term for satellite navigation systems that provide positioning with global coverage. A GNSS allow small electronic receivers to determine their location (longitude, latitude, and altitude) to within a few metres using time signals transmitted along a line of sight by radio from satellites. Receivers on the ground with a fixed position can also be used to calculate the precise time as a reference for scientific experiments.

As of 2007, the United States NAVSTAR Global Positioning System (GPS) is the only

fully operational GNSS. The Russian GLONASS is a GNSS in the process of being restored to full operation. The European Union's Galileo positioning system is a next generation GNSS in the initial deployment phase, scheduled to be operational in 2010. China has indicated it may expand its regional Beidou navigation system into a global system.

More than two dozen GPS satellites are in medium Earth orbit, transmitting signals allowing GPS receivers to determine the receiver's location, speed and direction.

Since the first experimental satellite was launched in 1978, GPS has become an indispensable aid to navigation around the world, and an important tool for map-making and land surveying. GPS also provides a precise time reference used in many applications including scientific study of earthquakes, and synchronization of telecommunications networks.

Developed by the United States Department of Defense, GPS is officially named NAVSTAR GPS (NAVigation Satellite Timing And Ranging Global Positioning System). The satellite constellation is managed by the United States Air Force 50th Space Wing. The cost of maintaining the system is approximately US$750 million per year,[17] including the replacement of aging satellites, and research and development. Despite this fact, GPS is free for civilian use as a public good.

3. TYPES OF VESSELS

Bulk carrier

A **bulk carrier, bulk freighter,** or **bulker** is a merchant ship specially designed to transport unpackaged bulk cargo, such as grains, coal, ore, and cement in its cargo holds. Since the first specialized bulk carrier was built in 1852, economic forces have fueled the development of these ships, causing them to grow in size and sophistication. Today's bulkers are specially designed to maximize capacity, safety, efficiency, and to be able to withstand the rigors of their work.

Today, bulkers make up 40% of the world's merchant fleets and range in size from single-hold mini-bulkers to mammoth ore ships able to carry 365,000 metric tons of deadweight (DWT). A number of specialized designs exist: some can unload their own cargo, some depend on port facilities for unloading, and some even package the cargo as it is loaded. Over half of all bulkers have Greek, Japanese, or Chinese owners and more than a quarter are registered in Panama. Korea is the largest single builder of bulkers, and 82% of these ships were built in Asia.

A bulk carrier's crew participates in the loading and unloading of cargo, navigating the ship, and keeping its machinery and equipment properly maintained. Loading and unloading the cargo is difficult, dangerous, and can take up to 120 hours on larger ships. Crews can range in size from three people on the smallest ships to over 30 on the largest.

Bulk cargo can be very dense, corrosive, or abrasive. This can present safety problems: cargo shifting, spontaneous combustion, and cargo saturation can threaten a ship. The use of ships that are old and have corrosion problems has been linked to a spate of bulker sinkings in the 1990s, as have the bulker's large hatchways, important for efficient cargo handling. New international regulations have since been introduced to improve ship design and inspection, and to streamline the process of abandoning ship.

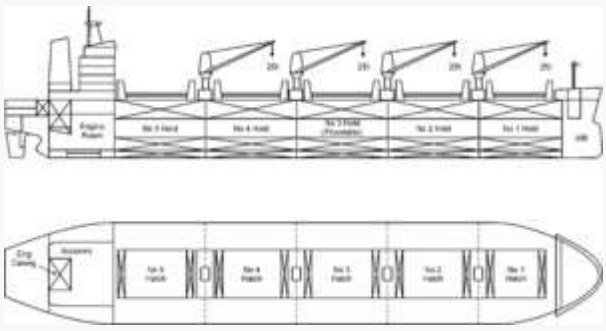
The *Sabrina I* is a modern Handymax bulk carrier.

Class overview

Name:	Freighter
Subclasses:	Handymax, Handysize, Panamax, Capesize
Built:	*c.* 1850–present
Active:	6,225 vessels over 10,000 long tons deadweight (DWT)[1]

General characteristics

Type:	Cargo ship
Propulsion:	2-stroke diesel engine and 1 propeller
Capacity:	up to 364,000 DWT
Notes:	Rear house, full hull, series of large hatches



Plans of a geared Handymax bulker

Definition

There are various ways to define the term bulk carrier. As of 1999, the International Convention for the Safety of Life at Sea defines a bulk carrier as "a ship constructed with a single deck, top side tanks and hopper side tanks in cargo spaces and intended to primarily carry dry cargo in bulk; an ore carrier; or a combination carrier." However, most classification societies use a broader definition where a bulker is any ship that carries dry unpackaged goods. Multipurpose cargo ships can carry bulk cargo, but can also carry other cargoes and are not specifically designed for bulk carriage. The term "dry bulk carrier" is used to distinguish bulkers from bulk liquid carriers such as oil, chemical, or liquefied petroleum gas carriers. Very small bulkers are almost indistinguishable from general cargo ships, and they are often classified based more on the ship's use than its design.

A number of abbreviations are used to describe bulkers. "OBO" describes a bulker which carries a combination of ore, bulk, and oil, and "O/O" is used for combination oil and ore carriers. The terms "VLOC," "VLBC," "ULOC," and "ULBC" for very large and ultra large ore and bulk carriers were adapted from the supertanker designations very large crude carrier and ultra large crude carrier.

Categories

Bulkers are segregated into six major size categories: small, handysize, handymax, panamax, capesize, and very large. Very large bulk and ore carriers fall into the capesize category but are often considered separately.

Other categories occur in regional trade, such as Kamsarmax, with a maximum length of 229 meters, the maximum length that can load in the port of Kamsar in the Republic of Guinea. Other terms such as Seawaymax, Setouchmax, Dunkirkmax, and Newcastlemax also appear in regional trade.

Mini-bulkers are prevalent in the category of small vessels with a capacity of under 10,000 DWT. Mini-bulkers carry from 500 to 2,500 tons, have a single hold, and are designed for river transport. They are often built to be able to pass under bridges and have small crews of three to eight people.

Handysize and Handymax ships are general purpose in nature. These two segments represent 71% of all bulk carriers over 10,000 DWT and also have the highest rate of growth. This is partly due to new regulations coming into effect which put greater constraints on the building of larger vessels. Handymax ships are typically 150–200 m in length and 52,000 – 58,000 DWT with five cargo holds and four cranes. These ships are also general purpose in nature.

The size of a Panamax vessel is limited by the Panama canal's lock chambers, which can accommodate ships with a beam of up to 32.31 m, a length overall of up to 294.13 m, and a draft of up to 12.04 m.

Capesize ships are too large to traverse the Suez or Panama canals and must round the Cape of Good Hope or Cape Horn to travel between oceans. Capesize bulkers are specialized: 93% of their cargo is iron ore and coal. Some ships on the Great Lakes Waterway exceed Panamax dimensions but they are limited to use on the Great Lakes as they cannot pass through the smaller St. Lawrence Seaway to the ocean. Very large ore carriers and very large bulk carriers are a subset of the capesize category reserved for vessels over 200,000 DWT. Carriers of this size are almost always designed to carry iron ore.

General Bulk Carrier Types

Illustration	Description
	**Geared bulk carriers** are typically in the handysize to handymax size range although there are a small number of geared panamax vessels, like all bulkers they feature a series of holds covered by prominent hatch covers. They have cranes, derricks or conveyors that allow them to load or discharge cargo in ports without shore-based equipment. This gives geared bulkers flexibility in the cargoes they can carry and the routes they can travel. (Photo: A typical geared handysize bulk carrier.)
	**Combined carriers** are designed to transport both liquid and dry bulk cargoes. If both are carried simultaneously, they are segregated in separate holds and tanks. Combined carriers require special design and are expensive. They were prevalent in the 1970s, but their numbers have dwindled since 1990. (Photo: The oil pipeline and dry bulk hold aboard the *Maya*.)
	**Gearless carriers** are bulkers without cranes or conveyors. These ships depend on shore-based equipment at their ports of call for loading and discharging. They range across all sizes, the larger bulk carriers (VLOCs) can only dock at the largest ports, some of these are designed with a single port-to-port trade in mind. The use of gearless bulkers avoids the costs of installing, operating, and maintaining cranes. (Photo:*Berge Athen*, a 225,000 ton gearless bulker.)
	**Selfdischargers** are bulkers with conveyor belts, or with the use of an excavator that is fitted on a traverse running over the vessel's entire hatch, and that is able to move sideways as well. This allows them to discharge their cargo quickly and efficiently. (Photo: The *John B. Aird* a self-discharging lake freighter.)

Lakers are the bulkers prominent on the Great Lakes, often identifiable by having a forward house which helps in transiting locks. Operating in fresh water, these ships suffer much less corrosion damage and have a much longer lifespan than saltwater ships. As of 2005, there were 98 lakers of 10,000 DWT or over.

BIBO or **"Bulk In, Bags Out"** bulkers are equipped to bag cargo as it is unloaded. The *CHL Innovator*, shown in the photo, is a BIBO bulker. In one hour, this ship can unload 300 tons of bulk sugar and package it into 50 kg sacks.

Chemical tanker

A **chemical tanker** is a type of tanker designed to transport chemicals in bulk.

Ocean-going chemical tankers generally range from 5,000 metric tons deadweight (DWT) to 40,000 DWT in size, which is considerably smaller than the average size of other tanker types due to the specialised nature of their cargoes and the size restrictions of the port terminals where they call to load and discharge.

Chemical tankers normally have a series of separate cargo tanks which are either coated with specialised coatings such as phenolic epoxy or zinc paint, or made from stainless steel. The coating or cargo tank material determines what types of cargo a particular tank can carry: stainless steel tanks are required for aggressive acid cargoes such as sulfuric and phosphoric acid, while 'easier' cargoes - e.g. vegetable oil - can be carried in epoxy coated tanks.

Cargoes

Chemical tankers often have a system for tank heating in order to maintain the viscosity of certain cargoes - typically this system consists of a boiler which pumps pressurized steam through so-called 'heating coils' - stainless steel pipes - in the cargo tanks, thus transferring heat into the cargo which circulates in the tank by convection. Many modern chemical tankers feature double hull construction and have one tank for each pump with separate piping, which means that each tank can load a separate cargo without any mixing. Tank cleaning after discharging cargo is a very important aspect of chemical tanker operations, because tanks which are not properly cleaned of all cargo residue can adversely affect the purity of the next cargo loaded. Before tanks are cleaned, it is very important that they are properly ventilated and checked to be free of potentially explosive gases.

Empty holds are normally protected against explosion by inert gas blankets.

Most new chemical tankers are built by shipbuilders in Japan, Korea or China, with other builders in Turkey, Italy, Germany and Poland.

The chemical tanker market is dominated by several major chemical tanker operators, including Stolt-Nielsen, Odfjell, Eitzen Chemical, Clipper Tankers and Berlian Laju Tanker. Charterers - the end users of the ships -include oil majors and specialist chemical companies.

To book space with the "big 3" or other smaller owners, most charterers use a Shipbroker in order to obtain the most competitive freight rate.

Container ship

Container ships are cargo ships that carry all of their load in truck-size intermodal containers, in a technique called containerization. They form a common means of

commercial intermodal freight transport.

Construction

Container ships are designed in a manner that optimizes space. Capacity is measured in Twenty-foot equivalent unit (TEU), the number of standard 20-foot containers measuring 20 × 8.0 × 8.5 feet (6.1 × 2.4 × 2.6 metres) a vessel can carry. This notwithstanding, most containers used today measure 40 feet (12 metres) in length. Above a certain size, container ships do not carry their own loading gear, so loading and unloading can only be done at ports with the necessary cranes. However, smaller ships with capacities up to 2,900 TEU are often equipped with their own cranes.

Informally known as "box boats," they carry the majority of the world's dry cargo, meaning manufactured goods. Cargoes like metal ores or coal or wheat are carried in bulk carriers. There are large main line vessels that ply the deep sea routes, then many small "feeder" ships that supply the large ships at centralized hub ports. Most container ships are propelled by diesel engines, and have crews of between 20 and 40 people. They generally have a large accommodation block at the stern, near the engine room. Container ships now carry up to 15,000 TEU (approximately equivalent to 35 100-car double-stack intermodal freight trains) on a voyage. The world's largest container ships, the M/V *Emma Mærsk* and her sisters, have a capacity of 15,200 containers.

In 2008 the South Korean shipbuilder STX announced plans to construct a container ship capable of carrying 22,000 TEU, and with a proposed length of 450 metres and a beam of 60 metres. If constructed, the container ship would become the largest seagoing vessel in the world.

Future

Economies of scale have dictated an upward trend in sizes of container ships in order to reduce costs. One limit on ship size is the "Suezmax" standard, or the largest theoretical ship capable of passing through the Suez Canal, which measures 14,000 TEU. Such a vessel would displace 137,000 metric tons deadweight (DWT), be 400 meters long, more than 50 meters wide, have a draft of nearly 15 metres, and use more than 85 MW (113,987 hp) to achieve 25.5 knots, specifications met by the Emma Mærsk.

Beyond Suezmax lies the "Malaccamax" (for Straits of Malacca) ship of 18,000 TEU, displacing 300,000 DWT, 470 meters long, 60 meters wide, 16 meters of draft, and using more than 100 MW (134,102 hp) for 25.5 knots. This is most likely the limit before a major restructuring of world container trade routes. The biggest constraint of this design, the absence of a capable single engine, has been overcome by the MAN B&W K108ME-C.

The ultimate problem was the absence of a manufacturer capable of producing the propeller needed for transmitting this power, which would be about 10 metres in diameter, and weigh 130 tonnes. One has since been built for the Emma Mærsk by Mecklenburger Metallguss GmbH in Waren, Germany. Other constraints, such as time in port and flexibility of service routes are similar to the constraints that eventually limited

the growth in size of supertankers.

Ten Biggest Container Ship Classes, listed by TEU capacity

Built	Name	Sisterships	Length o.a.	Beam	Maximum TEU	GT	Owners	Flag
2006	Emma Mærsk	7	397.7 m	56.4 m	15,200	151,687	Maersk Line	Denmark
2009	MSC Danit	6	365.50 m	51.20 m	14,000	153,092	Mediterranean Shipping Company S.A.	Panama
2009	MSC Beatrice	6	366 m	51 m	14,000	151,559	Mediterranean Shipping Company S.A.	Panama
2008	CMA CGM Thalassa	1	346.5 m	45.6 m	10,960	128,600	CMA CGM	Cyprus
2005	Gudrun Mærsk	5	367.3 m	42.8 m	10,150	97,933	Maersk Line	Denmark
2002	CLEMENTINE MAERSK	6	348.7	42.6 m	9,600 [11]	96000	Maersk Line	Denmark
2006	COSCO Guangzhou	4	350 m	42.8 m	9,450[12]	99,833	COSCO	Greece
2006	CMA CGM Medea	3	350 m	42.8 m	9,415[13]	99,500	CMA CGM	France
2003	Axel Mærsk	5	352.6 m	42.8 m	9,310	93,496	Maersk Line	Denmark
2006	NYK Vega	2	338.2 m	45.6 m	9,200	97,825	Nippon Yusen Kaisha	Panama

Cruise ship

A **cruise ship** or **cruise liner** is a passenger ship used for pleasure voyages, where the voyage itself and the ship's amenities are part of the experience, as well as the different destinations along the way. Transportation is not the prime purpose, as cruise ships operate mostly on routes that return passengers to their originating port, so the ports of call are usually in a specified region of a continent.

In contrast, dedicated transport oriented ocean liners do "line voyages" and typically transport passengers from one point to another, rather than on round trips. Traditionally, an ocean liner for the transoceanic trade will be built to a higher standard than a typical cruise ship, including high freeboard and stronger plating to withstand rough seas and adverse conditions encountered in the open ocean, such as the North Atlantic. Ocean liners also usually have larger capacities for fuel, victuals, and other stores for consumption on long voyages, compared to dedicated cruise ships.

However, the lines between both types of passenger ships have blurred, particularly with respect to deployment. Larger cruise ships have also engaged in longer trips such as transocean voyages which may not lead back to the same port for many months (longer round trips). Some former ocean liners currently operate as cruise ships, such as MS *Marco Polo* and MS *Mona Lisa*, however this number is ever decreasing. The only dedicated transatlantic ocean liner in operation as a liner, as of February 2010, is the *Queen Mary 2* of the Cunard fleet, and she also sees significant service on cruise routes.

Cruising has become a major part of the tourism industry, accounting for U.S.$27 billion with over 18 million passengers carried worldwide in 2010. The world's largest cruise liner is Royal Carribean International's *Oasis of the Seas*. The industry's rapid growth has seen nine or more newly built ships catering to a North American clientele added every year since 2001, as well as others servicing European clientele. Smaller markets such as the Asia-Pacific region are generally serviced by older tonnage displaced by new ships introduced into the high growth areas.

Feeder ship

Feeder vessels or **feeder ships** are ships of various sizes, but mostly understood to be sea going vessels with an average capacity of carrying 300 Twenty-foot equivalent units (TEU) to 500 TEU. Feeders collect shipping containers from different ports and transport them to central container terminals where they are loaded to bigger vessels. In that way the smaller vessels feed the big liners, which carry thousands of containers. Over the years, feeder lines have been established by organizations transporting containers over a predefined route on a regular base. Feeder ships are often run by companies who also specialize in Short sea shipping. These companies not only ship freight to and from ports like Rotterdam for further longhaul shipment, but also carry containers between smaller ports, for example, between terminals located on the north-west European seaboard and ports situated on the Baltic Sea coastline.

Ferry

A **ferry** (or **ferryboat**) is a form of transportation, usually a boat, but sometimes a ship, used to carry (or *ferry*) primarily passengers, and sometimes vehicles and cargo as well, across a body of water. Most ferries operate on regular, frequent, return services. A passenger ferry with many stops, such as in Venice, is sometimes called a water bus or water taxi.

Ferries form a part of the public transport systems of many waterside cities and islands, allowing direct transit between points at a capital cost much lower than bridges or tunnels. However, ship connections of much larger distances (such as over long distances in water bodies like the Mediterranean Sea) may also be called ferry services, especially if they carry vehicles.

Fishing vessel

A **fishing vessel** is a boat or ship used to catch fish in the sea, or on a lake or river. Many different kinds of vessels are used in commercial, artisanal and recreational fishing.

According to the FAO, there are currently (2004) four million commercial fishing vessels. About 1.3 million of these are decked vessels with enclosed areas. Nearly all of these decked vessels are mechanised, and 40,000 of them are over 100 tons. At the other extreme, two-thirds (1.8 million) of the undecked boats are traditional craft of various types, powered only by sail and oars. These boats are used by artisan fishers.

It is difficult to estimate the number of recreational fishing boats. They range in size from small dingies to large charter cruisers, and unlike commercial fishing vessels, are often not dedicated just to fishing.

Prior to the 1950s there was little standardisation of fishing boats. Designs could vary between ports and boatyards. Traditionally boats were built out of wood, but wood is not often used now because of cost and the difficulty in obtaining suitable timber. Fibreglass is used increasingly in smaller fishing vessels up to 25 metres (100 tons), while steel is usually used on vessels above 25 metres.

Roll-on/roll-off

Roll-on/roll-off (**RORO** or **ro-ro**) ships are vessels designed to carry wheeled cargo such as automobiles, trucks, semi-trailer trucks, trailers or railroad cars that are driven on and off the ship on their own wheels. This is in contrast to lo-lo (lift on-lift off) vessels which use a crane to load and unload cargo.

RORO vessels have built-in ramps which allow the cargo to be efficiently "rolled on" and "rolled off" the vessel when in port. While smaller ferries that operate across rivers and other short distances still often have built-in ramps, the term RORO is generally reserved for larger ocean-going vessels. The ramps and doors may be stern-only, or bow and stern for quick loading.

Tanker (ship)

A **tanker** (or **tank ship** or **tankship**) is a ship designed to transport liquids in bulk. Major types of tankship include the oil tanker, the chemical tanker, and the liquefied natural gas carrier.

Tankers can range in size of capacity from several hundred tons, which includes vessels

for servicing small harbours and coastal settlements, to several hundred thousand tons, for long-range haulage. Beside ocean- or seagoing tankers there are also specialized inland-waterway tankers which operate on rivers and canals with an average cargo capacity up to some thousand tons. A wide range of products are carried by tankers, including:

- hydrocarbon products such as oil, liquefied petroleum gas (LPG), and liquefied natural gas (LNG)
- chemicals, such as ammonia, chlorine, and styrene monomer
- fresh water
- wine
- molasses

Tankers are a relatively new concept, dating from the later years of the 19th century. Before this, technology had simply not supported the idea of carrying bulk liquids. The market was also not geared towards transporting or selling cargo in bulk, therefore most ships carried a wide range of different products in different holds and traded outside fixed routes. Liquids were usually loaded in casks—hence the term "tonnage", which refers to the volume of the holds in terms of the amount of tuns of wine (casks) that could be carried. Even potable water, vital for the survival of the crew, was stowed in casks. Carrying bulk liquids in earlier ships posed several problems:

- The holds: on timber ships the holds were not sufficiently water, oil or air-tight to prevent a liquid cargo from spoiling or leaking. The development of iron and steel hulls solved this problem.
- Loading and Discharging: Bulk liquids must be pumped - the development of efficient pumps and piping systems was vital to the development of the tanker. Steam engines were developed as prime-movers for early pumping systems. Dedicated cargo handling facilities were now required ashore too - as was a market for receiving a product in that quantity. Casks could be unloaded using ordinary cranes, and the awkward nature of the casks meant that the volume of liquid was always relatively small - therefore keeping the market more stable.
- Free Surface Effect: Describes the effect a large surface area of liquid in a ship will have on the stability of that ship. See Naval Architecture. Liquids in casks posed no problem, but one tank across the beam of a ship could pose a stability problem. Extensive sub-division of tanks solved this problem.

In the end, the tanker had its beginnings in the oil industry, as oil companies sought cheaper ways to transport their refinery product to their customers. The Oil Tanker was born. Today most liquids are cheaper to transport in bulk and dedicated terminals exist

for each product. Large storage tanks ashore are used to store the product until it can be subdivided into smaller volumes for delivery to smaller customers.

Even the Guinness brewery company in Dublin had a tanker fleet to export the famous stout to the UK.

Different products require different handling and transport. Thus special types of tankers have been built, such as "chemical tankers" and "oil tankers". "LNG carriers", as they are typically known, are a relatively rare tanker designed to carry liquefied natural gas.

Among oil tankers, supertankers are designed for transporting oil around the Horn of Africa from the Middle East. The floating storage and offloading unit (FSO) Knock Nevis, formerly the ULCC Jahre Viking, is the largest vessel in the world. The supertanker is 458 metres (1504 feet) in length and 69 m (226 ft) wide.

Supertankers are one of the three preferred methods for transporting large quantities of oil, along with pipeline transport and rail. However such tankers can create environmental disasters from oil spills especially if an accident causes the ship to sink. See Exxon Valdez, Braer, Prestige oil spill, Torrey Canyon, and Erika for examples of coastal accidents

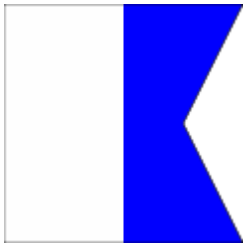
International maritime signal flags

The system of **international maritime signal flags** is a way of representing individual letters of the alphabet in signals to or from ships. It is a component of the International Code of Signals

There are various methods that the flags can be used as signals:

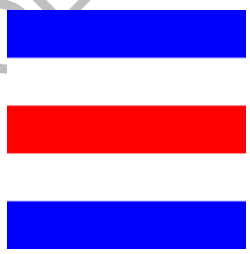
- Each flag spells out an alphabetic message, letter by letter.
- Individual flags have specific and standard meanings; for example, diving support vessels raise the "A flag" indicating their inability to move from their current location because they have a diver underwater.
- One or more flags form a code word whose meaning can be looked up in a code book held by both parties. An example is the Popham numeric code used at the Battle of Trafalgar.
- In yacht racing and dinghy racing, flags have other meanings; for example, the P flag is used as the "preparatory" flag to indicate an imminent start, and the S flag means "shortened course"

4. THE NAUTICAL FLAG

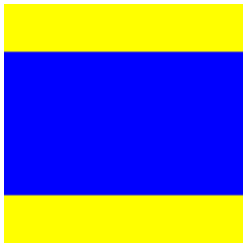


A (Alfa)
"I have a diver down; keep well clear at slow speed."

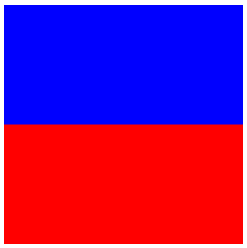
B (Bravo)
"I am taking in, or discharging, or carrying dangerous goods."



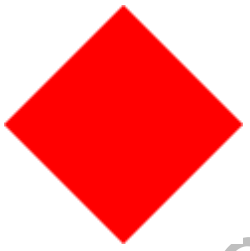
C (Charlie)
"Affirmative."



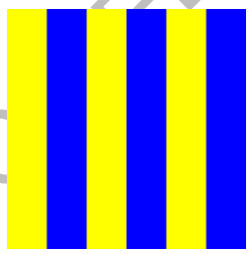
D (Delta)
"Keep clear of me; I am manoeuvering with difficulty."



E (Echo)
"I am altering my course to starboard."

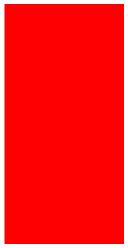


F (Foxtrot)
"I am disabled; communicate with me."



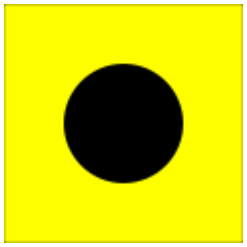
G (Golf)

"I require a pilot."



H (Hotel)

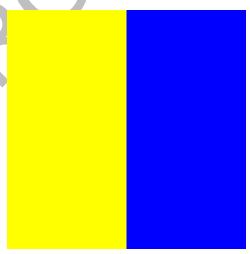
"I have a pilot on board."



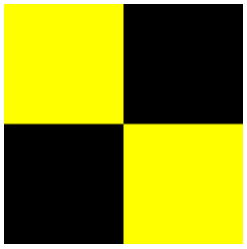
I (India)

"I am altering my course to port."

J (Juliet)
"I am on fire and have dangerous cargo on board: keep well clear of me “or” I Am leaking dangerous cargo."

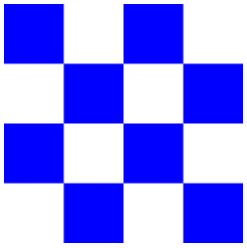


K (Kilo)
"I wish to communicate with you."

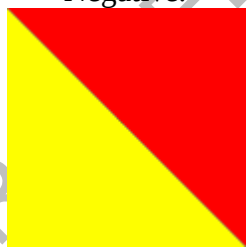


L (Lima)
In harbour: "The ship is under Quarantine."
At sea: "You should stop your vessel instantly."

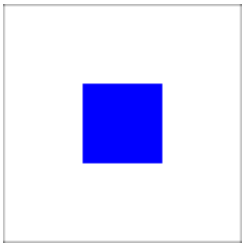
M (Mike)
"My vessel is stopped and making no way through the water."



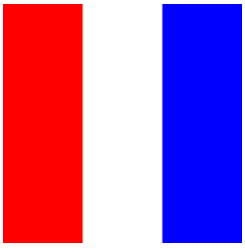
N (November)
"Negative."



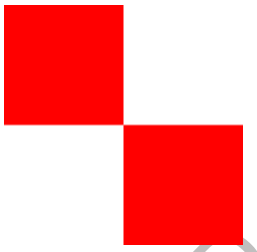
R (Romeo)
"The way is off my ship."



S (Sierra)
"I am operating astern propulsion."

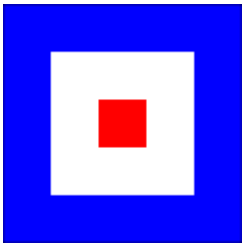


T (Tango)
"Keep clear of me; I am engaged in pair trawling."

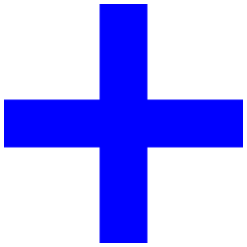


U (Uniform)
"You are running into danger."

V (Victor)
"I require assistance."



W (Whiskey)
"I require medical assistance."

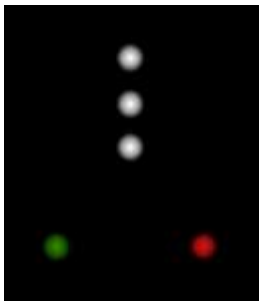


X (Xray)
"Stop carrying out your intentions and watch for my signals."

Y (Yankee)
"I am dragging my anchor."

Z (Zulu)
"I require a tug."
When made by fishing vessels operating in close proximity on the fishing grounds it means: "I am shooting nets."

5. **NAVIGATION LIGHTS**



W

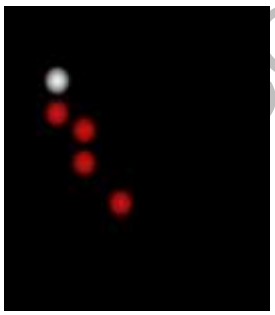
W

W

G **R**

What type of vessel or would show the above light?

A power driven vessel greater than 50m in length engaged in towing operation where the length of tow is less than 200m seen from ahead OR A power driven vessel less than 50 m in length engaged in towing where the length of tow exceeds 200 m seen from ahead.



W

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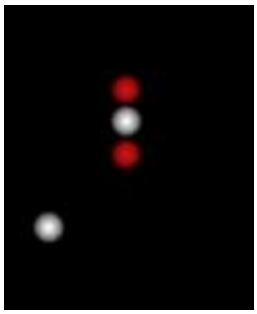
R

R

What type of vessel would show the above light?

A vessel engaged in pilotage duty, not under command, making way through the water and seen from the port side.



R

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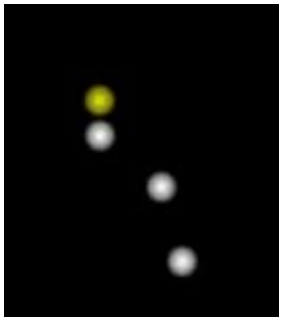
R

W

What type of vessel would show the above light?

A vessel restricted in her ability to manouevre at anchor or a vessel restricted in her ability to manouevre seen from astern.



Y

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W

First part of the question:

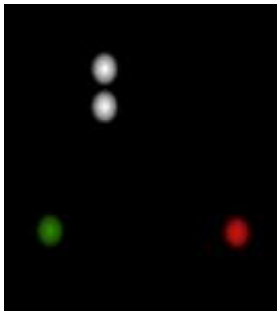
What do the above lights represent?

A power driven vessel engaged in towing two vessels viewed from astern. OR A power driven vessel engaged in towing a partly submerged object of 100m or less in length and 25m or less in length.

Second part of the question:

What difference would it make, if it was a dracone that was being towed?

A dracone, need not exhibit a light at or near the forward end.



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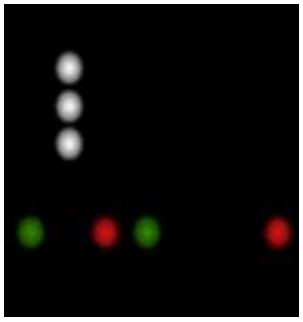
What type of vessel could show the above lights?

Possible arrangement for the lights on an aircraft carrier greater than 50m in length seen head on.



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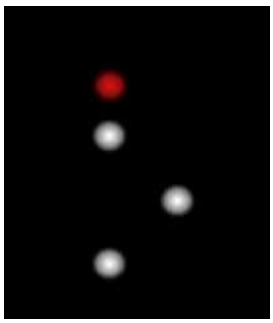
G R G R

What type el vessel would show the above lights?

A power driven vessel greater than 50m in length engaged in towing alongside seen from ahead.



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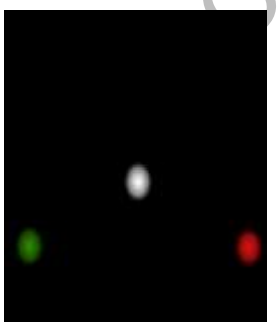
W

What type of vessel would exhibit the lights illustrated, and what sound signal would she make in restricted visibility?

A vessel engaged in fishing other than trawling with nets extending more than 150 meters making way through the water and seen from astern.

One prolonged blast followed by two short blasts at intervals of not more than two minutes.

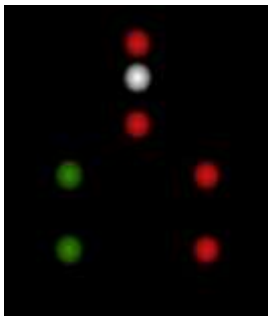


W

G **R**

What vessel or vessels would be excepted to show the above lights?

This is the possible distribution of seaplanes light while underway on the water.



R

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G

R

First part of the question:

What type of vessel, would exhibit the lights shown, and what sound signal would she make in restricted visibility?

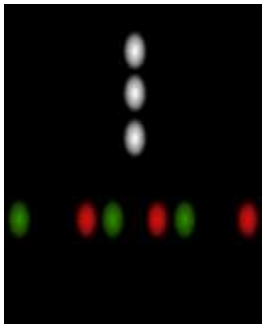
A vessel engaged in dredging, underway but not making way through the water. Or at anchor. One prolonged blast followed by two short blasts at intervals of not more than two minutes.

Second part of the question:

What daylight signals would the vessel show?

To indicate that she is restricted in her ability to manouevre, three shapes in a vertical line, the highest and lowest of these shapes shall be balls and the middle one a diamond.

Two balls in a vertical line to indicate on which side the danger exists, and two diamonds in a vertical line to indicate on which side it is sale to pass.



W

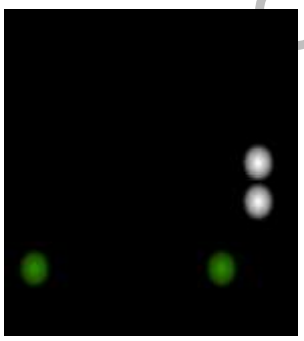
W

W

G R G R G R

What type of vessel or would show the above lights?

A power driven vessel greater than 50m in length engaged in towing with a vessel on either side.



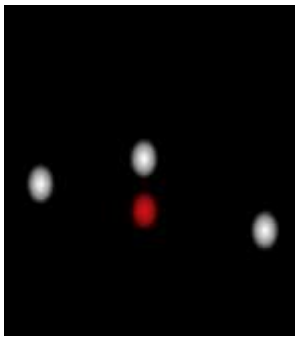
W

W

G G

What type of vessel or vessels would show the above lights and what sound signals would you expect to hear in restricted visibility?

A power driven vessel engaged in a towing operation where the length of tow is less than 200m and seen from the starboard side. One prolonged blast followed by two short blasts at intervals of not more than two minutes. Immediately after this the towed vessel, if manned would sound one prolonged blast followed by three short blasts.



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First part of the question:

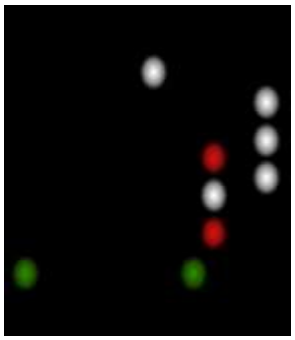
What type of vessel would show the above lights?

A vessel greater than 50 m in length engaged in pilotage duty at anchor viewed from the port side.

Second part of the question:

What sound signal would you expect to hear in restricted visibility?

At intervals of not mere than one minute ring the bell rapidly for about 5 secs, and if more than one hundred meters in length, after the ringing of the bell the gong shall be sounded rapidly for about 5 secs in the after part of the vessel. (She may in addition sound an identity signal consisting of four short blasts.



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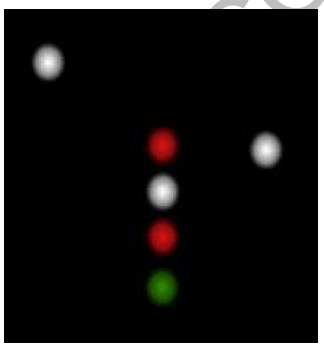
What type of vessel would show the above lights?

A power driven vessel greater than 50m in length engaged in a towing operation, where the length of tow is more than 200m in length and is unable to deviate the course she is fallowing.



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First part of the question:

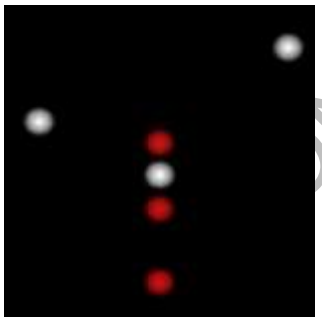
What type of vessel would show the above lights?

A power driven vessel greater than 50m in length restricted in her ability to manouevre seen from the stbd side.

Second part of the question:

Define Vessel restricted in her ability to manouevre?

……means a vessel which from the nature of her work is restricted in her ability to manouevre as required by these rules and is therefore unable to keep out of the way of another vessel.



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First part of the question:

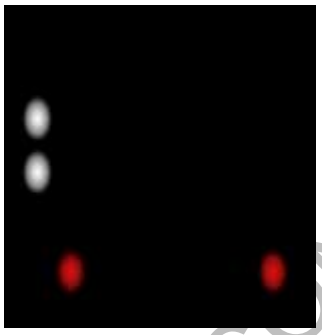
What type of vessel or vessel would show the above lights?

A power driven vessel greater than 50m in length restricted in her ability to manouevre and making way through the water seen from the part side.

Second part of the question:

The term 'Vessels restricted in their ability lo manouevre" includes?

- ✓ A vessel engaged in laying servicing or picking up a navigation mark, submarine cable or pipeline;
- ✓ A vessel engaged in dredging surveying or underwater operations;
- ✓ A vessel engaged in transferring persons, provisions or cargo whilst underway;
- ✓ A vessel engaged in the launching or recovery of aircraft.
- ✓ A vessel engaged in mine clearance operations.
- ✓ A vessel engaged in atowing operation such as severely restricts the owing vessel and her low in their ability to deviate from their course.



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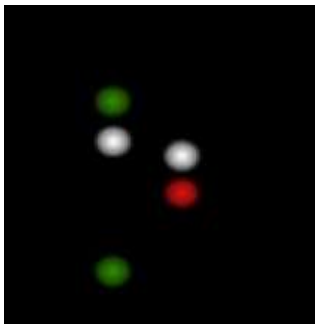
First part of the question:

What type of vessel or vessels would show the above lights?

A power driven vessel less than 50m in length engaged in a towing operation, when the length of tow is less than 200m and seen from the port side.

What is the minimum visible range, at what you would expect to sight the mast head light on the towing vessel?

5 miles, except if the vessel is less than 20m in length then 3 miles.



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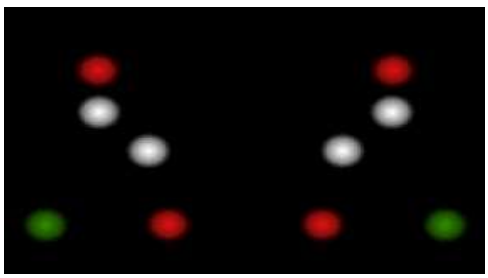
What type of vessel would show the above fights?

A vessel engaged in trawling making way through the water, showing the additional signal to indicate she is hauling her nets.



R **R**

W **W**

W W

G R R G

First part of the question:

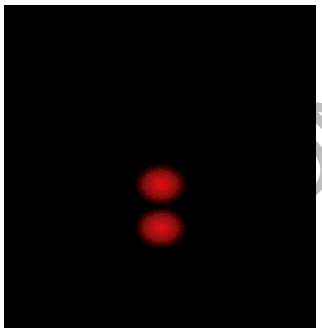
What type of vessel or vessels would show the above lights?

Two vessels [no indication of length) engaged in fishing with nets extending more than 150m making way through the water.

Second part of the question:

What daytime signal would the vessels exhibit to show there is outlying gear more than 150m from the vessel?

A cone apex upwards in the direction of the gear.



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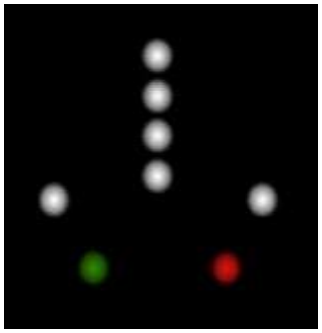
What type of vessel would show the above lights?

A vessel not under command, not making way through the water.



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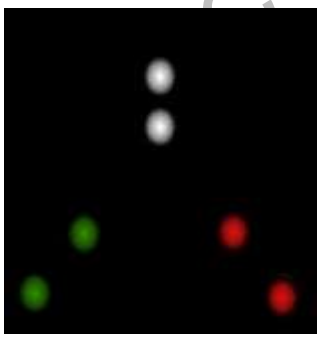
W **W**

G **R**

What type of vessel or vessels could the above lights show?

A power diven vessel greater than 50m in length engaged in a towing operation where the length of tow is more than 200m, towing a partly submerged object whose breadth is mare than 25m.



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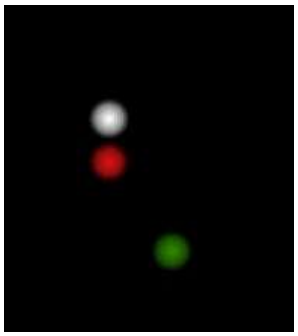
G **R**

G **R**

What type of vessel or vessels would show the above lights?

A power driven vessel less than 50m in length engaged in pushing another vessel and seen from ahead.



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<u>First part of the question:</u>

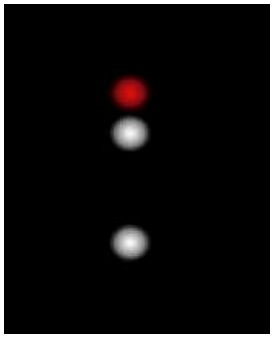
What type of vessel would show the above lights?

A vessel engaged in pilot duly under way seen from the stbd side.

<u>Second part of the question:</u>

What length is the Pilot vessel?

No indication of length.



R

W

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First part of the question:

What type of vessel is shown by the lights above?

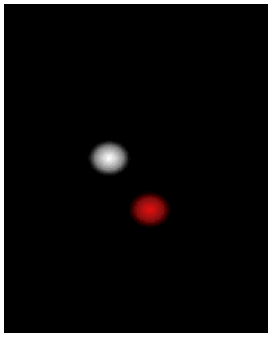
A vessel engaged in fishing other than trawling with outlying gear less than 150m, making way through the water seen from astern.

Second part of the question:

If own ship is on course 000 (I].

What possible headings could the fishing vessel be on?

292.5 -> 067.5 degrees (T).



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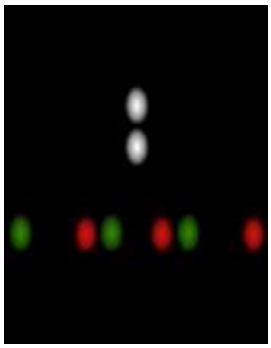
What type of vessel does the above light represent?

A power driven vessel less than 50m in length underway possibly making way seen from the port side.



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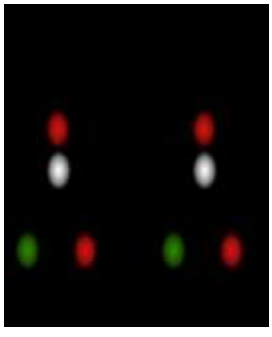
G R G RG R

What type of vessel or vessels would show the above lights?

A power driven vessel less than 50m in length engaged in lowing alongside with a vessel on either side seen from right ahead.



R R

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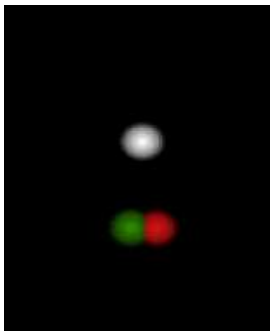
What type of vessels would show the above lights?

Two vessels engaged in fishing other than trawling with nets extending 150m or less making way through the water and seen from ahead.



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First part of the question:

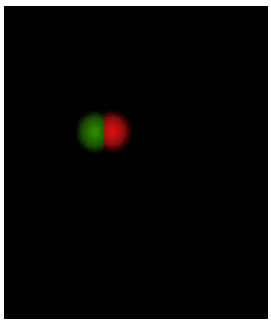
What type of vessel would show the above lights?

A power driven vessel less than 12 m in length seen from right ahead.

Second part of the question:

What sound signal would you expect to hear in restricted visibility?

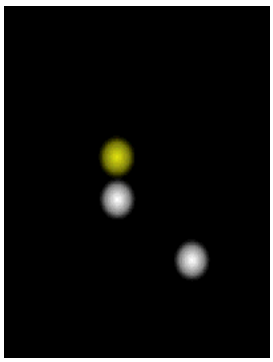
A vessel of less than 12m shall not be obliged to give the prescribed signals (as in Rule 35), but if she does not shall make same other efficient sound signal at intervals of not more than 2 minutes.



GR

What type of vessel would show the above lights?

A sailing vessel less than 20m in length



Y

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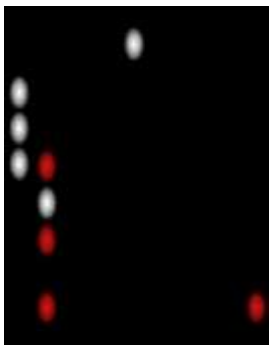
What type of vessel or vessels would show the above lights and what sound signals would you expect to hear in restricted visibility.

A power driven vessel engaged in towing seen from astern.

One prolonged blast followed by two short blasts at intervals of not more than two minutes. Immediately alter this towed vessel if manned would sound one prolonged blast followed by three short blasts.



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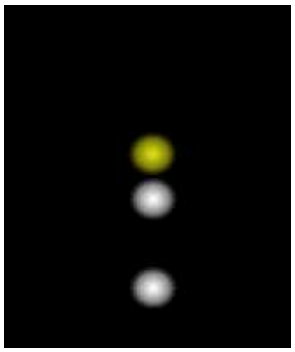
What type of vessel would show the above lights?

A power driven vessel greater than 50m in length engaged in a towing operation where the length of tow is greater than 200m and unable to deviate from the course she is following seen from the port side.



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First part of the question:

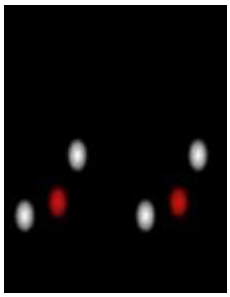
What type of vessel or vessels would show the above lights?

A power driven vessel engaged in a towing operation seen from astern.

Second part of the question:

What are is the yellow towing light visible through?

The same as for a stern light, showing an unbroken light over an are of the horizon of 135 degrees and so fixed as to show the light 67.5 degrees from right aft on each side el the vessel.



W W

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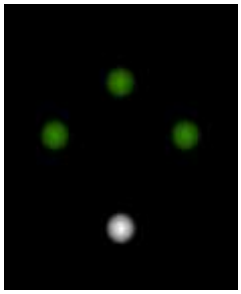
W W

What type of vessel or vessels could show the above lights?

Possible arrangement of lights for two submarines greater than 50m in length seen from the port side.



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G G

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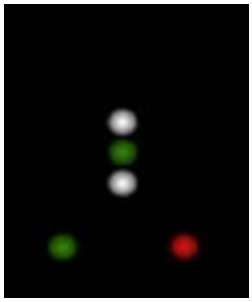
What type of vessel would show the above lights?

A vessel engaged in minesweeping operations seen from astern.



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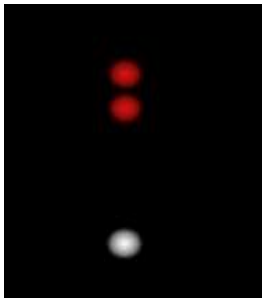
What type of vessel would show the above lights?

A vessel greater than 50m in length engaged in trawling making way through the water and seen from right ahead.



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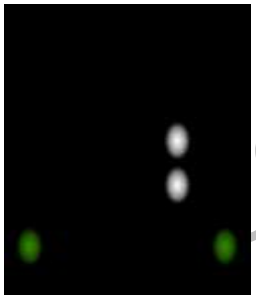
What type of vessel could show the above lights?

A vessel not under command making way through the water and views from astern, OR
A vessel less than 50m in length aground.



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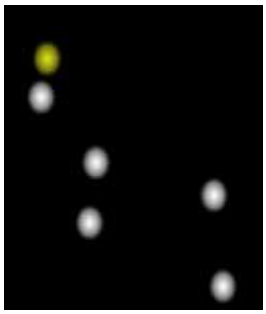
G **G**

What type of vessel or vessels could the above lights represent?

A power driven vessel less than 50m in length engaged in towing another vessel where the taw is less than 200m.



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First part of the question:

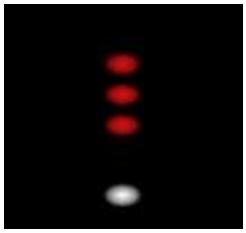
What type of vessel or vessels could the above lights indicate?

A power driven vessel towing a partly submerged object which is 25m or more in breadth seen from astern.

Second part of the question:

What difference would it make, if the towed object was more than 100m in Length?

If the tow exceeds 100m in length, additional all round while lights should be placed, so that the distance between the forward light and after light should net exceed 100m.



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First part of the question:

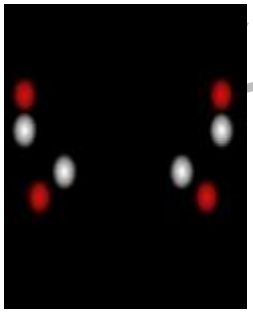
What type of vessel would show the above lights?

A vessel constrained by her draught seen from astern.

Second part of the question:

What daylight signal would the vessel show?

A cylinder where it can best be seen.



R **W**

R **W**

W **W**

R **R**

First part of the question:

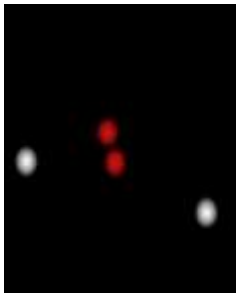
What type of vessel or vessels would show the above lights?

Two vessels engaged in fishing other than trawling with their nets extending more than 150m, making way through the water seen from the port side.

Second part of the question:

By day in addition to daylight fishing signals, what signal would the vessels use to indicate the direction of outlying gear?

A cone apex upwards in the direction of the gear.



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First part of the question:

What type of vessel would show the above lights?

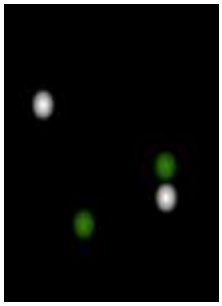
A vessel greater than 50m in length aground.

Second part of the question:

What sound signal would the vessel make in restricted visibility?

She shall at intervals of not more than 1 minute, give 3 distinct strokes on the bell followed by a rapid ringing of the bell for 5 secs, followed by 3 distinct strokes on the bell in the forepart of the vessel and immediately after in the after part of the vessel give a rapid ringing of the gong for 5 secs.

A vessel aground may give an appropriate whistle signal (Morse 'U' you are running in to danger]



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First part of the question:

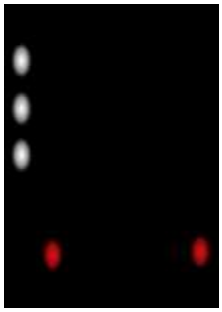
What type of vessel would show the above lights?

A trawler greater than 50m in length seen from the stbd side.

Second part of the question:

If the vessel was to drop anchor, with fishing gear still extending, what changes to her lights would she make?

She would switch of her sidelights.



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R **R**

First part of the question:

What type of vessel, or vessels would show the above lights, and what sound signals would you expect to hear in restricted visibility?

A power driven vessel engaged in towing where the lengths of tow exceed 200m, seen from the port side.

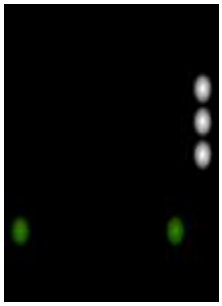
One prolonged blast followed by two short blasts at intervals of not more than two minutes. Immediately after this the towed vessel if manned would sound one prolonged blast followed by tree short blasts.

Second part of the question:

What sound signal would you expect to hear in restricted visibility?

The vessel engaged in towing shall sound at intervals of not more than two minutes three blasts in succession, namely one prolonged blast followed by two short blasts.

The vessel towed [if manned] shall immediately alter the towing vessel sound four blasts in succession namely, one prolonged followed by three short blasts.



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G **G**

First part of the question:

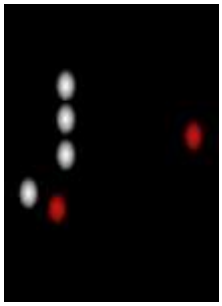
What type of vessel or vessels would show the above lights?

A power driven vessel less than 50m in length engaged in a towing operation where the length of tow is greater than 200m and seen from the starboard side.

Second part of the question:

What is the minimum visible range for the sidelight on the towing vessel?

- ✓ 2 miles.



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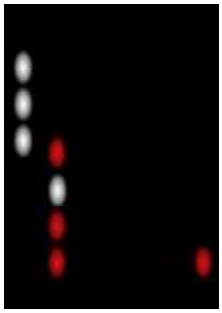
What type of vessel could the above lights represent?

A power driven vessel greater than 50m in length towing another vessel where the length of tow is more than 200m.



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<u>First part of the question:</u>

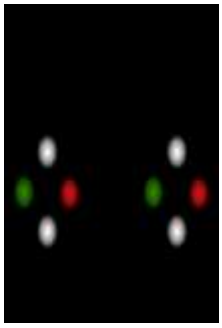
What type of vessel or vessels would show the above lights?

A vessel less than 50m engaged in a lowing operation where the length of tow is more than 200m and is unable to deviate from the course she is following seen from the port side.

Second part of the question:

What daytime signal would you expect to see?

On both the towing vessel and the low, a diamond shape where it can best be seen. On the lowing vessel, three shapes in a vertical line (ball. diamond. ball).



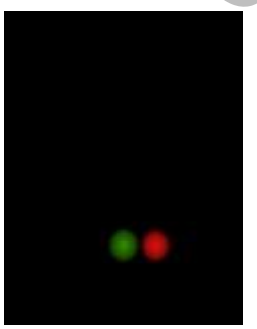
W W

G R G R

W W

What type of vessel or vessels could show the above lights?

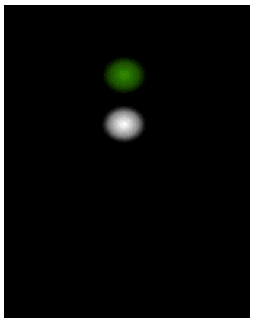
Possible arrangement of two submarines greater than 50m in length and seen from right ahead.



G R

What type of vessel would show the above lights?

A sailing vessel of than 20m in length seen from ahead.



G

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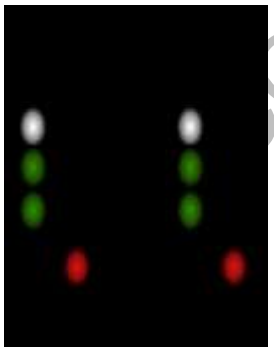
What type of vessel could show the above lights, and what sound signal would she make?

A vessel engaged in trawling and not making way through the water [or at anchor].

One prolonged blast followed by two short blasts at intervals of net more than two minutes.



W **W**

G **G**

G **G**

R **R**

First part of the question:

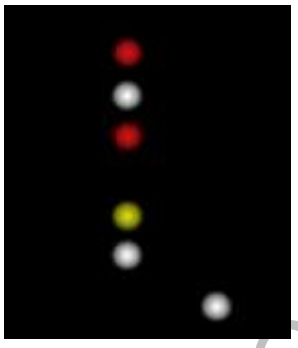
What type of vessel or vessels could the above lights show?

Two vessels less than 50m in length engaged in minesweeping operations and seen from the part side.

Second part of the question:

What distance do these lights indicate it is not safe to approach within, and at what is the range of the all-round green lights.

- ✓ 1000 metres
- ✓ 2 miles



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What type of vessel would show the above lights?

A power driven vessel engaged in a towing operation as viewed from astern unable to

deviate from the course she is following.

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First part of the question:

What type of vessel would show the following lights, and what sound signal in restricted visibility would she make?

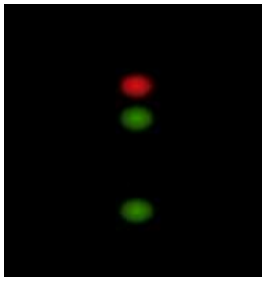
A sailing vessel showing the optional masthead lights.

One prolonged blast followed by two short blasts at intervals of not more than two minutes.

Second part of the question:

What sound signal, would the sailing vessel make in restricted visibility?

She shall sound at intervals of not more than two minutes three blasts in succession, namely one prolonged blast followed by two short blasts.



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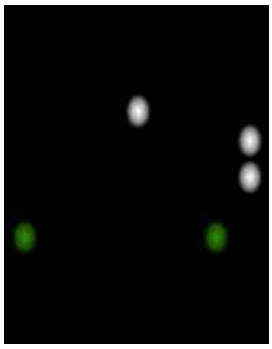
What type of vessel would show the above lights?

A sailing vessel underway showing the optional masthead lights and seen from the stbd side.



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G **G**

<u>First part of the question:</u>

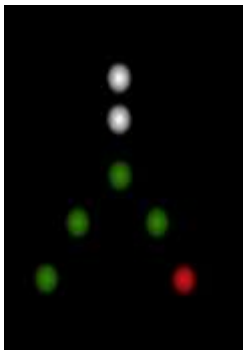
What type of vessel or vessels would show the above lights?

A power driven vessel greater than 50m in length engaged in a towing operation where the length of tow is less than 200m.

<u>Second part of the question:</u>

How is the length of tow measured?

From the stern of the towing vessel to the after end of the tow.



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First part of the question:

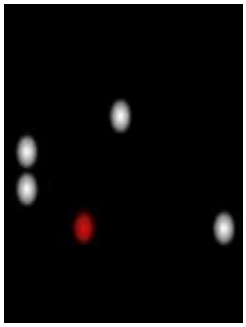
What type of vessel would show the above lights?

A vessel greater than 50m in length engaged in minesweeping operations seen from right ahead.

Second part of the question:

What do the mine clearance lights indicate?

That it is dangerous for another vessel to approach within 1000m of the mine clearance vessel.



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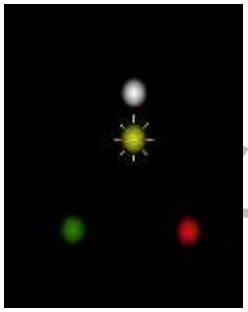
R **W**

What type of vessel would exhibit the above lights?

A power driven vessel greater than 50m in length towing a dracone, where the length of tow is less than 200m.



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G **R**

<u>First part of the question:</u>

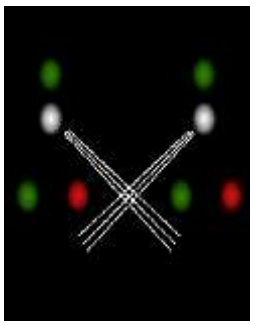
What type of vessel would exhibit the lights shown, and what sound signal would she give in restricted visibility?

An air cushion vessel less than 50m in length operating in the non-displacement mode seen from head on, One prolonged blast at intervals of not more than two minutes.

Second part of the question:

What frequency would the flashing light flash at?

120 flashes or more per minute.



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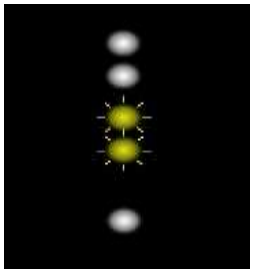
What type of vessel or vessel could show the above lights and what sound signal would they make?

Two vessels engaged in pair trawling and using searchlights, seen from ahead and making way through the water. One prolonged blast followed by two short blasts at intervals of not more than two minutes.



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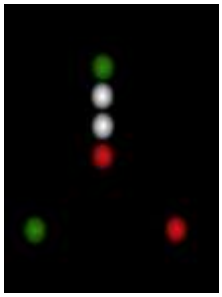
What type of vessel would show the above fights?

A vessel fishing with purse-seine gear as viewed from astern and exhibiting the optional lights to show that she is hampered by her gear. Her nets extend more than 150m.

G R

What type of vessel would show the above lights?

A sailing vessel less than 20m in length underway and seen from ahead



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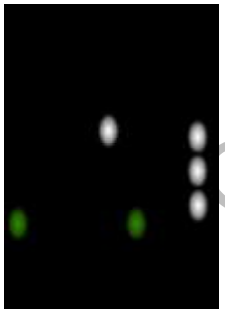
What type of vessel would show the above lights?

A vessel less than 50m in length engaged in trawling and exhibiting the optional lights indicating that she is hauling her nets making way through the water.



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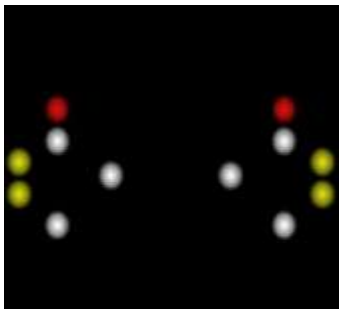
What type of vessels or vessels would show the above lights?

A power driven vessel greater than 50m in length engaged in a towing operation where the length of tow is greater than 200m seen from the starboard side.



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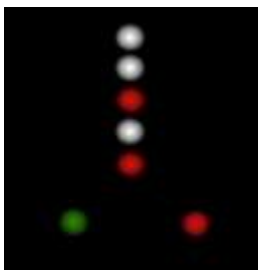
What type of vessels would show the above fights?

Two vessels engaged in fishing with purse seine gear with nets extending more than 150m, displaying the optional fights indicating that they are hampered by their gear, making way through the water and seen from astern.



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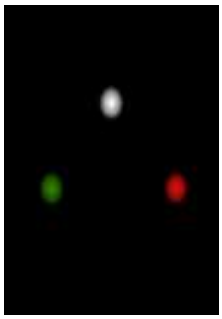
What type of vessel could show the above light?

A power driven vessel greater than 50m in length restricted in her ability to manouevre, seen from right ahead making way through the water OR A power driven vessel less than 50m in length engaged in a towing operation where the length of tow is less than 200m and the vessel is unable to deviate from the course she is following



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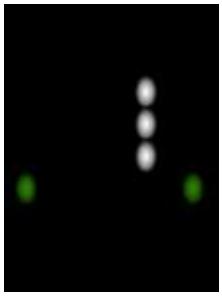
What type of vessel would show the above light?

A power driven vessel less than 50m in length seen from right ahead.



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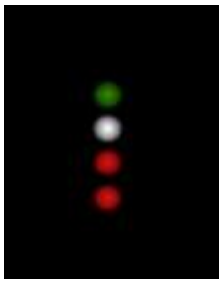
What type of vessel would the above lights represent?

A power driven vessel less than 50m in length engaged in a towing operation where the tow is greater than 200m.



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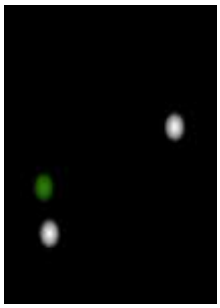
What type of vessel would show the above lights?

A vessel engaged in trawling showing the optional lights to indicate that her nets are last upon an obstruction and not making way through the water.



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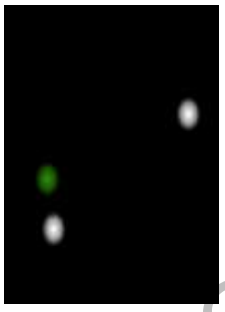
What type of vessel would show the above lights?

A vessel greater than 50m in length engaged in trawling not making way through the water seen from the port side.



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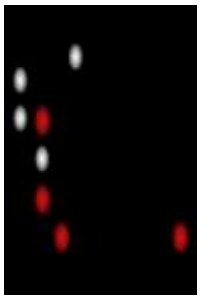
What type of vessel would show the above lights?

A vessel greater than 50m in length engaged in trawling not making way through the water seen from the port side.



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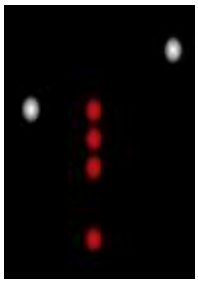
What type of vessel or vessels would show the above lights?

A power driven vessel greater than 50m in length engaged in a lowing operation where the length of tow is less than 200m.



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First part of the question:

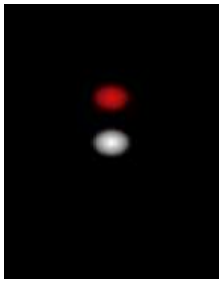
What type of vessel would show the above lights?

A power driven vessel greater than 50m in length, constrained by her draught and seen from the port side.

Second part of the question:

Define 'Constrained by her draught'?

The term vessel constrained by her draught means a power-driven vessel which, because of her draught in relation to the available depth and width of navigable water is severely restricted in her abi1ity to deviate from the course she is following.



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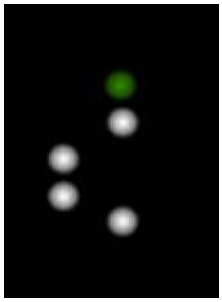
What type of vessel would show the above lights?

A vessel engaged in fishing with nets extending less than 150m underway and not making way through the water, or at anchor.



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What type of vessel would show the above lights?

A vessel engaged in trawling, making way through the water and exhibiting the optional lights indicating that she is shooting her nets seen from astern.

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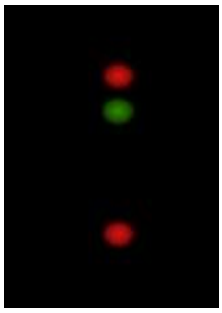
G **R**

What type of vessel could show the above lights?

An aircraft carrier seen from right ahead engaged in the launching and recovery of aircraft.



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What could the above lights represent?

A sailing vessel showing the optional masthead lights seen from the port side.

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<u>First part of the question:</u>

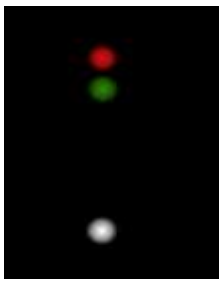
What type of vessel would show the above lights?

A vessel not under command and making way through the water and seen from the starboard side.

Second part of the question:

What day signal would you expect to see?

Two black balls in a vertical line where they can best are seen.



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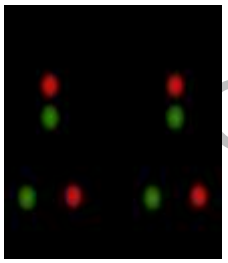
What type of vessel would show the above lights?

A sailing vessel underway exhibiting the optional masthead lights for sailing vessels.



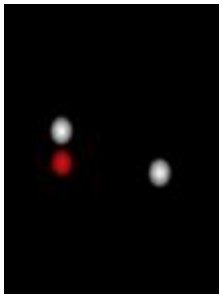
R **R**

G **G**

G **R** **G** **R**

What type of vessels would show the above lights?

Two sailing vessels underway are showing the optional masthead lights seen from right ahead.



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<u>First part of the question:</u>

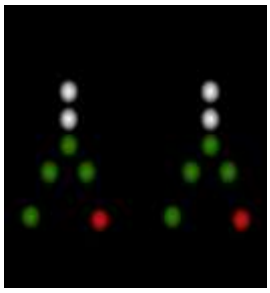
What type of vessel could show the above lights?

A pilot vessel at anchor, or viewed from astern.

<u>Second part of the question:</u>

When the vessel is not being used for pilotage, what changes to lights if any would she make?

She shall exhibit the lights or shapes prescribed for a similar vessel of her length.



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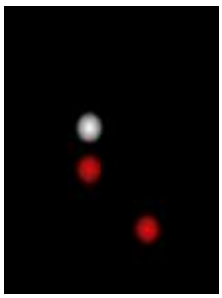
What type of vessel or vessels would show the above lights?

Two power driven vessels greater than 50m in length engaged in mine clearance operations seen from right ahead.



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First part of the question:

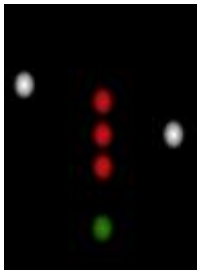
What type el vessel would show the above lights?

A vessel engaged on pilotage duty underway and seen from the port side.

Second part of the question:

What length is the pilot vessel?

No indication of length whilst the vessel is engaged en pilotage duty.



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R W

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First part of the question:

What type of vessel would show the above lights?

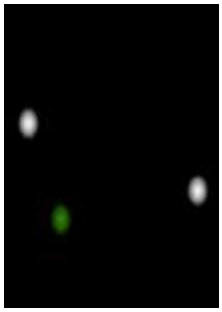
A power driven vessel greater than 50 m in length constrained by her draught.

Second part of the question:

Define the term 'Constrained by her draught?

…..means a power-driven vessel which because of her draught in relation to the available depth and width of navigable water is severely restricted in her

ability to deviate from the course she is following.



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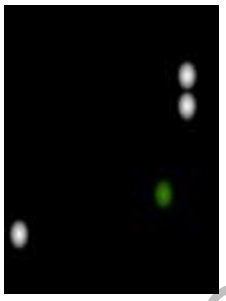
What type of vessel could show the following lights?

A power driven vessel greater than 50m in length and seen from the starboard side.



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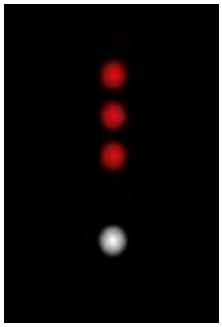
What type of vessel or vessels would show the above lights?

A power driven vessel of less than 50m in length engaged in towing a dracone where the length of the tow is 200m or less.



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First part of the question:

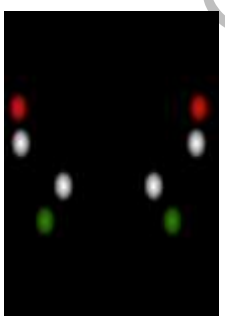
What type of vessel would show the above lights?

A vessel constrained by her draught underway and seen from astern.

Second part of the question:

What day signal would you expect to see?

A black cylinder where it can best be seen.



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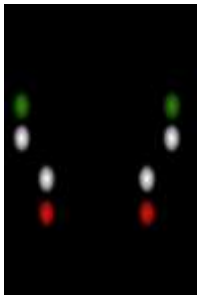
W **W**

G **G**

What type of vessel or vessels would show the above lights?

Two vessels engaged in fishing other than trawling with nets extending more than 150 meters, seen from the starboard side, making way through the water.



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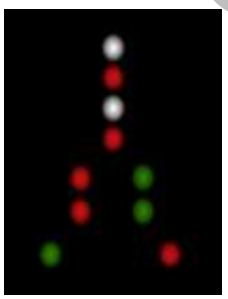
What type of vessels would show the above lights?

Two vessels engaged in pair trawling, hauling their nets and not making way through the water.



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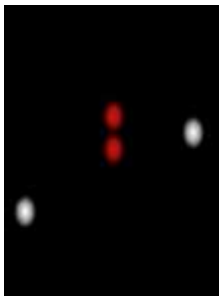
What type of vessel or vessels would show the above lights?

A vessel less than 50m in length engaged in dredging making way through the water, with an obstruction on her stbd side and safe to pass on the port side.



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First part of the question:

What type of vessel could show the above lights?

A vessel 50m or more in length, aground and seen from the starboard side.

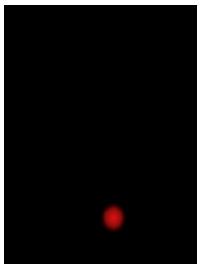
Second part of the question:

What sound signal would you expect to hear in restricted visibility?

3 distinct strokes on the bell followed by a rapid ringing of the bell followed by 3 distinct strokes and, if greater than 100m in length a rapid ringing of the gong for about 5 secs at intervals of not more than one minute.

What type of vessel would show the above lights?

A vessel less than 50m in length engaged in mine clearance operations seen from right ahead.



R

What type of vessel underway and seen from the port side?

A sailing vessel under gay and seen from the port side.

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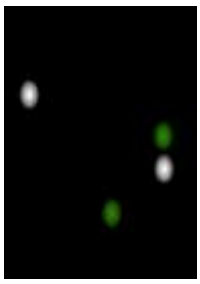
What type of vessel would show the above lights?

A vessel engaged in pilotage duty and seen from the stbd side.



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First part of the question:

What type of vessel may show the above lights?

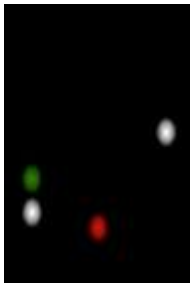
A vessel greater than 50 m in length engaged in trawling, making way through the water seen from the starboard side.

Second part of the question:

If the vessel was to come to a step, ie cease making way through the

Water, what change (if any) would she make to her lights?

She would switch off her sidelights.



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R

First part of the question:

What type of vessel would show the above lights?

A vessel of 50 meters or more in length engaged in trawling, making way through the water and seen from her port side.

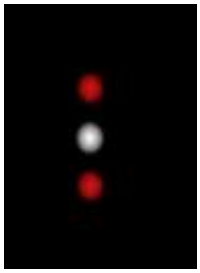
Second part of the question:

What additional light signals may a trawler exhibit?

i) When shooting nets: 2 white lights in a vertical line

ii] When hauling Nets: One white light over one red light in a vertical line.

iii] When the net has come last upon an obstruction: Two red lights in a vertical line.



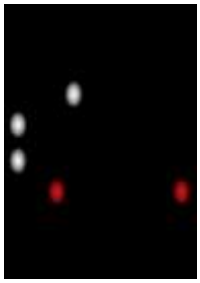
R

W

R

What type to vessel would show the above lights?

A vessel restricted in her ability to manouevre underway but not making way through the water



W

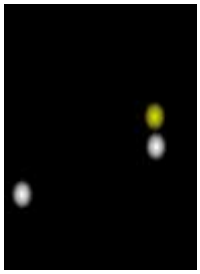
W

W

R **R**

What type of vessel or vessel would show the above lights?

A power driven vessel greater than 50m in length engaged in a towing operation where the length of town is less than 200m



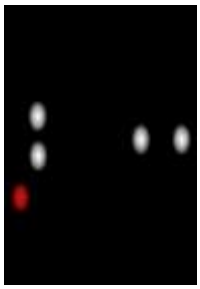
Y

W

W

What type of vessel would show the above lights?

A power driven vessel towing another vessel viewed from astern.



W

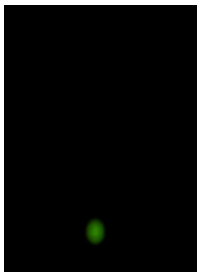
W W

W

R

What type of vessel would exhibit the above lights?

A power driven vessel less than 50m in length engaged in towing a partly submerged object less than 25m in breadth.



G

First part of the question:

What type of vessel would show the above light?

A sailing vessel underway seen from the starboard side.

Second part of the question:

What additional fight signal could a sailing vessel exhibit?

A sailing vessel underway may in addition exhibit at or near the top of the mast, where they can best be seen, two all round fights in a vertical line, the upper being red and the lower being green.

R

R

G R

First part of the question:

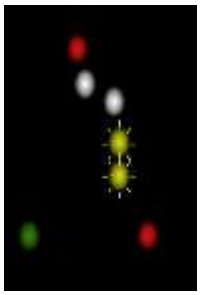
What type of vessel would show the above lights?

A vessel not under command making way through the water and seen from ahead.

Second part of the question:

What length is the vessel?

No indication of length.



R

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W

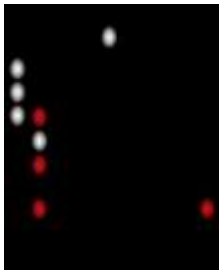
Y

Y

G **R**

What type of vessel would show the above lights?

A vessel fishing showing the optional lights to indicate that she is fishing with purse seine gear and with nets extending more than 150m, making way through the water and seen from ahead.



W

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W R

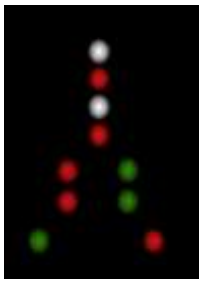
W

R

R R

What type of vessel would show the above light?

A power driven vessel greater than 50m in length engaged in a towing operation where the length of tow is greater than 200m in length and unable to deviate from the course she is following seen from the port side.



W

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W

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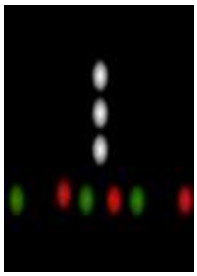
R G

R G

G R

What type of vessel would show the above lights?

A vessel less than 50m in length engaged in a dredging operation, seen from right ahead with an obstruction on her stbd side and safe to pass on her port side.



W

W

W

G R G R G R

First part of the question:

What type of vessel or vessels could show the above lights?

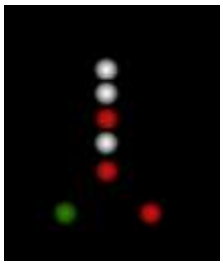
A power driven vessel el 50m or me re in length engaged in towing alongside seen from ahead.

Second part of the question:

On the towing vessel, what minimum ranges should the masthead lights and sidelights be visible at?

a) 6 miles

b) 3 miles



W

W

R

W

R

G R

What type el vessel would show the above lights?

A power driven vessel greater than 50m in length restricted in her ability to manouevre seen from right ahead. OR A power driven vessel less than 50m in length engaged in a towing operation where the length 01 tow is less than 200m.

W **W**

R **R**

W **W**

R **R**

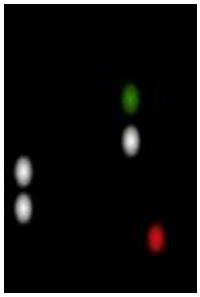
G R **R G**

G R **R G**

G R G

What type of vessel or vessel would show the above lights?

Two vessels less than 50m in length engaged in dredging, making way through the water, where it is not safe to pass between the two vessels but round the outer hand of either vessel.



G

W

W

W

R

First part of the question:

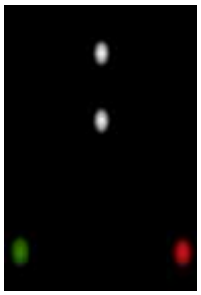
What type of vessel would show the above lights?

A vessel engaged in trawling, making way through the water, showing the additional signal to indicate that she is shooting her nets.

Second part of the question:

What daytime signals would you expect to see?

To indicate that she is fishing she would display two cones apexes together in a vertical line one above the other, and to indicate she is shooting her nets the international code flag 'Z'.



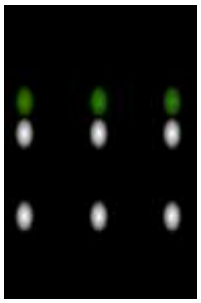
W

W

G **R**

What type of vessel do the above lights represent?

A power driven greater than 50m in length seen from right ahead. OR A power driven vessel less than 50m in length engaged in a towing operation where the length of tow is less than 200m in length seen from right ahead.



G **G** **G**

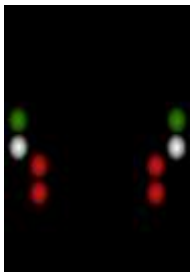
W **W** **W**

W

W **W**

What type of vessel or vessels would show the above lights?

Three vessels engaged in trawling as viewed from astern.



G W

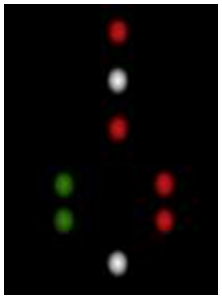
G W

R R

R R

What type of vessels would show the above lights?

Two vessels engaged in pair trawling with their nets fast upon an obstruction, not making way through the water.



R

W

R

G G

R R

W

First part of the question:

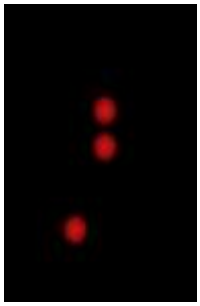
What type of vessel would show the above fights?

A vessel engaged in dredging, making way through the water and viewed from astern.

Second part of the question:

Which side is safe to pass?

Port



R

R

R

First part of the question:

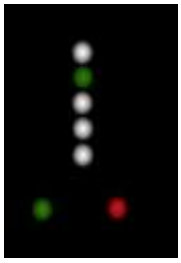
What type of vessel could show the above lights?

A vessel not under command making way through the water.

Second part of the question:

What daytime signal would the vessel show?

Two balls or similar shapes in a vertical line where they can best be seen.



W

G

W

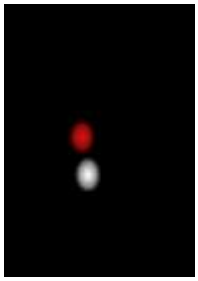
W

W

G R

What type of vessel would show the above lights?

A vessel engaged in trawling greater than 50m in length exhibiting the optional lights to show she is shooting her nets, making way through the water and seen from right ahead.

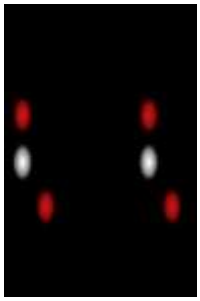


R

W

What type of vessel could show the above lights?

A vessel engaged in fishing other than trawling, not making way through the water, or at anchor.



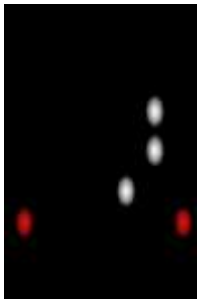
R R

W W

R R

What type of vessel or vessel would show the above lights?

Two vessel (no indication of length) engaged in fishing other than trawling with nets extending 150m or less seen from the port side making way through the water.



W

W

W

R R

What could the above lights represent?

A power driven vessel greater than 50m in length pushing ahead another vessel.

R

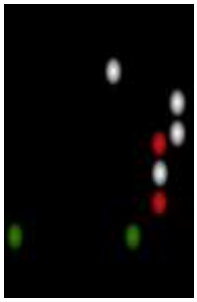
W

G

What type of vessel would show the above lights, and what sound signal in restricted visibility would she sound?

A vessel engaged in fishing other than trawling, with nets extending 150 meters or less from the vessel making way through the water.

One prolonged blast followed by two short blasts at intervals of not more than two minutes.



W

W

W

R

W

R

G G

What type of vessel or vessels would show the above lights?

A power driven vessel greater than 50m in length engaged in a lowing operation

where the length of law is less than 200m and is unable to deviate from the course she is following seen from the starboard side.

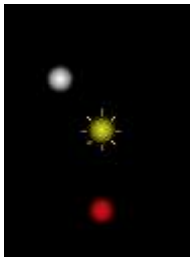
R

G

G

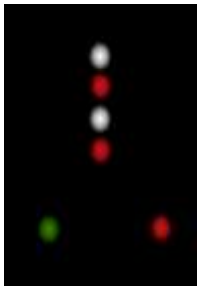
What type of vessel would show the above lights?

A sailing vessel showing the optional masthead lights seen from the stbd side.



What type of vessel would show the above lights?

An air-cushion vessel operating in the non-displacement mode seen from the port side.



W

R

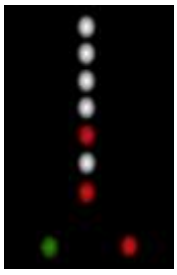
W

R

G R

What type of vessel would display the above lights?

A power driven vessel less than 50m in length restricted in her ability to manouevre making way through the water seen from right ahead.



W

W

W

W

R

W

R

G R

First part of the question:

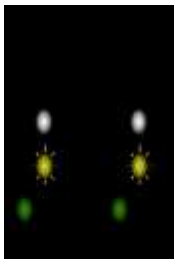
What type of vessel may show the above lights?

A power driven vessel greater than 50m in length engaged in a towing operation, where the length of tow exceeds 200m and unable to deviate from the course she is following.

Second part of the question:

At what minimum visible range would you expect to see the red/white/red all round lights which indicate she is unable to deviate from the course she is following?

3 miles



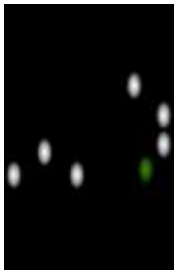
W W

Y Y

G G

What type of vessel or vessel would show the above lights?

Two air cushioned vessels operating in the now-displacement mode, less than 50m in length and seen from the stbd side.



W

W

W

W G

W W

What do the above lights represent?

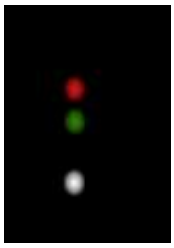
A power driven vessel greater than 50m in length engaged in a towing operation where the object being towed is over 100m in length and less 25m in breadth.

W

G R

What type of vessel could show the above fights?

A power driven vessel less than 20m in length exhibiting a combined lantern instead of sidelights.



R

G

W

First part of the question:

What type of vessel would show the above lights and what sound signal would she make?

A sailing vessel underway and showing the optional masthead lights for a sailing vessel seen from astern.

One prolonged blast followed by two short blasts at intervals of not more than two minutes.

Second part of the question:

What sound signal would the sailing vessel make?

One prolonged blast followed by two short blasts at intervals of not more than 2 minutes.

W

W

R

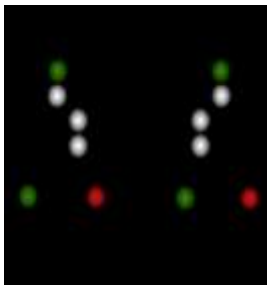
W

R

R R

What type of vessel or vessel would show the above lights?

A power driven vessel less than 50m in length engaged in a towing operation where the length of tow is less than 200m and she is unable to deviate from the course she is following.



G G

W W

W W

W W

G R G R

<u>First part of the question:</u>

What type of vessel or vessels would show the above lights and what sound signal

would you expect to hear in restricted visibility?

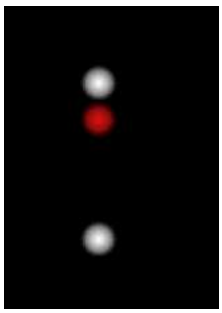
Two vessels engaged in pair trawling making way through the water and exhibiting the optional lights to show than they are shooting their nets.

One prolonged blast followed by two short blasts at intervals of not more than two minutes.

Second part of the question:

In addition to the lights shown, what other lights may vessels engaged in pair trailing exhibit?

A search light directed forward and in the direction of the other vessel of the pair.



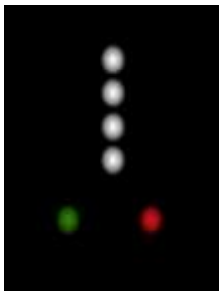
W

R

W

What type of vessel could show the above lights?

A pilot vessel engaged in pilotage duty making way through the water and viewed from astern. OR A pilot vessel engaged in pilotage duty at anchor.



W

W

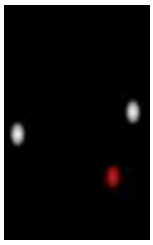
W

W

G **R**

What type of vessel could show the above lights?

A power driven vessel greater than 50m in length engaged in a towing operation where the length of tow exceeds 200m.



W

W

R

First part of the question:

What type of vessel would show the above lights?

A power driven vessel greater than 50m in length seen from the port side.

Second part of the question:

At what height is the after masthead light carried above the foremast light?

4.5m

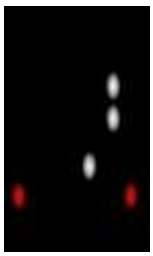
G

W R

R

What type of vessel would show the above fights?

A vessel engaged in trawling, not making way through the water, showing the optional signal to indicate that her nets are fast upon an obstruction.



W
W

W

R R

What type of vessel could the above lights represent?

A power driven vessel greater than 50m in length engaged in pushing ahead another vessel.

6. BRIDGE EQUIPMENT

Gone are the days when a ship navigation officer had to take help of unconventional ways to plan and navigate a voyage at sea. Today, a ship officer has myriad of marine navigation equipment which makes his life a lot simpler, thanks to the advancement in technology. Moreover, present day seafarers are trained so as to know the functioning and operation of all modern day navigational equipment that have made the journey at sea smoother and safer.

With modern day facilities and automation, a ship today has several advanced navigation equipment systems which give accurate data for the voyage.

Herein, we have enlisted 30 types of navigational equipment, both old and new, which are present on all merchant ships.

Gyro Compass

It is used for finding the right direction. Unlike magnetic compass, gyro compass is not hampered by external magnetic field. It is used to find correct North Position, which is also the earth's rotational axis. Its repeater system must be present in the steering platform for emergency steering.

Radar

It is used to determine the distance of the ship from land, other ships, or any floating object out at sea.

Magnetic Compass

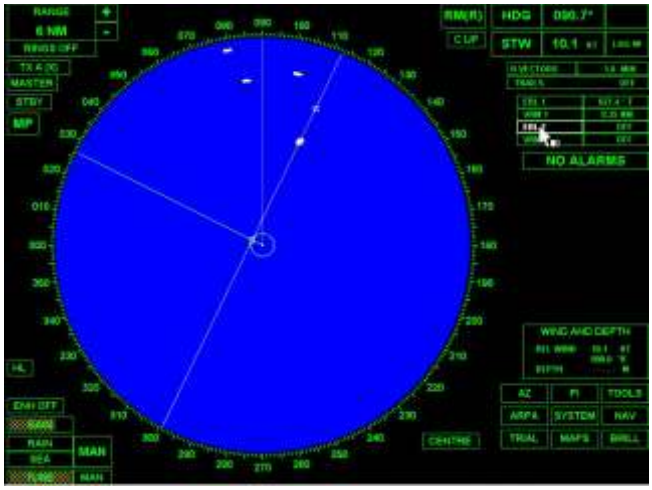
The magnetic compass work in conjunction with the magnetic field of the earth. It is used to get planned direction for the voyage.

Auto Pilot

It is a combination of hydraulic, mechanical, and electrical system and is used to control the ship's steering system from a remote location (Navigation bridge).

ARPA

Automatic Radar Plotting Aid displays the position of a ship and other vessels nearby. The radar displays the position of the ships in the vicinity and selects the course for the vessel by avoiding any kind of collision.



Automatic Tracking Aid

Just like ARPA, automatic tracking aid displays the information on tracked targets in graphic and numeric to generate a planned layout for a safer and collision free course.

Speed & Distance Log Device

The device is used to measure the speed and the distance traveled by a ship from a set point. By calculating the same, ETA of the ship is adjusted or given to the port authority and agent.

Echo Sounder

This instrument is used to measure the depth of the water below the ship's bottom using sound waves.

Electronic Chart Display Information System

ECDIS is a development in the navigational chart system used in naval vessels and ships. With the use of the electronic chart system, it has become easier for a ship's navigating crew to pinpoint locations, and attaining directions are easier than before

Automatic Identification system

AIS is a system which helps to pinpoint the location and other navigational statistics of ships. AIS uses VHF radio channels as transmitters and receivers to send and receive messages between ships which endeavors to fulfill a lot of responsibilities.

Long Range Tracking and Identification (LRIT) System

LRIT is an international tracking and identification system incorporated by the IMO under its SOLAS convention to ensure a thorough tracking system for ships across the world.

Rudder Angle Indicator

Rudder angle indicator, as the name indicates, provide the angle of the rudder. The display is provided on bridge to control the rate of turn and rudder angle of the ship.

Voyage Data Recorder

A VDR or voyage data recorder is an instrument safely installed on a ship to continuously record vital information related to the operation of a vessel. It contains a voice recording system for a period of at least last 12 hours. This recording is recovered and made use of for investigation in events of accidents.

Rate of turn indicator

It indicates how fast the ship is turning at steady rate, normally shown as number of degree turned.

GPS Receiver

A Global Positioning System (GPS) receiver is a display system used to show the ship's location with the help of Global positioning satellite in the earth's orbit.

Sound Reception System

This system is required for a ship with fully enclosed type bridge. It enables the navigating officer inside the cabin to listen to the sound signals and fog horn from other ships.

Navigational Lights

All boats – whether big or small are required to have night lights as a part of the navigation systems. This system was introduced in the year 1838 by the United States and then was followed by the United Kingdom in 1849. In the year 1889, the International Maritime Conference was established by the United States to establish proper guidelines to prevent marine accidents. In the year 1897, these rules were officially adopted internationally.

Ship Whistle

A ship's horn is known as whistle and it is generally provided in duplicate. One is driven by air and the other is electrically operated.

Daylight Signalling Lamp

They are light signalling devices used for emergency signalling in the day time.

Pilot Card

It is an informative booklet provided to the ship's pilot. It consists of the dimension, draught, turning circle, manoeuvring, propulsion equipment etc. of the vessel for safe manoeuvring.

Voyage Plan

A voyage Plan must be present onboard for referring past voyage plans or planning a future voyage.

Forecastle Bell

It is used to mark the presence of the ship in fog or bad weather and sound the alarm in case of any emergency.

Manoeuvring Booklet

In this booklet the performance of the propulsion plant and the ship during manoeuvring in different weathers and situations is recorded for quick reference.

Black Ball Shape

It is a day time signalling shape used to determine the characteristics of vessel with different arrangement of ball shapes. For e.g. a vessel at anchor will show a blackball at foremost end of the forecastle.

Record of Navigation Activities

All the navigational activities must be recorded and kept on board for ready reference. This is a mandatory and the most important log book.

Record of Maintenance of Navigational Equipment

Hard copy of the record must be present onboard ships for ready reference of port and regulatory authorities and must be signed by master and duty officers of the ship.

Wheelhouse Posters

Present in the Navigation bridge, it displays a detailed information of manoeuvring characteristics of the ship.

Transmitting Heading Devise

They are used to display the information of the vessel's true heading.

Black Diamond Shape

When the ship is being towed or when a vessel is unable to maneuvers on itself, a black diamond shape is shown during the day time.

Ship Flags

Various types of ship flags with different colors and signs are used to indicate a ship's position. Signal flags are they are commonly known, have been used since the ancient times and are still used on all vessels.