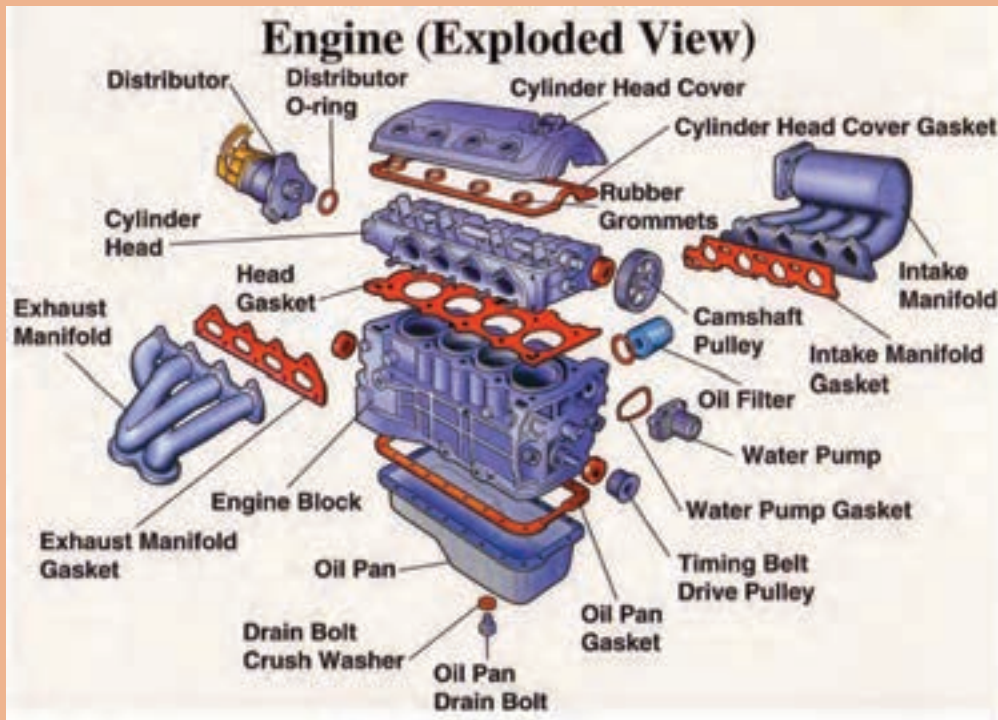


پودمان ۵

کسب اطلاعات فنی



واحد یادگیری ۵

کسب اطلاعات فنی

کسب اطلاعات فنی، شایستگی درک و دریافت دانش از منابع مختلف فارسی و غیر آن می‌باشد. با پیشرفت و گسترش و تنوع منابع، ضروری است که برای تحقق اهداف و توسعه شایستگی‌های خود به منابع و مراجع غیرفارسی نیز مراجعه کنیم. در این راستا پودمان حاضر به همین منظور در کتاب دانش فنی تخصصی طراحی و تألیف شده است.

برقراری ارتباط بین افراد شاغل در رشته‌هایی که به دلیل ماهیت‌شان نیازمند به تبادل اطلاعات هستند، اهمیت ویژه‌ای بیش از سایر رشته‌ها دارد.

با توجه به گستردگی علوم و فنون دریایی، توسعه روزافزون حمل‌ونقل و تجارت دریایی، فراگیری زبان انگلیسی به صورت عمومی و تخصصی برای دریانوردان ضروری می‌باشد. در کنار این موارد حضور کارکنان با ملیت و زبان‌های مختلف و همچنین ارتباط شناورها با یکدیگر در هنگام عملیات راهبری و هدایت کشتی، تخلیه و بارگیری و نیاز به برقراری ارتباط با پرسنلی که به زبان‌های مختلف سخن می‌گویند، سبب شده که «سازمان بین‌المللی دریانوردی» زبان انگلیسی را به عنوان زبان استاندارد رشته‌های دریایی انتخاب و تصویب نماید. با توجه به اهمیت موضوع، هنجویان پس از آشنایی با اصطلاحات مهم این رشته‌ها در این پودمان قادر خواهند بود مفاهیم بیان شده را (چه به صورت نوشتاری و چه به صورت گفتار) به درستی درک کرده و مفاهیم اولیه موردنظر خود را به زبان انگلیسی بیان کنند.

بدیهی است هدف از ارائه این پودمان، تدریس زبان انگلیسی نمی‌باشد بلکه کسب مهم‌ترین اطلاعات فنی گذشته تخصصی، حرفه‌ای خود می‌باشد. از طریق خواندن منابع ذکر شده می‌توان به این هدف دست یافت. البته برای پشتیبانی این امر در کتاب همراه هنجو، که خود نیز عملاً یک دانشنامه ویژه بیشتر به خواندن درست لغات، جملات و درک مطالب ارائه شده در کاتالوگ‌ها، بروشور و کتاب‌های راهنمای کاربردی تأکید دارد. پودمان ذکر شده حاوی یک لوح فشرده (CD) آموزشی نیز می‌باشد. در این لوح مطالب ارائه شده در درس به زبان اصلی بیان می‌شود تا راهنمایی در خواندن و گفتار باشد.

پروژه پایانی

هر گروه درباره یکی از موضوعات تخصصی پودمان، یک سخنرانی ۱۰ دقیقه‌ای انجام داده و ۵ دقیقه نیز به پرسش و پاسخ انگلیسی در کلاس اختصاص یابد.

Sailing ships: Ships normally used for training or pleasure but some researchers also may use them.



Fig 46(Sailing ship)

Search the internet and find out the purpose of the following vessels and present it in your classroom in English language.

- Ro-Ro ships
- Cattle carrier
- Salvage ships
- Industrial ships
- Fishing vessels
- Ferries

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

Passenger ship	A ship designed to carry specially shaped cubic cargo
Auxiliary ship	A ship designed to transport or store liquids
Tanker ship	A ship designed to carry refrigerated cargo
Bulk carrier	A ship designed to carry the people
Refer ship	A ship designed to transport unpackaged cargo
Container carrier ship	A ship which is designed to support warships

Tankers: Vessels designed to transport or store liquids or gases in bulk. Major types of tank ships include the oil, chemicals and gas.



Oil tanker



Fig 44 : gasGas tanker

Passenger ships: Ships whose main purpose is to carry the people as passengers but, sometimes cars or cargos are carried as well.



Fig 45: passenger ship

General cargo ships: Ships designed to carry all types of dry cargo.



Fig 42: General cargo

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



Fig 43: refrigeration ship

Container carriers: Ships designed to carry cubic shape cargo named container.



pipe laying vessel



Fig 40: container carrier

Bulk carriers: Ships specially designed to transport unpackaged bulk cargo, such as grains, coal, ore, and cement.



Fig 41: Bulk carrier

NAVAL SHIPS are either Warships or Auxiliary ships. Warships can be further classified under types and classes. The term type distinguishes between ships built for different purposes, for example **JAMARAN** is an Iranian made frigate and **KHARK** is an auxiliary ship which is designed to support warships at sea.



JAMARAN (destroyer)



Fig 39: KHARK (auxiliary)

Merchant ships can be classified by their purpose, for example, pipe laying vessels “PLV” are made to lay down the pipe line on the sea bed, and cargo ships’ purpose is to carry cargo. Some main cargo ships types are as follows:

4. which controls the opening and closing of the valves in the cylinder.
5. In the internal combustion engine, a fire or combustion takes place inside the of the engine?
6. An internal combustion engine that compresses air until it becomes so hot that an explosion takes place when fuel is injected into the cylinder is known as a Engine.
7. Label the parts in this diagram of the internal combustion engine.



Fig 38

Unit four

Types of ships

Ships have many varieties and, it is difficult to categorize them all, but three main types are:

- Naval ships
- Merchant ships
- Sailing ships

According to their purpose, each of the above types can be divided into smaller groups. Here are some groups;

The rest of the component such as valve operating mechanism, cooling systems, etc. are more likely the same.

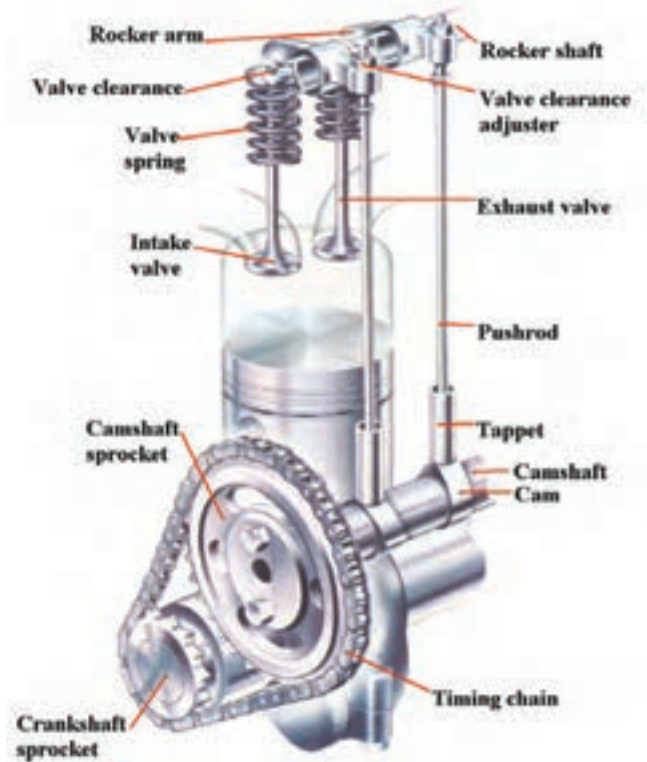


Fig 37: valves operating mechanism

discussion

1. Why is a steam engine sometimes called an external combustion engine?
2. How does a steam engine indicates its difference from an internal combustion engine?
3. Name three necessary components of the four stroke engine.
4. What is the principle on which the diesel engines work?
5. What is the difference between a spark – ignition engine and a compression-ignition engine?

Review

1. is a word that means fire or burning.
2. In a engine the piston makes two upward and two downward movements.
3. Gasoline is changed into a vapor and mixed with air in a

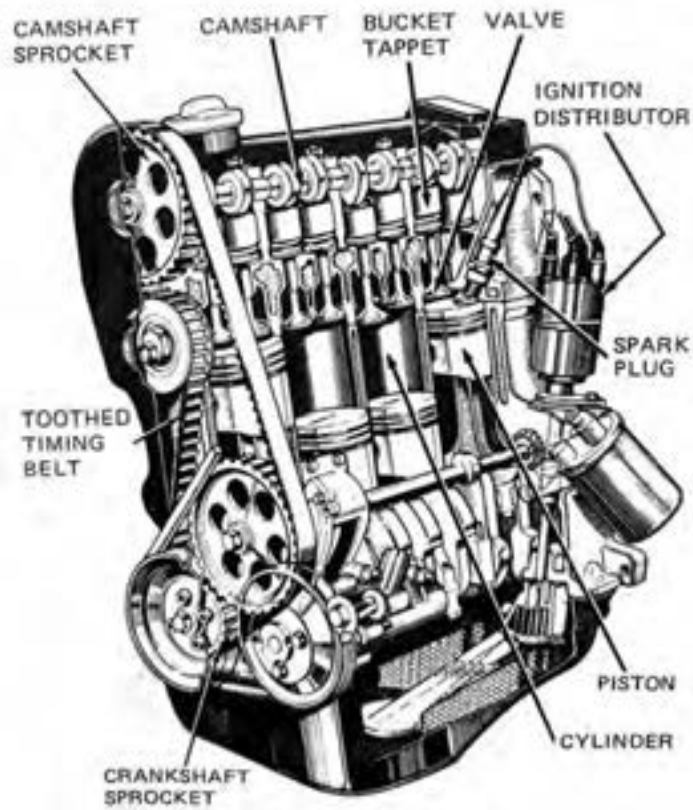


Fig 35: spark ignition engine

In the compression-ignition or diesel engine, the air alone is taken into the cylinder then the fuel is injected (sprayed) into the combustion chamber. The injection action is carried out by fuel pump, high pressure pipe and fuel valve.

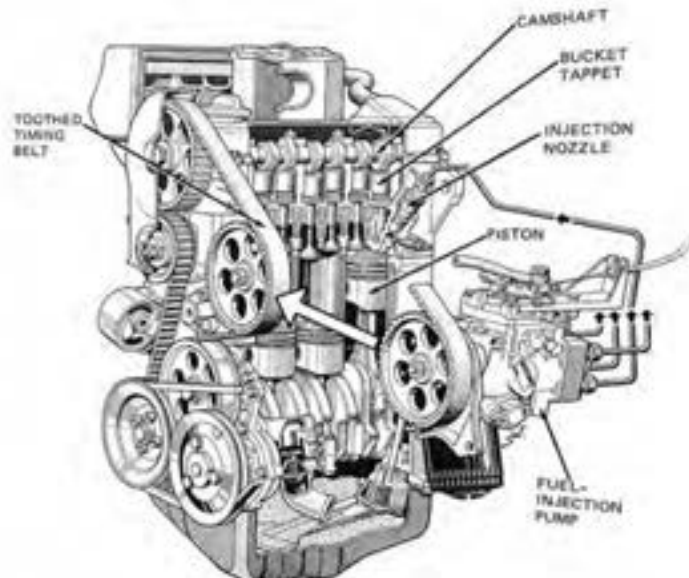


Fig 36: Diesel engine

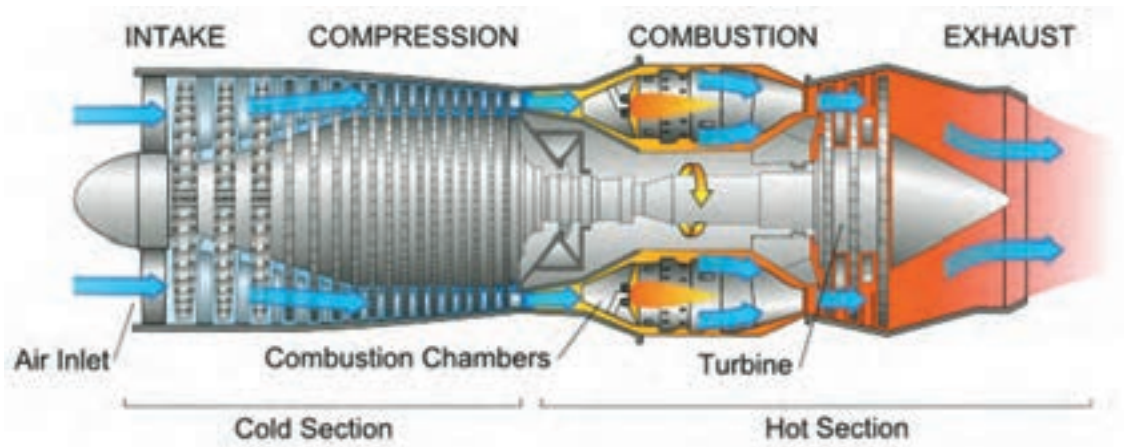


Fig 34: Gas turbine

There are two kinds of piston engine, *spark-ignition* and *compression-ignition* (diesel).

The *spark-ignition* and the *compression-ignition* are very much alike. They both have pistons that move up and down in cylinder which is connected to crankshaft through connecting rod. The differences between the two are:

- The type of the fuel used.
- The way the fuel gets into the engine cylinder.
- The way the fuel is ignited.

The spark – ignition engine uses a highly volatile fuel, such as gasoline, which turns to vapor easily, and it is the duty of the carburetor to prepare the correct amount of fuel-air ratio. This mixture then enters the cylinder through intake valve and is compressed. Next, an electric spark produced by ignition system sets fire in the combustion chamber. The main components of ignition systems are, spark plug, ignition distributor and ignition coil.



Train steam engine



Fig 33: Boiler

Nowadays, most of ships' engines are internal combustion engines. There are two types, reciprocating and rotary. Reciprocating means moving up and down, or back and forth. In almost all ships, electrical prime movers are of the reciprocating type. This type of engine is called a piston engine.

Rotary engines have rotors that spin, or rotate. A gas turbine is a famous rotary internal combustion engine.



steam ship engine



Steam ships boiler room

Carburetor: A device in which gasoline is changed into a vapor and mixed with air.

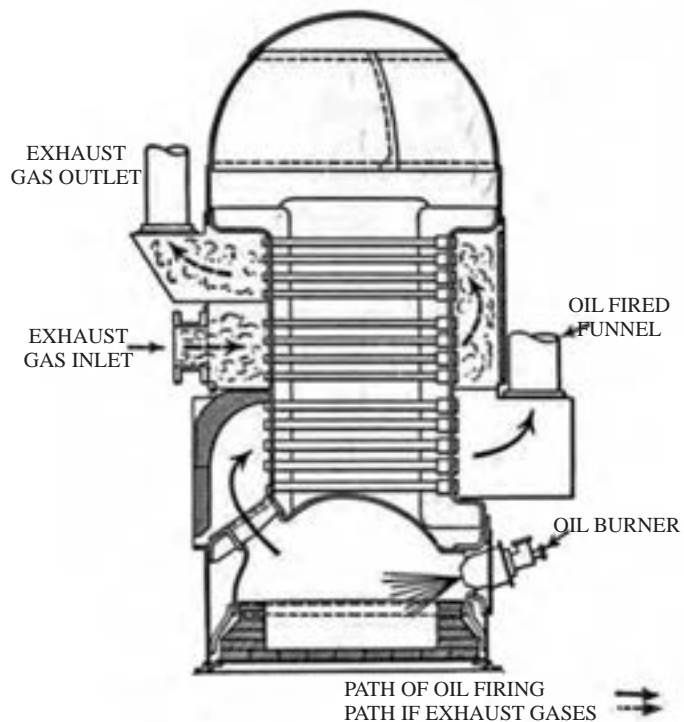


Fig 32: Carburetor

Vocabulary practice

1. What does a carburetor do?
2. What does a spark plug do?
3. What does a cam shaft do?
4. What does a crankshaft do?
5. Describe a cylinder head.
6. Describe a four stroke engine.

Combustion is a word for fire or burning, an internal combustion engine is one in which a fire occurs inside the engine. A steam engine uses fire in a boiler rather than inside the engine. For this reason, steam engines are sometimes called external combustion engines.



marine boiler

Cylinder head: A detachable metal casting that fits onto the top of a cylinder block. In an engine, it contains part of the combustion chamber and in most of the engines, it houses the valves and their operating mechanisms.

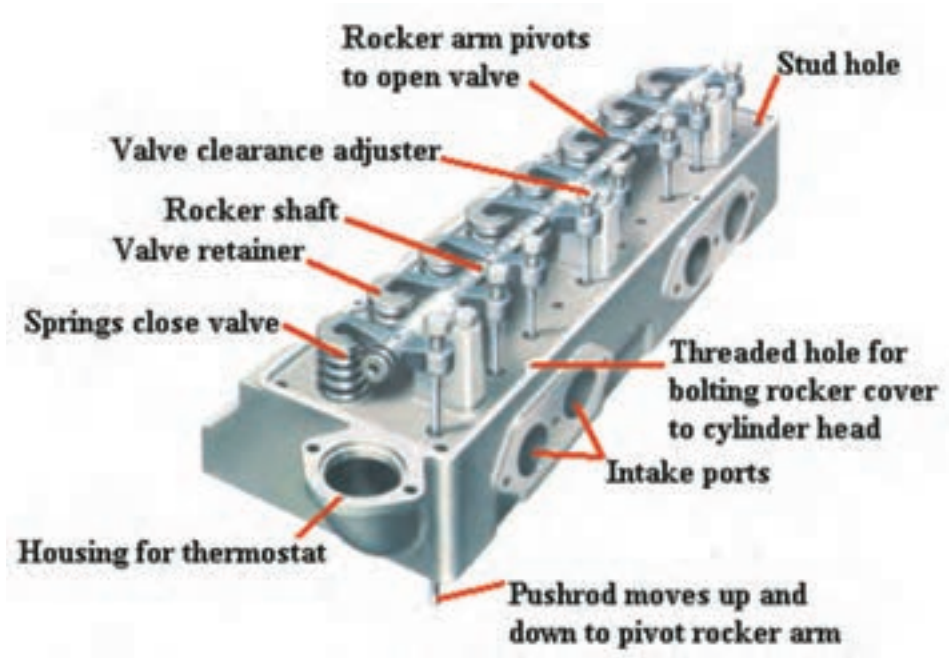


Fig 30

Spark plug: A device that includes a pair of electrodes and an insulator providing spark gap in the engine cylinder.



Fig 31: Spark plug

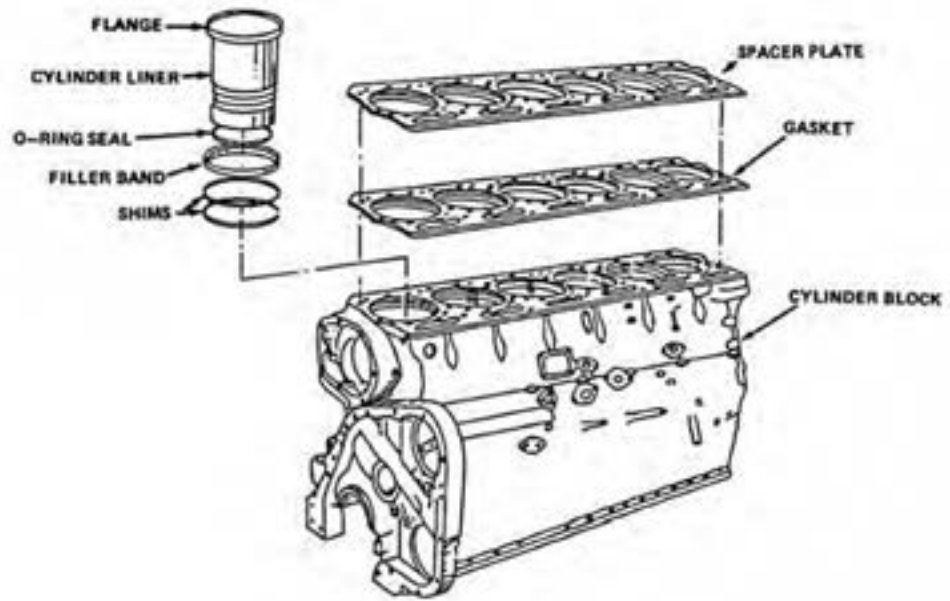


Fig 28: Cylinder

Connecting rod: A **connecting rod** is a shaft which connects a piston to a crankshaft.

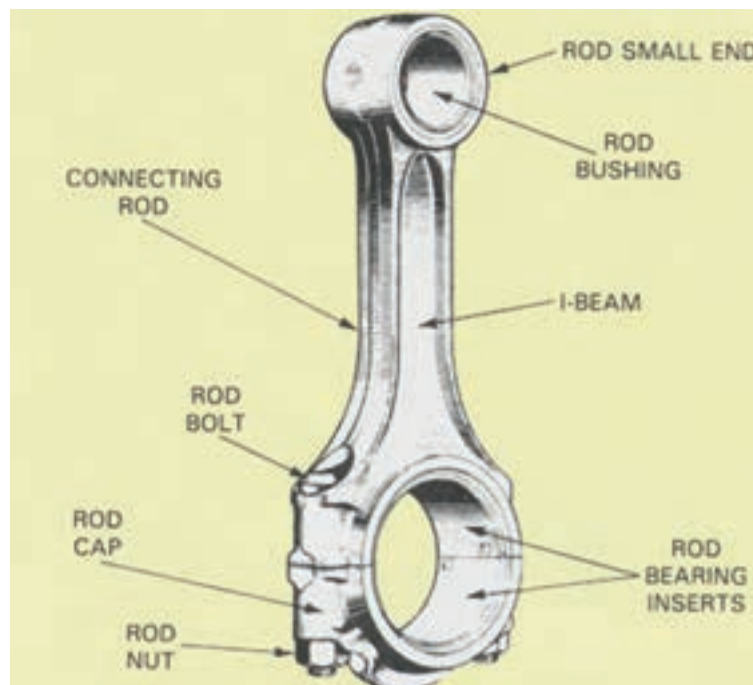


Fig 29: Conecting Rod

Camshaft: A **camshaft** is a shaft equipped with a cam to control the valves that let gases in and out of the cylinder.



Fig 26: Camshaft

Cylinder: A **cylinder** is the central working part of a reciprocating engine in which the piston travels.



Fig 27: Big engine cylinder liner



Fig 24: A four-Stroke Engine

Crank Shaft: A **crankshaft** is a mechanical part which converts reciprocating motion to rotational motion in reciprocating engines.

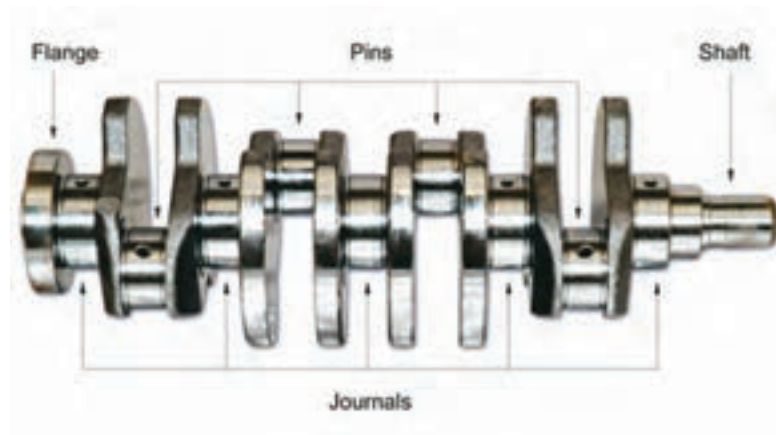


Fig 25: Crankshaft

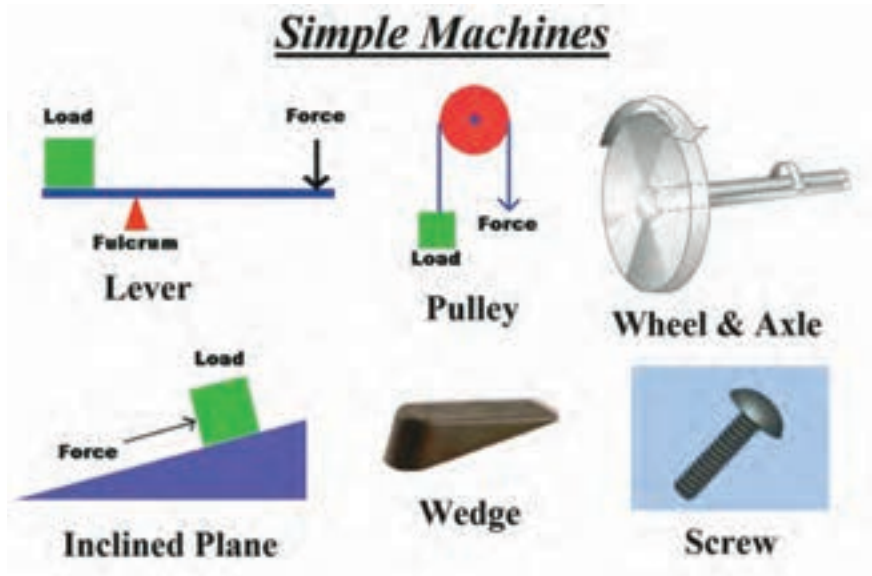


Fig 23

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

Lever	A combination of a fixed and movable block
Fulcrum	A wheel with grooved surface through which a rope, wire, or chain passes
Block	A shaft on which a wheel rotates
Block and tackle	A bent shaft or arm for transmitting motion changing reciprocating to rotary motion or the opposite
Crank	The point on which the lever turns
Wedge	A machine consisting of a rigid bar that turns on a point
Axle	A triangle of material tapering to a thin edge
Pulley	A pulley contained in a hosing

UNIT THREE

THE INTERNAL COMBUSTION ENGINE

Four-Stroke Engine: A **four-stroke engine** is an internal combustion engine in which the piston completes four separate strokes while turning the crankshaft.



ship propeller

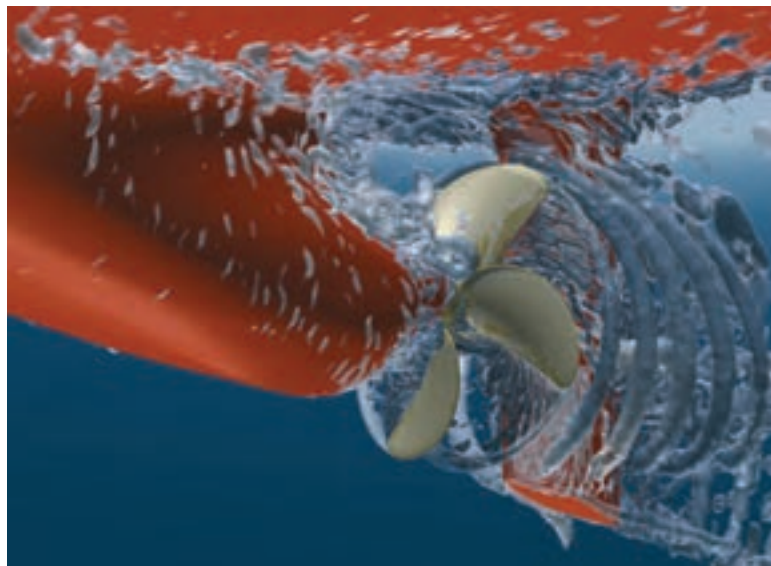


Fig 22: screwing effect

discussion

1. When a prehistoric man or woman pride up a stone with a stick, what machine was in use?
2. What can a crank do?
3. What is the third basic machine?
4. What can the block and tackle do?
5. What are the remaining basic machines that are sometimes grouped together?
6. What kind of motion does the propeller of a ship have? What is the result of this motion?

The inclined plane is an important factor that concerns civil engineerings when designing highways or railroads. A mechanical engineer more frequently uses the screw, a spiral form of the inclined plane which is mostly used for fastening parts together.



Fig 20: screw

Screws have so many applications in modern machines that it is impossible to list them all, but one which is extremely interesting is the rotary motion of a propellers on a ship which moves the vessel ahead as it screws its way through the water.



Fig 21: An inclined road



Fig 18

The three remaining basic machines are so related to one another that are sometimes grouped together. They are “wedges”, an “inclined planes”, and a “screws”. The wedge is a triangle with two chief surfaces that meet in a sharp angle. One of wedges applications is that they are used for splitting open or pushing apart.



Fig 19: A flange splitter



Fig 16: A Modern ship steering wheel

The potential of the wheel was increased by the development of a “crank” . A crank is a device which can transmit motion or can change rotary motion into reciprocating motion and the reverse. For example, a water wheel could be used for sawing wood.

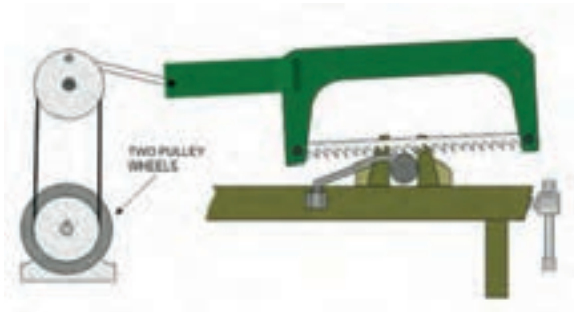


Fig 17 : water wheel

The third basic machine is a pulley. In its simplest form, it consists of a wheel with a groove around its outer surface through which a rope, wire, or chain can pass. This simple device was used in ancient times for tasks such as raising water from wells and hoisting sails onto ships. A pulley contained in a housing is called a block. When a fixed block is used with movable block to which a weight is attached, this device is called a “block and tackle”.



metal sheet cutter



crowbar

Fig 15

The wheel and axle is the second basic type of machine. An axle is a shaft on which a wheel can turn. The wheel and axle combination may have first been used around 5000 years ago, for transportation and raising water from wells, nowadays, there are endless applications for wheels, and one of them is ship steering wheel!!!



A Sailing ship steering wheel

Vocabulary practice

1. What is a lever?
2. What does a wheel and axle consist of?
3. What does a crank do?
4. Describe a pulley?
5. What is a block?
6. What is a wedge?
7. What is an inclined plane?
8. Describe a screw?

When a prehistoric man or woman used a stick to pry up a stone, the lever was invented. It is one of the six basic machines we will describe in this chapter. A lever is a rigid bar, like the early persons stick, which turns on a point called the fulcrum. When the force is applied at a first point, that force is transmitted to a second point where it can perform work. A grease pump handle is an example of lever.



Fig 14: Stick



Grease pump

CRANK: A device for converting reciprocating motion into rotary motion or vice versa.

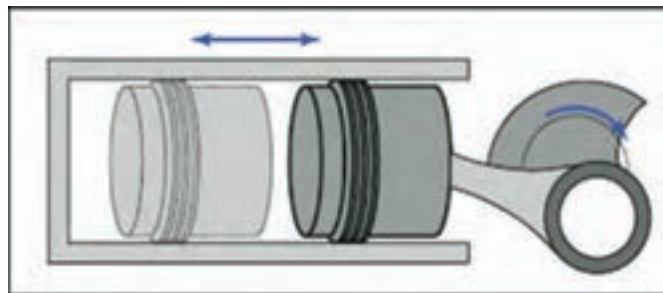
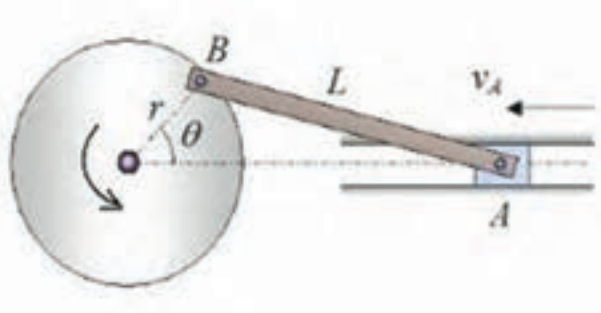


Fig 12: Crank

SCREW: A screw is simply an inclined plane around a cylinder.

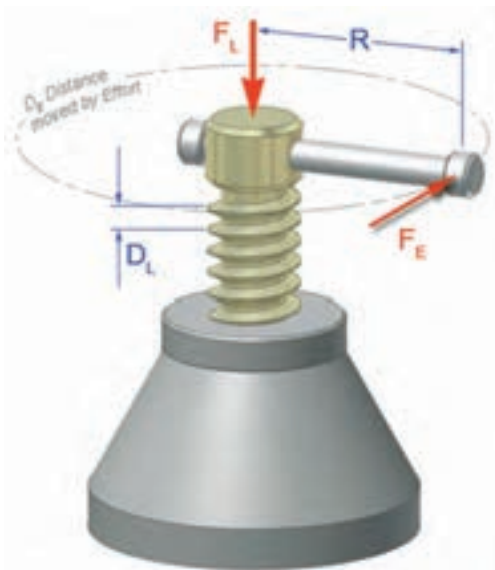


Fig 13



Fig 10

WEDGE: A wedge is a triangular shaped tool, and is a portable inclined plane, and one of the six classical simple machines. It can be used to separate two objects.

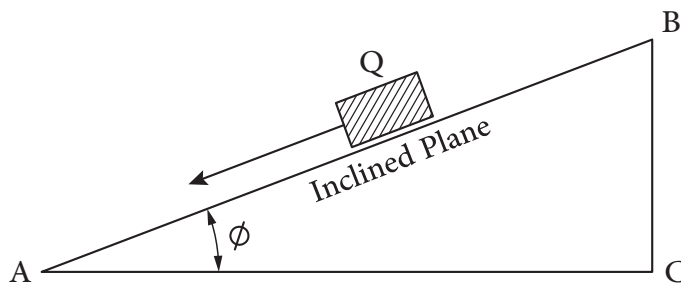


Fig 11

INCLINED PLANE: A basic machine, at its simplest form, a surface at an angle to the horizon.

PULLEY: A basic machine consisting of a wheel with grooved rim through which a rope, wire, or chain passes and is pulled to lift heavy things.

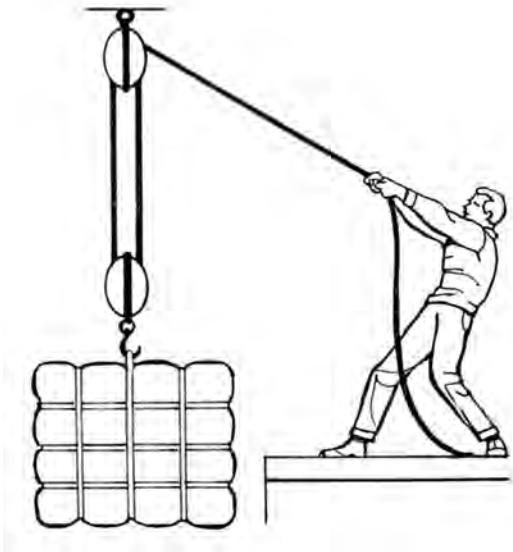


Fig 9

UNIT TWO

BLOCK & TACKLE:

The combination of a fixed and movable pulley together with a rope is known as a **BLOCK AND TACKLE**.



Remember safety affects everything in your life so think safely.

Task

During your ship visit, take some pictures from her safety signs and present in your class, mention their meanings in English language.

THE BASIC MACHINES

LEVER: A basic machine consisting of a rigid piece that turns on a point called **FULCRUM**.

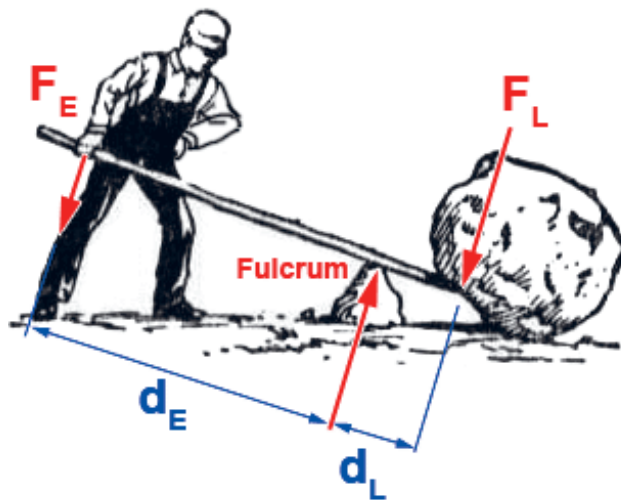


Fig 7

WHEEL AND AXLE: A basic machine consisting of a **WHEEL** that rotates on a shaft called the **AXLE**.

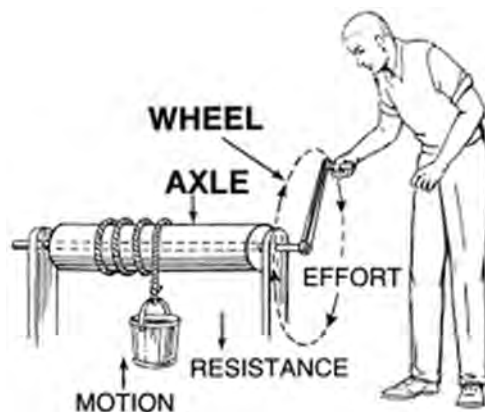


Fig 8

All the above mentioned equipment and many more are used on board ships to prevent harms.

In addition, there are some rules and regulations issued by international organizations such as INTERNATIONAL MARITIME ORGANIZATION “IMO” and national administrations like ISLAMIC REPUBLIC OF IRAN PORT AND MARITIME ORGANIZATION “PMO”

Following these rules and regulations is a “must” and all merchant vessels have to be comply with them, but navy ships have some exemptions.

For example, The **International Convention for the Safety of Life at Sea (SOLAS)** is an international maritime treaty, which sets minimum safety standards in the construction, equipment and operation of merchant ships.



Fig 5

Which to be followed by ship builders and ship owners.



Fig 6

Ships are also equipped with some machinery to protect environment such as:

Oily water separator	
Sewage treatment plants	
Sludge/Garbage incinerator	

Fig 4







			
Life raft	Life buoy	Muster station	Emergency telephone
			
Immersion suit	First aid box		

Fig 2

This signs are helping you to be safe but working in potentially dangerous industrial areas such as ships engine room needs special protecting equipment. Some of them are as follows:

Personal protective equipment “PPE”:

			
Safety shoes	Boiler suit	goggles	Hand gloves
			
Helmet	Ear muffs	Dust mask	Safety harness

Fig 3

UNIT ONE

SAFETY FIRST







Fig:1

Working on a ship is interesting; you will learn to do many jobs, overhauling a pump, adjusting engine valves, checking engine performance and many other jobs. All of these jobs can be done easily and safely if you follow the safety rules.

Safety means protecting yourself and others from possible dangers.

Look at the following safety signs, which are normally, posted on ships bulkheads.

			
Lifeboat	Life jacket	Fire hose	Fire extinguisher

ارزشیابی مرحله‌ای کسب اطلاعات فنی

نمره	استاندارد (شاخص‌ها، داوری، نمره دهی)	نتایج	استاندارد عملکرد (کیفیت)	تکالیف عملکردی (شایستگی‌ها)	عنوان پودمان فصل
۳	۱- کاربرد اصطلاحات تخصصی را بداند. ۲- توانایی نقشه‌خوانی، کاتالوگ‌خوانی و استفاده از برگه اطلاعات را داشته باشد. ۳- توانایی استخراج و کسب اطلاعات از منابع به‌روز را داشته باشد. هنرجو توانایی بررسی همه شاخص‌ها را داشته باشد.	بالاتر از حد انتظار	به‌کارگیری اطلاعات فنی در حوزه تخصصی	توانایی کسب اطلاعات فنی	کسب اطلاعات فنی
۲	۱- کاربرد اصطلاحات تخصصی را بداند. ۲- توانایی نقشه‌خوانی، کاتالوگ‌خوانی و استفاده از برگه اطلاعات را داشته باشد. ۳- توانایی استخراج و کسب اطلاعات از منابع به‌روز را داشته باشد. هنرجو توانایی بررسی ۲ مورد از شاخص‌ها را داشته باشد.	در حد انتظار			
۱	۱- کاربرد اصطلاحات تخصصی را بداند. ۲- توانایی نقشه‌خوانی، کاتالوگ‌خوانی و استفاده از برگه اطلاعات را داشته باشد. ۳- توانایی استخراج و کسب اطلاعات از منابع به‌روز را داشته باشد. هنرجو توانایی بررسی ۱ مورد از شاخص‌ها را داشته باشد.	پایین‌تر از حد انتظار			
					نمره مستمر از ۵
					نمره شایستگی پودمان از ۳
					نمره پودمان از ۲۰

ارزشیابی شایستگی کسب اطلاعات فنی

<p>شرح کار:</p> <p>۱- پاسخگویی به کلیه فعالیت‌های پودمان ۲- شرکت در بحث‌های کلاسی ۳- رایة سخنرانی با موضوع دلخواه</p>
<p>استاندارد عملکرد:</p> <p>به کارگیری اطلاعات فنی در حوزه تخصصی</p> <p>شاخص‌ها:</p> <p>توانایی خواندن، نوشتن و بیان اطلاعات فنی</p>
<p>شرایط انجام کار و ابزار و تجهیزات:</p> <p>شرایط: کلاس درس مجهز به پرده‌نگار</p> <p>ابزار و تجهیزات: در کلاس امکان نمایش فایل‌های صوتی و تصویری وجود داشته باشد.</p>

معیار شایستگی:

ردیف	مرحله کار	حداقل نمره قبولی از ۳	نمره هنرجو
۱	توانایی کاربرد اطلاعات تخصصی	۲	
۲	توانایی استخراج و بیان اطلاعات فنی از منابع مختلف	۱	
	<p>شایستگی‌های اخلاقی، زیست محیطی، ایمنی، بهداشتی و....</p> <p>۱- رعایت نکات ایمنی دستگاه‌ها ۲- دقت و تمرکز در اجرای کار ۳- شایستگی تفکر و یادگیری مادام‌العمر ۴- اخلاق حرفه‌ای</p>	۲	
	میانگین نمرات		*

* حداقل میانگین نمرات هنرجو برای قبولی و کسب شایستگی ۲ است.

- ۱- استاندارد شایستگی حرفه رشته مکانیک موتورهای دریایی. (۱۳۹۲). سازمان پژوهش و برنامه‌ریزی آموزشی، دفتر تألیف کتاب‌های درسی فنی و حرفه‌ای و کاردانش.
- ۲- استاندارد ارزشیابی حرفه رشته مکانیک موتورهای دریایی. (۱۳۹۲). سازمان پژوهش و برنامه‌ریزی آموزشی، دفتر تألیف کتاب‌های درسی فنی و حرفه‌ای و کاردانش.
- ۳- راهنمای عمل طراحی و تألیف بسته تربیت و یادگیری رشته‌های فنی و حرفه‌ای. (۱۳۹۳). سازمان پژوهش و برنامه‌ریزی آموزشی، دفتر تألیف کتاب‌های درسی فنی و حرفه‌ای و کاردانش.
- ۴- برنامه درسی رشته مکانیک موتورهای دریایی. (۱۳۹۳). سازمان پژوهش و برنامه‌ریزی آموزشی، دفتر تألیف کتاب‌های درسی فنی و حرفه‌ای و کاردانش.
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- ۷- کتاب تعادل کشتی، محمود سالاری، انتشارات مرکز برنامه‌ریزی و تألیف کتاب‌های درسی سپاه.

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