

**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ЦЕНТРАЛЬНОУКРАЇНСЬКИЙ НАЦІОНАЛЬНИЙ
ТЕХНІЧНИЙ УНІВЕРСИТЕТ**

Кафедра іноземних мов

АНГЛІЙСЬКА МОВА

**Методичні вказівки до самостійної роботи
для студентів 1 курсу спеціальностей
131 «Прикладна механіка»
133 «Галузеве машинобудування»**

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Методичні вказівки з дисципліни “Англійська мова” до самостійної роботи студентів I курсу всіх спеціальностей механіко-машинобудівного факультету спрямовано на розвиток у студентів немовних спеціальностей навичок читання та перекладу технічних та науково-технічних текстів, збагачення словникового запасу і оволодіння навичками письма та говоріння.

Методичні вказівки містять добірку неадаптованих текстів на базі сучасних оригінальних підручників, технічних журналів та газет, що виходять англійською мовою. Це дає можливість студентам ознайомитись з мовними стилями різних авторів і різних джерел.

Метою даного видання є розширення та закріплення студентами термінологічної лексики за фахом, а також надбання ними базових навичок технічного читання, аудіювання та спілкування. З метою розвитку у студентів навичок перекладу та розуміння спеціальної термінології без перекладу до текстів додані вправи на систематизацію знань з граматики, закріплення знань з лексики та розвиток навиків мовлення.

Виконання студентами методичних вказівок сприяє інтенсифікації процесу вивчення англійської мови та розуміння науково-технічних текстів за фахом.

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SCREW FASTENINGS & RIVETED JOINTS

Machine parts are held together by parts: (a) working in tension, (b) working in shear, (c) creating friction, and (d) using both shear and friction forces.

All fastenings can be divided into two classes – disconnectable fastenings and permanent joints. Disconnectable fastenings, in turn, are effected by: (a) bolts and screws, (b) wedges, (c) dowel pins, (d) keys.

Permanent joints are obtained by means of: (a) press fits, Shrink fits, (c) rivets, (d) welding, brazing, and soldering and (e) casting.

Screw fastenings are used for holding two or more machine parts together or for adjusting one part with relation to another. In screw fastenings the threads are made in several forms but are always of triangular-type single threads. Screw threads are made right-hand and left-hand.

Riveting has been the standard method of joining plates and structural parts before welding began to replace it with increasing rapidity.

A rivet is a round bar consisting of an upset end called the head, and a long part called the shank. The rivet blank is heated to a red glow, inserted into one of the holes, and, while the head is held firmly against the plate by a heavy sledge, the projecting end is formed into a second head, called the point, by means of a hand hammer and set on by a press.

Button heads are used for small rivets which are driven cold; pan heads are used chiefly in ship work; countersunk heads are used only in special cases, chiefly in structural work and below the water line in ships; the countersunk points weaken the plate so much that they should be used only when unavoidable; the others, including button heads, are used in boiler and structural work.

Notes and commentary:

1. are held together by parts - утримуються деталями
2. parts working in tension - деталями, що працюють на розтягування
3. parts working in shear - деталями, що працюють на зрушення (зріз)
4. parts creating friction - деталями, що створюють тертя
5. parts using both — and - деталями, що використовуються як...так і..
6. disconnectable fastenings - роз'ємні з'єднання
7. permanent joint - нерухоме з'єднання
8. are effected by -здійснюються
9. dowel pin - встановлювальний штифт, нагель
10. are obtained by means of — здійснюються за допомогою

11. press fits - пресо́ва поса́дка
12. shrink fits - гаря́ча поса́дка
13. with relation to another - відно́сно іншо́ї (деталі)
14. triangular-type single thread - трику́тна однозахі́дна різьба
15. right-hand thread - пра́ва різьба
16. left-hand thread - лі́ва різьба
17. is heated to a red glow - нагрі́вається до черво́ниння
18. is held firmly against the plate - прити́скається щі́льно до пласти́ни
19. is formed into a second head - формую́ться в дру́гу голо́вку
20. which are driven cold - які клепа́ються в холо́дному ста́ні
21. they should be used only when unavoidable - засто́совуютьс́я ті́льки коли це не́минуче

Task I. Answer the following questions:

1. How are machine parts held together?
2. What classes of fastenings do you know?
3. How are disconnectable fastenings effected?
4. How are permanent joints obtained?
5. What are screw fastenings used for?

Task 2. Translate into Ukrainian paying attention to fug- forms:

1. Sheaves employed to obtain positive driving action without slippage.
2. A connecting pin may be used as a permanent connection.
3. Riveting has been the standard method of joining plates and structural parts before welding began to replace it with increasing rapidity.
4. The boiling point of a substance depends upon the surrounding pressure.
5. The original field of the automatic screw machine was the making of screw.

Task 3. Find in the text English equivalents for the following words and word combinations:

різьба, встановлювальний шриф́т, закле́пка, пая́ння, те́ртя, зді́йснюва́тися, утримува́тися, за до́могою, регу́люва́ння.

KEYS & PINS

The main function of a key is to transmit torque between a shaft and a machine part assembled on it. In most cases keys prevent relative motion, both rotary and axial. In some constructions keys allow an axial motion between the shaft and the hub, such keys are called feather or spline keys. In spite of the tendency to standardize there are many key types in use by various manufacturers.

According to various characteristics keys can be distinguished as straight and taper; rectangular, dovetailed, chamfered round and disk-shaped, radial and tangential, and (according to their use) for light duty and for heavy duty.

Geometrically pins can be divided into cylindrical pins, called straight pins, and conical or taper pins. Dynamically pins can be classified as those used only to locate the relative position of two parts when there is little or no force acting upon the pin, and those that fasten two or more parts together and are subjected to considerable stresses, which are, mostly in shear but sometimes in bending. Locating pins are called dowel pins or simply dowels. A connecting pin, like a dowel, may be used either as a permanent connection or as a fulcrum for a movable joint.

Notes and commentary:

1. in most cases - у більшості випадків
2. feather or spline key - шпонка напрямна або призматична
3. in spite of - не зважаючи на
4. according to - згідно
5. dovetailed key - шпонка у вигляді ластівкового хвосту
6. chamfered round key - циліндрична шпонка або шпонка зі скошеними ребрами
7. disk-shaped key- дископодібна шпонка
8. radial and tangential key- радіальна або тангенціальна шпонка
9. for light and for heavy duty- для малих і великих навантажень
10. are subjected to - піддаються
11. which are mostly in shear but sometimes in bending- які зазвичай зрізуються, але іноді вигинаються
12. either...or - або.. або

Task I. Answer the following questions:

1. What is the main function of a key?
2. What keys are called feather or spline keys?

3. How can keys be distinguished according to various characteristics?
4. How are keys classified according to their use?
5. How can pins be divided geometrically?
6. How can pins be classified dynamically?
7. What are locating pins?
8. What are connecting pins?

Task 2. Find in the text English equivalents for the following words and word combinations:

шпонка напрямна, малі навантаження, обертальний рух, шпонка зі скошеними ребрами, крутний момент, шпонка у вигляді ластівкового хвоста, виробники, не звертаючи увагу на, вісь.

Task 3. Use the following words and phrases in sentences of your own:

straight pins, taper pins, to be subjected to considerable stresses, permanent connection, a fulcrum for a movable joint

PRESS, SHRINK AND FRICTION JOINTS

A press joint, also called a force joint is obtained by forcing a shaft into a hole that is slightly smaller than the shaft. This is possible because of the elasticity of the materials which produces the grip that holds the hub and shaft together.

A shrink joint differs from a press joint chiefly by the method of assembling it. The hub is heated to expand its bore and to slip it on the shaft. When the hub cools down to the temperature of the shaft, the grip is produced in the same way as in the force joint. The shrink joint is also used to connect machine parts by means of special rings, anchors, and tie rods.

In a friction joint the holding grip is produced by the conical shape of the shaft end and the hub bore and by the pull of a nut, or by a slotted hub whose bore is smaller than the shaft and which is spread by a wedge when the joint is being assembled.

The assembling of a shaft and a hub by means of a press joint is simpler than that with a shrink joint especially if a hydraulic press of a sufficient capacity is available. Shrink joints are used mainly in places where it is difficult or impossible to assemble a press joint, as in the case of rings or anchors. On the other hand, shrink joints assemblies with the same interference as press joints give more than three times the holding power against both torsion and axial pull. This superior

effectiveness is due to the absence of abrasion between the surfaces of the shaft and the hub during assembly.

All three joints are used when machine parts must be connected more securely than can be accomplished with a key or screw joint, especially when they are subjected to shock or vibration.

Notes and commentary:

1. a press joint-пресо́ва поса́дка
2. is obtained by forcing a shaft into hole - отримується при впресуванні валу в отвір
3. which produces the grip that holds the hub and shaft together - той, що затискає і утримує втулку і вал разом
4. a shrink joint - гаряча поса́дка
5. the hub is heated to expand its bore and to slip it on the shaft – втулка нагрівається для розширення її внутрішнього діаметру і посадки на вал
6. by means of - за допомогою
7. tie rod - з'єднувальна тяга
8. the conical shape of the shaft end and the hub bore -конічна форма кінця валу та отвору агулки
9. the pull of a nut - затягування гайки
10. as in the case - як і у випадку
11. on the other hand - з іншого боку
12. more than three times - більш, ніж в три рази
13. when they are subjected to - коли вони піддаються

Task 1. Answer the following questions:

1. How is a press joint obtained?
2. What is the difference between a shrink joint and press joint?
3. What is the shrink joint used for?
4. How is the holding grip produced in a friction joint?
5. When are all three joints used?

Task 2. Retell the text using the following words and word combinations:

a press joint, to force a shaft into a hole, elasticity, to produce the grip, shrink joint, the method of assembling, the hub anchors, the conical shape of the shaft, a hydraulic press, absence of abrasion.

Task 3. Translate into Ukrainian paying attention to the word "by".

1. This high pressure created by the compressed gases causes the shaft to turn or rotate.
2. Petroleum, or crude oil, is put through a refining process by which the gasoline is distilled out
3. The method of cooling by water is easy to accomplish.
4. A new car factory will have been constructed by the end of this year.
5. The driver can make the car operate by turning the fly-wheel.

METHODS OF HOLDING TOOLS BETWEEN CENTERS

When machining a piece or work on a lathe it is usually mounted between the lathe centers. Having been mounted on the lathe the work is supported by conical points or the live and dead centers. The work must have centre holes in each and drilled by using a combined drill and a countersink. The size of the centre hole has to be proportional to the weight of the work and the size of the cut to be taken.

The two lathe centers are mounted in two spindles: one the live centre is held in the headstock spindle and turns together with the spindle and the work, the other I the dead centre is held in the tailstock spindle and in most cases does not turn and rubs against the work piece. The point of the dead centre should be hardened to prevent its wearing during the operations performed on the lathe.

Both lathe centers should always be aligned, i.e. the points are to meet when the tail stock with its centre is moved up to the headstock centre.

When works are machined at high speeds or when they are too heavy a dead centre and the work will be heated up so as to cause excessive wear from friction. In such cases so-called running centers are used.

Short parts are usually held in a chuck. This method of holding work is of great importance since it is widely used with lathes. A chuck is a rotating vice which may be attached to the nose of the lathe spindle. There are three important varieties of lathe chucks such as independent jaw chucks, concentric or self-centering chucks or contracting chucks.

Notes and commentary:

1. live centre - центр, що обертається; передній центр
2. dead centre - нерухомий центр
3. countersink - зенкування
4. running centre - обертальний центр

5. vice - лещата
6. independent jaw chucks - патрон з незалежними кулачками
7. concentric chuck - самоцентрований патрон
8. contracting chuck - цанговий патрон

Task 1. Answer the following questions:

1. What is the most widely used method of holding work in the lathe?
2. By what parts of the centres is the work supported while being turned?
3. Where are the two lathe centres mounted on a lathe?
4. What kinds of centres are used on a lathe?
5. Where is the live centre held and how does it operate?
6. Where is the dead centre held and does it turn or not?
7. Where are the short parts held?
8. What main lathe chucks do you know?

Task 2. Find in the text English equivalents for the following words and word combinations:

передня бабка, задня бабка, зенкувати, обертальний центр, лещата, патрон, вмонтовувати, підтримувати, знос, обертати, тертя, машинна обробка, розмір, отвір, вирівнювання, прикріплювати, передній кінець шпінделя.

Task 3. Translate the following sentences:

1. Відомо, що передня та задня бабки вмонтовуються на протилежних кінцях станини верстата.
2. При обробці заготівка встановлюється між центрами верстата.
3. Обидва центри верстата повинні бути вирівняні.
4. Короткі деталі закріплюються в патронах.
5. Існують різні види патронів.

MACHINE-CUTTING TOOLS

The cutting tool is that part of machine which serves for removing material from revolving work. The quality of work depends upon correct selection of cutting tools used for metal-cutting operations.

Cutting tools are made of hardened and tempered steel or alloy metals. All cutting tools are used to perform certain work more efficiently and they may be subdivided into turning tools, shaper tools, boring tools, planing tools, milling tools etc.

These tools having one effective cutting edge along which excess material from the work piece is removed are known as single-point cutting tools. Other tools removing excess material on two or more cutting edges simultaneously are known as multiple-point cutting tools. Each cutting tool consists of a shank for holding the tool in the machine and a tip or cutting edge for removing chips from the work.

The various types of cutting tools differ in shapes and in the angles to which the surfaces of the tools are ground. The cutting tip should be ground by hand or by machine with correct angles on the top face (rake angles) and sides (clearance angles) to a desired shape.

The shape of the tool as well as the proper rake and clearance angles depend upon a large number of factors, such as the specific operations, the material to be cut, and the material from which the tool is made. For efficient operations of the machine, the proper surface speed of the work being machined must be maintained. If the speed is too slow, the jobs take more time than necessary and on the other hand, if the speed is too great, the cutting edge will be worn down too rapidly.

Cutting tools used for longitudinal turning are subdivided into roughing tools and finishing tools. Roughing tools are applied for roughing or removing the excessive metal from the work. Such tools are usually carbide-tipped and they have a long cutting edge.

Finishing tools are used after the work has been turned with a roughing tool to give accurate size and clean surface to the work being machined. Before starting the cutting operation tools should be clamped in the tool-holder by means of two or more bolts.

Notes and commentary:

1. effective cutting edge - робоча ріжуча кромка
2. single - point cutting tool - різець з дуже тонкою ріжучою кромкою
3. multiple - point tool - різець з декількома ріжучими кромками
4. roughing tools - чорнові різці
5. rake - нахил, кут нахилу, передній кут різця
6. clearance - зазор; просвіт, допуск
7. clearance angle - задній кут

Task 1. Answer the following questions:

1. What is the cutting tool used for?
2. What are cutting tools made of?
3. What kind of work do cutting tools perform?
4. What parts does a cutting tool consist of?
5. What are finishing tools used for?

Task 2. Translate the following sentences:

1. Різці виготовляються із загартованої сталі.
2. Ріжучі інструменти використовуються для зняття металу з деталі.
3. Кожен різець складається з хвостовика і ріжучої кромки.
4. Різні типи різців відрізняються формою і кутом, під яким заточена поверхня різця.
5. Для ефективної роботи верстата повинна підтримуватися відповідна швидкість обробки.

Task 3. Use the following words and phrases in sentences of your own:

turning tool, roughing tools, cutting edge, shank, accurate size, finishing operations, tool-holder, by means of, surface, to machine.

HYDRAULIC SYSTEMS

The simplest hydraulic system is perhaps the hydraulic shock absorber which consists of a pump (piston) and resistance. Another elementary type of system is the hydraulic weighing machine, which consists of a non-continuous pump element (piston or diaphragm) and a pressure gauge.

Other elementary systems consist of a jack, transmission line, and a pump of the non-continuous type without control gear, although valves may still be present for secondary purposes. Systems of this type are used for remote transmission of manual or pedal effort or motion, or for remote transmission of instrument indication. The simplest best known system of this type is the hydraulic brake.

The basic elements of hydraulic systems are: the fluid, the generator element (pump), the transmission element (pipes and connections), the control element (valve or restrictor), the motor element (jack or continuous motor), tank and filter.

The most elementary form of pump can only function as a pump while the piston is moving into the cylinder and acts as a motor while the piston moves back. If non-return valves are added, the inlet valve is connected to a tank and the piston is given a to-and-fro motion, the device becomes a source of continuous supply of liquid, except for interruptions during the suction stroke, which can be avoided by having two or more cylinder and pistons. Thus we obtain a continuous pump.

Notes and commentary:

1. non-return valve - зворотний клапан
2. to-and-fro motion - зворотно-поступальний рух
3. pressure gauge - манометр
4. remote transmission - дистанційна (на відстані) передача
5. manual or pedal effort - ручного або ногового підсилення

Task 1. Answer the following questions:

1. What are the basic elements of hydraulic systems?
2. What is the simplest hydraulic system?
3. What does the hydraulic weighing machine consist of?
4. How can you describe the hydraulic brake?

Task 2. Make up questions to the underlined words:

1. The low-pressure oil for the controlling hydraulic mechanisms is supplied by the additional gear pump.
2. Electrically remote-controlled hydraulic system with a pump and rotary motor operates the feed and rapid traverse of a milling machine.
3. The variable delivery piston pump with axial pistons is intended for controlling the speed of the constant delivery hydraulic motor.
4. With a constant delivery pump the discharge is controlled by throttling the flow.
5. In circuit with variable delivery pumps the cutting speed and the rate of feed can be regulated by reducing or increasing the flow of the fluid.

TUBING, TUBE CONNECTORS AND FLEXIBLE HOSE

The various units of a hydraulic system are connected with some form of tubing or flexible hose. Tubes are joined by means of tube connectors, usually of the same material.

Some of the factors governing the selection of tubing are corrosion, temperature, weight, mechanical strains, abuse, and pressures. Because of its light weight, aluminum-alloy tubing and fittings are used wherever possible.

Fittings are designed to withstand the bursting pressure that the tube of maximum wall thickness will withstand, assuming that the tube and fittings are of similar materials. For general high pressure installations steel tubes and fittings are recommended. Flexible hose is used to connect hydraulic units between stationary and moving parts. Hoses are made up of varying layers of synthetic rubber, fabric, and wire braid. In installing hoses care must be taken that the hose is free from twists. Under pressure a twist will rotate the hose and loosen the connection, causing failure.

Notes and commentary:

1. tubing - труби
2. flexible hose - гнучкий шланг
3. joined by means of - з'єднані за допомогою
4. the factors governing the selection - чинники, що визначають вибір
5. whenever possible - де тільки можливо
6. the bursting pressure - розривний тиск
7. assuming that - беручи до уваги
8. stationary and moving parts - нерухомі й рухомі частини
9. are made up of - зроблені з
10. In installing flexible hose a care must be taken that the hose is free from

twist - При установці гнучкого шланга слід вжити заходи проти скручування шлангу

Task 1. Answer the following questions:

1. How are the various units of a hydraulic system connected?
2. What are the factors governing the selection of tubing?
3. What are fittings designed for?
4. What is the use of flexible hoses?
5. What are hoses made up of?

Task 2. Translate the following sentences paying attention to Passive Constructions, Gerund and Participle:

1. Strength of metals is the property of hard materials to be subjected to

2. the influence of external forces without changing their shape.
3. The ability of a material to take deformation without breaking is known as plasticity.
4. By testing a metal one can define its mechanical properties.
5. This bar is subjected to the action of two sets of external forces.
6. Cutting tools are made of carbon steel.
7. The distance that the tool is set into the work for cutting operations is referred to as the depth of cut
8. Different kinds of cutting tools are used for metal-cutting processes depending upon the kind of metal being cut.

PLANER, SLOTTER & SHAPER

Planers are essentially used for machining plane surfaces which are larger than can be cut or reached on the shaper. The modern planer with modern electric controls has a high output

The planer has a reciprocating table which travels beneath a cross bar on which the tool heads are mounted. Normally one or two tool heads are mounted on the cross bar, but additional tools, generally for cutting vertical faces, may be mounted on the columns supporting the cross bar. The usual design comprises two vertical columns between which the table reciprocates. The cross bar is so mounted that it can slide vertically on these columns. All motions for feed or cut take place either by dropping the cross bar, moving the tool head across the cross bar, or lowering the tool holder mounted on the tool head. The first two of these motions are generally power or hand-operated but the last is often hand-operated only.

The table is normally operated by some form of rack-and-pinion or spiral drive. Modern high-speed planers are now fully electrified. The slotting machine may be looked upon as a vertical shaping machine. It machines the internal surfaces of a casting or forging and can do circular work by virtue of its pivoted table. Originally slotters were used for cutting keyways, machining the square holes in such parts as dog clutches and they are still used for this work in small shops.

The work table is usually circular and provided with T-slots for clamping the work. It is mounted on two horizontal slides at right angles to each other and can be moved with either hand or intermittent automatic feed in either direction along them.

It can also be rotated in the horizontal plane about its axis in either direction by hand or automatically. Slotters are usually provided with three or four speeds, obtained either by cone pulley or gear-box.

A shaper is a machine that forms surfaces by successive reciprocating cuts of a tool over the work. The work is stationary with reference to the tool but moves laterally in small steps so that the successive cuts can be made. Although most of the work performed on shapers consists of plane horizontal surfaces, it is also possible to finish vertical and angular surfaces, and, with the proper tools and accessories even curved surfaces may be machined.

The size of a shaper is determined by the longest stroke of the ram. Shapers are driven by belt from a countershaft, by direct connected motor, or by hydraulic power.

Notes and commentary:

1. planer - поздовжньо-стругальний верстат
2. plane surface - плоска поверхня
3. high output - висока продуктивність
4. reciprocating table - стіл, що рухається назад і вперед
5. cross bar - поперечина
6. tool heads - інструментальні головки
7. motions for feed or cut take place - рухи для подачі або обробки ріжучим інструментом відбуваються
8. rack-and-pinion drive - зубчато-рейковий привід
9. spiral drive - привід гвинтовими колесами
10. may be looked upon - може розглядатися
11. by virtue of its pivoted table - завдяки повороту стола на осі
12. cutting keyways - прорізання шпонкових канавок (пазів)
13. dog clutch - кулачкова муфта
14. T-slots for clamping the work - T-подібні пази для затискання деталі
15. in either direction - у будь-якому напрямі
16. in the horizontal plane about its axis - у горизонтальній площині навколо своєї осі
17. cone pulley - ступінчастий шків
18. by successive reciprocating cuts of a tool over the work – послідовним зворотно-поступальним зняттям металу ріжучим інструментом, що переміщується над деталлю
19. in small steps - малими подачами
20. plane horizontal surfaces - плоскі горизонтальні поверхні

Task 1. Make the following sentences refer to the past and future:

1. Some lathes can do over two hundred various operations.
2. The energy of water is converted into mechanical energy.
3. We must cut different metals at different speeds.
4. We can harden high carbon steel by heating it to a certain temperature and then quickly cooling in water.
5. This steel must be used for automobile parts such as gears, and

Task 2. Put questions to each part of the following sentences:

1. Drilling apparatus and techniques have undergone wide improvements.
2. Various methods have also been applied to collect supplementary information.

GENERAL DESCRIPTION OF LATHES

A lathe is a machine tool for producing and finishing surfaces of work- pieces. The machine is designed to hold and revolve a work around an axis of rotation so that it may be subjected to the action of a cutting tool moving in a horizontal plane through the axis of the work. When the cutting tool moves in a longitudinal direction or parallel to the axis, the operation is known as "turning"; when it moves in a transverse direction, it is known as "facing". In addition to turning and boring, which the machine is designed for, many other operations, such as drilling, threading, tapping, and by employing special adapters grinding and milling, may be performed on a lathe.

Modern lathes are highly efficient, accurate and complex devices, capable of doing a great quantity and variety of work. Lathes are made in a wide variety of types and sizes, from the small precision lathe found in watch repair shops to the immense machine.

The lathe consists essentially of a bed, headstock, tailstock and saddle.

The Bed. The main casting of the lathe is called the bed, and usually consists of a good quality grey iron casting of rigid design. It is provided with accurately machined ways, on which slides the saddle and the tailstock, and on which the headstock is located and bolted. The ways may be flat or of inverted V-type. Various lugs and brackets are integral with the casting for the mounting of other parts as required on the machine.

The headstock is located true with the ways and bolted rigidly to the bed at the left-hand end. It carries the lathe spindle and back gearbox if the lathe is of the all-g geared head type. The

spindle is mounted in two large plain bearings, capable of adjustment, and provided with thrust washers to prevent end play. The nose of the spindle is provided with an external thread and register for attaching a face plate or a chuck back plate and a taper bore for the insertion of a centre. On the other end is mounted a gear to drive a train of wheels for driving the screw and the feed shaft.

The tailstock consists of a casting fitted to the bed and capable of being firmly clapped to it at any position along its length. The casting is bored for a sliding sleeve which is moved axially by a hand-wheel at the right-hand end.

The saddle consists of a casting designed to carry the tool post slide or slides, and is fitted to the ways of the bed so that it may slide along it without lateral movement. The front of this casting, called the apron, carries the gearing and controls for traversing the saddle towards and away from the headstock. The cross slide is mounted on the top of the saddle and must be at right angles to the bed.

On the cross slide is mounted the tool slide. There are four main types of headstocks, which are classified by the method of power application. They are the step-cone head, the geared head, the built-in motor-drive head, and the foil hydraulic-drive head.

The step-cone type of lathe is driven by a belt from an overhead countershaft, which has a step-cone pulley corresponding to the step cone on the lathe. A geared-head lathe is driven by a constant-speed motor usually located in the base of the lathe, or it may be driven by belt on a single pulley. A direct motor-drive geared head has the motor built directly into the headstock.

A recent design of lathes uses a variable-speed hydraulic motor as a source of power. The motor is belted to the head by means of V-belts. The hydraulic motor has a speed variation from zero to maximum speed by an infinite number of steps. Any working speed can be obtained by merely turning a dial that regulates the hydraulic motor.

Notes and commentary:

1. modern lathes - сучасні токарні верстата
2. accurate and complex devices - точні та складні прилади
3. precision lathe - прецизійний токарний верстат (для точної обробки)
4. main casting of lathe is called a bed - основний каркас токарного верстата називається станиною
5. accurately machined ways - точно оброблені напрямні верстата
6. on which slide the saddle and the tailstock - по яких рухаються полозки та задня бабка
7. of inverted v-type - форма перевернутої літери V, клиноподібний

8. are integral with the casting - зроблені відповідно до станини
9. is located true with the ways - розміщується паралельно до напрямних
10. at the left-hand end - з лівого краю
11. all geared head type - токарний верстат із передньою бабкою з одношківним приводом та коробкою швидкостей
12. the lathe spindle - шпindel токарного верстату
13. plain bearings - підшипники (вальниці) без вкладиша
14. thrust washers - опорні шайби
15. to prevent end play - запобігти подовжньому люфту
16. external thread - зовнішня різьба
17. face plate - планшайба
18. chuck back plate - диск універсальної планшайби
19. taper bore - конусне розточування
20. to drive a train of wheels - приводити в рух систему колес
21. lead screw - ходовий гвинт
22. feed shaft - вал подачі
23. firmly clamped to it - міцно прикріплений до нього
24. at any position along its length - у будь-якому місці вздовж всієї її довжини
25. sliding sleeve - ковзаюча втулка, висувна піноль
26. to cap the tool post slide - переміщувати полозки, що тримають різець
27. lateral movement - поперечний рух
28. towards and away from the headstock — у напрямку передньої бабки та назад
29. step-cone head - передня бабка зі ступінчатим приводом
30. geared-head - передня бабка з постійною швидкістю ременя та коробкою швидкостей
31. built-in motor drive head - передня бабка з вмонтованим мотором
32. single-pulley - одношківний
33. V-belts - клинові ремені
34. infinite number of steps - нескінченна кількість ступенів
35. by merely turning a dial - простим поворотом шкали
36. turning - обробка на токарному верстаті
37. facing - обробка (обточка) торцівки
38. boring - розточка, висверлювання, розсверлювання
39. drilling - сверління
40. threading - нарізування різьби мітчиком

41. tapping - нарізання різьби
42. grinding - шліфування
43. mil ling - фрезування
44. bench-lathe - верстат
45. turret lathe - револьверний верстат

Task 1. Answer the following questions:

1. What is a lathe? What is the lathe designed for?
2. What is facing?
3. What operation is known as turning?
4. What kind of operations can lathes perform?
5. How are lathes classified?

Task 2. Find in the text English equivalents for the following words and word combinations:

горизонтальна площина, вісь обертання, нарізування різьби, шліфування, свердлення, конструкційні особливості, деталь обробки, верстак, розточування, в поперечному напрямі, точність, револьверний верстат, обробка (обточування) торцівки.

Task 3. Translate the following sentences paying attention to the Participle Constructions:

1. A lathe being a machine tool, it can perform different operations.
2. Numerous experiments having been carried out, the design of the new grinding wheels was approved.
3. Clutch constructions being based on the positive-action and friction principles, couplings are made in two main types: rigid and flexible.
4. The automatic lathe being designed by a group of young engineers works with great precision.
5. Moving with great speed the motor is heated.

DRILLS AND DRILLING

Drilling is one of the cutting operations producing cylindrical holes of different diameter in solid material by means of rotating tools called drills.

The most common type of drill in use is the twist drill. Twist drills are made with two, three or four spiral grooves or flutes milled from the solid. These grooves or flutes winding around the body of the drill serve for forming the cutting edges of the drill, as well as for removing the chips formed in drilling from the hole. The twist drill comprises three principal parts: body, shank and pointy. The twist drill has 2 cutting edges known as "lips". These cutting edges, or lips, are connected by a third edge called "web". It is this part that gives rigidity and strength to the drill. When in use the first two cutting edges remove the material from the work, while the third one penetrates into the material by rubbing rather than cutting.

In order to drill holes in a material the cutting edges of a drill should be correctly ground to a certain angle. Drills have shanks of various types, the most commonly used being those having straight and tapered shanks. The shank of the drill serves for clamping the drill either in the chuck spindle or socket of a drilling machine. The above part of the drill may be either of a cylindrical shape, like in straight shank drills, or of tapered shape like in tapered shank drills.

The third part of the drill is called "a drill point". It is always ground to a cutting angle varying with the kind of material to be drilled. For hard materials this cutting angle equals 140° and for soft materials it equals 90°. The cutting edges of flat drills used for drilling holes in steel or in cast iron are ground to an angle of 100° to 120°. All the drills get worn while drilling and they should be re-ground from time to time.

Notes and commentary:

1. twist drill - гвинтове, спіральне свердло
2. groove - паз
3. flute - канавка, жолобок
4. shank - хвостовик
5. point - робочий кінець різця
6. lip - ріжуча кромка різця, свердла
7. web - сердечник
8. tapered - калічний
9. socket, chuck - зажимний патрон, муфта

Task 1. Answer the following questions:

1. What is drilling?
2. By means of what tools is drilling performed?
3. Which is the most widely used tool for drilling?
4. What are the principal parts of a twist drill?

5. What are cutting edges of a twist drill called?
6. What part of the twist drill gives it rigidity and strength?

Task 2. Analyze different meanings of ing- forms and translate the following sentences Into Ukrainian:

1. Drilling means removing some metal from the work.
2. A drilling machine is the most important machine for drilling holes of different size in metal.
3. Boring can be performed on drilling machines.
4. A boring machine can not be used at speeds exceeding permissible one.
5. Milling machines are used for milling operations.
6. Milling is the process of removing material from work with a multitoothed rotating cutter.
7. The horizontal plain milling machine has a horizontal spindle rotating in anti-friction bearings in the column.
8. Cutting speeds on the milling machine depends upon the nature of the work, the type of cutler, the condition of the machine and the experience of the operator.
9. A semi-automatic, vertical boring machine is designed to facilitate the machining of heavy components such as railway wagon wheels.

Task 3. Find in the text sentences with the Participle Constructions and translate them into Ukrainian.

TYPES OF DRILLING MACHINES

Drilling machines which are used mainly for drilling holes in machine parts are made in many different types designed for handling the various classes of work.

The upright drilling machine is the type most commonly used, and the name applied to this class indicates that the general design of the machine is vertical, and also that the drill spindle is in a vertical position.

The radial drilling machine. The main advantage of a radial machine is that the drill can be moved over the work to any desired position, so that a large number of holes can be drilled in the work without moving it

Gang Drills. When a number of single-spindle drilling machine columns are placed side by side on a common base and have a common work table, the machine is known as a gang drill. Each spindle is independently controlled as to speed and feed so that a number of operations may be

performed in succession and simultaneously upon the machine. In this machine work is moved progressively from one spindle to the next.

Drills and drilling machines are used to a greater extent than any other tools. Drilled holes are usually finished by reaming, broaching, grinding, or tapping. The drill seldom being dependent upon for the finished hole. But drilled holes can be much more accurate than is usually the case if sufficient attention is given to the grinding of the drill, to the accuracy of the drill spindle and chuck and to the drilling fixture.

Both the material to be drilled and the nature of the work should be considered in selecting the drill and the machine to be used.

While for most work the regular two-lipped twist drill will be perfectly satisfactory, there are cases where the three- and four-lipped drill has advantage. The three- and four-lipped drills are usually used for enlarging bored holes in castings and work of this character.

Very small drills require extremely high speeds on account of both the work and the drill: held truly, in a well-balanced drilling spindle, even a small drill will stand up better than might be thought possible. Instead of bending and breaking, it seems to cut itself free, if the speed is high enough and the drill is sharp.

Keeping drills properly ground, so that both lips will cut an equal amount, and with right clearance, is not an easy matter. There are drill-grinding machines that do a good job and that should be used on larger drills if not on small ones.

A special kind of drilling which is used to a considerable extent in automotive shops is known as deep-hole drilling. The main problem is to get the chips out of the hole and to keep the drill cool. This requires a hollow drill and a heavy pressure of cutting fluid, usually oil, the pressure running up to 1.0001b. to the square inch in some cases.

Some deep-hole drilling is however being done successfully with long twist drills by what is known as intermittent or step feed. Here the drill feed is relieved at frequent intervals and the chips washed off as it is removed from the hole.

Drilling can generally be classed as a roughing operation, the holes being usually finished by reaming, boring or grinding. Drills can be made to cut very close to size if sufficient care is taken to have the drill point ground correctly, both as to angle and length of each cutting lip. If this is not done, the hole will be larger, than the drill unless the material is such that it closes around the hole after the drill is withdrawn, as is the tendency in some plastic materials. The concentricity of the

drill spindle and chuck and the decreasing drill diameter from the drill point back to the shank affect very accurate drilling.

Drilling is one of the most essential operations and enters into the machining of nearly every part of the machine. It is frequently one of the first operations performed, although holes are drilled at any stage of process, depending on the design of the piece and the routing of the work.

Notes and commentary:

1. drilling machines - свердлильні верстати
2. machine parts - деталі станків
3. for handling the various classes of work - для виконання різноманітних видів робіт
4. upright drilling machine - вертикальний свердлильний верстат
5. radial drilling machine - радіально-свердлильний верстат
6. sensitive drill - швидкохідний свердлильний станок с ручної подачею
7. delicate work - дрібна деталь
8. side by side on a common base - поруч, на загальній основі
9. as to speed end feed so that - що стосується швидкості та подачі то
10. upon a machine - на станку
11. reaming - зенківка
12. broaching - протяжка
13. carbon drill - вуглецеве свердло
14. the idle time of the machine - холостий хід машини
15. three- and four-lipped drills - трьох- та чотирьох-фланцеві свердла
16. castings - виливок
17. hollow drill - розточувальне свердло
18. twist drills - кручені свердла
19. step feed - ступенева подача
20. cutting lip - ріжучий фланець

Task 1. Answer the following questions:

1. When are drills and drilling machines used?
2. How are drilled holes usually finished?
3. What should be considered in selecting the drill and the machine to be used?
4. When are the three- and four-lipped drills usually used?
5. What is deep-hole drilling done successfully with?

6. How can drilling be classed?
7. By what operations are holes usually finished?
8. Is drilling one of the most essential operations?

Task 2. Find in the text English equivalents for the following words and word combinations:

свердла, свердлильний верстат, зенкувати, протяжка, шліфування, розточувальне свердло, кручене свердло, холостий хід машини, затискний патрон, хвостовик.

Task 3. Translate the following sentences paying attention to the Participle and Participle Construction:

1. Drilled holes are usually finished by reaming, broaching, grinding, or tapping, the drill seldom being dependent upon for the finished hole.
2. But drilled holes can be much more accurate than is usually the case if sufficient attention is given to the grinding of the drill, to the accuracy of the drill spindle and chuck and to the drilling fixture.
3. Keeping drills properly ground, so that both lips will cut an equal amount, and with right clearance, is not an easy matter.
4. This requires a hollow drill and a heavy pressure of cutting fluid, usually oil, the pressure running up to 1.000 lb. to the square inch in some cases.
5. Drilling can generally be classed as a roughing operation, the holes being usually finished by reaming, boring or grinding.
6. It is frequently one of the first operations performed, although holes are drilled at any stage of process, depending on the design of the piece and the routing of the work.

DRILL GRINDING MACHINE

The grinding machine has a reciprocating wheel, the face of which provides for grinding the conventional cutting edges. Point thinning to provide a drill which has an improved self-centring action, especially during starting, may then be performed with the aid of the attachment seen at the right. Drills sharpened in this manner are claimed to be suitable for use on numerically-controlled machines without guide bushes.

Provision is made for semi- or fully-automatic sharpening of the main cutting edges in the left-hand position, with the drill held in locating and clamping elements with scales on which the required point angles can be set. The drill is then transferred to the right-hand side where it is

located in a somewhat similar manner, and can be fed towards the auxiliary grinding wheel under manual control. Provision is made for dressing the auxiliary wheel to a suitable profile to produce the relief angles required. Drills of 0.4 to 2.95 in. diameter, can be handled on the machine.

Notes and commentary:

1. reciprocating wheel - колесо із зворотно-поступальним рухом
2. self-centring - самоцентруюче
3. guide bush - напрямна втулка
4. clamping elements - зажимні пристрої
5. numerically-controlled machine - станок с числовим програмним керуванням
6. relief angle - задній кут

Task 1. Put 5 questions to the text and answer them.

Task 2. Retell the text using the following word combinations:

drill grinding machine reciprocating wheel, conventional cutting edges, point thinning, self-centering action of a drill, to sharpen a drill, guide bushes, semi- or fully-automatic sharpening, locating and clamping elements, auxiliary grinding wheel relief angles.

Task 3. Translate into Ukrainian paying attention to translation of Passive Constructions:

1. Machining is one type of mechanical working. When a metal or machine parts are machined they are subjected to the influence of external forces which are called "loads".
2. Many machines are used for working metals they are generally called "machine tools".
3. The lathe is used for turning different objects and engine parts.
4. Different working parts of a lathe are mounted on a frame.
5. A headstock is placed on the left hand part of the frame.
6. The cutting tool of the turning machine is fixed to the support which can be moved longitudinally as well as cross-wise.
7. The general-purpose power-driven testing machine is designed for elongation, squeeze, bending, close bend over static tests of metal and other samples.
8. The hydraulic press is designed for squeeze, cross-bending due to axial compression static tests of metal samples, parts, units, constructions.
9. Drilling holes of various diameters is performed with the help of drilling machine.
10. Milling machines are referred to as machines of high efficiency; that is why in working flat surfaces in many cases they take the place of planing and shaping machines.

BORING MACHINES

This group includes universal horizontal boring and milling machines, jig-borers, fine boring machines and unit-type multispindle machines as well as boring machines and various specialized machines.

In recent years, the basic trends in boring machines is to have more powerful drives, to enable milling to be done as well as boring. They have rigid beds, uprights and spindle units which are vibration-proof during heavy duty milling work. They have various accessories and attachments such as indexing tables and copying devices.

The use of d.c. motors with easy control over a wide speed range makes it possible to change the feed rate during cutting and to simplify the machine. The adjustable main drive enables the optimum speed to be selected during machining according to the conditions.

A suspended control panel with devices for visually checking the co- ordinate enables the operator to control the machine from any place convenient during the work process.

The increased accuracy of horizontal boring machines has come about by including in their design the features of precision jig-borers and by improvements which have made conventional machines more accurate; high- precision measuring scales and optical devices, a reduction in temperature distortions, especially the displacement of the spindle shaft during machining, and greater smoothness in slow movements.

Universal small and medium-sized boring machines are built with a fixed upright, while the large machines have an upright traveling longitudinally. In extra-heavy machines the upright travels both longitudinally and transversely.

Notes and commentary:

1. jig-borer - розточувальний верстат
2. rigid bed - стійка станина
3. indexing table — стіл, що періодично повертається
4. feed rate - швидкість подачі
5. conventional machine - машини звичайного типу, серійні
6. spindle shaft - вал шпинделя
7. accessories - пристосування

Task 1. Answer the following questions:

1. What is a boring machine?

2. What does the use of direct current motors make it possible?
3. What does the adjustable main drive enable?
4. With what are small and medium-sized boring machines built?
5. How does an extra-heavy machine travel?

Task 2. Find in the text English equivalents for the following words and word combinations:

горизонтальний розточувальний верстат, фрезерний верстат, багатошпіндельний верстат, привід, стійка станина, стійка, пристосування, шкала вимірювання.

MILLING MACHINES

Milling is the process of removing metal with rotating cutters. The essential features of most milling machines are a power-driven table on which the work is done, and a spindle carrying one or more multiple-toothed cutters, slots or grooves.

The horizontal milling machine consists of a main casting in which is mounted the Spindle and its gear drive, and the feed gearbox. On the front of this casting is this vertical V-guide on which is mounted the knee. The knee is raised or lowered by a telescopic jack screw. A saddle slides from front to back on V- guides on the top of the knee. The work table is mounted in V-guides on the saddle. The table is provided with movement in two directions at right angles to each other in the horizontal plane, and with vertical movement relative to the cutter, whose height is permanently fixed. The cutter is mounted on an arbor, and held in the desired position by spacing washers and a locking nut.

The type of a cutter mainly used on the horizontal miller is what is known as a side and face cutter, that is a cutter provided with cutting edges on both sides and on periphery. For large surfaces, roller milling cutters are used, having cutting edges in the form of helix about the axis of rotation.

Notes and commentary:

1. milling machines - фрезерні станки
2. rotating cutters - фрези, що обертаються
3. power-driven table - столик з механічним приводом

4. multiple-toothed cutters - багатозубчасті фрези
5. gear drive - шестерний привід
6. feed gear-box - зубчаста коробка передач
7. V-guide - V-подібна напрямна
8. jack screw - домкратний гвинт
9. on the top of the knee - зверху кронштейна
10. relative to - відносно
11. is permanently fixed - постійно закріплений
12. is mounted on an arbor - змонтований на шпинделі
13. spacing washers and a locking nut - шайби розпорів та затисні гайки
14. side and face cutter - бокова та лобова фреза
15. cutting edges on both sides and on periphery - ріжучі кромки з боків та на периферії
16. in the form of helix about the axis of rotation - у формі спіралі за віссю обертання

Task 1. Find and translate Passive Constructions in the text.

Task 2. Translate from English into Ukrainian paying attention to Passive Constructions:

1. The cutting tool of the turning machine is fixed to the support which can be moved longitudinally as well as cross-wise.
2. The hydraulic press is designed for squeeze, cross-bending and bending due to axial compression of static tests of metal samples, parts, units, constructions.
3. Machining is one type of mechanical working. When a metal or machine parts are machined they are subjected to the influence of external forces which are called "loads".
4. Many machines are used for working metals; they are generally called "machine- tools".
5. The lathe is used for turning different objects and engine parts.
6. Different working parts of a lathe are mounted on a frame.
7. Drilling holes of various diameters are performed with the help of drilling machines.
8. Milling machines are referred to as machines of high efficiency.

SPECIAL AUTOMATIC SLOT MILLING MACHINE

A series of machines are designed for slot milling operations on parts of circular shape that are incorporated in automatic knitting machines, and each is provided with two self-containing milling units, one for vertical and one for horizontal operation, which can function either separately

or simultaneously. A heavy steel frame carries the columns for the milling units, also the table, which has an electrically driven indexing mechanism. Each of the milling units incorporates 0.5 h.p. motor and drive is transmitted to the spindle through worm gearing. There is a choice of spindle speed of 300 - 420 or 580 r.p.m. Feeds which are applied hydraulically are varied from 1 to 10 in.per min. with rapid traverse at 72 in. per min.

Cylinders from 20 to 40 in. in diameter can be mounted on the 28 in. table. The machine will cut 240 to 2400 equally spaced slots with widths of 0.016 to 0.40 in. and depth of 0.375 in. Accuracy is said to be as high as 20 sec. total error, representing about 0.0015 in. on a circle of 30 in. diameter. The number of slots required is cut in a fully automatic cycle, and safety arrangements interrupt the operation in the event of saw breakage, or incorrect indexing. All solenoid valves for the hydraulic system are centralized in a monoblock unit. The electric control system for the machine is used.

Notes and commentary:

1. circular shape - кругла форма, круглий
2. knitting machine - вязальна машина
3. frame - рама
4. safety arrangement — захисний пристрій
5. breakage - поломка
6. valve - клапан, золотник

Task 1. Answer the following questions:

1. What is an automatic slot milling machine designed for?
2. What are the main parts of this machine?
3. How is drive transmitted to the spindle?
4. What is the speed of a spindle?
5. How many slots can the machine cut and what is their width and depth?

Task 2. Find in the text English equivalents for the following words and word combinations:

форма, вмонтувати, одночасно, рама, що приводиться в рух за допомогою електрики, черв'ячна передача, подача, канавка, вузол.

Task 3. Translate the following sentences into Ukrainian:

1. This machine is known to cut the number of slots in a fully automatic cycle.
2. Each of the milling units is considered to incorporate a 0.5 h.p. motor.

3. The machine is supposed to cut 240 to 2400 equally spaced slots.
4. Accuracy is said to be as high as 20 sec.
5. The electric control system for the machine is said to be improved.

ANNEX 1

Reading Techniques

Skimming is a technique suitable for scientific texts as well as for general texts. This is defined as the search of main ideas using only the first and last paragraphs to obtain a general view of the text. When you are working with scientific texts applying this technique can be easier since this type of literature usually contains topic headings, abstracts or summaries that might come in handy for the reader. Another advantage of a scientific text is that they are usually written in block of information grouped in paragraphs. In this case the best alternative is to read the first sentence of each paragraph. It is important to note that this technique is used not as a short cut to reading the whole text. It does not mean that you can simply read the first and last paragraphs and that you can understand everything. This technique is used to help you get an idea of what you are about to read. Skimming is like having a map before entering a city. It is less likely that you get lost if you have previous information.

Scanning. When students face a new text they tend to read word by word. This way of reading affects the general understanding of the passage and the time taken to finish the reading can be too long for the final results. The students can end up reading every word very well but in the long run the idea of what they have read is lost. To avoid this loss of time and effort a reader can use Scanning to help him or her. Scanning consists on running your eyes down the text, searching for important or key words, as well as the most outstanding facts. Scanning can be a preliminary step in reading because with it you can locate new terms, look them up in a dictionary or a glossary and save time when you actually begin to read. The process of Scanning can not take more than a couple of minutes. After that you must decide which terms are the most important and which part of the reading deserves more attention. Do not forget that this is only a comprehension technique designed to help you get into the reading, in order to interpret the authors intentions and ideas it is important to read the whole text and the analysis of it must be done with a little bit more detail.

Using Context. Most of the times we are faced with reading something just then, at that precise moment. In the real world you can not be too prepared to read a text. In many cases you simply do not have the time to use a dictionary or to apply a given technique. It is only you and the text. This is when understanding context can come in handy. Context can be defined as the elements

that surround a term and help clarify its meaning. The first thing to do when taking advantage of context is recognizing the grammatical category of the word we are trying to understand or define. Is it an adverb, an adjective, a verb or a noun? English grammar can give us some tips to know exactly what kind of word we are dealing with, for example:

- If the word ends in *ly* and is located after a verb it is likely that you have an adverb.
- If the word is before a noun and is not pluralized it can be an adjective.
- If the word is after a personal pronoun or a noun it might be a verb.
- If the word has a definite or indefinite article or it is pluralized it is possible to be a noun.

Writing Techniques

The Paragraph. A paragraph is a basic unit of organization in writing in which a group of sentences develops one main idea. The number of sentences a paragraph contains is not important. It can be as short as one sentence or as long as nine sentences, the most important thing is that the idea stated at the beginning is clearly developed.

Parts of a Paragraph. Three essential parts compose any paragraph: a topic sentence, supporting sentences and a concluding sentence.

1. **Topic Sentence:** it states the main idea of the paragraph. It contains the name of the topic that is to be carried out. This sentence has to be precise, but avoid telling everything in the first sentence or your reader will lose interest. The topic sentence serves to limit the topic to one or two areas that will be discussed entirely in the space of one paragraph. The area is what we call the controlling idea.
2. **Supporting Sentences:** they come after the topic sentence, making up the body of a paragraph, they help develop the topic sentence. It means that these sentences explain the topic by giving reasons, examples, facts, statistics, and quotations.
3. **Closing Sentences:** it's the last sentence in a paragraph, it indicates that the paragraph is ending and sums up important points to remember or reprises the main idea. You write it restating the main idea of a paragraph but using different words.

In addition to the three parts of a paragraph, a good paragraph also needs two important elements: unity and coherence. **Unity:** it means that in your paragraph you discuss one and only one main idea which is stated in the topic sentence and then developed by supporting sentences. **Coherence:** it means that your paragraph is easy to read and understand because:

- Your supporting sentences are in logical order.
- Your ideas are connected by the use of appropriate transition signals.

How to Write an Essay. To define the essay briefly, one can say that it is a piece of writing usually short (3 to 10 pages), written in prose, and that may be on any subject. The essay is generally based on other people's statements. In the essay you can include your personal opinion, and some examples to illustrate your point of view. It is written about one topic, just as a paragraph is. However, the topic of an essay is too long and too complex to discuss it in one paragraph. Therefore, you must divide the topic into several paragraphs. In general, essays have three basic parts: introduction, body and conclusion.

The Introduction. It is the first section of your essay. This makes it extremely important, because first impressions are often lasting ones. It consists of two parts: a few general statements about your subject to attract your reader's attention, and a thesis statement, that states the specific subdivisions of topic and/or the "plan" of your paper. The introduction then, begins with remarks to interest people. As it progresses, it should present general ideas or facts to orient the reader. Then, it will narrow its focus, and move from general to specific facts smoothly and logically.

The body Paragraphs. They are the longest section of your essay. In a short essay there are usually three body paragraphs, each one considering in detail one aspect of the essay's controlling idea. This is called a three-point essay. At the beginning of each of your support paragraphs, there is a topic sentence that tells what the rest of your text is going to be about. This sentence should direct your readers back to the controlling idea and indicate which aspect of it you are going to discuss. Once you present your topic, you need details and facts to support it. It is not enough to state your position; your reader needs to be convinced that your point of view is valid and accurate. There is not any rule that determines how long a body paragraph should be. The more relevant detail you can bring in to support your topic sentence, the clearer your points will be.

The Conclusion. The ideas in this part must be consistent with the rest of your essay. In it, you should restate the controlling idea. This restatement is usually more effective when it is located at the beginning of the conclusion. It reminds your public about the major points you were trying to make, and it indicates your essay is about to end. Many writers like to end their conclusion with a final emphatic sentence. This strong closing statement will make your readers think about the implications of what you wrote. You do not introduce your points in your conclusion.

Transitional Signals can be compared to traffic signs. They are words that tell you to go forward, to turn, to slow down and to stop. Better said, they help the reader when you are giving a similar idea, an opposite idea, an example, a result, or a conclusion. As a writer it is important to use these types of words to help you follow your ideas coherently.

Types of Transitional Signals. Transition words can be classified taking into account the type of help they might offer a writer. They can be classified in the following types:

1. *Words that Show Addition.* They aid the writer when he or she wants to present two or more ideas that continue along the same line of thought. Some common addition words are: and, also, another, in addition, moreover, first of all, second, third, furthermore, finally.
2. *Words that Show Time.* They indicate a time relationship. They tell us when a specific event took place in relation to another. Some of these words are: First, then, often, since, next, before, after, soon, as, now, until, previously, while, during, immediately, frequently.

3. *Words that Show Contrast*, They signal a change in the direction of the writer's thought. They tell us a new idea will be different in a significant way from the previous one. Some contrast words are: but, however, yet, although, in contrast, instead, still, in spite of, despite, on the other hand, on the contrary.

4. *Word that Show Comparison*. These words are used when a writer wants to point out a similarity between two subjects. They tell us that the previous idea is similar to the next one in some way. Some words that show comparison are: like, as, just like, just as, in like manner, equally, similarly, in a similar fashion, in the same way.

5. *Words that Show Illustration*. These words are used if you as a writer want to provide one of more examples to develop and clarify a given idea. They tell us that the second idea is an example of the first. Some illustration words are: for example, for instance, as an illustration, to illustrate, such as, to be specific, including.

6. *Words that Show Location*. Location transitions show a relationship in space. They tell us where something is in relation to something else. Some of these words can be: next to, in front of, in back of, below, between, inside, outside, opposite, on top of, across, beneath, in the middle of, on the other side, at the end of; ahead of, over, under, behind, near, far.

7. *Words that Show Cause and Effect*. These types of words are useful if an author wants to describe a result of something. They tell us what happened or will happen because something else happened. These type of words are: because, if... then, as a result, consequently, accordingly, therefore, since, so.

8. *Words that Summarize or Conclude*. These types of words are used when the idea that follows will sum up the entire writing or a final statement will be written as a conclusion. These words are: in summary, in conclusion, in short, all in all, in brief, in other words, on the whole, to conclude, to sum up.

Capitalization Rules. We use a capital letter in the following cases:

1. First words. Capitalize the first word of every sentence and of a quotation.
2. Personal Names. Capitalize the names of people including initials and titles of address, family words if they appear alone or followed by a name. (Let's go, Dad. Where's Grandma?). Capitalize names of God. (Allah, Jesus Christ). Do not capitalize family words with a possessive pronoun or article. (My uncle. An aunt)
3. Place Names. Capitalize the names of countries, states, provinces, cities, lakes rivers, islands, mountains (Mexico, the Amazon, Lake Ontario). do not capitalize the names of seasons (summer, spring, fall, winter)

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