UNCUYO
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FACULTAD DE INGENIERÍA

INGLÉS TÉCNICO

Arquitectura: *Inglés Técnico*
Ingeniería Civil*: Acreditación de Conocimientos de Inglés Técnico*
Ingeniería Industrial*: Inglés Técnico*
Ingeniería en Mecatrónica*: Inglés Técnico I*
Ingeniería de Petróleos*: Inglés Técnico como parte del trayecto de la Acreditación INGLÉS.*
Licenciatura en Ciencias de la Computación*: Comunicación Técnica II*

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LA FRASE NOMINAL - PRE Y POST MODIFICACIÓN DEL NÚCLEO

1						Charges		are	positive.
2	The					Charge		is	positive.
3	A					charge		is	positive.
4	This					charge		is	positive.
5	Those					charges		are	positive.
6	Its					charge		is	positive.
7	The device´s					charge		is	positive.
8		One				charge		is	positive.
9	The	second				charge		is	positive.
10		Both				charges		are	positive.
11		Each				charge		is	positive.
12		Another				charge		is	positive.
13		Several				charges		are	positive.
14	The		respective			charges		are	positive.
15	The	two	same			charges		are	positive.
16	The	two	main			charges		are	positive.
17	The		main	central		charges		are	positive.
18				Powerful		charges		are	positive.
19				Electric		charges		are	positive.
20	These	two	different	electric		charges		are	positive.
21	A		very important	electric		charge		is	positive.
22	An		extremely high	electric		charge		is	positive.
23	A		well distributed	electric		charge		is	positive.
24	The				capacitor	charge		is	positive.
25	The				pole	charge		is	positive.
26	The			existing		charge		is	positive.
27	The			electric		charge	in the capacitor	is	positive.
28	The					charge	to move the engine	is	positive.
29	The					charge	measured in the capacitor	is	positive.
30	The			electric		charge	for the capacitor	is	positive.
31	The					charge	requiring supervision	is	positive.
32	The					charge	which we incorporated	is	positive.
33	The					charge	that the device requires	is	positive.
34	The					charging	of the capacitor	is	crucial
35						Charging	the capacitor	is	crucial
36						To charge	the capacitor	Is	crucial
37	To charge the capacitor, follow the instructions.								

EL SUSTANTIVO, NÚCLEO DE LA FRASE NOMINAL

Sustantivos

Propios o comunes en singular o plural (personas, lugares, cosas, entidades abstractas, etc.)

Cuando se trata de generalizaciones, se debe proporcionar el artículo castellano en la traducción: ***el, la, los, las, lo,*** *dado que en inglés se generaliza sin artículo.*

Para su **búsqueda en el diccionario** *tener en cuenta lo siguiente:*

Plural con –s	day – days;	
Plural con –es	bru**sh** – brushes	
	ga**s** – gases	
	bo**x** – boxes	
Plural con –ies	countr**y** – countries	
	theor**y** – theories	
Plural con –ves	hal**f** – halves	
	kni**fe** – knives	
	Lea**f** – leaves	
Plurales irregulares	man – men	
	woman – women	
	foot – feet	
Plurales latinos o griegos	medium – media	
	stratum – strata	
	datum – data	
	phenomenon – phenomena	
	criterion – criteria	
	nucleus – nuclei	
	thesis – theses	
	analysis – analyses	
Plural igual al singular	sheep – sheep	
	Chinese – Chinese	
Plural con –oes	hero – heroes	(photo – photos)
	potato – potatoes	(radio – radios)
Singulares terminados en –s	news; Mathematics; Physics; Mechanics	
Plurales sin singular	pincers, pliers, tongs, stairs, means.	

Pronombres personales

I yo
You tú, ustedes.
He el
She ella
It el, ella, ello,
We nosotros
They ellos

1. **Engineers** must work hard.
2. **Computers** have changed the world. **They** are revolutionary.
3. **Oil** is a fuel
4. **Carbon** is an element. **It** is in nature.
5. **We** produce oil and gas
6. **He** designs software.

LOS PREMODIFICADORES DE LA FRASE NOMINAL

Artículos:
The: el, la, los, las, lo
A, **an**: un, una
*Traducir **antes** que el núcleo*

7. There is a plant that produces gas and oil.
8. The plant is in Mendoza.
9. Computers are electronic and digital.
10. The machinery is called hardware.
11. The instructions and data are called software.
12. A central processing unit is the heart of a computer.

Demostrativos:
This: este, esta, esto, éste, ésta.
These: estos, estas, éstos, éstas.
That: ese, esa, eso, aquel, aquella, aquello.
Those: esos, esas, aquellos, aquellas.
*Traducir **antes** que el núcleo.*

13. This book is about Civil Engineering.
14. These services are provided by technicians.

Posesivos: *Traducir **antes** que el núcleo*
My mi
Your tu
His su (de él)
Her su (de ella)
Its su (no de persona)
Our nuestro
Their su (de ellos)

Posesivos: *Traducir **después** del nucleo*
Smith´s de Smith (perteneciente a Smith)
Smith and Simpson´s de/perteneciente a Smith y Simpson.
Smith and Harris´ de/perteneciente a Smith y Harris.

15. **My** design has new features.
16. **Our** intention is to transmit knowledge.
17. **His** book was published in 1985.
18. **Maxwell's** Equations are in chapter 8.
19. **Peter Norton´s** book.
20. **PPG´s** Coatings will be quoted.
21. **Jones´** presentation was too long.

Numerativos y cuantificadores indefinidos

Some algo (de) un poco de, algunos, algunas, (**some + cantidad=** alrededor de)
Any cualquier, alguno,todo, ningun, algo
No nada de, ningún
Every todo, todos, cada, todos los
Each cada (uno), todo(s) cada cual,
Many muchos, numerosos
Several varios/as, diversos/as
All todos, completamente, la totalidad
Other otro, otra, otros, otras
Another otro/a, distinto/a
Much mucho, la mayor parte de, la mayoría
Few pocos / **a few** algunos
Little poco/ **a little** un poco
Either cada
Both ambos
Neither ninguno
*Traducir **antes** que el núcleo*

Numerativos y cuantificadores definidos

One, two, etc: uno, dos, etc.
One hundred: cien, etc.
Two thousand dos mil, etc.
First, second, third: primero, Segundo, tercero,
forth, fitfth, sixth … cuarto, quinto, sexto…

*Traducir **antes** que el núcleo*

22. The first edition appeared in 1985.
23. A few instructions appear in this chapter.
24. Each machine is similar to one in the book.
25. Many applications are included here.

Palabras que indican grados de fama, familiaridad, comparación

Same, el mismo, los mismos
Different, diferente, diferentes,
Various, distintos, variados
Other, otro, otros,
Whole, todo, la totalidad de
Respective, respectivo/s
Possible, posible, posibles
Obvious, obvio/s
Complete, todo
*Son adjetivos que en general se traducen **antes** que el núcleo, pero pueden ir **después** sin cambiar el significado.*

26. I am using the **same** devices.
27. The **possible** uses follow.
28. The **various** reasons are given.
29. The **other** problem is distance.
30. Computers have changed the **whole** world.
31. The **respective** alternatives are these ones.
32. The **other possible two** alternatives are these ones.
33. A **famous** book was mentioned.
34. The energy sector requires **new proposals**

Descriptores del núcleo sustantivo (adjetivos)

- *Indican cualidades de los sustantivos a los que preceden.*
- *Muchos se reconocen por su terminación (sufijos –al, -ory, -ant, -ive, etc.)*
- *No tienen forma plural en inglés. Debemos proporcionarla cuando el sustantivo núcleo esté en plural.*
- *Generalmente se traducen **después** del núcleo del grupo nominal.*
- *Pueden ser modificados por* **intensificadores del adjetivo: (adverbios): very**, muy, **extremelly**, extremadamente, **completely**, completamente, etc.
- *Cuando hay varios descriptores pueden estar separados por comas (no se usa "and" en la enumeración de adjetivos que preceden al sustantivo)*
- *A veces se trata de adjetivos compuestos unidos por un guión corto.*

35. **Important investments** are needed.
36. The energy sector requires **new proposals**
37. **A very practical perspective** is introduced here.
38. **These introductory remarks** are very clear.
39. **An extremely important function** is being explained.
40. **A well-structured** presentation.

Clasificadores del núcleo sustantivo (sustantivos o adjetivos)

- *Cumplen la función de clasificar al sustantivo núcleo dentro de alguna categoría, grupo o clase.*
- *Se traducen **después** del núcleo generalmente precedidos por la preposición* **de,** *o alguna otra preposición según sea adecuado para la frase en español si se trata de un sustantivo, y sin preposición se es un adjetivo.*
- *En el lenguaje técnico o científico son de uso obligado en taxonomías.*

41. Business services.
42. Pipeline management.
43. High pressure hoses and connectors
44. Compatibility certification.
45. Voice modulation patterns.
46. Turbine efficiency.
47. Petrochemic**al** plant.
48. Gas compression.
49. Arithmet**ic** operation.
50. Internal memory

LOS POSTMODIFICADORES DE LA FRASE NOMINAL

Frases preposicionales

- *Se traducen después del núcleo y de los premodificadores y también clasifican o cualifican al núcleo.*

Preposiciones		
About, acerca de, cerca de, alrededor de, aproximadamente	**Down to**: hasta (con sentido descendente)	**Per,** por (al mencionar una medida o una relación)**Round**, alrededor de, en
Above, por encima de	**during**, durante, mientras	**Since**, desde , a partir de
Across a través de, del otro lado de	**For:** para, (con sentido de intercambio) en, por	**Till**, hasta
After, después de, detrás de	**From**: desde	**Through**, a través de , durante, por medio de
Against, contra	**In**: en, dentro de, de	**To**: a, para, hacia, hasta
Along, a lo largo de	**Inside**, en el interior de	**Together**, junto
Among, entre	**Into,** adentro, hacia adentro	**Together with**, junto con
Around, en , alrededor de,	**Like,** como	**Under**, debajo de
At, en a	**Near:** cerca de	**Until,** hasta
Before, antes, frente a,	**Next to** junto a	**Up**, hacia arriba
behind, detrás	**Of,** de	**Up to:** hasta (con sentido ascendente)
below, por debajo de	**Off** desde, fuera de, lejos	**Upon**, sobre
Beside, al lado de, cerca de	**On,** sobre, encima de	**While**, mientras
Between, entre	**Opposite**, enfrente de	**With**, con
By, por, junto a, hacia, para	**Out**, fuera, afuera de	**Within,** dentro de
Down, debajo de	**Outside**, afuera	**Without**, sin
	Over, sobre, encima de	

51. The complexity of algorithms.
52. The correctness of algorithms.
53. Typical applications **of** refrigeration and gas compression.
54. Center **for** chemical process safety.
55. The evolution **of** high performance.
56. Origins and development **of** the Argentine Oil Industry.
57. Strategies **for** a rational use **of** energy **in** the industry.
58. University training **in** the work environment.

1. the machine	18. some mechanic**al** devices	34. great theories
2. the brick	19. a big industrial suburban area	35. thermal qualities
3. his computer	20. block construction	36. the customers´needs
4. these brushes	21. his deep clear scientific thought	37. plans for development
5. all faults	22.crack control	38. the atomic nuclei.
6. first stage	23. important useful information	39. mass communication
7. many engines	24. field tests	40. communication work
8. some materials	25. short construction time	41. a relatively small open area
9. other controls	26. Einstein´s theories	42. **the great inventor´s** original scientific discovery
10. three panels	27. tool boxes	43. wooden knives
11. organ**ic** compound	28. **his teacher`s** notes	44. wooden shelves
12. atom**ic** number	29. copper wire	45. two large, modern factories
13. new tools	30. **the scientists´**work	
14. light colour	31. information from outer space	
15. porous membrane	32. huge volume of data for future use	
16. good materials	33. Industrial wealth is important.	
17. good construction workers		

Fundamentals of Metallic Corrosion: Atmospheric and Media Corrosion of Metals

Marque el sustantivo núcleo y traduzca los siguientes ejemplos:

a- several organic chemicals
b- the earth´s curvature
c- a well-developed project
d- the greatest breakthrough
e- his academic career
f- a similar technique
g- the commercial applications
h- many highway bridges
i- several scientific societies
j- the increasing production potencial
k- a new bridge construction technology
l- the long-term existing environmental implications.
m- his contributions to the aerospace industry.
n- the linear static stress analysis
o- a leading international petroleum and petrochemical company
p- a sophisticated new electronic dealing system

1. Organizations and the Dynamics of the Environment
2. Interoperability Recipes: A Problem-Solution Approach
3. Unconventional Essays on the Nature of Mathematics
4. 3-D Structural Geology: A Practical Guide to Quantitative Surface and Subsurface Map Interpretation
5. 50 Years of Artificial Intelligence
6. 50 Years of EU Economic Dynamics: Integration, Financial Markets and Innovations
7. A Basic Course in Probability Theory
8. A Buyer's and User's Guide to Astronomical Telescopes and Binoculars
9. A Changing World: Challenges for Landscape Research
10. A Short Course in Quantum Information Theory: An Approach From Theoretical Physics
11. A Software-Defined GPS and Galileo Receiver: A Single-Frequency Approach
12. A Tester's Guide to .NET Programming
13. An Introduction to the Theory of Piezoelectricity
14. Bifurcations, Instabilities, Degradation in Geomechanics
15. Nanotechnology and Occupational Health
16. Tensor Algebra and Tensor Analysis for Engineers: With Applications to Continuum Mechanics
17. Thermal Decomposition of Solids and Melts: New Thermochemical Approach to the Mechanism, Kinetics and Methodology
18. Thermal Decomposition of Solids and Melts
19. *New Thermochemical Approach to the Mechanism, Kinetics and Methodology*
20. Metal Fatigue: What It Is, Why It Matters

LAS PARTES DE LA ORACIÓN

SUJETO: contiene una o más frases nominales núcleo: sustantivo (o pronombre)
PREDICADO: contiene: una o más frases verbales complementos del verbo circunstancias (frases preposicionales) núcleo: verbo

1.The testing of new cars	could cause	accidents	**in** the circuit	sometimes.
núcleo	núcleo			
Frase nominal	frase verbal	complemento del verbo	circunstancia de lugar.	circunstancia de tiempo
SUJETO	**PREDICADO**			

2. **At** low temperatures,	some objects	are	luminous.
	n	*n*	
circunstancia de condición o contingencia	frase nominal	verbo	complemento
PREDICADO	**SUJETO**	**PREDICADO**	

- **LOS COMPLEMENTOS,** *tradicionalmente llamados* ***Objeto directo***, ***Objeto indirecto*** *y* ***Complemento sujeto****, son palabras, o grupos de palabras que añaden detalles, limitan o complementan lo expresado por el verbo. A veces aparecen después del verbo solamente para complementar información sobre el sujeto ("luminous", después del verbo to be en el ejemplo* ***2.*** *agrega un atributo al sujeto "objects".)*
- *Se trata de* ***frases nominales*** *que siguen al verbo y cuyo núcleo es* ***un sustantivo****, o, en su defecto,* ***un adjetivo,*** *como en el ejemplo* ***2.*** *que se presenta más arriba. En el caso del ejemplo* ***1.*** *, el objeto del verbo "causar" es "accidentes" (esta palabra es un sustantivo)*
- *A veces la frase nominal del complemento ha sido reemplazada por un* ***pronombre objetivo:***

me	*(a mi, mi,)*	***us***	***(****a/nosotros, nos)*
you	*(te, ti,)*		
him, her	*(el, ella, se, si)*	***them***	***(****ellos, los, les)*
it	*(lo, la, le, a el/ella)*		

LOS ADJUNTOS CIRCUNSTANCIALES, *son palabras o grupos de palabras que identifican circunstancias que acompañan a la acción o estado indicado por el verbo (Ej.* ***1. 2****.)*

- *Las* ***CIRCUNSTANCIAS*** *indicadas pueden ser:*

a) de LUGAR (responden a la pregunta ¿dónde? ¿a qué distancia?)
b) *de TIEMPO (¿cuándo? ¿durante cuánto tiempo?)*
c) *de MODO (¿cómo? ¿como qué?)*
d) *de CANTIDAD (¿cuánto?)*
e) *de MEDIO O INSTRUMENTO (¿con qué)*
f) *de CAUSA (¿por qué)*
g) *de FIN (¿para qué?)*
h) *de COMPAÑIA (¿con quién? ¿quién más? ¿qué más?*
i) *de TEMA (¿sobre qué? ¿de qué?)*
j) *de ROL (¿a modo de qué? ¿como qué?)*
k) *de CONTINGENCIA o CONDICIÓN(¿bajo qué condiciones? ¿en caso de qué? ¿a pesar de qué? ¿a falta de qué?*
l) *de ÁNGULO o PUNTO DE VISTA (¿según quién? ¿de acuerdo con quién o qué?)*

- *Las palabras que constituyen los COMPLEMENTOS CIRCUNSTANCIALES son:*

  a) ***ADVERBIOS (****ayer, aquí, rápidamente* ***(AD VERBIO SIGNIFICA "QUE ACOMPAÑA AL VERBO")***

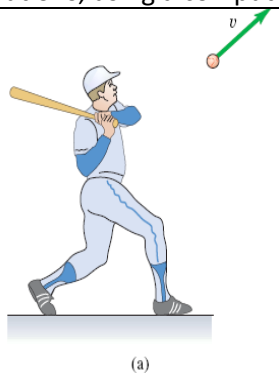
  b) ***GRUPOS PREPOSICIONALES*** *(una frase nominal introducida por una preposición. El conjunto tiene función adverbial) (****en*** *Mendoza,* ***con*** *María,* ***según*** *el profesor. Estas frase preposicionales pueden contener un pronombre objetivo reemplazando a la frase nominal:*

  mi/conmigo; ti, contigo, si, consigo, con/para el, con ella, con nosotros, con ellos

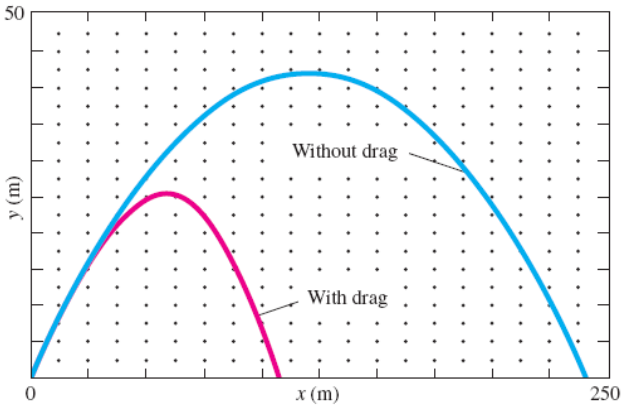
- *Muchos ADVERBIOS DE MODO pueden reconocerse por su terminación* ***–ly*** *que se traduce como* ***–mente****. La mayoría se forma a partir de adjetivos, por lo que si el adverbio no aparece en el diccionario, se puede eliminar la terminación –****ly,*** *buscar el adjetivo, y luego transformarlo nuevamente en adverbio agregando la terminación* ***–mente*** *o su equivalente castellano. (general – general****ly*** *simple – simp****ly*** *principal – principal****ly)***

Topic 1 | Projectile Motion with Air Resistance
A Case Study in Computer Analysis

In our study of projectile motion, we assumed that air-resistance effects are negligibly small. But, in fact, air resistance (often called *air drag,* or simply *drag*) has a major effect on the motion of many objects, including tennis balls, bicycle riders, and airplanes. In Section 5 .3 we considered how a fluid resistance force affected a body falling straight down. We'd now like to extend this analysis to a projectile moving in a plane.
It's not difficult to include the force of air resistance in the equations for a projectile, but solving these equations for the position and velocity as functions of time, or the shape of the path, can get quite complex. Fortunately, it is fairly easy to make quite precise numerical approximations to these solutions, using a computer. That's what this section is about.



A projectile in flight with velocity μ relative to the ground.



Computer-generated trajectories of a baseball with and without drag. Note that different scales are used on the horizontal and vertical axes.

a. Traducir el título, la bajada o copete y los epígrafes. b)Resumir el texto en dos o tres oraciones.

b. Considerar la estructura de las siguientes frases nominales extraídos del texto y, decidir si son parte del **sujeto**, del **complemento del verbo** o son **objeto de preposición**. Marcar el núcleo y traducir.

1. our study of projectile motion(1) ....
2. air-resistance effects (1) ....
3. negligibly small (1) ....
4. a major effect on the motion of many objects (2) ....
5. a fluid resistance force (4) ....
6. a body falling straight down (4) ....
7. a projectile moving in a plane (5) ....
8. the force of air resistance (6) ....
9. solving these equations for the position and velocity as functions of time can get complex. (6-7) .....
10. quite precise numerical approximations to these solutions (8) .....

VERBO + ING

USO Y TRADUCCIÓN DE LAS FORMAS –ING

1- -ING COMO NÚCLEO DE LA FRASE NOMINAL

Global **warming** is the investigators´ main concern. (***sustantivo abstracto)***
Generating electrical power by incineration is controversial. (***infinitivo)***
They are trying to follow the **programming** devised in advance.
The **processing** of the data takes place at a very high speed. It´s an effective process.

2- -ING COMO PREMODIFICADOR DEL NÚCLEO

This is a **time-consuming** method. (***de+verbo; que + verbo;*** *o como* ***adjetivo en –nte/-or/-ble/-ivo****.)*

3- -ING COMO POSTMODIFICADOR DEL NÚCLEO

There are controversial methods **of generating** electrical power. (***preposición + infinitivo)***
There are controversial methods **generating** electrical power. (***que + verbo)***

4- COMO VERBO PRINCIPAL DE LA FRASE VERBAL EN LOS TIEMPOS PROGRESIVOS O CONTINUOS. (*–ando –endo –iendo)*

Researchers **are exploring** alternative fuels for automobiles and motor vehicles.
Researchers **have been exploring** alternative fuels for automobiles.
Researchers **can´t have been exploring** alternative fuels for automobiles.

5- **COMO VERBO PRINCIPAL EN GRUPOS VERBALES EXPANDIDOS DESPUÉS DE VERBOS COMO *STOP, AVOID, LIKE, PREFER, ETC. (infinitivo*** *+ preposición requerida por el verbo)*

They **stopped producing** benzene a month ago.
They **avoid producing** benzene.
They **are trying to avoid producing** benzene.
They **continued producing** benzene.

6- DESPUÉS DE CONECTORES COMO "*THUS*" O "*THEREBY*" (así, de esta manera), O EN AUSENCIA DE LOS MISMOS, MUCHAS VECES DESPUÉS DE UNA COMA (tratándose en ambos casos de cláusulas u oraciones reducidas, donde el sujeto omitido coincide con el de la cláusula completa anterior) *–ando/endo/-iendo*

Many factories pump out untreated detergents, **thus polluting** water.
Many factories pump out untreated detergents, **polluting** water.

7- EN CIRCUNSTANCIALES DE INSTRUMENTACION, DESPUÉS DE LA PREPOSICIÓN "*BY*" (*por, por medio de)*** *–**ando/-endo/-iendo*** **sin** *la preposición.*

The plant produces electricity **by burning** the fuel.

8- DESPUÉS DE UNA PREPOSICIÓN (distinta de –by). *(preposición + el verbo en infinitivo)*

There are not good locations **for building** large dams.

9- DESPUÉS DE LAS PALABRAS *"WHEN"*,"IN" u "*ON"(ELIPSIS)*(*"AL + Infinitivo"o"CUANDO SE +V)***

When considering such factors, we must take special care.
On considering such factors, we must take special care.
In considering such factors, we must take special care.

10- EN TITULOS (*sustantivo abstracto, el/la + sustantivo abstracto o "cómo + infinitivo")*

"Installing the computer"

Ejemplos de –ing dentro de la frase nominal

1. Water Handling
2. Acoustic Signal Processing
3. Electrical Engineering
4. Our understanding of the universe.
5. The heating of iron or steel to a high temperature causes oxidation.
6. Specifying both the number of protons and the number of neutrons is necessary to identify the nucleus.
7. all engineering disciplines
8. signal-conditioning circuits
9. recording or display devices
10. the corresponding change in an electrical variable
11. sewing machine
12. This computer runs in two operating modes.
13. She will discover the rules for recombining sounds into words.
14. This is a composite material having a high thermal conductivity and a small thermal expansion coefficient.
15. These are the equations describing the behaviour of fundamental particles.
16. Storing operations are difficult to carry out if you cannot handle the machine.

PRE Y POSTMODIFICACIÓN CON –ED/3ª COL.VERBOS IRREG.

El participio pasado de verbos regulares termina en –ed, y en el caso de los irregulares corresponde a la tercera columna de la Tabla de Verbos Irregulares.
*Se traducen con la terminación –**ado –ido** en el castellano, o terminaciones equivalentes.*

1. The instrument used in conducting experiment is subject to the laws of nature.
2. The total *work per unit charge* associated with the motion of charge between two points is called voltage.
3. In protected mode, the computer reserves a predetermined amount of memory for an executing program.
4. An operating system using protected mode allocates memory among several different tasks.
5. This shows data obtained with an experimental MHD-power plant.
6. Figure 2.4 shows an automotive battery connected to a variety of circuits in an automobile.

Comparación de formas –ing y formas –ed /3º columna (participio pasado)

Activating device	Activated device
Brushing technique	Brushed surface
Coding sheets	Coded sheets
Heating device	Heated room
Limiting capacity	Limited capacity
Piping system	Piped system
Processing data	Processed data
Watering hose	Watered lands

1. An integrated application for historical knowledge management with mould design navigating process.
2. A multi-objective mixed-integer programming model for a multi-floor facility layout.
3. Representing function-technology platform based on the unified modelling language.
4. Reconfigurable manufacturing systems: the state of the art.
5. The next-generation research facility.
6. Optimal pricing policy for a deteriorating product by dynamic tracking control.
7. Production and quality control policies for deteriorating manufacturing system.
8. Proving external validity of ergonomics and quality relationship through review of real-world case studies.
9. A decision model for the analysis of ergonomic investments.
10. Improving Industrial Engineering Performance through a Successful Project Management Office.
11. Balancing and sequencing of parallel mixed-model assembly lines.
12. An improved self-starting cumulative count of conforming chart for monitoring high-quality processes under group inspection.
13. Optimal replacement policy and inspection interval for condition-based maintenance.
14. ORGANIZATIONAL AND INDIVIDUAL LEARNING AND FORGETTING.
15. A two-step heuristic algorithm for layout design of unequal-sized facilities with input/output points.
16. An entropy-based approach for assessing a product's BOM blocking effect on a manufacturing process flow.
17. Assembly sequence influence on geometric deviations propagation of compliant parts.
18. The double row layout problem.
19. Analysing critical interaction instances in collaborative concurrent engineering: satellite development.
20. Analysis of systematic engineering design paradigms in industrial practice: Scaled experiments.
21. A dynamic model for serial supply chain with periodic delivery policy.
22. Complexity analysis of an operation in demand-based manufacturing.
23. Effects of operating speed on production quality and throughput.
24. DFSME: design for sustainable manufacturing enterprises (an economic viewpoint).
25. Dynamic card number adjusting strategy in card-based production system.
26. Analysis of systematic engineering design paradigms in industrial practice: A survey.
27. Order-oriented cooperative sequencing optimisation in multi-mix-model assembly lines.

Artificial Life and Robotics
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Artificial Life and Robotics is an international journal publishing original technical papers and authoritative state-of-the-art reviews on the development of new technologies concerning artificial life and robotics especially computer-based simulation and hardware for the twenty-first century. This journal covers a broad multidisciplinary field including areas such as artificial brain research artificial intelligence artificial life artificial living artificial mind research chaos cognitive science complexity evolutionary computations fuzzy control genetic algorithms innovative computations micromachines mobile vehicles neural networks neurocomputers neurocomputing technologies and applications robotics and virtual reality. Hardware-oriented submissions are particularly welcome.

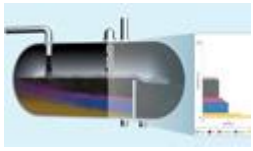
Tracerco is a world leading industrial technology company providing unique and specialised detection, diagnostic and measurement solutions.

Oil & Gas Processing

Oil processing and **gas processing** involves both the extraction of crude hydrocarbon material from the ground and then the separation of the oil and gas from the water, sand and other solid materials that come up during extraction. The company provides a range of scanning and tracer technologies at both the extraction and separation stages enabling real time characterization of conditions in the process in much the same way as analogous techniques (e.g. CT scan, angiogram) are used in the medical world.

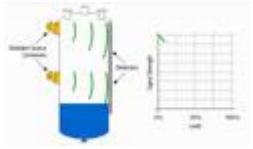
The **separation of oil and gas** from its by-products, sand and water, is at the heart of all hydrocarbon production facilities. Tracerco has developed a range of services and Instrumentation that is used to optimise the performance of the separator systems used by our customers, by measuring in real-time what is actually occurring within the process vessels.

Featured Products and Services

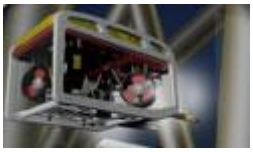


Profiler
Allows customers to monitor, control and optimise phase and interface levels in tanks, separators, pipes.

Separator Study
The ability to assess the performance of production separator.



Level Gauge
A custom designed nucleonic level system to provide highly accurate phase level information.



FMI
Minimize both the time and cost associated with inspecting the integrity of steel jacket members.

Slug Monitor
The TRACERCO™ Slug Monitor allows the detection and control of process slugs.

Scan
A technique to investigate the process conditions and the extent of mechanical damage that exist within a distillation column.

Accident rate A measure of the disabling accidents occurring in any specified exposure of workers to employment hazards. 1. Frequency rate—the number of disabling or lost-time accidents in an exposure of 1 million labor-hours worked. 2. Severity rate—the total number of lost labor-days charged to disabling accidents during an exposure of 1 million labor-hours worked.
Activity network A representation of two particular aspects of a project: (1) the precedence relationship among the activities and (2) the duration of each activity.
Administration The function that is concerned with the determination of the general objectives, major policies, and organizational structure of an enterprise.
Algorithm A prescribed set of well-defined rules for the solution of a problem in a finite number of steps.
Allowance A time increment included in the allowed time for an operation to compensate the worker for production lost due to fatigue and normally expected interruptions.

USOS DEL INFINITIVO CON "TO"

Función:	Traducir como:	Oraciones
Dentro de la frase nominal		
1. Núcleo de la frase nominal	infinitivo	1.2.3
2. Postmodificador del núcleo	-*para* + verbo infinitivo -preposición requerida+ verbo infinitivo	4.5.6.
3. Después de palabras interrogativas WHAT- WHICH - WHERE – WHEN – WHO – WHY – HOW HOW LONG – HOW FAR – HOW DEEP- ETC	infinitivo	7
4. Anticipador "IT" + Verbo BE o similar (LIKE, SEEM, LOOK) + To infinitive	infinitivo	8
Dentro de la frase verbal y en el predicado de la oración.		
5. Circunstancial de propósito o finalidad.	"*para*" + infinitivo	9.10.11
6. Después de verbo BE indicando futuro.	*Ir a/ Estar por / estar a punto de* (*Be + about + to infinitive)*	12.13
7. Después de verbo conjugado indicando:		
Temporalidad: begin, continue, start	preposición requerida por el verbo + infinitivo; o *ando-endo* si así lo requiere el verbo	14.15
Grado de certeza: seem, appear	*parecer* + infinitivo	16.17
Esfuerzo, volición o logro: try, manage, succeed, decide, want, etc.	preposición requerida por el verbo + infinitivo.	18.19.20
Modo de realizar una acción: hesitate, happen, tend,	preposición requerida + infinitivo	21.22.23
Causante de una acción (seguido por la persona gramatical que la realiza): help, encourage, enable, allow, put, etc (agree/acordar, allow/ permitir, claim/sostener, demand/exigir, enable/facultar, permitir encourage/incentivar, alentar, forbid/prohibir, indicate/indicar, order/ordenar, plead/suplicar, promise/prometer, propose/proponer, remind/report/informar, request/pedir , require/solicitar, tell/decir, ask/preguntar, pedir, threaten/amenazar, warn/advertir	(inf. o subjuntivo)	24.25.26
8. Después de un adjetivo en el complemento del verbo.	Preposición requerida por el adjetivo + infinitivo	27.28
9. Despuésde la forma pasiva de algunos verbos que agregan significado modal: be supposed to, be allowed to, be required to, etc	17infinitive o subjuntivo	29.
10. Pasivas especiales con verbos de discernimiento que acompañan a los procesos de investigación, descubrimiento y comunicación.	Verbo pasivo + *QUE* + Sujeto + Infinitivo	30.
11. Después de los mismos verbos de discernimiento del punto 10, pero en voz activa.	QUE +verbo conjugado en el tiempo que corresponda.	30.31. 32.
12. Después de "too" (demasiado) "enough" (suficiente)	*para* + infinitivo	33

1. To see is to believe.
2. To specify both the number of protons and neutrons is necessary to identify a nucleus.
3. To end our dependence on rapidly dwindling oil supplies is the main concern of our government.
4. It´s time to think for yourself again.
5. The tools to excavate have been stored nearby.
6. All engineering disciplines require the ability to perform measurements of some kind.
7. This book will show you how to convert data into knowledge.
8. It is essential to have some professional experience before you get your degree.
9. We have thermal printer mechanisms to meet any demand.
10. To put more capabilities into the same space, you need smaller and smaller components.
11. Now we are repricing everything to save you time and money.
12. They are to build new schools.
13. It is about to boil. It is to boil in five minutes.
14. The company began to restore the fast-crumbling historical monument.
15. The wind will continue to blow the whole day.
16. They seem not to understand our gestures.
17. There seems to be considerable research in this field.
18. Have you ever tried to assemble a radio?
19. We tried to push the car but we were not able to move it.
20. These institutions have managed to provide substantial training for mechanical engineers.
21. He hesitated to pour the frozen liquid.
22. The column tends to tilt to the left.
23. Personal computers help the economy to keep going.
24. This workshop will allow students to gain valuable experience.
25. The software enables them to perform a wider range of tasks.
26. I`m anxious to help. I`m willing to help. I`m almost determined to help. I`m reluctant to help.
27. The project was difficult to put into practice.
28. You are supposed to finish your project. / You were allowed to use the laboratory. / They will be expected to finish on time. / The students have been prohibited to use this device.
29. The gas was believed to be inert. / They believed the gas to be inert.
30. The experiments proved his theory to be correct.
31. Scientists do not believe supernovae to be explosive stars that occur in other galaxies only.
32. The temperature was too high to conduct the experiment./ high enough to conduct the …

Use of an on-location dewatering unit during operations has become mandatory in some parts of the world, such as the Arctic, jungles, and rain forests and in close proximity to urban environments. Additionally, on-location dewatering units may be mandated when drilling near freshwater sources, near sensitive fishing areas, or where concern for protecting ocean species is very strong or regulated.

With the pH of fluid typically being between 7.0 and 10.0, the colloidal particles in the fluid **tend to be** negatively charged. The negative charges repel the particles, preventing them from clumping together **to form** larger particles. **To remove** these submicron colloids is difficult, even with a high-speed centrifuge with 2000 g force. Therefore, **to remove** these tiny particles in the fluid, it is first necessary **to treat** the fluid with chemicals **to agglomerate** the solids **to make** them large enough **to be removed** by a high-speed centrifuge.

The process of agglomeration **to create** large, dense clusters requires three steps:

1. Destabilize the submicron particles so they no longer repel each other.
   This is easily achieved by lowering the pH from 7.0_10.0 to approximately 5.5.
2. Coagulate or bring together the fine solids—create an attraction between the particles.
3. Flocculate, bundle, or wrap together **to create** large dense clusters.

Waste Management Drilling Fluids Processing Handbook

TIEMPOS VERBALES
MODALES
THERE + BE

Tiempos	**Simples**	**Continuos**	**Perfectos**
Presente	**Aux: do- does** (no se traduce)	**Aux: be: am-is- are** (se traduce ***estar***)	**Aux: Have – Has** (se traduce ***haber***)
	+ Verbo en su forma simple y sin auxiliar en el afirmativo. La tercera persona singular lleva ***–s/-es***	**+** Verbo seguido de la forma **ING.** (ando endo)	**+**Verbo en participio pasado –**ED** o tercera columna (ado.ido)
	I investigate Yo investigo *He investigates* El investiga *Do I investigate?* ¿Investigo? *Does he investigate?* ¿Investiga? *I don´t investigate.* No investigo. *He doesn´t investigate* El no investiga.	*They are investigating* Están investigando *He is investigating.* Está investigando. Is he investigating? *Are they investigating?* ¿Están investigando?	*I have investigated* He investigado *He has investigated* El ha investigado *Have they investigated*? ¿Han investigado?
Pasado	**Aux: did** (no se trad.)	**Aux**: be: **was – were**	**Aux: had**
	+ verbos regulares terminados en **– ED, o** irregulares segunda columna.	**+**Verbo seguido de la forma **– ING**. (ando endo)	**+**Verbo en participio pasado (regulares terminan en **–ED**) o **tercera columna** de irregulares **ado.ido**
	I investigated. Yo investigaba. Yo investigué. *Did I investigate?* ¿Investigué? *I didn´t investigate.* No investigué.	*I was investigating.* Estaba investigando. Estuve investigando	*I had investigated* Había investigado.
Futuro	**Aux. Will/shall** (no se traduce)	**Aux**: **Will be** (*estar* en futuro)	**Aux: Will have** (*haber* en futuro)
	+ Verbo principal en su forma simple. (se traduce en futuro)	**+**Verbo seguido de la forma **– ING**. (ando endo)	**+**Verbo en participio pasado (regulares terminan en **–ED**) o **tercera columna** de irregulares **ado.ido**
	I will investigate Investigaré *Will I investigate?* Investigaré? *I won´t investigate.* No investigaré.	*I will be investigating* Estaré investigando	*I will have investigated* Habré investigado

Condicional	**Aux. would** (no se traduce)	**Aux. would be** **(**estaría)	**Aux. would have** (habría)
	+Verbo principal en su forma simple. (se traduce en condicional –**ia**)	**+**Verbo seguido de la forma **– ING**. (ando endo)	**+**Verbo en participio pasado (regulares terminan en **–ED**) o tercera columna de irregulares ado.ido
	I would investigate Investigaría *Would I investigate?* Investigaría? *I wouldn´t investigate*. Yo no investigaría	*I would be investigating* Estaría investigando	*I would have investigated* Habría investigado
Modales	**can – could-** **may – might** **be able to** **must – mustn´t** **ought to – should –** **need to** **have to – had to**	**auxiliar modal** **+** **be**	**auxiliar modal** **+** **have**
	+ verbo en su forma básica.	**+** verbo + ING.	**+** verbo en participio pasado o tercera col.
	I can investigate. Puedo investigar *I could investigate.* Podría investigar *I may investigate* Puedo investigar *I had to investigate* Tenía que investigar *I must investigate* Debo investigar. *etc.*	*I can be investigating* Puedo estar investigando. *He must be investig.* Debe estar invest. *They should be investigating.* Deben estar invest. *She can´t be investigating.* No puede estar investigando *She has to be investigating.* Tiene que estar inv. etc	*He can´t have investigated.* No puede haber investigado. *He must have investigated.* Debe haber investigado. *He shouldn´t have investigated.* No debería haber investig
There + Be (indica existencia= **haber**	**tiempos simples,** *There is computer.* *There was...* *There will be*		**perfectos,** *There has/had been a difficulty.*
Formas pasivas (Be + participio pasado) El tiempo lo determina la forma del verbo TO BE	*The issue **is** discussed* El asunto es discutido Se discute el asunto *It **was** discussed*. Se discutió *It **will be** discussed*. Se discutirá. *It **would be** discussed*. Se discutiría.	*The issue is being discussed.* El asunto está siendo discutido. Se está discutiendo *It was being discussed*. Se estaba discutiendo.	*The issue has been discussed.* El asunto ha sido discutido. Se ha discutido… *It had been discussed*. Se había discutido. *It will have been …* Se habrá discutido

VERBOS MODALES

VERBOS MODALES

- *Los verbos modales permiten detectar la "presencia del autor" en el texto, en el sentido de que indican* ***hipótesis, posibilidades, sugerencias, certezas, promesas, obligaciones, etc.***
- *Son verbos auxiliares que, a diferencia de los auxiliares estudiados hasta ahora, sí tienen un contenido semántico además del gramatical, ya que incorporan los significados mencionados al verbo principal del grupo, que ahora está expandido y expresa un sentido más complejo.*

- **PODER**

can (presente)	can´t / cannot	**poder** (tener la capacidad, posibilidad o permiso de hacer algo)
could (pasado de *can*)	could not couldn´t	**podía o pudo** (tenía o tuvo capacidad, o permiso de hacer algo)
could (condicional)		**podría** (tendría la capacidad o permiso para hacer algo) Es una posibilidad más remota que la que expresa *can.*
be able to equivale a **can**	isn´t able to/ aren´t /won´t be able to / etc.	**poder, ser capaz de**
may (presente)	may not	**poder** (existir la posibilidad o tener permiso para hacer algo)
might (pasado de *may)*	might not mightn´t	**podía –** (tenía la posibilidad o el permiso para hacer algo)
might (condicional)		**podría –** (tendría la posibilidad o el permiso para hacer algo) Es una posibilidad más remota que la que expresa *may.*

- **DEBER**

must (presente)	must not mustn´t	**deber** (tener la obligación o la necesidad de hacer algo) Es también un consejo o una deducción.
have to equivale a **must**	don´t have to /doesn´t have to / won´t have to, etc	**deber, tener que**
should (presente)	should not shouldn´t	**deber** (tener la obligación moral, o la necesidad de hacer algo)
should (condicional)		**debería** (tendría la obligación moral de hacer algo /sugerencia
ought to	ought not oughtn´t	**Debe /debería** (tener la obligación de hacer algo) Implica obligación y recomendación.

1. A substance **can change** from one state into another.
2. A substance **is able to change** from one state into another.
3. This substance **was able to change** from one state into another.
4. This substance **has been able to change** from one state into another.

5. Metals which cool rapidly **may fracture/could fracture/might fracture.**
6. An expert **should perform / must perform / can perform / ought to perform** the operation.
7. The study of the surface **could not determine** oil presence. Consequently, we **had to carry out** a geological survey of the underground rock structure**.**
8. These bearings are popular because they **can take** very heavy loads and are self-aligning.
9. These bearings are popular because they **are able to take** very heavy loads and are self-aligning.

AUXILIARES MODALES EN PASADO

- *Los verbos modales en las formas ya estudiadas (**MODAL + VERBO PRINCIPAL**) indican **tiempo presente y/o futuro**.*

- *COULD se puede tomar como **pasado de can (habilidad)** o como **condicional**, y lo mismo sucede con MIGHT (**pasado de may** o **condicional**), aunque la referencia al pasado se da en muy pocos contextos:*
  I can´t move the block. He told me that he **couldn´t move** the block.
  He may not come. I knew that he **might not come**.

- *Cuando el AUXILIAR MODAL va seguido de una **FORMA PERFECTA (HAVE + ED O TERCERA COLUMNA)**, entonces la indicación temporal es claramente **el pasado**, el verbo **HAVE** se traduce como **HABER** y la traducción de los grupos verbales es la siguiente:*

could have –ed/3º col.	podría haber + participio pasado	posibilidad en pasado
might have –ed/3º col.	podría haber + participio pasado	posibilidad en pasado
should have –ed/3º col.	debería haber + participio pasado	obligación en pasado
shouldn´t have –ed/3º col.	no debería haber + participio pasado	acción que se concretó pero que no debió haberse hecho.
ought to have –ed/3º col.	debió haber + participio pasado	obligación en pasado
outhtn´t have –ed/3º col.	no debió haber + participio pasado	acción que se concretó pero que no debió haberse hecho.
must have –ed/3º col.	debe haber + participio pasado	conclusión sobre el pasado
can´t have-ed/3º col.	no puede haber + participio pas-	conjetura o conclusión
should have -ed/3º col.	debió haber + participio pasado	conclusión en pasado
would have –ed/3º c	habría + participio pasado	**condicional perfecto**

*>Los modales en pasado se combinan también con la frase de existencia THERE BE, obteniéndose las correspondientes formas pasadas **THERE + MODAL + HAVE BEEN***

- *There could have been podría haber habido (posibilidad de existencia en pasado)*
- *There should have been debería/debió haber habido (obligación de existencia en pasado)*
- *There must have been debe haber habido (conjetura de existencia en pasado)*

1. The solution could have been contaminated by dirt in the test tube.
2. There ought to have been more accurate forecasts.
3. There could have been a mistake.
4. There should have been a serious investigation.
5. These modifications would not have been necessary.
6. By the end of Chapter 8, you should have accomplished the following objectives:
7. In a practical machine, for example, one might have had as many as 60 segments, and the variation of γ from 90◦ would have been only }3◦, with a torque fluctuation of less than 1 percent.

16.1 ELECTRICITY AND MAGNETISM

In the early 1800s, H. C. Oersted, a Danish physicist, had proposed the notion that the phenomena of electricity and magnetism are interconnected. Oersted had shown that an electric current produces magnetic effects (more specifically, a magnetic field). Soon after, the French scientist André Marie Ampére expressed this relationship by means of a precise formulation, known as *Ampére's law*. A few years later, the English scientist Faraday illustrated how the converse of Ampére's law also holds true, that is, that a magnetic field generates an electric field; in short, *Faraday's law* states that a changing magnetic field gives rise to a voltage.
We shall undertake a more careful examination of both Ampére's and Faraday's laws in the course of this chapter.

A. Traducir las siguientes oraciones y las variantes dadas.

1. The industrialized countries experienced a serious energy shortage.
2. have experienced
3. will have experienced
4. had experienced
5. have been experiencing
6. had been experiencing
7. would have been experiencing
8. are to experience

9. Such a system offers many potential advantages.
10. offered
11. is offering
12. was offering
13. would offer
14. should offer
15. might offer
16. can´t offer

17. There are fundamental limitations on photocell efficiency.
18. will be
19. would have been
20. could be
21. must be
22. were
23. have been
24. could have been
25. might have been
26. had been

The Evolution of Petroleum Refining

Until the advent of the gasoline engine in the late 19th century, people used petroleum for what we now consider pretty basic needs-heating, light, and maybe lubrication. Even when Colonel Edwin Drake discovered oil at the depth of 69 feet in Titusville, PA in 1859, his investors were excited because they saw an opportunity to compete with whale oil in the illumination market. For the rest of the century, petroleum refining aimed to remove all the light stuff in crude oil that would eventually be used as gasoline. Refiners burned most of it in a pit, just to get rid of it. Initially they were after kerosene for lanterns. They soon recognized the value of the heavier parts of the crude as fuel oil for raising steam and heating buildings—first industrial and eventually commercial and residential.

As a logical consequence, many of the early automobiles, like the famous Stanley brothers' Stanley Steamer, were steam-driven, using kerosene as fuel. By 1890 inventor-entrepreneurs like Karl Benz, Henry Ford, Ransom Olds, and Dave Buick were marketing cars with internal combustion engines that needed a light fuel—gasoline—that changed forever the profile and purpose of petroleum refining.

After 1900 the demand for gasoline exceeded even the volumes formerly burned off in the pits. The chemical engineers then realized they could convert some of the heavier parts of the crude oil by just cooking it until it cracked into lighter products. They invented the first thermal crackers. Even then, the demand for gasoline grew so rapidly that thermal cracking couldn't keep up efficiently. Just as well, since electricity was wiping out the market for lamp oil all through the world and the jet engine hadn't been commercialized yet. Refiners needed a growth product.

Catalysis was still an emerging science, but by 1916 the grandfather of all cat crackers—a fixed bed design—was in place. In 1936 the Frenchman Houdry put the first continuous flow cat cracker on stream. During World War II refiners responded to the demand for high octane (C_8H_{18}) aviation gasoline with alkylation plants and toluene extraction.

Meanwhile the automotive engineers continued to perfect engine design and demanded better quality gasoline. In 1949 the first catalytic

reformer went on stream, improving the octane number of the naphtha already being blended into gasoline.

In the latter part of the 20th century, refiners resorted to innovations from the petrochemicals industry to meet both quality and environmental needs. New gasoline blending components made in refineries now had names like methyl tertiary butyl ether (MTBE), tertiary butyl alcohol (TBA), methanol, and ethanol.

Almost all that is changing today is driven by environmental regulation, causing refiners to tweak the existing processes. The technology introduced in the last 15 years has been centered on catalyst improvement, not new processes. All that should be good news to you. It's tough enough to catch up with what's happening until now, without having to worry about what's changing and becoming obsolete after you've learned it.

Cybernetics

Prospects for Brain–Computer Interfacing

Team uses brain waves to drive robot.

A group of undergraduates at Northeastern University demonstrated in June that they could steer a robot via thought. The subject in the experiment watched a computer screen and selected commands using his retina, causing electrical activity in the brain's visual cortex ranging from 4 to 100 hertz. The signals were then translated to a small robot, similar to the Roomba vacuum cleaner.

Electrical engineering professor Deniz Erdogmus, who oversaw the project at Northeastern, says that because the connection between the user and the robot is Internet-based (you can track the robot over Skype) an operator could control it from a considerable distance away.
(...)

Previous studies had shown that linking mammalian brain matter with electric circuitry has a burning or melting effect on the brain.

However, in the last two decades, advances in computation have enabled researchers to bypass this problem, somewhat, and rely more on devices that don't have to be surgically implanted to collect brain signals.

Electroencephalography (EEG), which the Northeastern University team used, is among the favored of these techniques. EEG uses a sensor array affixed to a subject's head externally, like a swimming cap.

Because the signal from an EEG is weaker than the signal from a surgically implanted sensor, more guesswork is required to deduce what the brain is trying to communicate;
that guesswork is aided through algorithmic math. Noninvasive BCI relies much more on algorithms and mathematic problem solving.

CHAPTER 1.1

THE PURPOSE AND EVOLUTION OF INDUSTRIAL ENGINEERING

Louis A. Martin-Vega
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The historical events that led to the birth of industrial engineering provide significant insights into many of the principles that dominated its practice and development throughout the first half of the twentieth century. While these principles continue to impact the profession, many other conceptual and technological developments that currently shape and continue to mold the practice of the profession originated in the second half of the twentieth century. The objective of this chapter is to briefly summarize major events that have contributed to the birth and evolution of industrial engineering and assist in identifying common elements that continue to impact the purpose and objectives of the profession.

INTRODUCTION

Born in the late nineteenth century, industrial engineering is a dynamic profession whose growth has been fueled by the challenges and demands of manufacturing, government, and service organizations throughout the twentieth century. It is also a profession whose future depends not only on the ability of its practitioners to react to and facilitate operational and organizational change but, more important, on their ability to anticipate, and therefore lead, the change process itself.

The historical events that led to the birth of industrial engineering provide significant insights into many of the principles that dominated its practice and development throughout the first half of the twentieth century. While these principles continue to impact the profession, many of the conceptual and technological developments that currently shape and will continue to mold the practice of the profession originated in the second half of the twentieth century. The objective of this chapter is to briefly summarize the evolution of industrial engineering and in so doing assist in identifying those common elements that define the purpose and objectives of the profession.

EARLY ORIGINS

Before entering into the history of the profession, it is important to note that the birth and evolution of industrial engineering are analogous to those of its engineering predecessors. Even though there are centuries-old examples of early engineering practice and accomplishments, such as the Pyramids, the Great Wall of China, and the Roman construction projects, it was not until the eighteenth century that the first engineering schools appeared in France. The need for greater efficiency in the design and analysis of bridges, roads, and buildings resulted in principles of early engineering concerned primarily with these topics being taught first in military academies (*military engineering*). The application of these principles to nonmilitary or civilian endeavors led to the term *civil engineering*. Interrelated advancements in the fields of physics and mathematics laid the groundwork for the development and application of mechanical principles. The need for improvements in the design and analysis of materials and devices such as pumps and engines resulted in the emergence of *mechanical engineering* as a distinct field in the early nineteenth century. Similar circumstances, albeit for different technologies, can be ascribed to the emergence and development of *electrical engineering* and *chemical engineering*. As has been the case with all these fields, *industrial engineering* developed initially from empirical evidence and understanding and then from research to develop a more scientific base.

The Industrial Revolution

Even though historians of science and technology continue to argue about when industrial engineering began, there is a general consensus that the empirical roots of the profession date back to the Industrial Revolution, which began in England during the mideighteenth century. The events of this era dramatically changed manufacturing practices and served as the genesis for many concepts that influenced the scientific birth of the field a century later. The driving forces behind these developments were the technological innovations that helped mechanize many traditional manual operations in the textile industry. These include the flying shuttle developed by John Kay in 1733, the spinning jenny invented by James Hargreaves in 1765, and the water frame developed by Richard Arkwright in 1769. Perhaps the most important innovation, however, was the steam engine developed by James Watt in 1765. By making steam practical as a power source for a host of applications, Watt's invention freed manufacturers from their reliance on waterpower, opening up far greater freedom of location and industrial organization. It also provided cheaper power, which led to lower production costs, lower prices, and greatly expanded markets. By facilitating the substitution of capital for labor, these innovations generated economies of scale that made mass production in centralized locations attractive for the first time. The concept of a production system, which lies at the core of modern industrial engineering practice and research, had its genesis in the factories created as a result of these innovations.

Specialization of Labor

The concepts presented by Adam Smith in his treatise *The Wealth of Nations* also lie at the foundation of what eventually became the theory and practice of industrial engineering. His writings on concepts such as the division of labor and the "invisible hand" of capitalism served to motivate many of the technological innovators of the Industrial Revolution to establish and implement factory systems. Examples of these developments include Arkwright's implementation of management control systems to regulate production and the output of factory workers, and the well-organized factory that Watt, together with an associate, Matthew Boulton, built to produce steam engines. The efforts of Watt and Boulton and their sons led to the planning and establishment of the first integrated machine manufacturing facility in the world, including the implementation of concepts such as a cost control system designed to decrease waste and improve productivity and the institution of skills training for craftsmen. Many features of life in the twentieth century including widespread employment in large-scale factories, mass production of inexpensive goods, the rise of big business, and the existence of a professional manager class are a direct consequence of the contributions of Smith and Watt.

Another early contributor to concepts that eventually became associated with industrial engineering was Charles Babbage. The findings that he made as a result of visits to factories in England and the United States in the early 1800s were documented in his book entitled *On the Economy of Machinery and Manufacturers*. The book includes subjects such as the time required for learning a particular task, the effects of subdividing tasks into smaller and less detailed elements, the time and cost savings associated with changing from one task to another, and the advantages to be gained by repetitive tasks. In his classic example on the manufacture of straight pins, Babbage extends the work of Adam Smith on the division of labor by showing that money could be saved by assigning lesser-paid workers (in those days women and children) to lesser-skilled operations and restricting the higher-skilled, higher-paid workers to only those operations requiring higher skill levels. Babbage also discusses notions related to wage payments, issues related to present-day profit sharing plans, and even ideas associated with the organization of labor and labor relations. It is important to note, however, that even though much of Babbage's work represented a departure from conventional wisdom in the early nineteenth century, he restricted his work to that of observing and did not try to improve the methods of making the product, to reduce the times required, or to set standards of what the times should be.

EL IMPERATIVO

- *Consiste en el uso de la forma básica del verbo para dar órdenes, instrucciones, o sugerencias.* **Fasten your seat-belt**. (Ajuste su cinturón de seguridad)

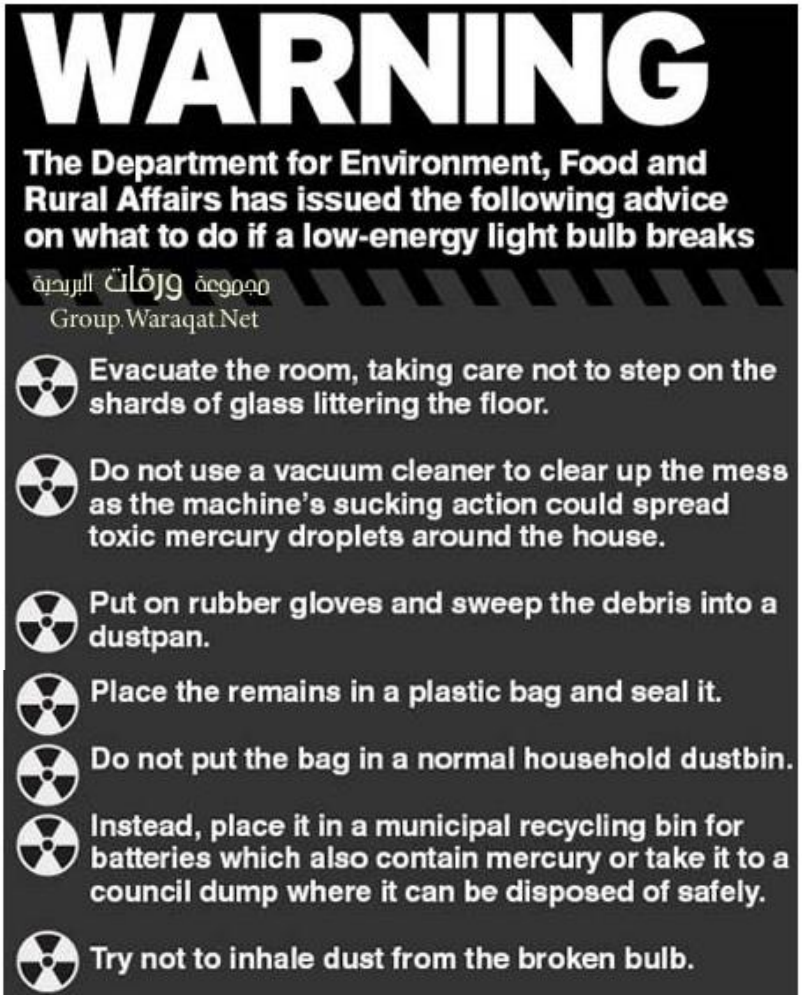
- *En general no se usa el sujeto de la oración, el que queda sobreentendido como la segunda persona* ***you*** *(singular o plural), aunque a veces puede aparecer delante del verbo.* **You fasten your seat-belt.**

- *La forma negativa es* ***don´t, o Don´t you...*** **Don´t smoke here**. (No fume aquí)
  Don´t you forget it. (No lo olvide Ud.)

- *Puede aparecer intensificado con el verbo* ***DO+forma base:*** **Do take care!** (tenga cuidado)

- *También puede aparecer en plural con la forma Let´s o let us + base.*

Let us consider this hypothesis. (Consideremos esta hipótesis)


WARNING
The Department for Environment, Food and Rural Affairs has issued the following advice on what to do if a low-energy light bulb breaks
مجموعة ورقات البريطية
Group.Waraqat.Net
Evacuate the room, taking care not to step on the shards of glass littering the floor.
Do not use a vacuum cleaner to clear up the mess as the machine's sucking action could spread toxic mercury droplets around the house.
Put on rubber gloves and sweep the debris into a dustpan.
Place the remains in a plastic bag and seal it.
Do not put the bag in a normal household dustbin.
Instead, place it in a municipal recycling bin for batteries which also contain mercury or take it to a council dump where it can be disposed of safely.
Try not to inhale dust from the broken bulb.

AFIJOS

FORMACION DE PALABRAS: PREFIJOS Y SUFIJOS

- *Los **AFIJOS (prefijos** y **sufijos)** son partículas que se encuentran agregadas al comienzo o al final de una palabra y que alteran el significado de la misma (aunque mantienen la raíz) o cambian la clase de palabra de que se trata (de verbo a sustantivo, o a adjetivo, por ejemplo)*
- *Estar familiarizado con la existencia de prefijos y sufijos facilita la búsqueda de las palabras en el diccionario, ya que es posible quitarlos, buscar la palabra de origen del vocablo y a partir de ésta llegar al significado en castellano.*
- *(Se incluyen primero ejemplos de formación de palabras, y, al final, una lista completa de prefijos y sufijos por orden alfabético con sus respectivos ejemplos.)*

Formación de VERBOS a partir de adjetivos (-ize/-ise, -ify, -en)

legal	legalize	modern	modernize
popular	popularize	pure	purify
simple	simplify	sharp	sharpen
short	shorten	straight	straighten

1. They want to modernize the factory.
2. Use these tablets to purify the water.

Formación de VERBOS a partir de sustantivos (-ify/-efy, -en)

beauty	beautify	liquid	liquefy
length	lengthen		

Formación de ADVERBIOS a partir de adjetivos (-ly)

easy	easily	main	mainly
quick	quickly	stupid	stupidly

3. These alloys break easily.

Formación de SUSTANTIVOS a partir de verbos (-er *agente*, **-ment, -tion, -ance, -t)**

sharpen	sharpener	fasten	fastener
open	opener	teach	teacher
amaze	amazement	develop	development
pay	payment	retire	retirement
move	movement		
admire	admiration	associate	association
examine	examination	organize	organization
react	reactance	weigh	weight

4. The scientists are giving the new instruments a careful examination.
5. The scientists are giving a careful examination to the new instruments.

Formación de SUSTANTIVOS a partir de adjetivos (-ity/-ty, -ness, -dom, -hood, -ics, -ure, -ian (agente)

pure	purity	cruel	cruelty
odd	oddity	stupid	stupidity
dark	darkness	clear	clearness
aware	awareness	free	freedom
false	falsehood	economic	economics
physic	physics	moist	moisture
difficult	difficulty	electric	electrician

6. Is this a mayor discovery or a scientific oddity?

Formación de SUSTANTIVOS a partir de otros sustantivos (-age, -ship, , -ery, -ful, -ing, -ism, -ist)

drain	drainage	scholar	scholarship
hard	hardship	wine	winery
spoon	spoonful	tube	tubing
magnet	magnetism	motor	motorist

Formación de ADJETIVOS a partir de sustantivos (-y, -ic, -ical, -ful, -less, -en, -ive, -like, ous, -ward (en dirección a))

dirt	dirty	hair	hairy
atom	atomic	biology	biological
grammar	grammatical	pain	painful
care	careless	care	careful
pain	painless	gold	golden
effect	effective	tree	treelike
resine	resinous	pore	porous
back	backwards	tree	treeless

7. The operation was painless.

Formación de ADJETIVOS a partir de verbos (-able, -ible *que se puede*, **-ive** *que puede*)

wash	washable	debate	debatable
break	breakable	observe	observable
recognize	recognizable	detect	detectable
dispose	disposable	react	reactive

8. Those elements are no longer recognizable because they are blended into the surroundings.

Formación de OPUESTOS (un-, in-, im-, il-, ir-, dis-, de-, non-,)

wind	unwind	block	unblock
efficient	inefficient	possible	impossible
legal	illegal	regular	irregular
agree	disagree	approve	disapprove
honest	dishonest	centralize	decentralize
increase	decrease	ascend	discend
sense	nonsense	payment	nonpayment
resident	nonresident	conformist	nonconformist
absorbent	nonabsorbent		

9. There is a lot of disagreement with respect to the last point.

Indicación de superioridad (super- ultra- over), inferioridad (under-, infra-,) anticipación (fore, pre-,) posterioridad (post-) repetición (re-) duplicidad (double-, ambi-) negación (non-, dis-, un-,) oposición (anti-, contra-,) separación (extra-) unicidad (mono-) cantidad (multi- poly- ultra)

light	ultralight	violet	ultraviolet
sonic	ultrasonic	developed	underdeveloped
load	overload		
employed	underemployed	red	infrared
structure	infrastructure	cast	forecast
ground	foreground	heat	preheat
determine	predetermine	admit	readmit
distribute	redistribute	barrel	doublebarrelled
check	doublecheck	edged	doubleedged

Otros prefijos: formación de verbos (en-)

large	enlarge	code	encode

Reducing Wear in Abrasive Conditions

Abrasion is the removal of material from a surface by the movement of material across its surface. The factors affecting abrasive wear are the surface properties of the item being worn away, the abrasive properties of the material moving across the surface and the characteristics of motion. Where abrasive wear is a problem it becomes necessary to understand the mechanism of attrition.

VOZ PASIVA

is/ am /are made	es/soy/son hechos	se hace/n
was/were made	era/ eran hechos – fue/fueron hechos	se hacía/ n – se hizo
will/ shall be made	será hecho	se hará
would be made	sería hecho	se haría
is/am/are being made	está siendo hecho	se está haciendo
was/were being made	estaba/estuvo siendo hecho	se estaba/estuvo haciendo
have/has been made	ha sido hecho	se ha hecho
had been made	había sido hecho	se había hecho
will have been made	habrá sido hecho	se habrá hecho
can be made	puede ser hecho	se puede hacer
can´t have been made	no puede haber sido hecho	no se puede haber hecho
could be made	podría/podía ser hecho	se podría/pudo hacer
could have been made	podría haber sido hecho	se podría haber hecho
may be made	puede ser hecho	se puede hacer
may have been made	puede haber sido hecho	se puede haber hecho
might be made	podría/podía ser hecho	se podría/podía hacer
might have been made	podría haber sido hecho	se podría haber hecho
should be made	deberia/debe ser hecho	se debería/debe hacer
should have been made	debería/debió haber sido hecho	se debería/debió haber hecho
must be made	debe ser hecho	se debe hacer
must have been made	debe haber sido hecho	se debe haber hecho
ought to be made	deber ser hecho	se debe hacer
ought to have been made	debió haber sido hecho	se debió haber hecho

Once the electric drive had been selected, the results of battery tests performed by the battery team were evaluated to determine the proper battery technology, and the resulting geometry and weight distribution of the battery packs. With the preferred battery technology identified (see Figure 1.7), energy criteria were included in the simulation, and lap times and energy consumption were predicted. Finally, appropriate instrumentation was designed to permit monitoring of the most important functions in the vehicle.

Mechatronic Systems—Design of anElectric Race Car

For oil, a long, steel tank, called a separator, is used to separate natural gas and salt water from the oil. The oil is then stored in steel stock tanks.

Production from wells can be increased by acid and frac jobs. Acid is pumped down a well to dissolve some of the reservoir rock adjacent to the wellbore during an acid job. During a frac job, the reservoir rock is hydraulically fractured with a liquid pumped under high pressure down the well. Periodically, production from the well must be interrupted for repairs or remedial work during a workover.

After the natural reservoir drive has been depleted in an oilfield, waterflood, and enhanced oil recovery can be attempted to produce some of the remaining oil. During a waterflood, water is pumped under pressure down injection wells into the depleted reservoir to force some of the remaining oil through the reservoir toward producing wells (Fig. I–12). Enhanced oil recovery involves pumping fluids that are not natural to the reservoir, such as carbon dioxide or steam, down injections wells to obtain more production.

Nontechnical Guide to Petroleum Geology, Exploration, Drilling, and Production

Several steps can be taken to prevent and/or control crevice corrosion:

1. Proper design, avoiding crevices, will control crevice corrosion. If lap joints are used, the crevices caused by such joints should be closed by either welding or caulking. Welded butt joints are preferable to bolted or riveted joints.
2. Porous gaskets should be avoided. Use an impervious gasket material. During long shutdown periods, wet packing materials should be removed.
3. The use of alloys resistant to crevice corrosion should be considered. The resistance of stainless steels to crevice corrosion can be improved by increasing the chromium, nickel, molybdenum, and nitrogen content. For example, type 316 stainless steel containing 2–3% molybdenum is fairly resistant, whereas nickel alloys are more resistant than stainless steels.
4. Reduction of crevice corrosion can be accomplished, when possible, by reducing the temperature, decreasing the chloride content, or decreasing the acidity.
5. The gaps along the periphery of tanks mounted on a masonry platform should be closed with tar or bitumen to avoid seepage of rainwater. Vessels and tanks should be designed to provide complete drainage, thereby preventing the buildup of solid deposits on the bottom.
6. Regular inspections and removal of deposits should be scheduled.

VOZ PASIVA ESPECIAL

Se llama voz pasiva especial a la ***construcción pasiva*** *(Be + participio pasado) seguido de un* ***infinitivo*** *(to + verbo; to+have+participio pasado – infinitivo perfecto o to+have been + participio pasado- infinitivo perfecto pasivo)*
El grupo verbal extendido se puede dividir en dos partes, la parte en voz pasiva y la parte que contiene el infinitivo.

El verbo principal de la parte en voz pasiva *generalmente representa un proceso mental o verbal (verbo de pensamiento o habla) relacionado con el descubrimiento, experimentación o comprobación de un fenómeno, por eso, para traducir estas oraciones al castellano, partimos desde ese verbo, usando la forma* ***"Se",*** *por ejemplo,* Se piensa **que…** se supo **que…** se comprobará **que...**

Luego se traduce ***el sujeto*** *de la oración, que representa el foco de la comprobación o experimentación o descubrimiento.*

El verbo en infinitivo tiene que ver con aquello que se ha descubierto, visto, o experimentado o demostrado. Este verbo corresponde al sujeto de la oración. El tiempo verbal en castellano se decidirá según el contexto.

-All living organisms **are known** **to consist** of cells.

2 / Se + 1 + que / 3 / 4

-*Se sabe que todos los organismos vivientes consisten de células*.

Se + 1 + que/ 2 / 3 / 4

All living organisms are known to consist of cells.
were known to consist
will be known to consist
had been known to consist
could be known to consist
must be known to consist

Ejemplos de verbos de pensamiento o habla en infinitivo y en participio:

announce	announced	Know	known
Believe	believed	Nominate	nominated
Consider	Considered	Pronounce	Pronounced
Establish	established	Refer	referred
Estimate	estimated	Suppose	supposed
expect	expected	Show	Shown/showed
Find	Found	Say	said

1. Water **is said to boil** at 212 degrees Fahrenheit.
2. Two or more circuit elements are said to be **in series** if the identical current flows through each of the elements.
3. The voltage divider network of Figure P2.26 is expected to provide 2.5 V at the output.
4. Sometimes programmers use a suffix letter *b* for binary numbers, *o* for octal, *h* for hexadecimal, and *t* or *d* for tens for decimal. Other times you are simply expected to know from context the number base that is being used.
5. Modern PCs are expected to spot any new hardware and adapt themselves to it.
6. The true value of the response was known to be constant.

Traducir los siguientes titulares de artículos periodísticos

- Vast petroleum reserves are thought to be under the Arctic
- WARMING IS FOUND TO DISRUPT SPECIES
- Dirty Smoke From Ships had been Found To Degrade Air Quality In Coastal Cities
- Michigan laser beam is believed to have set record for intensity
- UPS is said to be in talks to buy a Dutch rival, TNT.
- Disclosures Are Found to Change Financial Behavior
- Diesel fumes are found to cause cancer, N.J. residents at high risk
- Many related organisms are found to have the same enzymes and hormones
- Babies raised among dogs are found to be healthier study says
- The earliest inhabitants of North America were thought to have come across a bridge of land thousands of years ago from what continent?
- Immigrants will be expected to speak English and champion British culture
- Some of the oldest rocks ever found have been estimated to be about 3.9 billion years old

ORACIONES CONDICIONALES

TIPO I (condicionales reales – presente y futuro)

*Son oraciones donde se expresa la **posibilidad cierta** de que algo suceda si se da o se cumple la condición expresada. O sea que la oración consta de dos partes: Una condición que expresa una situación posible, y una predicción o resultado, también posible.*

- ***La condición** se expresa en algún tiempo presente (simple, continuo, perfecto, o modal) y va precedida por el conector **IF (Si...).***
- ***El resultado o predicción** se expresa generalmente en algún tiempo futuro. También se puede usar un tiempo presente (condicional tipo O) o imperativos o modales (tipo Mixto)*

If you know the temperature, you will calculate the results.
, you calculate
, you can calculate
, you will be able to
, calculate

1. **If** they do not trust the government, they may be afraid to invest their capital in the country.
2. **If** they are not properly lubricated, metal parts have to be replaced.
3. **If** the mechanism is operating improperly, you must report this to the supervisor.
4. If the motor can´t be spared from service, the cleaning operation will have to be made "in situ"

TIPO II (condicionales hipotéticas – presente y futuro)

Son oraciones donde se expresa una posibilidad remota de que algo sucediera si se cumpliera la condición expresada. La condición no es una situación real sino hipotética. En muchos casos la frase continúa con un "pero..."seguido de la situación real, que se contrapone a la hipotética.

- ***La condición** se expresa en pasado simple (para indicar distanciamiento de lo real) y se traduce como subjuntivo pasado en español: -ara, -iera, -ase, -iese. **Si bien el verbo está en pasado, la referencia temporal es presente: situación hipotética presente.***
- ***El resultado** se expresa generalmente en condicional con el auxiliar **would** o modales condicionales **should, might, could**, (para indicar alejamiento de un resultado real).*

If we knew the temperature, we would calculate the results. But ...
could calculate
might calculate
would be able to calculate
would have to calculate

5. ... nuclear energy is very polluting and dangerous. **If** there was a slight error, it would lead to tremendous damage to the environment and destruction of human life.
6. **If** a crack were found, the material should be checked.

TIPO III (condicionales hipotéticas en pasado)

Son oraciones donde se expresa la posibilidad de que algo habría sucedido en el pasado si se hubiesen dado, o se hubiesen cumplido ciertas condiciones, que en la realidad no se cumplieron.

- ***La condición** se expresa en pasado perfecto, para indicar distanciamiento de la realidad y referencia al pasado, y se traduce en subjuntivo pluscuamperfecto (hubiera/hubiese)*
- ***El resultado** se expresa en condicional perfecto, para indicar aquello que habría sucedido si la condición se hubiese dado.*

If we had known the temperature, we would have calculated the results. But ...
could have calculated
might have calculated
might have been able to calculate
would have had to calculate

7. Expansion of the use of computer technology throughout the country would certainly not have reached its current proportions **if** Hong Kong had not developed its own facilities...
8. If the atom had had a net positive charge, it would have been ionized.
9. The equipment would have lasted longer, if the maintenance had been more efficient.
10. The results would not have been uncertain if the specified instructions had been followed.

Automotive Power

A Case Study in Energy Relations

The power requirements of a gasoline-powered automobile are an important and practical example of the concepts in Chapter 6. **If** roads **were** flat and frictionless and air resistance **didn't exist**, there **would be** no need for an automobile to have an engine. All you'**d need t**o go for a drive **would be** a few strong friends to give you a push to get started and a few other friends at your destination to stop you.
(Steering on frictionless roads **would be** a problem, though.)

In the real world, however**, if** a moving car **doesn´t have** an engine, it **slows** down because of forces that resist its motion. The engine's function is to continuously provide power to overcome this resistance. So, **if** we **want to understand** how much power is required from a car's engine, we **must analyze** the forces that act on the car.
Two forces oppose the motion of an automobile: rolling friction and air resistance...

If the temperature **is** too high or too low, the operating time of the battery **will become** shorter. **If** you drop the battery accidentally, **check t**o see if the body of the battery and the terminals are damaged.

C. PRODUCING OIL AND GAS

If it appears that a well has located commercial quantities of oil or gas, the drilling crew places a continuous *string* of production-casing pipe (thirty-foot lengths screwed together) in the hole.

Oil and Gas Law in a Nutshell. 5th Edition by John S. Lowe

If the natural pressure within the rocks is high, the pressure will force oil to flow to the surface. If the pressure is low, the well owner will install pumping equipment to lift the oil to the surface; generally the familiar "horsehead" pumping jack is required. Gas will normally flow, controlled by a system of valves and gauges at the top of the well called a "Christmas tree."

CONDICIONALES ESPECIALES

*Llamamos **condicionales especiales** a todas aquellas oraciones donde, si bien aparecen las funciones de **condición y resultado** similares a las ya estudiadas en **condicionales tipos I, II y III**, se diferencian de aquellas ya sea por utilizar una palabra introductoria de la condición que **no es "if**", o por tener una estructura diferenciada en cuanto al orden en el que aparecen las palabras **(inversión verbo+ sujeto**)*

conectores distintos de "if"	
as long as	si, mientras, siempre que
but for	si no fuera por, si no hubiese sido por
in case	en caso de que
in the event	en caso de que
only if	si, sólo si
unless	a menos que
provided (conector en posición inicial)	si, siempre que
providing (conector en posición inicial)	si, siempre que
since	puesto que, dado que,
suppose/supposing	suponiendo que , supongamos que
whether	si, ya sea
inversión	
should	si, en caso de, si acaso, si llegara/n a (II)
were + inversión + to infinitive (posición inicial)	si + subjuntivo (tipo II)
had + inversión (posición inicial)	si (tipo III)

Whether (= if) - Si **Whether or not - si...o ...no** **ya sea que...o...no**	I don´t know **whether** the configuration was applied properly. **Whether or not** this configuration is applied properly, it will work. **Whether** this configuration is applied properly **or not**, it will work.
Unless - A menos que **= if not** (Nexo con significado negativo)	Unless this configuration is applied properly, it won´t work.
Even if - Aún cuando **Incluso si** **Aunque** (Nexo cuyo resultado no se basa en la condición)	Even if this configuration is applied properly, it won´t work.
• **Only if - Sólo si** • **As long as - Siempre que** • **Provided (that) - Siempre que** • **Providing (that) – Siempre que** • **On the condition that – A condición de que** (Nexos de condiciones necesarias)	Only if / as long as/ Provided that/ Providing that/ On the condition that /this configuration is applied properly, it will work.
• **But for + noun - de no ser por si no hubiera sido por…** (Nexo negativo de condición necesaria)	But for the use of this configuration, the system would have never worked.
In case (that) - en caso de que, por si **Assuming (that) suponiendo que** **Supposing (that) - suponiendo que** (Nexos de condiciones imaginarias)	Assuming that the configuration is applied properly, it will work.
As if - Como si (Nexo de condición hipotética)	Let´s continue **as if** the configuration had been applied properly.
Con Inversión:	
Condicional sin nexo y con inversión SHOULD **(si, en caso de que)**	Should the product be defective, you may contact our helpdesk. **If** the product **is** defective, you… **If** the product **were** defective…
Condicional sin nexo y con inversión WERE **(oración hipotética - presente)**	Were the product defective, you may contact our helpdesk. If the product were defective, you…
Condicional sin nexo y con inversión HAD **(oración hipotética – pasado)**	Had the product been defective, you might have contacted our helpdesk, but … If the product had been defective, you might have contacted our helpdesk, but… Hadn´t the product been defective, you might have never contacted our helpdesk.

Your Philips Warranty
In case your Philip product is not working correctly, please contact first our helpdesk to assist you. **If** the helpdesk concludes with you that the product is defective, contact your Philip Dealer where you bought the product.
In the event you require service while in another country, or you cannot contact the dealer where you bought the product, contact our helpdesk for support to solve the problem.
Should you come across any more difficulty during installation or use, before you contact Philip technical support, please prepare the following information so that we could solve your problem more quickly.

1. **Had** businesses not deployed mobile applications, they would have never gained competitive advantage.
2. **Providing** the devices have an easy-to-use interface, the use of the different applications will be successful.
3. **Were** the engineers to design a complete usability test, they would have to foresee all the possible situations of the applications use.
4. Finally, we should remark that two complex numbers are equal ***if and only if*** the real parts are equal and the imaginary parts are equal. This is equivalent to stating that two complex numbers are equal **only if** their magnitudes are equal and their arguments are equal.
5. Definition: The Norton equivalent current is equal to the short-circuit current that would flow **were** the load replaced by a short circuit.
6. **Since** these three subcircuits are in parallel, the same voltage will appear across each of them.
7. Note that this method is also useful for circuits containing a larger number of elements, **provided that** we can represent these circuits by their equivalents, with the diode appearing as the load.
8. The buzzer also sounds **when** the key is not turned but the lights are on. In addition, the car will not start **unless** the key is in the ignition, the car is in park, and all doors are closed and seat belts fastened. Design a logic circuit that takes all of the inputs listed and sounds the buzzer and starts the car **when** appropriate.
9. It is virtually impossible to specify what the best motor would be, **unless** the application and its environment are clearly specified.
10. **Unless** otherwise specified, the fermentation medium consisted of (l-1): 12 g sucrose, 0.1 g KH2PO4, 0.5 ml corn steep liquor (nitrogen content 47 mg ml-1), 0.5 g urea, 0.1 g NaCl and 0.2 g MgSO4_7H2O. The initial pH of all media was adjusted to 7.8.
11. **Since** the actuator rotates the valve diverter which redirects the flow of water, it is imperative that the seals and the O-rings within the valve body be lubricated often (at least every *three (3) months*).
12. Check **whether** the load is within the permitted range.
13. This procedure allows for a safety factor should the mud density increase slightly.

TRADUCCIONES CON "SE"

1. **Pasivas con "se" (pasiva común sin "by"**
   1. A similar molding made of untreated material should be used.

2. **Pasiva con "se" al final de una oración**
   2. Several methods of determining moisture content have been developed.
   3. By choosing your operating time with care, even greater distances can be reached.
   4. In that case, special materials that have little or no change in resistance over a wide temperature range are used.

3. **Pasivas especiales (pasiva + to infinitive)**
   5. These effects were supposed to have appeared previously.
   6. Conductors are said to offer a low resistance to the flow of current.
   7. This phenomenon was found to occur in ferrous metals.
   8. The sun and moon were believed to move in circles.
   9. As fluid approaches the pump suction, it is assumed to have very little to no rotational velocity. Note: Prerotation of fluid in suction piping can andoften does exist, but will be disregarded in this discussion.

4. **Voz pasiva con elipsis e -ing con elipsis.**

   10. **When getting ready** to leave, the firemen were called for an emergency.
   11. **When used** in construction, these materials provide elasticity to the building.
   12. This is the eclipse **as observed** just before the beginning of the annular phase.
   13. In his investigations **already mentioned** on the consistency of the quantum theoretical methods, Heisenberg has given this relation.
   14. Besides the formula **already mentioned** for benzene, several others have been proposed.
   15. **As shown** in Fig. 1, the process can be repeated and a further section of the same group of cells obtained.
   16. The lowest resistance observed was '420 **when working** through 10 ohms.
   17. **If working** under standard conditions **one** might expect standard results.

5. **Pasivas con sujeto consciente o animado**

   18. **A hundred and thirty two scientists were given** grants enabling them to attend twenty-nine different international scientific meetings and also, during the course of the project, **more than a hundred developing country scientists were given** advanced training.

   19. **Washington Programme officers at the US National Science Foundation (NSF) have been told** to stop using their influence with principal investigators to negotiate down the size of research grants.

6. Frases verbales pasivas con significado específico:

make use of	Usar/aprovechar	be made use of	hacer**se** uso de
make allowance for	tener en cuenta	be made allowance	tenerse en cuenta
account for	explicar	be accounted for	explicar**se**
take care of	tener cuidado/cuidar	care should be taken	debe cuidarse que/ + debe tenerse cuidado de que + subjuntivo
take account of	tener en cuenta	account should be taken	debe tenerse en cuenta

20. This important fact **was made use of** in the operation of the mechanisms.
21. **Care should be take**n that the temperature does not exceed 80ºC.
22. **Allowance must be made** for the possibilities of heavy peak loads.
23. **No allowance** has been made for age, differences in diameter, or any abnormal condition of interior surface.
24. Considering first the chemistry involved, **account must be taken of** the effects of the reactants on the metal.
25. The useful work of the unit **is accounted for** by displacement of the oil.
26. Some machines have adjustable angle drive systems that can be changed **to account for** various process conditions.
27. No information has been published that **accounts for** all variables.
28. The problem with this equation is that it fails to **account for** other rheological variables.
29. All practical formulae for the flow of fluids are derived from Bernoulli's theorem, with modifications from empirical studies **to account for** losses due to friction.

7. Verbos intransitivos y transitivos sin objeto directo que deben traducirse con "se"

30. The sun and moon both **rise** in the east and **set** in the west.
31. The more heat, the faster ice **melts**.
32. Which frozen liquid **melts** the fastest?
33. Most structural alloys **corrode** merely from exposure to moisture in the air.
34. Zinc **dissolves** in salt water.
35. A suspension is different from a solution. The solid particles **have not dissolved** but are suspended in the liquid.
36. A solid **dissolves** in a liquid when it **mixes** completely with the liquid.
37. If a substance is soluble in water, then we can show it **dissolving.**
38. You see streamers of color **precipitate** downward through the water.
39. Why does stainless steel **corrode?**
40. These substances **separate** when dissolved in water.

8. Acciones reflejas (-self /-selves) y recíprocas (each other, one another) y "together"

41. Any two bar magnets placed near each other will try to **align themselves** head-to-tail.
42. These programs **protect each other** from viruses.
43. These programs **protect one another** from viruses.
44. Like poles **repel each other**.
45. This article is about the alteration of the note of railway whistles in trains **meeting each other.**
46. All developing countries have no option but to increase their investment in science if they want **to lift themselves** above the pile of underdeveloped nations.

47. Many mathematicians **feel themselves** perceived as unable to conduct the simplest practical task, unfashionably attired, nerdy and isolated from the world.
48. The article explains how plants **maintain themselves** in the struggle for existence.
49. We propose a way to stimulate the Earth's capacity **to cure itself**, as an emergency treatment for the pathology of global warming.
50. The land **exhausts itself** very rapidly after growing soya bean two running years.
51. New techniques from molecular neuroscience are beginning to give us a glimpse of how the visual system **is put together**.
52. A warehouse is a central database where data from many different sources are **brought together** on one physical site.
53. The lines are coated and insulated from **each other.**
54. You cannot solder nichrome wires to each other or to other types of wire.

9. <u>Verbos become - get - go - grow y make+objeto - seguidos de participio pasado o adjetivo</u>

Cuando estos verbos van seguidos del **participio pasado** de otro verbo, o **de un adjetivo**, son indicaciones de un proceso de transformación, y deben traducirse como ***volverse*** aquello que se indica en el adjetivo o participio**,** o, si fuera posible, debe transformarse el adjetivo o participio en verbo y traducirse con "se".
Cuando el verbo ***make*** va seguido de un adjetivo, o de un objeto directo más adjetivo, sigue el mismo patrón y se traduce como ***volver,*** pero ***sin*** la partícula ***se.***

55. A significant fraction of the hormone molecules that **bind** to cells **become linked** to their receptors.
56. The difficulties with corrosion **become greater** as the temperature is raised.
57. Questions about the nature of the new coronavirus will be answered within days, when virologists **get hold** of the complete genetic sequence now being generated at the CDC.
58. The response to the second stimulus could **get larger or smaller** than to the first depending on the device.
59. The engineers **got interested** in how to handle this new device.
60. This well-produced book is a 'must buy' for anyone wanting to **get started** in this field.
61. Too much silicon makes the core brittle and difficult to machine into the desired shape.
62. Highly inhibitive WBMs, such as PHPA/glycol in a 20 to 25%msolution of NaCl, can remove water from the cuttings, but the cuttings may actually **get stickier**, depending on how wet they were when generated.
63. The usual procedure is to start with coarser-mesh screens in the fast drilling, larger holes near the top of the well and to ''screen down'' to finer screens as the well **gets deeper.** Finer screens can be used when the drilling rate decreases.
64. As holes **get larger and deeper**, the surges **become larger and more violent.**
65. Other natural environments may **make** <u>burial</u> **difficult or impossible**.
66. The net cost of improper care will probably **make** <u>the decision</u> **very costly.**

10. <u>Usos impersonales de YOU y ONE</u>

67. **One** can anticipate the content of the text by reading its title.
68. **One** may ask why this technique has been adopted so late.
69. **You** must be careful when working with statistics.

5.4 Assembly of Valve
Before proceeding with the mounting of a valve onto an actuator **make sure** that the actuator operates in the desired direction of rotation and both actuator / valve are correctly orientated.
Important: When using a spring return actuator for a fail safe operation, ensure that when air or electricity failure occur the direction of rotation is correct for your application.
_ Fit the valve (5) onto the actuator (3). **Ensure that** the actuator is in normal position (closed position).

ELLIPSIS

Se llama elipsis a la eliminación o elisión de algunos elementos de la oración cuando están sobreentendidos. Deben tenerse en cuenta los elementos elididos para hacer la traducción.

Por lo general lo que se elimina es :

- **el verbo to be** como parte de tiempos continuos y perfectos, en oraciones en voz activa y pasiva. (en estos casos lo que permanece en la oración es el verbo principal con –ing, o el participio pasado. Decidir el tiempo verbal según el contexto)
- **el sujeto** (recordar que el pronombre eliminado siempre es igual al de la oración en la que se ha producida la elipsis, o la más cercana a ella)
- **los pronombres relativos** : which, who, that, where (traducir según el contexto)
- Se puede encontrar el conector **(if, as, when, while, though, unless, whether, etc**,) seguido de la forma **–ing o del participio pasado**, habiéndose omitido el sujeto y el verbo to be (it is, it was, they are, they were)

Ejemplos de casos de expresiones elípticas:

If necessary	While working
If possible	Done, work will go on…
As indicated	Unless otherwise said…
As above shown	Once obtained…
As said	After tested, the results…
As stated	Regarding the results…
	Related to this…

While testing the inflammable properties of the explosive mixture of air and coal-gas **proceeding** from the mouth of an unlighted Bunsen-burner, and **observing** its flame kindle and flashing back along a glass tube, it occurred to one of the students and to the chemical demonstrator, Mr. Haigh, to check the flame in its descent by inserting a piece of wire-gauze in the tube. **On reaching** the wire-gauze the flame rested there, **as expected**.

1. It should be remembered that we are not able to determine the lines very accurately, there being a possible error of 0-005, **as previously stated**.
2. Impressive solar-to-electrical energy conversion efficiencies have been achieved with such films **when used** in conjunction with liquid electrolytes.
3. In fact, **as first indicated**, the so-called 'high-velocity' stars which describe highly elongated elliptic trajectories around the galactic centre seem to possess rather different physical characteristics **as compared with** the 'ordinary' stars predominating in the neighbourhood of our sun and moving along regular, almost circular, orbits.
4. The nature of the X-rays was finally determined when**, aided** by Planck's theory of radiation, Prof, von Laue was able to show that X-rays could be diffracted.
5. To determine the forces that may be released in earthquakes is a complicated process, even **when aided** by satellites of the Global Positioning System.
6. The main advantage of land application is that, **if done** right, the waste is incorporated into the land and the land can be returned to its original status (e.g., for growing crops).
7. '**When in doubt**, leave out'

VERBO CON PREPOSICIÓN, ADVERBIO o ADJETIVO

Abrade	Raer, raspar	call at	ir a, parar en
Apply	Aplicar-aplicarse	call away/off	cancelar,ordenar
Attract	Atraer	call back	revocar
be back	estar de vuelta	call for	necesitar, demandar
be down	estar escrito	call forth	hacer salir, sacar
be in for	estar expuesto a	call in	pedir, llamar
be off	estar apagado, salir	call on	visitar
be out	no ser considerado	call out	gritar
be out of sth	no tener más	call up	citar, convocar
be over	terminar	carry away	llevarse
be up	estar levantado	carry back	devolver
be up to	estar dispuesto a	carry off	alzar, retirar
Bend	Doblar, torcer	carry on	proseguir
Blow	Soplar	carry out	ejecutar, llevar a cabo
Boil	Hervir	carry over	pasar a otra página
Bore	Perforar	carry through	llevar a cabo,
break away	soltarse, escapar	Cast	Vaciar, moldear
break down	romperse, averiarse	Connect	Conectar
break from	desprenderse	Cool off	Enfriar
break in	forzar, intervenir	come about	ocurrir, efectuarse
break off	separar, cortar,cesar	come along	caminar, venir
break out	escapar, comenzar	come back	volver
break thorugh	superar, atravesar	come by	pasar por
Break out	Desenroscar	come down	bajar, descender
Break up	Desmenuzar,terminar	come for	venir a buscar
Brick up	Enladrillar	come from	proceder, provenir
bring about	efectuar	come in	entrar
bring away	llevarse algo	come near	acercarse
bring back	devolver	come on	avanzar
bring close/near	acercar	come out	publicar
bring down	bajar	come over	venir, cruzar
bring forth	producir	Cut	Cortar, labrar
bring in	introducir	cut away	recortar
bring off	lograr, llevar a cabo	Cut down	Rebajar, reducir
bring on	llevar, acarrear	Cut in	Conectar, introducir
bring out	demostrar	cut off	quitar, amputar
bring up	educar, criar	cut open	abrir cortando
bring over	persuadir	cut out	eliminar, desconectar
Buck up	Contrarremachar	cut short	interrumpir
Burn out	Quemarse	cut up	cortar, despedazar

Deal	Distribuir	get up	preparar, levantarse
Displace	Desalojar	get through	terminar
Dissolve	Disolver	get to	llegar a
Do away with	Deshacerse de		
do for	servir, bastar para	give back	devolver
do over	hacer de nuevo	give in	rendirse
do with	poder con, arreglarse	give off	echar, despedir
do without	arreglarse sin	give out	publicar, faltar
Draw	Tirar, sacar, dibujar	give over	entregar, abandonar
draw away	quitar, llevarse	give up	renunciar
draw back	retroceder	go across	cruzar
draw in	atraer	go against	oponerse
Draw off	Decantar, sacar	go along	seguir
draw out	sacar	go back	retroceder
draw over	persuadir	go by	pasar por alto
draw up	parar	go down	bajar
Dry up	Secar, deshidratarse		
Drill	Taladrar	go forward	adelantar
Drive	Mover, accionar	go in	entrar
Drive in	Martillar	go into	participar
Evaporate	Evaporar	go off	explotar
Experiment	Experimentar	go through	discutir en detalle
Fall	caer	go to	dirigirse a
Fall back	retroceder, retirarse	go up	incrementar, subir
fall down	caerse	Guild	construir
fall in	caer adentro	hold	sostener/sostenerse
fall off	disminuir, decaer	keep away	mantener alejado
fall out	suceder	keep back	guardar
Fasten	Asegurar, atar	keep down	decrecer,sujetar
File	Limar, registrar	keep in	mantener, sostener
Filter	Filtrar	keep off	no entrar, no tocar
Fit	Ajustar, proveer	keep on	continuar, seguir
Fit out	Equipar	keep to	adherirse
Fit up	Bulonar	keep up	mantenerse firme
Flow	Fluir	keep up with	ir parejo,a igual ritmo
Flow back	Refluir	Knock down	Desmontar, voltear
Forge	Forjar, fraguar	Lay out	Proyectar
Frame	Armar, componer	let	permitir
get at	llegar, alcanzar	let down	dejar caer
get back	recobrar	let in	dejar entrar
get down	descender	Let in	Empotrar
get into/in	entrar	let off	explotar, dejar ir
get off	salir, sacar	let on	revelar un secreto
get on	progresar	let up	relajarse, disminuir
get out	desaparecer	Light	Quitar la presión
get out of	salir de, evitar	Line in	Alinear

get over	recuperarse	look after	cuidar
look at	mirar	stand back	retroceder
look for	buscar	stand by	estar inactivo, listo
look forward	prever, esperar	stand for	representar,
look like	parecerse	stand forth	adelantarse
look on	considerar	stand off	mantenerse a distancia
look out	cuidarse	stand out	mantenerse firme,destacar
look to	atender a,	stand to	no abandonar, seguir
look through	examinar	stand up	levantarse
look up	averiguar, consultar	stand up for	enfrentar
look upon	considerar	Take apart	Desarmar (una máq)
make again	rehacer	take away	quitar, sacar, llevarse
make of	deducir	take back	devolver, llevar a
make off	irse	take from	restar, sustraer
make out	discernir	take in	engañar, dar ingreso
make over	transferir	take off	despegar, sacarse
make up	completar, inventar	take on	prometer, asumir,
put away	apartar, poner aparte	take out	sacar, llevar, quitar
put back	guardar, atrasar	take to	comenzar a, dedicarse
put down	bajar, reprimir	take up	levantar,admitir,ocupar
put in	introducir	Temper	Templar
put off	posponer, diferir	Test	Probar, ensayar
put out	extinguir, despedir	Thin out	Entresacar, reducir
put over	dilatar,llevar a cabo	Throw out	Desengranar
put to	agregar, añadir	Top out	Coronar, rematar
put up	poner en su lugar	Trim off	Recortar
put up with	tolerar	Trim up	Adornar, componer
run across	atravesar, hallar	Tune in	sintonizar
run after	buscar	turn away	desviar, echar
run down	parar, extenuar	turn back	volver
run on	continuar	turn down	declinar,rechazar,doblar
run out	agotar, desperdiciar	turn into	convertir en, cambiar
run out of	quedarse sin algo	turn off	apagar
run over	hojear, repasar	turn on	prender
run through	examinar	turn out	resultar
run up	incurrir, sumar	Turn over	Volcar, transferir
Saw	Serrar, serruchar	turn to	comenzar, transformar
Scrape off	Quitar raspando	Turn off	Desconectar
Screw down	Atornillar	Wrap up	Arrollar, envolver
Seat	Ajustar (válv.)	Wind off	desenrollar
Set up	armar	Wind up	Devanar
Sharpen	Afilar, amolar	Wreathe	Enroscar
Shield	proteger	Wriggle out	Deslizarse
Shut down	Parar, cesar	Wear away	Consumirse
Shut off	Cortar	Wear off/out	Gastarse, borrarse
Slot	Acanalar	Wedge	Acuñar, calzar
Smooth	Alisar, aplanar	Weld	Soldar, unir
Spread out	Extender distribuir	Whitewash	Blanquear

1. Keep shale shakers well maintained, and never bypass them.
2. Install a removable screen over the suction to keep out large solids and trash.
3. The surface system needs to have the capability to keep up with the volume-building needs while drilling; otherwise, advanced planning and premixing of reserve mud should be considered
4. The main drawback has been the slow and tedious process to change requirements to keep up with technology.
5. If the rig cannot mix drilling fluid fast enough to keep up with these losses, reserve mud and or premixed drilling fluid should be available to blend into the active system to maintain the proper volume.
6. Screen blinding occurs when grains of solids being screened find a hole inthe screen just large enough to get stuck in.
7. Now there is better control over what gets into the pit.
8. Suspended solids make up the wall cake; dissolved solids remain in the filtrate.
9. Agitation will also help in the removal of gas, if any is present, by moving the gaseous drilling fluid to the surface of the tank, providing an opportunity for the gas to break out.
10. All the wells were dried up by the long drought.
11. Well workers could not put up with salary cuts.
12. Storing operations are difficult to carry out if you cannot handle the machine.
13. They have developed a product to do away with rust.
14. After the oil overflows a weir or plate inside the tank, it is pumped away.
15. A pipe on the top carries the gas away.
16. With the pump shut down, remove the hopper and valve from the tee.
17. When the first mud cleaners were introduced into the field, they had to be shut off during weight-up.
18. Since fluid will naturally flow in the direction of least resistance, it will tend to flow back (recirculate) toward the suction inlet, where fluid entering the impeller is at a relatively low head.

EL SUBJUNTIVO

- **subjuntivo propiamente dicho**
- **en oraciones condicionales**
- **con "it" y "there" introductorios**
- **con verbos especiales**
- **en causativos**
- **en imperativos**
- **en pasivas especiales**
- **en cláusulas temporales**

Significado de los verbos en modo subjuntivo:

El hablante usa estas formas verbales para referirse a procesos o acciones que **no son reales** (no se pueden ubicar en la línea del tiempo -pasado, presente, futuro-) sino **virtuales y subjetivas**; que existen en su pensamiento a modo de:

DESEO, DUDA, HIPÓTESIS, POSIBILIDAD, TEMOR, NECESIDAD, o CREENCIA

Desde el punto de vista sintáctico, el subjuntivo aparece en un verbo adjunto al verbo principal o a una frase principal cuando éstos expresan una acción dudosa, hipotética, posible, necesaria o deseada. (Por ejemplo en la oración *Espero que llegues a tiempo* el verbo *llegar* está en subjuntivo (*llegues*) y acompaña al verbo de la frase principal *esperar*, que está en modo indicativo, tiempo presente (*espero)*

Subjuntivo en español:

Presente **Verbo AMAR**	**Verbo TEMER**	**Verbo PARTIR**	**Verbo SER**
que yo ame	que yo tema	que yo parta	que yo sea
que tú ames / que vos ames	que tú temas / que vos temas	que tú partas/ que vos partas	que tú seas / que vos seas
que él ame	que él tema	que él parta	que él sea
que nosotros amemos	que nosotros temamos	que nosotros partamos	que nosotros seamos
que ustedes amen	que ustedes teman	que ustedes partan	que ustedes sean
que vosotros améis	que vosotros temáis	que vosotros partáis	que vosotros seáis
que ellos amen	que ellos teman	que ellos partan	que ellos sean
Imperfecto (pasado) **Verbo AMAR**	**Verbo TEMER**	**Verbo PARTIR**	**Verbo SER**
que yo amara /amase	que yo temiera /temiese	que yo partiera/partiese	que yo fuera/fuese
que tú/ que vos amaras /amases	que tu temieras/ temieses	que tú / que vos partieras/partieses	que tú/vos fueras/fueses
que él amara/ amase	que él temiera /temiese	que él partiera/partiese	que él fuera/ese
que nosotros amáramos/amásemos	que nosotros temiéramos/temiésemos	que nos partiéramos/partiésemos	que nosotros fuéramos/fuésemos
que ustedes amaran/amasen	que ustedes temieran o temiesen	que ustedes partieran/partiesen	que ustedes fueran/fuesen
que vosotros amarais/amaseis	que vosotros temierais o temieseis	que vosotros partiérais/partiéseis	que vosotros fuerais/fueren
que ellos amaran /amasen	que ellos temieran/ temiesen	que ellos partieran/partiesen	que ellos fueran/fuesen

Tiempos compuestos: **Perfecto de subjuntivo** **Verbo AMAR** Que (aunque) yo haya amado hayas amado haya amado hayamos amado que ustedes hayan amado hayáis amado que ellos hayan amado	**Verbo TEMER** Que (aunque) yo haya temido hayas temido haya temido hayamos temido hayan amado hayáis temido hayan temido	**Verbo PARTIR** Que (aunque) yo haya partido hayas partido haya partido hayamos partido que ustedes hayan partido hayáis partido que ellos hayan partido	**Verbo SER** que (aunque) yo haya sido hayas sido haya sido hayamos sido que ustedes hayan sido hayáis sido que ellos hayan sido
Pluscuamperfecto de subjuntivo **Verbo AMAR** que(aunque) yo hubiera/-ese amado hubieras/-eses amado hubiera/-ese amado hubiéramos/-ésemos amado que ustedes hubieran/-sen amado hubierais/-seis amado hubieran/-esen amado	**Verbo TEMER** Yo hubiera/ese temido hubieras/eses temido hubiera /ese temido hubiéramos/esemos temido que ustedes hubieran/-esen temido hubierais/eseis temido hubieran/esen temido	**Verbo PARTIR** que(aunque) yo hubiera/-ese partido hubieras/-eses partido hubiera/-ese partido hubiéramos/-ésemos partido que ustedes hubieran/-sen partido hubierais/-seis partido hubieran/-esen partido	**Verbo SER** que yo hubiera/-ese sido hubieras/-eses sido hubiera/-ese sido hubiéramos/-ésemos sido que ustedes hubieran/-sen sido hubierais/-seis sido hubieran/-esen sido

1. **Frases hechas con expresión de deseo** (Forma básica del verbo)

   "God **save** the Queen"
   "Heaven **forbid**"
   "Long **live** the king"
   "God **bless** you my son"
   "If he wants to waste his money on that, then so **be** it!

2. **Expresiones de deseo con "wish"(+pasado o condicional)**
   1. I wish she **were** an expert on the subject.
   2. I wish you **were** here.
   3. He wishes the product **were** cheaper.
   4. I wish it **wasn't raining**.
   5. I wish **I didn't have to** go to work tomorrow
   6. I just wish those people **would go** somewhere else.

3. **Oraciones con verbos de pensamiento o de habla que a su vez proyectan una cláusula que requiere "que" en castellano.**

procesos mentales:

- **de conocimiento** como ***know*** (saber) ***think*** (pensar), ***understand*** (entender) ***believe*** (creer) ***doubt*** (dudar) ***remember*** (recordar) ***forget*** (olvidar), ***wonder*** (preguntarse)
- **de volición** como ***want*** (querer) ***need*** (necesitar) ***intend*** (tener la intención de) ***desire*** (desear) ***hope*** (esperar) ***wish*** (desear), ***would like*** (desear) ***realize (***darse cuenta)
- **de percepción** como ***see*** (ver) ***hear*** (oir) ***notice*** (percibir, notar) ***feel*** (sentir) ***taste***

(percibir el sabor) ***smell*** (percibir el olor) Cuando estos verbos son negativos, van seguidos de subjuntivo.

- **de afecto** como ***like*** (gustar), ***love*** (amar) ***admire*** (admirar) ***miss*** (extrañar) ***fear*** (temer) ***hate (***odiar) ***appreciate*** (apreciar) ***prefer*** (preferir) ***annoy*** (molestar) ***puzzle*** (desconcertar)

procesos verbales (de decir)

- ***say*** (decir) ***tell*** (contar) ***ask*** (preguntar, pedir) ***request*** (pedir, solicitar) ***reply*** (responder) ***suggest*** (sugerir) ***warn*** (advertir***) explain*** (explicar) ***propose*** (proponer)

Uso de should: A veces se utiliza la forma ***should*** que en este uso no debe traducirse como modal, sino simplemente debe traducirse el verbo que le sigue en subjuntivo.

En estas oraciones uno de los participantes, generalmente el sujeto, es aquel que realiza el proceso de pensar, sentir o decir, y va seguido de otra cláusula que contiene aquello que se piensa, se recuerda, se dice, se pide o se ordena.

A veces en la segunda cláusula también aparece la persona gramatical a la que se le pide, ordena, recuerda o advierte algo.

En castellano las dos partes de la oración se conectan con ***"que"*** seguido de ***subjuntivo presente o pasado.***

a) Subjuntivo con verbo en su forma básica (con o sin *should)*:

1. It was suggested that the government **not raise** taxes at the end of the year.
2. We recommend that every applicant **apply** for the job in person.
3. They recommend that every student **be** here at three.
4. I insist that she **come** immediately.
5. They insist that she **be** here immediately.
6. The Prime Minister insisted that he **be** photographed with the President.
7. He **requests/requested** that I **be** there as soon as possible.
8. Our decision is that the school **remain** closed.
9. The engineer proposes that his decision **be** accepted. **(be: subjuntivo)**

Storage instructions

If the actuators are not immediately used, the following precaution must be taken for storage:
_ Store in a dry environment at ambient temperature.
_ It is recommended that the actuator **be stored** in its original box.
_ Do not remove the plastic plugs on air supply ports.

Safety notice

It is important that the actuator **should only be used** within pressure limits indicated in our technical specifications.
Operating the actuator over pressure limits will damage internal parts as well as cause damage to the housing.
Operating the actuator over or under temperature limits will damage internal and external components.
Operating the actuator in corrosive environments with incorrect protection may damage the internal and external parts.
Isolate all air lines and make sure that actuator air connection **is vented** before installation or servicing of the actuator.

b) Subjuntivo expresado con *to-infinitive*

1. I prefer them **to come round** here every day.
2. They don´t believe him **to have worked** much.
3. She doesn´t believe him **to have been working** much lately.
4. I believe him **to be** an honest man.
5. I don´t believe him **to be** an honest man.
6. They intend us **to be** completely discredited.
7. I don´t want unpleasant words **said** to people.
8. I want you **to remember** to loop the cable over the platform.
9. Could you ask the professor **to bring** the tester?
10. Each one would be requested **to select** an option.
11. The teacher told us **to leave** the exercise undone.
12. The notice warned us against **taking** this path. **(-ing)**

4. **Imperativos:** Después de verbo en imperativo afirmativo o al traducir el verbo en imperativo negativo.

1. "Let me **help** you with that," he offered.
2. **Ensure** that ventilation **is provided**.
3. **Make sure** ventilation **is provided**.
4. **Make certain** that formation fluids are not entering the well bore.
5. **Don´t talk** to her!
6. **Don´t stop** the movement.

5. **Condicionales**

Tipo II (If + pasado simple)	**subjuntivo pasado (ref.presente-futuro)**	**si... –ara/-ase –iera/iese**
Tipo II (were + inversión)	**subjuntivo pasado**	**si... –ara/-ase –iera/iese**
Tipo II (should + inversión)	**subjuntivo pasado**	**si.../ en caso de de/ si acaso/ – ara/ase – iera/iese**
Tipo III (If + pasado perfecto)	**subjuntivo pluscuamperfecto**	**si... hubiera/hubiese ...-ado ido**
Tipo III (sin if – had + inversión)	**subjuntivo pluscuamperfecto**	**si... hubiera/hubiese ...-ado ido**
Tipos II o III (con otros nexos)	**subjuntivo pasado o pluscuamperfecto**	

1. If he **had worked** more, he would have collected more.
2. If we **had been working** all the time, the project would be ready now.
3. **Had** a crack **been found**, the material would have required inspection.
4. **Should** the material **show** any signs of failure, the company would replace it.
5. **Had** the desilters or centrifuges **been fed** by centrifugal pumps, some type of flow meter **would have been required** to accurately determine the feed rate.
6. If a flow meter **were unavailable**, determine the flow rate to the solids control equipment.

6. Verbos que deben traducirse con la palabra "que" seguido de subjuntivo.

keep ...from verbo+ ing **prevent ...from verbo+ing** **restrict…from verbo+ing** **Stop …from verbo+ing**	**Evitar que algo o alguien haga algo**
enable + persona gramatical + to infinitive **allow + persona gramatical+ to infinitive** **let + persona gramatical + infinitivo sin *to***	**permitir que algo o alguien haga algo**
wish + cláusula	**deseo que/ desearía que .../ querría que + subjuntivo / "Ojalá" + subjuntivo**
it is to be wished	**es deseable que .../es de esperarse que…**
be likely to + verbo	**ser posible que/ser probable que + subjuntivo**

1. This problem is likely to **get worse.**
2. There will likely **be** a public plan as a backup for SMEs.
3. These problems are likely to **happen.**
4. I wish he were here.
5. We wish you **to do** it.
6. It is to be wished that our ideas **will be considered** soon.
7. We wish that our ideas **will be considered** soon.
8. I wish **I knew.**
9. Low-molecular-weight (LMW) shale inhibitors (e.g., various amines) serve as clay intercalators and hydration suppressants and **keep** cuttings **from** swelling and dispersing
10. The procedure is convenient because it keeps oil from **being spilled**.
11. The mud cleaner screen **keeps** larger particles **from** entering the system.
12. The excess drilling fluid (2400 bbl) would need to be removed from the drilling-fluid system to keep the pits from overflowing.
13. When a back tank (possum belly), is used, the flowline should enter at the bottom to prevent solids from settling and building up.
14. This device will help **prevent** the shaft **from** bending.
15. After each operation, flush the entire system with clean fluid to **prevent** the mud **from** drying and plugging the system.
16. The use of this device will prevent chemical waste from **settling** inside the pipes.
17. The flowline must have sufficient slope to **prevent** fluid **from** overflowing the bell nipple.
18. Poor solids control not only prevents achieving a good drilling rate, but it also affects hole cleaning.
19. Better drilling fluid properties were required to prevent trouble.
20. Coarse screens **allow** more drilled solids **to pass through.**
21. Sometimes large amounts of oil are encountered, and it is desirable **to allow** some oil **to biodegrade** before mixing with dirt to achieve the final waste/soil mixture.
22. Soil humus adsorbs large amounts of sodium, **allowing** the clay in the soil **to remain** flocculated.
23. The most common practice is to bury the solids in the existing reserve pit after the water **is allowed to evaporate.**
24. This **enables** the chemicals **to** fully **react** with the particles.
25. Google can enable us **to go** faster and farther.
26. One of the primary functions of the drilling fluid is to bring drilled cuttings to the surface in a state that **enables** the drilling-fluid processing equipment **to remove** them with ease. To achieve this end, quick and efficient removal of cuttings is essential.

Since ignition temperature is the temperature at which ignition may occur due to contact with a hot surface, it follows that motor selection must be based on the maximum surface temperature that will never exceed the autoignition temperature of any potentially explosive mixture **likely** to exist. The National Electrical Code mandates that motors be marked to indicate the maximum temperature when they are placed in service with combustible materials.

The IEC classifies hazardous locations into zones according to the probability of a potentially explosive atmosphere occurrence. The degree of danger varies from extreme to rare:

. Zone 0: An explosive gas/air mixture is continuously present or present for long periods of time. No electric motors may be used in these areas.
. Zone 1: An explosive gas/air mixture **is likely to occur** in normal operations.
. Zone 2: An explosive gas/air mixture **is not likely to occur** in normal operations and, if it does occur, will exist for only a short time.

There is some evidence that above 180 rpm, turbulent flow ensues for many fluids. At these high levels, there seems to be little additional benefit to hole cleaning from increasing pipe rotation any further; most likely this is because cuttings beds cannot form in turbulent flow. During sliding, hole cleaning is minimal and cuttings beds are likely to form. Thus, sliding should be kept to a minimum during any drilling operation. Indeed, this is one of the reasons that rotary steerable tools have become popular.

7. Causativos:

Estas oraciones se componen de dos partes: causante o iniciador de la acción + realizador de la acción, y en este contexto, los verbos **cause, make, have y get** se traducen como **hacer que** alguien haga algo, o **hacer que** algo se haga o sea hecho.

cause + persona gramatical+ to infinitive	**hacer que alguien o algo haga algo.**
Get + persona gramatical + to infinitive	
make + persona gramatical + verbo	
have + persona gramatical + participio pasado	**hacer que algo se haga/ hacerse hacer algo**
get + persona gramatical + participio pasado.	

1. This substance causes the reaction **to stop**. (Comparar: This substance causes the reaction)
2. The teacher made the student **explain** the results of the project.
3. Did you make the voltage **fall?**
4. The company had the characteristics of the product improved and the components **modified**.
5. (The company had the characteristics of the product)
6. The company´s refusal has caused the employees **to go** on strike.
7. Flocculation **causes** particles **to join together** to form a loose**,** open network.
8. Clays **would cause** the circulating fluid to thicken, thus increasing the viscosity of the fluid.
9. Application of this centripetal acceleration **causes** heavier particles **to move outward** against the walls of the cone.

10. Elevated temperatures can also destroy direct and invert-emulsion systems and can **cause** gelation in clay-based muds, either of which can negatively affect equipment performance.
11. Drilled solids create poor fluid properties and **cause** many of the costly problems associated with drilling wells.
12. This **makes** the PHPA **appear to be** much more viscous than it really is.
13. Foaming **makes it difficult** to separate gas from liquid. The best practical defoamers are aluminum stearate and alcohol.
14. *Inertia.* Force that **makes** a moving particle **tend to maintain** its direction or a particle at rest to remain at rest.

17.1 INTRODUCTION TO ELECTRICAL THEORY
The properties of electricity are voltage, current, and resistance. Voltage (also known as electromotive force, or emf) is the strength of a circuit that causes current to flow through the resistance in the circuit. It is a force that causes electrons to move from one atom to the next. Voltage is analogous to pressure in the mechanical system.

8. For... to infinitive para indicar propósito

1. The project was too expensive <u>for</u> the company **to accept** it.
2. <u>For a</u> pollution-control strategy **to be considered** by the U.S. Environmental Protection Agency, it must be the most effective and reliable technology available.
3. <u>For t</u>his thesis **to be** applied, the social phenomena involved should be kept constant.
4. This development <u>made it possible</u> **for** the shale shaker **to remove** particles greater in size than API 80_API 80 (177 microns).
5. Agitation will also help in the removal of gas, if any is present, by moving the gaseous drilling fluid to the surface of the tank, providing an opportunity **for** <u>the gas</u> **to break out.**
6. The degasser discharge pit is also the suction pit **for** the centrifugal pump used to pump drilling fluid through the eductor on the degasser.

In most wells, the casing is done in stages called a *casing program* during which the well is drilled, cased, drilled deeper, cased again, drilled deeper, and cased again.

In order for the gas or oil to flow into the well, the casing is shot with explosives to form holes called perforations (Fig. I–10). A long length of narrow diameter steel pipe (tubing) is then suspended down the center of the well. The produced fluids (water, gas, and oil) are brought up the tubing string to the surface to prevent them from touching and corroding the casing that is harder to repair. The tubing is relatively easy to repair during a workover.

Most oil wells, however, do not have enough pressure for the oil to flow to the surface and artificial lift must be used. A common artificial lift system is a sucker-rod pump (Fig. I–11). A downhole pump on the bottom of the tubing string is driven by a beam-pumping unit on the surface. The pump lifts the oil up the tubing to the surface.

Nontechnical Guide to Petroleum Geology, Exploration, Drilling, and Production

9. Frases y conectores que deben traducirse con la palabra "que" seguida de subjuntivo.

Condicionales especiales	
as if	como si + subjuntivo
but for	a no ser por / si no fuera por .../ si no hubiese sido por
even if	aún si / aún cuando / aunque ...
even though	aunque
in case / in the event	en caso de que
provided / providing (that)	siempre que / si
supposing	suponiendo que/ si
unless	a menos que
whether	si... / ya sea que
Otros casos	
once	una vez que...
no matter what	no importa lo que ... + subjuntivo
since	dado que (causa/consecuencia)
so that	de modo tal que
until	hasta que
No matter	No importa lo que, no importa, sin importar
Pronombres , adjetivos o	**adverbios**
whatever	cualquier cosa que ... lo que sea, lo que
whichever	cualquiera que / cualquier cosa que, cualquier, cual sea
whoever	quienquiera que, quien sea,
whenever	cuando sea que
wherever	en cualquier lugar que, donde sea que, donde quiera que

1. Even though he **has worked** well, his contract will not be signed.
2. Whatever problem you **have**, an assistant will help you.
3. Crews need to be alert to torn screens **no matter** what shaker is used.
4. Solids-control systems, **no matter** how good, cannot totally separate the drilling fluid from the drilled cuttings.
5. The damaged part will look **as if** a spoon were used to scoop sections of metal from the part.
6. If the discharge from the mud hopper is routed into a tank that is not stirred properly, a large quantity of commercial materials could settle, **even if** the hopper is properly dispersing and wetting the materials.
7. **Even if** the actual V_s **were** 57% instead of 60%, the low-gravity solids concentration would be 34% volume.
8. Correction factors should be determined and applied **in cases** in which the base liquid contains more than 10,000 ppm salt, or emulsified oil.
9. Underbalanced drilling may be conducted using any type of fluid, **provided that** the hydrostatic column of that fluid is less than formation or pore pressures.
10. These smaller hydrocyclones became known as desilters, **since** they removed solids called silt down to 15 to 30 microns.
11. The desirable effect is to reduce the liquid content of the discarded drilled solids **so that** they can be removed from a location with a dump truck instead of a vacuum truck.

12. Use this procedure to remove a cuttings bed **once** it has formed.
13. **Once** the sample has completely passed through the stack of sieves, dry each sample of solids on each individual sieve.
14. Dumping the back tank into the pits (to clean the screen or for **whatever reason**) is a form of bypassing the shale shaker and should not be done.
15. Then, the contents of the pit can run down the hill and collect in **whatever** is at the bottom.
16. **Whichever** shaker or shakers are used, consideration must be given to providing sufficient safe power to the shaker motors.
17. Replace screens **whenever** necessary.
18. The mud cleaner is effective in removing solids before they grind to smaller size, and should be used **whenever** circulating.

10. Introductor "it"

a) Recordar: introductor "it" + adjetivo+ to infinitive

1. It is advisable to start early.
2. It is fundamental to make an informed decision.
3. For the large jobs, it is advantageous to have some storage (buffer) for generated waste.
4. The aboveground pit is constructed where it is impractical to dig a pit.

b) Introductor "it" seguido de adjetivo + "that" = "que" + cláusula en subj.

Estas oraciones introducen valoraciones (juicios de valor, reacciones emotivas, dudas, desconocimiento o negación sobre lo que sigue)

1. It is imperative that more decisions **are made** by the shareholders.
2. It is probable that the earth **is** just as old as the moon.
3. It is essential that all the mathematical symbols **be** understood.
4. It is almost impossible that they **arrive** on time.
5. Thus **it is** important **that** the burial cell be placed below the rooting zone of future plants.
6. It is imperative that the solids **be** removed from recycled water because they act as a defoamer and tend to interfere with the development of proper recyclable foam.
7. It is imperative that individual lengths align precisely within a section.

c) Introductor "it" seguido de adjetivo + "for"+ persona gramatical + verbo subj.

1. It is essential *for* everyone **to be** informed of the new regulations.
2. It is advisable for the students **to start** early.
3. It is impossible for the shareholders **to make** more decisions.
4. It is possible for companies to permit, own, and operate their own disposal facilities, but it has not been done to date.

11. Introductor "there"

1. There are/were/ will be/ would be/ could be/ must be/ should be new regulations.

There + seem/ appear/ look

2. There seem to be new regulations.
3. There appears to be a new regulation.
4. There seems/ appears/ looks advisable to consider the budget.

El modo subjuntivo en las construcciones impersonales con "there" introductorio.

5. **There need** to be new regulations.
6. **If there were** new regulations, this industry would be flourishing.
7. This company would have flourished **if there had been** new regulations.
8. This company could have flourished **if there could have been** new regulations.
9. If there could have been a clearer recognition that widespread burning of coal pollutes the air, serious consequences for the environment and the climate would have been prevented.

Pipe Rotation

As pipe rotation rate increases, the pipe drags more fluid with it. In deviated wells, this layer of drilling fluid disrupts cuttings beds that have formed around the pipe while lying on the low side of the hole. Step changes appear to be the norm, occurring in most cases at around 85, 120, and 180 rpm. **There is** some evidence that above 180 rpm, turbulent flow ensues for many fluids. At these high levels, **there seems to be** little additional benefit to hole cleaning from increasing pipe rotation any further; most likely this is because cuttings beds cannot form in turbulent flow. During sliding, hole cleaning is minimal and cuttings beds are likely to form. Thus, sliding should be kept to a minimum during any drilling operation. Indeed, this is one of the reasons that rotary steerable tools have become popular.

Drilling Fluids

Drilling Fluids Processing Handbook

12. Pasivas especiales:

be expected to	esperarse que
be permitted to	permitirse que
be allowed to	permitirse que
be asked to	pedírsele que (me, te, le, nos, les)
be requested	pedírsele que (me, te, le, nos, les)
be assumed to	asumirse que / pensarse que

1. The dissolved protein was allowed **to pass** through the membrane.
2. The engineers will be requested **to present** their qualifications.

13. Cláusulas con referencia temporal futura (en un tiempo presente o pasado) introducidas por "when"

1.When he works here, you will notice his ability.
2.When we are working there, you may come and help us.

3. ***All removal compartments, except the sand trap, should be well stirred or agitated to ensure even loading of solids-removal equipment***.
Solids-control equipment works best when the solids loading remains constant. Slugs of large quantity of solids tend to plug the lower discharge opening in desilters. When this occurs, drilled solids will not be removed until the plugged cones are cleaned.

Outlets in the bathroom

The most recent National Electrical Code requires that outlets in the bathroom and other sensitive areas be of the ground fault current interrupt (GFCI) variety; GCFIs are designed to trip more quickly than the standard circuit breaker. The commercial unit of Fig. 4.26 trips in 5 ns.

It has been determined that 6 mA is the maximum level that most individuals can be exposed to for a short period of time without the risk of serious injury. A current higher than 11 mA can cause involuntary muscle contractions that could prevent a person from letting go of the conductor and possibly cause him or her to enter a state of shock.

Higher currents lasting more than a second can cause the heart to go into fibrillation and possibly cause death in a few minutes. The GFCI is able to react as quickly as it does by sensing the difference between the input and output currents to the outlet; the currents should be the same if everything is working properly. An errant path such as through an individual establishes a difference in the two current levels and causes the breaker to trip and disconnect the power source.

Metal- to- metal wear

Properly lubricated metal parts wear slowly, for a film of the lubricant keeps the metals from actually touching. Inadequate lubrication or excessive pressure will allow metal to make contact and then a gall or cold weld may result as one part slides over the other. Two pieces of aluminium may be cold welded by power brushing the surfaces and then pressing or rolling the prepared surfaces together. In a similar manner, a steel part that slides over another steel member may rub off the separating film. With high enough contact pressure, the iron atoms of each surface may get close enough to each other to exert their potential atomic forces of attraction. Frequently the little weld thus formed is strong enough to hold and pull some of the parent metal. This bit of metal will plow into the surface of the other member, picking up more metal, and soon the parts will be keyed or frozen together. If this does not happen, they will certainly be chewed up to the extent that they must be replaced.

Certain combinations of metal gall less readily than others: steel does not gall when working with brass or bronze. In general, hard metals gall less readily than soft ones.

COMPARACIÓN DE ADJETIVOS Y ADVERBIOS

grado positivo (forma base: **1 o 2 sílabas –y -ow**)	grado comparativo (más ... que)	grado superlativo (el más ...)	comparación de igualdad (tan...como)
short	shorter (than...)	the shortest	not /as –so short as
fast	faster (than...)	the fastest	not/as –so fast as
hot	ho**tt**er (than...)	the ho**tt**est	not/as –so hot as
tin**y**	tin**ier** (than...)	the tin**iest**	not/as-so tiny as
narrow	narrower (than...)	the narrowest	not/as-so narrow as

grado positivo (forma base**: 2 o más sílabas**)	grado comparativo (más ... que)	grado superlativo (el más ...)	comparación de igualdad (tan...como)
expensive	more expensive than	the most expensive	not/as-so expensive as
dangerous	more dangerous than	the most dangerous	not/ as-so dangerous as

grado positivo (forma base – **todos)**	grado comparativo **de inferioridad** (menos...que)	grado superlativo **de inferioridad** (el menos..
dangerous	less dangerous (than)	the least dangerous

- *Algunas formas **irregulares:***

grado positivo (forma base)	grado comparativo (más ... que/mejor que)	grado superlativo (el más .../ mejor que)	comparación de igualdad (tan...como)
good (adjetivo) well (adv. de modo)	better (than...)	the best	not/ as-so good as not/ as well as
bad	worse (than)	the worst	not/ as-so bad as
far	farther (than)	the farthest	not/ as far as
much (mucho-a) many (muchos-as)	more (than) más que/ más de	**most + adjetivo:** más, la más, lo más... **most + sustantivo:** la mayoría de, la mayor parte de**…** **most+ adverbio:** muy **most:** lo máximo, lo más	not/ as much as not/ as-so many as
little (adjetivo) pequeño	smaller	the smallest	as/so little as
little / a little (adv.cant.) incontables poco / algo de	less (than) menor/menos de	the least (el/la/lo/menos)	not/ as little as
few/a few(adv.cant.) pocos /algunos (cont)	fewer (than) less (than)	the fewest/the least	as few as

- An American and two Japanese physicists on Tuesday won the Nobel Prize in Physics for their work exploring the hidden symmetries among elementary particles that are **the deepest constituents of nature**.
- Since the tank is **deeper** than 6 feet, flat (turbine) impellers cannot be used; therefore, canted impellers are chosen.

Pour Point

All crude oils contain some paraffin molecules. If the paraffin molecules are 18 carbon atoms or longer in length, they are waxes. Waxes are solid at surface temperature. A crude oil containing a significant amount of wax is called a *waxy crude oil.* In the subsurface reservoir where it is very hot, waxy crude oil occurs as a liquid. As it is being brought up the well, it cools, and the waxes can solidify. This can clog the tubing in the well and flowlines on the surface. The well then has to be shut in for a workover to clean out the wax.

Oil can be as thick and black as tar or as thin as water. Petroleum has a lot of energy. We can turn it into different fuels—like gasoline, kerosene, and heating oil. Most plastics and inks are made from petroleum, too.

Pollution from cars is a big problem in many parts of the country. Oil companies are making cleaner gasoline and other fuels every year.

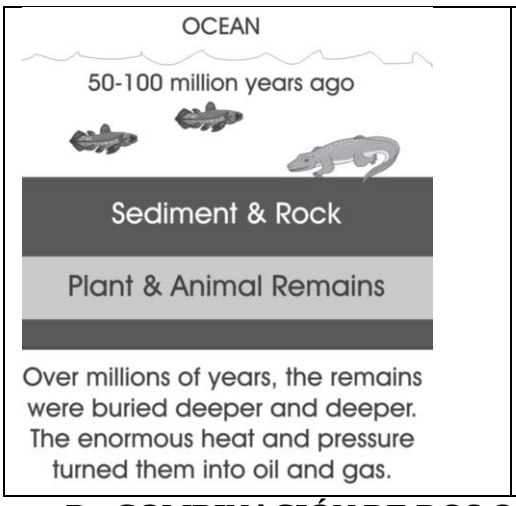
Oil can pollute soil and water, injuring the animals that live in the area. Oil companies work hard to drill and ship oil as safely as possible. They try to clean up any oil that spills.

COMPARATIVOS ESPECIALES

A. REITERACIÓN DEL COMPARATIVO (*comparativo +<u>and</u>+comparativo*)

- Indica: Aumento o disminución gradual.
- Se traduce: ***cada vez más.../menos...***

1. The crack was **getting greater and greater.**
2. Apple's *MacBook* **gets bigger and bigger**.
3. Galileo discovered that the consecutive swings **were getting smaller and smaller** as the pendulum was slowly coming to rest.
4. Equipment changes and improvements have responded to the necessity to treat **more and more expensive** drilling fluids.
5. Microtunneling has become very popular in Europe and is being used **more and more** in the United States.
6. As oil well drilling encountered **more and more difficult conditions**, hole problems finally became undeniably associated with excessive drilled solids.



Properties

The color of crude oil ranges from colorless through greenish-yellow, reddish, and brown to black. In general, the darker the crude oil, the lower the °API. The smell varies from gasoline (sweet crude) to foul (sour crude) to fruity (aromatic crude). Crude oil has a calorific heat value of 18,300 to 19,500 Btu/lb.

Nontechnical Guide to Petroleum Geology, Expl.. by Norman J. Hyne, Norman J. Ph.d Hyne

B. COMBINACIÓN DE DOS O MÁS COMPARATIVOS (*<u>the</u> +comp....+<u>the</u>+comp.)*

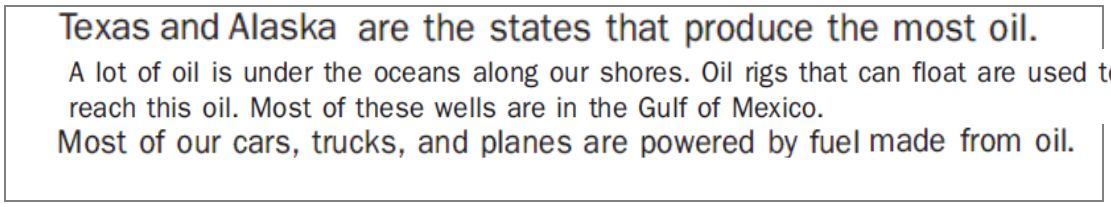
- Indica: un aumento o disminución en la misma proporción, o en paralelo.
- Se traduce: ***Cuanto más/menos, mientras más/menos... tanto más/menos...***

1. **The more heat**, **the faster** ice melts.
2. **The tighter** the belt**, the sooner** it will wear out.
3. **The faster** the propeller turns**, the faster** the vehicle moves**.**
4. **The lower the aniline point** of a particular oil, **the greater** its propensity for damaging rubber parts.
5. **The farther** the vortex finder is extended, **the better** the separation.
6. **The more sensitive** the instruments **become**, **the greater** will **become** the number of tiny earthquakes which they record.
7. **The denser the drilling fluid**, **the more** the displacement force of the bubble upward.
8. **The more fluid** is pumped or ejected, **the less the residence time** in the vacuum; or contrary-wise, with more gas, there will be less fluid throughput.
9. **The higher the tank** is above the surface of the drilling fluid, **the more of** the energy from the jet or pump is used to lift the fluid.
10. Generally, **the higher the iodine number**, **the more severe** the destructive action of the oil on rubber.

C. MOST

- *Ver tabla de comparativos y superlativos.*

11. **Most** of the water vapour in the air comes from the sea.
12. This is a **most** powerful motor.
13. This is the **most** powerful motor we can manufacture.
14. **Most** rocks are mixtures of different substances.
15. **Most of the people** involved with the API work volunteered to write this new book.
16. The fluid flows across a shale shaker before entering the mud pits. **Most shale shakers** impart a vibratory motion to a wire or plastic mesh screen. This motion allows the drilling fluid to pass through the screen and removes particles **larger than** the openings in the screen.
17. These systems, or combinations of the various items discussed above, meet **most environmental requirements.**
18. Dewatering units reduce waste volume and disposal costs substantially and are **most economical** when used to process large volumes of expensive drilling fluid.



D. FURTHER

- La palabra"***far***" tiene dos comparativos: **farther**: más lejos / más lejano y **further.**
- **Further** se traduce como ***extra, adicional*** cuando modifica a un sustantivo, como ***más, o aún más, o más allá*** cuando funciona como adverbio y como ***más aún*** si funciona como nexo.
- **Further** también puede ser un verbo: fomentar, favorecer, impulsar, propiciar

1. The company is planning **further** experiments to clarify the origin of the failure.
2. The reduction of magnetic flux becomes negligible at sub-micrometre distances, but in thin films the effect may survive **much farther** into the material.
3. Part of the fluorescence light, therefore, travels very much **farther** through the material than it would if it could escape equally in all directions.
4. In aqueous-based fluids, when drilled solids **become too small to be removed** by the solids-control equipment, they are recirculated downhole and dispersed **further** by a combination of high-pressure shear from the mud pumps, passing through the bit, and the additional exposure to the drilling fluid.
5. Screen use records should be established for **further guidance**.
6. As gas cutting increases, the flow properties of the fluid increase and the head above the suction decreases, all of which **will further degrade** the performance of a positive displacement pump.
7. Keeping a separator operating under pressure is a critical factor in drilling safety. **Further**, the separator system is generally instrumented to give a history of annular pressure and measurements of gas, water, and oil volumes.
8. The drilling fluid enters the vacuum chamber of the unit through holes in the top of the rotating pipe, and at that point is **further accelerated** and sprayed outward against the walls of the vacuum chamber.
9. Since water cannot infiltrate the soil matrix, there is no water available to support plant life**.** **Further**, salt inhibits the transport of water via osmosis to the plant.

(source: Drilling Fluids Processing Handbook)

E. INTENSIFICADORES DE LOS ADJETIVOS Y FRASES COMPARATIVAS

- ***much****(mucho)****, even (****aún, hasta, incluso****) , far*** *(muy, más, mucho****), a bit*** *(algo, un poco)* ***, a little*** *(un poco),* ***quite*** *(algo, bastante)****, rather****(algo),* ***slightly*** *(algo, levemente),* ***somewhat (****algo, un poco****),a lot (****mucho)*

10. Massive stars burn **brighter** and **hotter** than smaller stars, and exhaust their fuel **far more** rapidly.
11. Much of this material is **rather soft.**
12. Recent experiments give a **far more** striking proof of this phenomenon.
13. The readers who were not present at the Brighton meeting have got a **somewhat** incorrect impression as to the true state of affairs.
14. The actual mass of an atom may be **somewhat less** than the sum of the masses of component positive and negative electrons when in the freestate.
15. The evil effects of drilled solids are real. Acknowledging that fact and preparing to properly handle them at the surface will result in **much lower drilling costs.**
16. However, it is clear that, in most cases, drilled solids have a much greater effect thanbarite on viscosity.
17. The shape of solids frequently makes screening difficult. In single-layer screens, particles that are **only slightly larger** than the opening size can **become wedged** into openings.
18. The apex velocity in rope discharge is **far less than** that in spray discharge; therefore, separation is **less efficient** because **fewer solids** are discarded.
19. Other than cone and manifold plugging, improperly sized or operated centrifugal pumps are **by far** the greatest source of problems encountered with hydrocyclones.
20. The use of atmospheric degassers is **somewhat restricted** to low-weight, low-yield point fluids.
21. In such fluids, the target limit of % LGS may be **somewhat higher than** 5%.

Drilled-solids management has evolved over the years as drilling has **become more challenging** and environmental concerns **have become paramount.** Equipment changes and improvements have responded to the necessity to treat **more and more expensive drilling fluids**. In this context, probably the largest impact on the drilling industry has been the recognition that polymers can make **much better drilling fluids** than those used heretofore even though they are expensive. Polymer drilling fluids require **lower** drilled-solids concentration, so superior solidsremoval systems were developed **to meet those demands**.

F. ALGUNAS FRASES Y CONECTORES QUE CONTIENEN COMPARATIVOS

as much as	tanto como
at last	por último, finalmente
at latest	a más tardar
at the least /at least	al menos por lo menos
first and foremost	primero y principal, ante todo
last but one	penúltimo
more or less	más o menos
none the less	no obstante
not in the least	en lo más mínimo / de ninguna manera
outer/inner	externo, exterior / interno, interior
so far as...is concerned *as far as…is concerned*	en lo que concierne a
the former	el primero (ya mencionado)
the latter	el ùltimo mencionado
upper/lower	superior/inferior

22. Atmospheric brown clouds may have masked **as much as** half of the global warming attributed to the recent rapid rise in greenhouse gases
23. The condensers provided to store the magnetic field energy can store perhaps twice **as much as** when used on alternating current.
24. The **latter effect** has not been considered previously
25. UBD or ‘‘balanced’’ drilling with conventional drilling fluids is no different than conventional overbalanced drilling **as far as** basic solids control **is concerned**.
26. The **upper end** is in the downstream compartment.

CONECTORES

LA ORGANIZACIÓN DEL TEXTO

Llamamos **conectores lógicos** o **elementos conjuntivos** a todas aquellas palabras que tienen como función:

- conectar elementos dentro de una oración (conjunciones ***and, or, but, yet,*** relativos ***who, which, that, when, why, where,)***
- conectar oraciones entre sí (***but, or, so, then, etc)***
- conectar párrafos o grupos de oraciones entre sí y con el resto del texto (***however, on the other hand, after that, because of this, etc)***

Los conectores son palabras o frases que al cumplir su función establecen entre las partes conectadas distintos tipos de **relaciones lógicas**, que se pueden clasificar del modo siguiente:

Conectores **aditivos** o de **adición**	and, and also, also, as a matter of fact, further, furthermore, in addition, additionally, besides, moreover, not only but also. Either…or, neither…nor, nor, **de alternativa** or, or else alternatively, apart from this, as well as that, **de explicación o clarificación:** that is, i.e, I mean, in other words, that is to say,as can be seen **de ejemplificación**: for instance, for example, thus, e.g,viz., such as, **de comparación**: likewise, similarly, in the same way, as well as, on the other hand, by contrast, in contrast, in reality, as opposed to this (añade algo diferente) **de modo perspectiva y punto de vista**: in this way, considering this, in this sense, from this perspective, according to,
Conectores **adversativos, o de oposición o contraste**	yet, though, but, however, on the other hand, as against that, only, unless, still **de concesión**: although, nevertheless, however, except for, **de corrección:** instead, rather, on the contrary, different from,
Conectores **de causa y consecuencia**	so, then, for, for this reason, because, hence, therefore, consequently, because of this, as a result, in consequence, since, due to this, thus, due to, owing to, so that, **de propósito**: for this purpose, for this reason, in order to, so as to, so that, **de condición**: in that case, in case, in such an event, if, then, under the circumstances, otherwise, unless, even if, as long as, but for, unless, provided, providing, whether,
Conectores **temporales o de orden textual**	**de secuencia y enumeración**: first, at first, second, then, next, after that, soon, after a time, next time, on another occasion, next day, from now on, afterwards, since, to begin with, finally, **de simultaneidad**: at the same time, meanwhile, at this moment, while, whereas **de anterioridad**: previously, before that, up to now, **conclusivas, de resumen y cierre**: finally, at last, in conclusion, to sum up, in short, briefly, to conclude,

Linux is an operating system like many others, **such as** DOS, VMS, OS/360, **or** CP/M.
It performs many of the same tasks in very similar manners**: i.e.** it is the manager and administrator of all the system resources and facilities. Without it, nothing works.
Despite this, most users can go on indefinitely without knowing even which operating system they are using, **let alone** the basics of how the operating system works.
For example, **if** you own a car, you don't really need to know the details of the internal combustion engine to understand that this is what makes the car move forward. **Moreover**, you don't need to know the principles of hydraulics to understand what isn't happening when pressing the brake pedal has no effect.

PALABRAS Y FRASES QUE FUNCIONAN COMO CONECTORES

INGLÉS	ESPAÑOL
above all	ante todo, sobre todo
according to	según, conforme a, de acuerdo con
accordingly	por lo tanto, pues, en consecuencia
actually	en realidad
admitedly	concedido que
admitting that	admitiendo que
after	después
after all	después de todo
after a time	después de un rato, de un tiempo
afterwards	luego, más tarde, después
again	nuevamente, de nuevo, otra vez
already	ya
also	también
alternatively	alternativamente, por turno
although	aunque, si bien
always	siempre
amid	en medio de
among	entre
and	y, e, u
and also	y también
and ... too	y ... también
anyhow	de cualquier modo, de todos modos
apart from	aparte de
and so on	etcétera, y así sucesivamente
and so on and so forth	y así sucesivamente
apart from this	además de esto
arising out of this	desprendiéndose de esto
as	como, tal como, a medida que, cuando
as a consequence	como consecuencia
as a final point	como último punto
as a matter of course	como cosa común o corriente, de hecho
as a matter of fact	en realidad, de hecho
as against	comparado con
as an illustration	por ejemplo
as a whole	en su totalidad
as far as	hasta, tan lejos como
as far as ...is concerned	en lo que concierne a
as follows	como sigue
as from	a partir de
as if	como si, como
as for	en cuanto a, referente a, en lo que respecta a
as...as	tan ... como
aside	aparte (de)
as late as	tan recientemente como, apenas, no más
as long as	mientras, siempre que
as many as	tantos como
as much	tan, tanto
as much as	tanto como, tanto cuanto
as regards	en cuanto a, en lo que se refiere a
as soon as	tan pronto como, luego que
as soon as possible	cuanto antes

as such	como tal
as to	en lo que respecta a
assuming that	asumiendo que
as though	como si
as well	también, además, del mismo modo
as well as	así como, también como, lo mismo que
as with	en cuanto a, en lo que refiere a
as yet	aún, todavía, hasta ahora
at all	del todo, en absoluto
at any rate	de todos modos, de cualquier modo
at no rate	de ninguna manera
at first	al principio, inicialmente
at large	extensamente, en general
at last	por último, finalmente
at least	por lo menos
at most	a lo sumo, cuanto más
at no rate	de ninguna manera
at once	de inmediato, de una vez
at present	en la actualidad
at random	al azar
at stake	en juego
at the same time	al mismo tiempo
at this point	en este punto, aquí
at this moment	en este momento
at times	a veces
at the rate of	a razón de
at the same time	al mismo tiempo
at will	a voluntad
away from	lejos de
a while after	poco después, rato más tarde
a while ago	hace un rato, recién
because	porque
because of	debido a, a causa de
because of this	por esto,
before	adelante, adelante de, al frente, antes de
before that	antes que eso,
being...	siendo, estando
besides	además (de), también
beyond doubt	sin duda alguna
beyond that	más allá de eso, aparte de eso
both	ambos, los dos
both...and	ambos, tanto... así como..
but	pero, sino, excepto, salvo
but yet	pero aún/ aún así
but then	pero entonces
by and large	de manera general
by any means	de cualquier modo
by all means	sin duda, sin falta,por todos los medios
by chance	por casualidad
by contrast	en oposición a esto, del modo contrario
by far	con mucho, por mucho, lejos

by itself	por sí mismo
by means of	por medio de
by no means	de ningún modo, de ninguna manera
by now	ahora
by then	para entonces
by the way	de paso, a propósito
by this time	para entonces
by way of	por la vía de, pasando por,por medio de
concerning	en lo que respecta a, concerniente a,
consequently	en consecuencia
considering that	considerando que
conversely	a la inversa
currently	en el presente, en la actualidad
despite	a pesar de
despite this	a pesar de esto
due to	debido a, a causa de
during	durante
each other	recíprocamente
earlier	más temprano, anteriormente
e.g.	por ejemplo, tal como
either	cualquira, uno u otro
either ... or	o ... o / o bien... o
either way	de cualquier modo
else	otro más, además
equally	del mismo modo
equally important	igualmente importante,
even	aún, incluso, siquiera
even so	a pesar de eso
even though	incluso cuando, si bien
eventually	al final, finalmente
even when	aún cuando
except	excepto, a excepción de, salvo
except that	excepto que, excepto por
finally	finalmente, para finalizar
first	primero, ante todo, en primer lugar
firstly	primeramente
first of all	ante todo, en primer lugar
finally	finalmente
following from this	siguiendo de esto, como consecuencia
for	dado que, porque, puesto que
for a while	por algún tiempo, por un rato
for example	por ejemplo
for instance	por ejemplo, verbigracia
for all that	por todo eso
forever	para siempre
former / the former	el anterior, lo mencionado primero
for that /this reason	por esa razón
for the most part	en su mayor parte, principalmente
for the sake of	con el objeto de
for ever	para siempre
from	desde

from time to time	de vez en cuando
further	más allá, en adición, además
furthermore	ulterior, más aún
given that	dado que
granting that	concediendo que
hardly	escasamente, casi nunca
hardly ever	casi nunca
hence	de aquí (que), por lo tanto
here	aquí,
however	sin embargo, no obstante, de cualquier modo
i.e.	o sea, esto es
if	si (introduce condición)
incidentally	a propósito, entre paréntesis, de paso
inside	adentro, interior, del lado de adentro, dentro de
instead	en cambio, en lugar de
if any	si las hay, si los hay
if so	si así son las cosas
immediatelly	inmediatamente
immediately following	inmediatamente a continuación
in addition to	además de
in advance	de antemano, por adelantado
in as much as	en tanto, en cuanto
in between	entre
in brief	para resumir
in case	en caso de que, por si acaso
in closing	para concluir
in comparison with	comparado con
in conclusion	en conclusión
indeed	efectivamente
in due course	debidamente, a su debido tiempo
in due time	a su debido tiempo
in effect	en efecto
in either case	en cualquier caso
in exchange for	a cambio de
in fact	en efecto, de hecho
in order to	con el objeto de, a fin de, para
in order that	para, con el objeto de
in order to	para, con el objeto de
in short	en suma, en una palabra
in a word	en suma, en una palabra
in so far as	en lo que respecta a
in some measure	en cierto modo, hasta cierto punto
in spite of	a pesar de, no obstante
in such an event	bajo tales circunstancias
instead of	en vez de, en lugar de
in that case	en ese caso
in the event of	en caso de que
in the long run	a la larga, a largo plazo
in the meantime	mientras tanto, en el interín

in the middle of	en medio de
in the second place	en segundo lugar
in the same way	del mismo modo
in this way	de este modo, de esta manera
in turn	a su turno, a su vez, en cambio
in view of the above	considerando lo ya dicho, en vista de lo anterior
is/are referred to	se refiere a
it follows that	se entiende que, se desprende que
just	recién, ya, simplemente
just about	aproximadamente
just as	al momento que, lo mismo que
just as if	lo mismo que si
just before	justo antes
just in case	por si acaso
last	por último, finalmente
last but not least	último en orden pero no en importancia
last but one	penúltimo
last but two	antepenúltimo
lastly	por último, finalmente
later	más tarde
latter/the latter	el último mencionado, el último
leaving that aside	dejando eso de lado
like	como, tal como, similar a
likewise	asimismo, igualmente, además
long ago	hace tiempo
meanwhile	mientras tanto
more or less	más o menos
moreover	además, por otra parte
most likely	muy probablemente
most of	la mayoría de
most of all	sobre todo
namely	o sea, especialmente
near	cerca, junto a, casi cercano
nearly	aproximadamente
neither	ningún, ninguno
neither ... nor ...	ni ... ni ... tampoco
never	nunca
never mind	no importa
nevertheless	sin embargo
next	luego, el siguiente, a continuación, el próximo
next day	al día siguiente
next time	la próxima vez
no less than	no menos que, no inferior a
no longer	no más, ya no más
no matter	no importa
no matter what	no importa lo que sea
nor	ni, tampoco
not only ... but also	no sólo ... sino también
not at all	en absoluto
notwithstanding	a pesar de (que)
now	ahora, en la actualidad. O continuativo

nowadays	hoy en día
now and again	de vez en cuando
now and then	de vez en cuando
now that	ahora que
now then	y bien, pues bien
of a sudden	de repente
of course	por supuesto (continuativo)
often	frecuentemente, a menudo
on account	a cuenta
on account of	debido a, a causa de
on an average	por término medio, en promedio
on another occasion	en otra ocación
on a previous occasion	anteriormente, en una ocasión anterior
on a sudden	de repente
on behalf (of)	por/a favor de, en representación de, de parte de
once	una vez que, cuando, anteriormente
once and again	una y otra vez, varias veces
once and for all	de una vez por todas
once more	una vez más
on duty	en servicio, de guardia
on guard	alerta, de guardia
only	solo, solamente,
on purpose	a propósito, adrede
on time	a tiempo
on that score	en cuanto a eso, a ese respecto
on the contrary	por el contrario, antes bien
on the grand scale	a gran escala
on the one hand	por un lado
on the other hand	por otro lado, en cambio
on the contrary	por el contrario
on the score of	con motivo de
on that account	por eso
on top of	encima de, sobre
on top	con éxito, arriba
or	o, u
or else	o tal vez, o también, o
otherwise	de lo contrario, de otro modo
out of date	sin actualizar
out of order	fuera de funcionamiento
outside	fuera (de), a excepción de,
over	sobre, por encima de, durante, al otro lado
owing to	debido a, por causa de
particularly	especialmente, particularmente
perhaps	tal vez
presently	enseguida
previously	anteriormente, previamente
provided that	dado que, en la medida en que
providing that	siempre que, con tal que
rather than	más bien que, en vez de

recently	recientemente
regarding	con respecto a, en cuanto a
regardless of	a pesar de, independientemente de
save that	excepto por
second	en segundo lugar
seeing that	viendo que
seldom	rara vez
similarly	del mismo modo
since	desde entonces, ya que, puesto que, a partir de,
so	pues, por lo tanto, así, de este modo, entonces
so as to	para, a fin de, de modo tal que
so far	hasta ahora, hasta aquí
so far as	en lo que respecta a
so long as	con tal de que, siempre que
so much the better	tanto mejor
so that	de manera que, de modo tal que
sometime	alguna vez
sometimes	a veces
soon	pronto, prontamente
soon after	poco después
sooner or later	tarde o temprano
sooner that	antes que
so that	para, a fin de que
so then	así pues, por tanto
so to speak	por así decirlo
specifically	específicamente
still	sin embargo, no obstante, todavía, aún
subject to	sujeto a
subsequently	subsiguientemente, a continuación
such	tal, semejante
such a	tan
such and such	tal y tal, tales y tales
such not being the case	no siendo ese el caso
such that	tal que
such as	tal como
supposing that	suponiendo que
surely	seguramente
than	que
that	esto, eso, que, todo eso,
that being the case	siendo ese el caso, así las cosas
that is	o sea
that is to say	es decir
that is why	por eso es que
then	entonces, luego, por eso
the other way about/around	al contrario, al revés
there	allí,
therefore	por lo tanto, en consecuencia
thereby	con eso, por eso
this is to say	es decir
this time	esta vez
though	aunque, aún cuando
through	a través de, por
throughout	por todo, en todo, de principio a fin

the sooner the better	cuanto antes mejor
this holds true	esto también es cierto, se mantiene
this way	por aquí, de este modo, así
thus	así, de este modo, por lo tanto
thus far	hasta ahora, hasta aquí
till	hasta
to the last	hasta el fin, hasta lo último
to a certain extent	hasta cierto punto
to a great extent	en gran medida
to begin with	para empezar
to conclude	para terminar
together with	junto con
to sum up	en suma, en una palabra
to summarize	para resumir
to the full extent	en toda su extensión, completamente
together	junto, junto a
together with	junto con
to return to the point	para volver al tema
to this end	para esto
under no circumstances	bajo ninguna circunstancia
underneath	debajo (de), bajo, por debajo
unless	a menos que, a no ser que
until	hasta
until then	hasta entonces
up	hacia arriba, de subida, ascendente
upon this/that	por sobre eso, encima de eso, además
up till that time	haste ese momento
viz	a saber, es decir
well	bien, (continuativo)
what is more	lo que es más, también
whatever	cualquier cosa que, todo lo que
when	cuando
whenever	cuando quiera que, en cualquier momento
where	donde
wherever	donde sea que, en cualquier lugar que
whereas	mientras que, puesto que
whether	si, ya sea que,
whether...or	ya sea que... o que
whichever way	de todos modos
whichever way it is	de cualquier manera que sea
while	mientras, en tanto que
with regard to	con respecto a, en cuanto a
with the aim of	con el objeto de
with this in mind	teniendo esto en cuenta, con esto en mente,
without	sin
yet	aún, a pesar de eso, todavía, sin embargo

Albert Einstein (1879–1955). Relativity: The Special and General Theory. 1920.

V. **The Principle of Relativity (In the Restricted Sense)**

IN order to attain the greatest possible clearness, let us return to our example of the railway carriage that was travelling uniformly. We call its motion a uniform translation ("uniform" because it is of constant velocity and direction, "translation" because although the carriage changes its position relative to the embankment, it does not rotate). Let us imagine a raven flying through the air in such a manner that its motion observed from the embankment is uniform and in a straight line. If we observe the flying raven from the moving railway carriage, we will find that the motion of the raven would be one of different velocity and direction, but that it would still be uniform and in a straight line. If we want to express this in an abstract manner, we may say: If a mass *m* is moving uniformly in a straight line with respect to a co-ordinate system *K*, then it will also be moving uniformly and in a straight line relative to a second co-ordinate system *K'*, provided that the latter is executing a uniform translatory motion with respect to *K*. In accordance with the discussion contained in the preceding section, it follows that:

If *K* is a Galileian co-ordinate system, then every other co-ordinate system *K'* is a Galileian one, when, in relation to *K*, it is in a condition of uniform motion of translation. Relative to *K'* the mechanical laws of Galilei-Newton hold good exactly as they do with respect to *K*.

We advance a step farther in our generalization , when we express the tenet thus: If, relative to *K*, *K'* is a uniformly moving co-ordinate system devoid of rotation, then natural phenomena run their course with respect to *K'* according to exactly the same general laws as with respect to *K*. This statement is called the *principle of relativity* (in the restricted sense).

As long as one was convinced that all natural phenomena were capable of representation with the help of classical mechanics, there was no need to doubt the validity of this principle of relativity. But in view of the more recent development of electrodynamics and optics, it became more and more evident that classical mechanics affords an insufficient foundation for the physical description of all natural phenomena. At this point, the question of the validity of the principle of relativity became ripe for discussion, and it did not appear impossible that the answer to this question might be in the negative.

Nevertheless, there are two general facts which, at the outset, speak very much in favour of the validity of the principle of relativity. Even though classical mechanics does not supply us with a sufficiently broad basis for the theoretical presentation of all physical phenomena, still we must grant it a considerable measure of "truth," since it supplies us with the actual motions of the heavenly bodies with a delicacy of detail little short of wonderful. The principle of relativity must therefore apply with great accuracy in the domain of *mechanics.*

(...)

ALGUNAS EXPRESIONES CRÍTICAS PARA LA TRADUCCIÓN

- Hay palabras y grupos de palabras en inglés que necesitan una traducción especial, no literal, para que el significado sea realmente equivalente al español.
- Este grupo al que llamamos de "expresiones críticas" incluye sustantivos, adjetivos, verbos comunes, verbos preposicionales, verbos con partícula adverbial, y conectores.
- La lista que sigue incluye sólo las expresiones de aparición más frecuente, y sólo algunos conectores, ya que los restantes se pueden consultar en el *Listado de conectores.*
- Además, se debe tener en cuenta que muchos **sustantivos y adjetivos son usados como verbos** en inglés, por lo tanto debe considerarse la función gramatical de la palabra antes de realizar la búsqueda en el diccionario. En muchas ocasiones ambas funciones, sustantivo y verbo *(s, n, ó v, vt, v intr, tr, intr.)* aparecen en el diccionario, pero cuando esto no ocurre, debe transformarse el significado que da el diccionario en la palabra con la función deseada.

CUANTIFICADORES	
any (en oraciones afirmativas) **any (en oraciones interrogativas y negativas)**	cualquiera (no importa cual) algo de, algún/ a, ningún/a
both	ambos, los dos, tanto...como...(a veces no se traduce)
every	todos, cada
first	primero/primer... /por primera vez(cuando acompaña al verbo)
neither	ninguno, ninguno de los dos
no	ninguno-a, nada de...
rather	algo, bastante
(cantidad) out of (cantidad) three out of every 10)	(tres) de cada (10)
(cantidad) as much ...as / as many... as	(cantidad) veces más que...
INTENSIFICADORES	
even	aún, incluso
far	lejos, distante, mucho más (intensificador)
further	extra, ulterior, adicional, nuevo
too	demasiado (delante de un sustantivo)
rather than	antes que, más bien que, más que, en lugar de
SUSTANTIVOS	
time	tiempo/ vez/ hora, sincronizar (v)
way	manera, modo , camino
oil	petróleo o aceite
PRESPOSICIONES	
for	para (rara vez se traduce *por)*
up to	hasta
Down to	hasta
within	dentro, dentro de,
without	sin

NEXOS Y CONECTORES	
actually (adv) ,/ actual (adj)	en realidad, /real
as (comparativo, temporal, causa-consecuencia)	como, a medida que, mientras, cuando, dado que, porque
as...as	tan...como
as long as	con tal de que, siempre que
As many …as	Tantos como
As much …as	Tanto…como - hasta
because /	porque (+ oración)
because of	debido a (+ sustantivo)
but for	de no haber sido por.../
currently (adv) / current (adj)	actualmente / actual, de actualidad
due to	debido a, a causa de
either ... or	ya sea... o .../ o...o/cualquiera de los dos/
for	para/ porque/ debido a / pues / puesto que
too	también.
ever	siempre, nunca (si el verbo es negativo) , si es sólo enfático, no se traduce
likely	posible, posiblemente
no longer	ya no
not (only)...but (also)	no sólo / no solamente... sino también
other than	salvo, excepto, aparte de, que no sea
owing to	debido a, a causa de
rather than	antes que, más bien que, más que, en lugar de
so that,	de modo tal que,
/ so...that	/ tan...que
unlike	distinto de , diferente, diferente de, a diferencia de..
what	que, **lo que**
VERBOS	
be likely to	ser posible que
fail to (v)	no
close (v) (prep) (adj)	cerrar/ cerca, al lado de, / estricto, minucioso
look for/check for/ investigate for	en busca de, para comprobar,
operate	funcionar
provide for	proporcionar, dar
substitute for (substitute A for B)	reemplazar, suplir (substituir B por A)
time (v)	sincronizar
even (v)	emparejar, alisar, igualar // equilibrado, parejo, llano, igual (adj)
SUSTANTIVOS Y ADJETIVOS USADOS	**COMO VERBOS**
Blanket	
Bracket	
Bridge	
Chair	
Coat	
Dwarf	
Engineer	
even	
Face	
Fork	
Fuel	
House	

Image	
Jet	
level	
lower	
power	
Sandwich	
School	
Shape	
smooth	
Sort	
Square	
Tailor	
Time	
Total	
Tune	
Update	

1. The machine will operate properly **as long as** the maintenance is kept.

2. The method is **no longer** used in industry.
3. The above instructions **no longer** apply in this case.
4. When solids plug the discharge port of a desilter, that desilter no longer removes solids.

5. Tubes made of usual materials **other than** glass do not break when first bent.
6. The joint is considered unsafe for **other than** very low pressure.
7. Interrupts are one of the most important ways that things are caused to happen in a PC **other than** by direct action of the CPU.

8. They predict a steady **rather than** a spectacular growth in this industry.
9. This operation is **rather** difficult to perform. (cuantificador del adjetivo)
10. This is not a complicated process; **rather**, it is easy to understand and simple to use. (conector)

11. There are, however a number of differences between one system and the other **owing to** their type and the environment in which they operate.

12. **But for** the widespread use of chemicals, the factory would´t have closed. (conditional)

13. Water quality was poor **because of** high turbidity.
14. Water quality was poor **because** it was very turbid.

15. The mixture reacted **as** boiling oil. (conjunción comparativa)
16. The reaction appeared **as** one substance began to dissolve.
17. **As** the reaction was not the one expected, the experiment was repeated.

18. The problem was complicated, **so that** it was useless to insist.
19. The problem was **so** complicated **that** we decided to use a different device.

20. The cause of the accident was difficult to determine, **too**. (conector)
21. The cause of the accident was **too** difficult to determine. (intensificador del adjetivo)
22. This condition is important **for** a correct welding operation.
23. The material must be **checked for** possible defects.

24. Lubricated metal parts wear slowly, **for** a film of the lubricant protects them all the time.
25. The device must be **checked for** humidity every other day.
26. Check for holes in screens. Wash screens during a connection for this examination.

27. The instrument might be damaged if you **fail to** observe the above instructions.
28. The new device **has failed to** reduce the flow and transfer of heat.
29. The problem with this equation is that it **fails to account for** other rheological variables.

30. Other forms of energy must be **substituted for** oil in the near future.
31. Democracy is the **substitution** of ballots **for** bullets.
32. Engineers will **substitute** a new metal structure **for** the old wooden frame.

33. An adequate wedge should be inserted **to even up** surfaces.
34. His statement about oil production **does not square** with the facts.
35. The huge equipment was housed to prevent rusting.
36. The insulation material is **sandwiched** between two steel sheets.
37. A layer of carbon monoxide from the extinguisher **blankets** the flames.
38. The engine **is powered** by fuel.
39. **Coat** the case with lubricant.
40. The road **forks** into a central section and two ramps.
41. The mechanism **was timed** to operate at the proper moment.
42. These additives show ability **to lower** resin costs.
43. You **can tailor** your voltage starter to your needs.

44. The result **is likely to be** zero.

45. Make certain that the components of the screen tensioning system, including **any** rubber supports, nuts, bolts, springs, etc., are in place and in good shape.
46. For **any** particular shale shaker, the size and shape of the screen openings have a great effect on solids removal. This means that the performance of **any** shaker is largely controlled by the screen cloth used.

47. You will find the fire extinguisher **close to** the door. (preposición de lugar)
48. Be sure to **close** the door behind you.(verbo)
49. They should make a **close** inspection of the area. (adjetivo)

50. The new engine was four **times** as efficient as the old one.
51. Although they become colloidal, they are still 1000 times larger than bentonite platelets.
52. Conductivity. Measure of the quantity of electricity transferred across unit area per unit potential per unit time.
53. When linear motion shale shakers were introduced into oil well drilling operations, drilling fluid could routinely be sieved through API 200 screens for the first time.

54. This car costs **twice as much as** the other one.
55. Today, there are **three times as many** new industries **as** at the end of the last century.
56. Our company has **half as much** capital as our competitors.
57. The action inside the hydrocyclone can multiply gravitational force by **as much as** 200 times.

58. Eight **out of every** ten glass factory workers suffer from this disease.

59. You will also find that some texts say that you should have at least ***twice*** **as much** swap **as** physical RAM.

60. Each entry in this table **not only** contains the file's physical location on this disk**, but** the owner of the file, the access permissions, and the number of links, **as well as** many other things.
61. **Not only** does it prevent achieving a good drilling rate, **but** it **also** affects hole cleaning.

62. **Rather than** tying everything up, the program waits until the next key is pressed.
63. **Rather than** using binary to represent numbers in computer programs, another base, hexadecimal is usually used.

64. Particle size has a significant effect on **both** solids and liquid capacity.
65. **Both** designs have advantages and disadvantages.
66. This applies to **both** land and offshore rigs.

67. In warm climates, where moisture conditions are kept reasonable (**neither** flooded **nor** dry), biodegradation rates are very rapid.
68. **Neither** the motor mounting **nor** the mechanical coupling should exhibit signs of wear.
69. However, **neither** of these models has been widely adopted by the drilling-fluid community.

70. This effect can be reduced by making the mud **either** more inhibitive **or** less inhibitive so as to reduce the hydrational and adhesive forces.
71. Elevated temperatures can also destroy direct and invert-emulsion systems and can cause gelation in clay-based muds, **either of which** can negatively affect equipment performance.

72. There should be very little or **no** material on the rig that falls into the reactive/oxidizer category.
73. A 9.2-ppg drilling fluid with **no** barite and 2.6 specific-gravity low-gravity solids would have 6.5% volume of solids.

74. The desander, **as well as** the desilter, needs to be downstream of the degasser operation.
75. Plastic viscosity is important but yield and gel strengths can have a significant impact **as well.**

76. Crews need to be alert to torn screens no matter **what** shaker is used.
77. *Blow Out Control and **What** You Need to Know About It*. (title)
78. Think about **what** effect the piping will have on the flow patterns within the compartment.
79. The manufacturer states that the use of this type of nozzle will increase the amount of fluid moved by up to four times **what i**s delivered to the orifice.
80. It depends on **what** is most important for your drilling operation.

Lubrication
The actuators are factory lubricated for the life of the actuator in normal working conditions. The standard lubricant is suitable for use **from** -40° C (-40° F) **to** +80° C (+176° F).

Construction
Puretorq Vane Rotary actuator design is suitable for **both** indoor and outdoor installations.

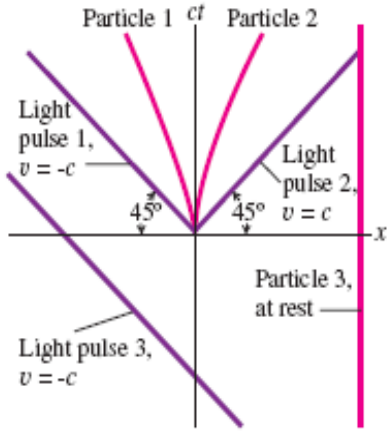
Encontrar en el texto que sigue las siguientes dificultades gramaticales, subrayarlas y traducirlas.

1. "Make" causativo (make sth do sth)	
2. Comparativo de inferioridad	
3. not only... but (also) (with inversion)	
4. be+adj+to infinitive	
5. both	
6. provide sb/sth with sth	
7. rather than	
5. conectores: and, so, such..., so that, for..., thus, since, that	

Topic 14 | Spacetime Diagrams

Graphical representations can make kinematic concepts be less abstract and also give useful information. For example, not only does a v-t graph for one-dimensional motion show the velocity at any instant, but its slopes give accelerations, and areas under it give displacements. For relativity the transformations $y9 = y$ and $z9 = z$ are easy to understand, so we'll just consider the $\pm x$ directions.

The usual convention in relativity is to graph ct on the vertical axis and x on the horizontal axis. Such a graph provides us with a **spacetime diagram.** We use ct rather than t so that both scales can have the same unit and the same scale. The path of a particle forms a line, called its **worldline,** as the particle moves in onedimensional motion. At any point, the slope of the worldline is $d(ct)/dx = (c\,dt)/(v\,dt) = c/v$. Thus a light pulse with $v = \pm c$ has a slope of ± 1 on a spacetime diagram, giving angles of 45° with the $\pm x$-axes. Since material particles have speeds less than c, all worldlines for material particles are steeper than those 45° angles. That is, nothing known has a worldline with a slope between 1 and 1. The worldline of a particle at rest is vertical and so has infinite slope. Figure T14.1 shows six worldlines, three of light pulses and three of particles. Can you show that these six worldlines agree with the statements made in this paragraph about their slopes?



T14.1 A spacetime diagram showing worldlines of three light pulses and three particles. Particles 1 and 2 leave $x = 0$ at $t = 0$, accelerating from rest in opposite directions.

Encontrar en el texto ejemplos de las siguientes dificultades gramaticales, subrayarlas y traducirlas.

1. most	
2. elipsis	
3.subjuntivo	
4. –ing	
5. “It” introductorio	
6. voz pasiva	
7. as	
8. condicional II	
9. not only but also	
10. not...but	

Coax Cable

Because a coax cable is most commonly referred to as an *RF* (radiofrequency) *transmission line*, most people associate the use of coax cables with high frequencies. However, this is certainly not the case, as evidenced by medical technology that deals with static dc levels and low-voltage (in microvolts or millivolts), “slow” (less than 5 Hz) ac. In general, coax cables should be used wherever there is a need to ensure that the transmitted signal is undisturbed by any surrounding noise.

Coax cables are acceptable for the full range of frequencies from 0 Hz to a few hundred gigahertz, with sound frequencies extending from about 15 Hz to 20 kHz, radio frequencies from 20 kHz to 300 MHz, and microwave frequencies from 300 MHz to 300 GHz. Our discussion thus far has centered on protecting the transmitted signal from external noise. It is important to realize also that when a coax cable is used, it will not act as a transmitter for the signal that it is carrying. This fact is very important as we hook up electronic appliances such as VCRs to our TVs. If we simply used a twin lead wire between the VCR and TV, not only would the wire pick up signals by acting like an antenna, but it would also transmit channel 3 (or 4) to the surrounding medium which would affect not only your TV’s response but also that of any other TV or receiver in the area.

For the coupling between the systems in which coax cable is typically used, it is not the level of voltage or current that is the primary concern but whether there is a good “match” between components and the cable.

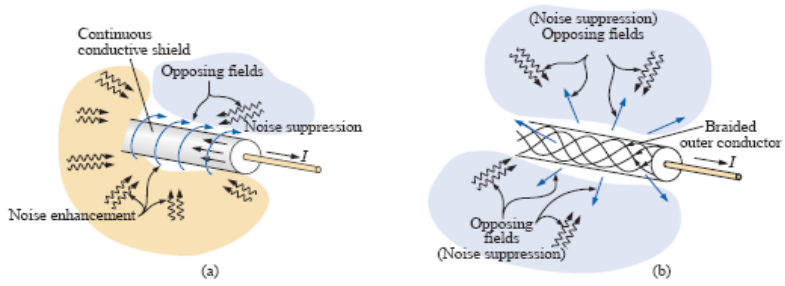


FIG. 16.24
Shielding: (a) solid outside inductor; (b) braided outside conductor.

SELECCIÓN DE TEXTOS

ELECTROMECHANICAL ENERGY CONVERSION

From the material developed thus far, it should be apparent that electromagnetomechanical devices are capable of converting mechanical forces and displacements to electromagnetic energy, and that the converse is also possible. The objective of this section is to formalize the basic principles of energy conversion in electromagnetomechanical systems, and to illustrate its usefulness and potential for application by presenting several examples of **energy transducers.** A transducer is a device that can convert electrical to mechanical energy (in this case, it is often called an **actuator**), or vice versa (in which case it is called a **sensor**).

Several physical mechanisms permit conversion of electrical to mechanical energy and back, the principal phenomena being the **piezoelectric effect,**3 consisting of the generation of a change in electric field in the presence of strain in certain crystals (e.g., quartz), and **electrostriction** and **magnetostriction,** in which changes in the dimension of certain materials lead to a change in their electrical or magnetic) properties. Although these effects lead to many interesting applications, this chapter is concerned only with transducers in which electrical energy is converted to mechanical energy through the coupling of a magnetic field. It is important to note that all rotating machines (motors and generators) fit the basic definition of electromechanical transducers we have just given.

Forces in Magnetic Structures

Mechanical forces can be converted to electrical signals, and vice versa, by means of the **coupling** provided by energy stored in the magnetic field. In this subsection, we discuss the computation of mechanical forces and of the corresponding electromagnetic quantities of interest; these calculations are of great practical importance in the design and application of electromechanical actuators. For example, a problem of interest is the computation of the current required to generate a given force in an electromechanical structure. This is the kind of application **that is likely to** be encountered by the engineer in the selection of an electromechanical device for a given task.

As already seen in this chapter, an electromechanical system includes an electrical system and a mechanical system, **in addition to** means through which the two can interact. The principal focus of this chapter has been the coupling that occurs through an electromagnetic field common to **both** the electrical and the mechanical system; to understand electromechanical energy conversion, it will be important to understand the various energy storage and loss mechanisms in the electromagnetic field. Figure 16.37 illustrates the coupling between the electrical and mechanical systems. In the mechanical system, energy loss can occur because of the heat developed **as a consequence** of *friction*, **while** in the electrical system, analogous losses are incurred **because of** *resistance*. Loss mechanisms are also present in the magnetic coupling medium, since *eddy current losses* and *hysteresis losses* are unavoidable in ferromagnetic materials. **Either** system can supply energy, and either system can store energy. Thus, the figure depicts the flow of energy from the electrical to the mechanical system, **accounting for these** various losses. The same flow could be reversed if mechanical energy **were** converted to electrical form.

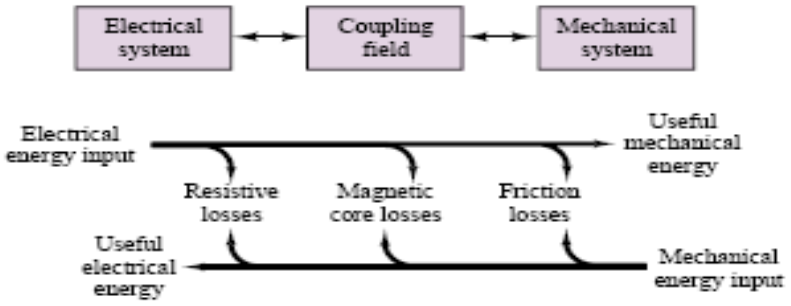
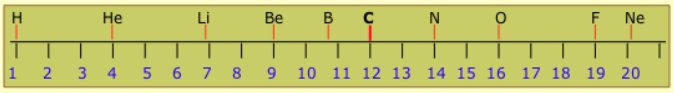


Figure 16.37

Counting atoms Avogadro's number

Owing to their tiny size, atoms and molecules cannot be counted by direct observation. There are, however, a number of indirect methods that **enable us to estimate** the number of these particles in a sample of an element or compound. **Once t**his has been done, we know the number of formula units (to use the most general term for any combination of atoms we wish to define) in any arbitrary weight of the substance. The number will of course depend **both** on the formula of the substance and on the weight of the sample. But if we consider a weight of substance *that is the same as its formula (molecular) weight expressed in grams*, we have only one number to know: ***Avogadro's number***, 6.022137×10^{23}, usually designated by N_A.

You can visualize the atomic weight scale as a long line of numbers that runs from 1 to around 280. The beginning of the scale looks like this:



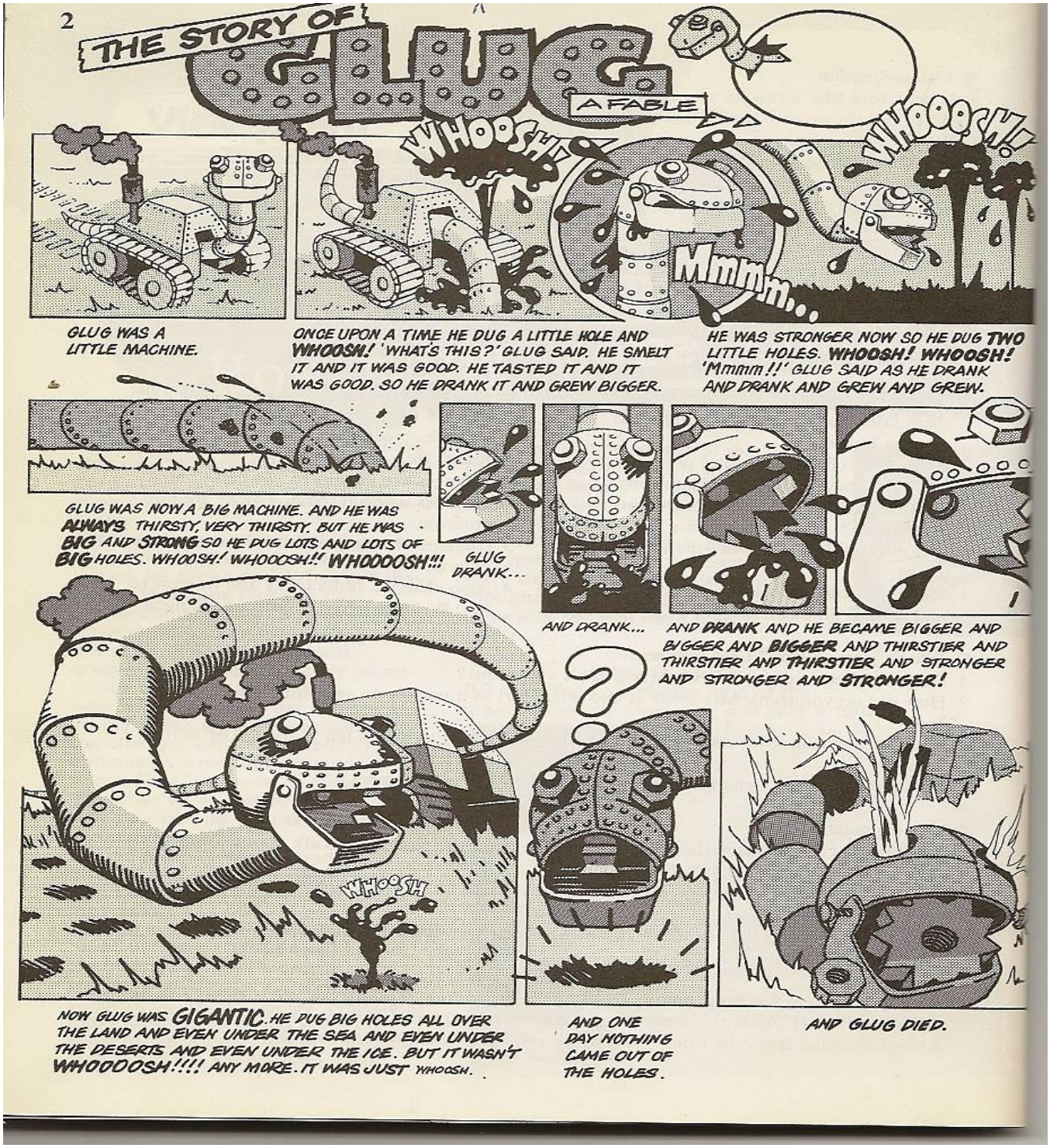
You will notice that the relative masses of the different elements (shown in the upper part) are not all integers. If the nuclei all differ by integral numbers of protons and neutrons that have virtually identical masses, we would expect the atomic weights to be integers. Some are **very close** to integers (the reason they are not exactly integral will be explained in the next section), but many are nowhere near integral. This puzzling observation eventually led to the concept of *isotopes*.

Aston's first experiments with his newly-invented mass spectrometer in 1919 immediately revealed that most of the elements exist in nature as mixtures of isotopes. For example, the mass spectrum of magnesium shows three isotopes of masses 24 through 26 having the natural abundances shown on the plot.
Of the 92 natural elements, 23 have only a single isotope, and are said to be ***monoisotopic***.

Mass spectrometry

An alternative way of examining the behavior of individual atomic particles became evident in 1899, when J.J. Thomson, whose work on "cathode rays" had revealed that the atoms has internal components of its own, showed that the charged particles resulting from their break-up could be deflected by externally-applied magnetic and electrostatic fields. The most significant finding (also made a year earlier by Wilhelm Wien) was that the degree of deflection of a particle is proportional to the ratio of its electric charge to its mass.
Neutral atoms, having no charge, cannot be accelerated along a path so as to form a beam, nor can they be deflected. They can, however, be made to acquire electric charges by directing an electron beam at them, and this was the basis of the first mass spectrometer developed by Thomson's former student F.W. Aston (1877-1945, 1922 Nobel Prize) in 1919. This enabled him to quickly identify 212 of the 287 naturally occurring isotopes.

The mass spectrometer has become one of the most widely used laboratory instruments. Mass spectrometry is now mostly used to identify molecules. Ionization usually breaks a molecule up into ionized fragments having different charge-to-mass ratios, each molecule resulting in a unique "fingerprint" of particles whose origin can be deduced by a jigsaw puzzle-like reconstruction. For many years, "mass-spec" had been limited to small molecules, but with the development of novel ways of creating ions from molecules, it has now become a major tool for analyzing materials and large biomolecules, including proteins.


THE STORY OF
GLUG
A FABLE
WHOOSH!
WHOOSH!
Mmmm...
GLUG WAS A LITTLE MACHINE.
ONCE UPON A TIME HE DUG A LITTLE HOLE AND WHOOSH! 'WHAT'S THIS?' GLUG SAID. HE SMELT IT AND IT WAS GOOD. HE TASTED IT AND IT WAS GOOD. SO HE DRANK IT AND GREW BIGGER.
HE WAS STRONGER NOW SO HE DUG TWO LITTLE HOLES. WHOOSH! WHOOSH! 'Mmmm!!' GLUG SAID AS HE DRANK AND DRANK AND GREW AND GREW.
GLUG WAS NOW A BIG MACHINE. AND HE WAS ALWAYS THIRSTY, VERY THIRSTY. BUT HE WAS BIG AND STRONG SO HE DUG LOTS AND LOTS OF BIG HOLES. WHOOSH! WHOOOSH!! WHOOOOSH!!!
GLUG DRANK...
AND DRANK...
AND DRANK AND HE BECAME BIGGER AND BIGGER AND BIGGER AND THIRSTIER AND THIRSTIER AND THIRSTIER AND STRONGER AND STRONGER AND STRONGER!
WHOOSH
NOW GLUG WAS GIGANTIC. HE DUG BIG HOLES ALL OVER THE LAND AND EVEN UNDER THE SEA AND EVEN UNDER THE DESERTS AND EVEN UNDER THE ICE. BUT IT WASN'T WHOOOOSH!!!! ANY MORE. IT WAS JUST WHOOSH.
AND ONE DAY NOTHING CAME OUT OF THE HOLES.
AND GLUG DIED.

PREFIJOS	SIGNIFICADO/ INTERPRETACION	EJEMPLO EN INGLES	EQUIVALENTE CASTELLANO
a- **ab-** **an-**	-negativo, no, sin -transformar en	atypical afloat asymetrical	atípico a flote, flotante asimétrico
aero-	-aire	aeroplane	avión, aeroplano
after-	-después	aftereffect	efecto posterior
ambi- **amphi-**	(de) ambos lados	amphibious	anfibio
ante-	anterior contrario	antemeridian antedating	antemeridiano retrotracción
ant- **anti-**	-contrario/contra	antitoxin	antitoxina
arch-	-principal	archbishop	arzobispo
auto-	-auto, por sí mismo, mismo	autobiography	autobiografía
be-	-transformar en	become becalm	devenir, transformar en sosegar
bi-	-dos	bimetallic	bimetálico
bio-	-vida	biology	biología
by-	-accesorio, derivado	Byproduct by-pass	subproducto derivación
centi-	-100	centimetre/meter	centímetro
co- com- con-	-con, junto (con)	cooperate	cooperar
contra- **contro-** **counter-**	-contra, contrario, opuesto	controversy counteract counterclockwise	controversia contrarrestar contrario a las agujas del reloj
cross-	-a través -al través	crosspiece cross-section	travesaño sección transversal
De-	-despojado de, opuesto	dehydrated	deshidratado
deci- **deca-**	--una decena, diez	decimetro/meter decasyllable	decímetro decasílabo
di-	-dos, dos veces	dioxide	dióxido
dia-	a través de	diameter	diámetro
dis-	-no, opuesto,negativo	disconnected dismantle	desconectado desmantelar
e- **en- em-**	-transformar en	elongate enclose	alargar encerrar
Ex	-recíprocamente -exponer al exterior	exchange exhale extract	intercamiar exhalar extraer
extra-	-extra	extraterritorial	extraterritorial
hemi-	-medio	hemisphere	hemisferio
For(e)-	-anterior -hacia adelante	foregoing forecast	precedente predecir

hetero-	-diferente	heterogeneous	heterogéneo
hind-	-posterior	hindbrain hindmost	cerebelo postrero, último
homo-	-mismo	homogeneous	homogéneo
hydro-	-agua -hidrógeno	hydrology hydrocarbon	hidrología hidrocarbono
hyper-	-excesivo, extremado	hypertension	hipertensión
hypo	-por debajo, menos de lo usual	hypotension	hipotensión
ill	-errónea, mal	illmatched illdefined	desigual, incompatible mal definido
im- **in-**	-no -opuesto	impossible inaccurate	imposible inexacto
in-	-adentro	inborn	innato
infra-	-debajo de	infrared	infrarrojo
inter-	-entre	interaction	interacción
intra- intro-	-dentro	intravenous	intravenoso
ir-	no -opuesto	irregular	irregular
iso-	-igual	isomagnetic	isomagnético
kilo-	-1000	kilogram	kilogramo
macro-	-grande	macromolecule	macromolécula
mal- **male- mali-**	-mal -negativo	malformation malevolent	malformación malevolente
mega- **megalo-**	-muy grande -un millón	megawatt	megavatio
meta-	-cambio	metamorphic	metamórfico
micro-	-pequeño, en pequeña escala	microclimate	microclima
milli-	-un milésimo	milligram	miligramo
mini-	-pequeño	miniskirt	minifalda
mis-	errado, mal	miscalculate	calcular mal
mono-	-uno	monoxide	monóxido
multi-	-muchos	multilateral	multilateral
neo-	-nuevo	neolithic	neolítico
non-	negativo	noneffective nonsense	ineficaz sin sentido
out-	en exceso exterior	outmeasure outlying	medir en exceso extrínseco
over-	en exceso, demasiado superior, encima	overdose overconfident	sobredosis demasiado confiado
para-	-similar a	parasympathetic	parasimpático
peri-	-alrededor	perimeter	perímetro
phono-	-sonido	phonology	fonología
pent(a)-	-cinco	pentagon	pentágono
photo-	-luz	photography	fotografía

poly-	-muchos	polymorphous	polimorfo
pre-	-anterior	prehistory	prehistoria
pro-	-del lado de	proconsul	proconul
proto-	-primero, original	prototype	prototipo
post-	-después	post-war	post guerra
pseudo-	-falso, seudo	pseudonymous	pseudónimo
quadri-	-cuatro	quadrivalent	cuadrivalente
re-	-de nuevo, volver a -junto, mutuamente	recombine react	recombinar reaccionar
self-	por sí mismo, auto	selfgoverning selfpropelled	autónomo con impulso propio
semi-	-medio, imperfecto	semicircle semiconductor	semicírculo semiconductor
sub-	-debajo de, menos que, sub	subconscious	subconsciente
supra- **super-**	-por encima -más allá de	supersonic	supersónico
sur-	-sobre	surpass	sobrepasar
syn/m-	-con, junto	synthesis	síntesis
tele-	-distancia	television	televisión
tetra-	-cuatro	tetrachloride	tetracloruro
therm(o)-	-calor	thermometer	termómetro
trans-	-a través de, trans	transplant	transplante
tri-	-tres	triangle	triángulo
ultra-	-más allá, más de lo usual	ultrasonic	ultrasónico
un-	no, negativo, contrario	uneven unbusinesslike	desparejo Contrario a la práctica comercial
under-	insuficiente, inferior	underdeveloped undersea	subdesarrollado submarino
uni-	-uno	unicellular	unicelular
vice	-vice, asistente	vece-president	vicepresidente

SUFIJOS	FUNCIÓN	EJEMPLO EN INGLÉS	EQUIV. EN CAST.
-able	Adjetivo (que se puede...) Que puede, o es digno de ser…	Observe - observable Exchange-exchangeable Rely – reliable Unforgettable unobjectable	Observar observable Intercambiable Confiar – confiable Inolvidable Inobjetable
-age	Sustantivo abstracto (acción de) (cantidad o conjunto de)	Break - breakage Assemble assemblage Percent- percentage Short - shortage	Romper ruptura Montar montaje Porciento-porcentaje Déficit – merma
-al	Sustantivo abstracto (acción de)	Refuse refusal Arrive - arrival	Rechazar rechazo Llegar – llegada
-al **-ial** **-ical**	Adjetivo Que tiene la cualidad de…	Magic magical Race racial Psychology psychological	Magia mágico/mágica Raza racial Psicología psicológico/a
-an **-ian**	Sustantivo Agente (persona que se dedica a) que pertenece a	Mathematics mathermatician Music musician	Matemática matemático Música músico
-ance --ce **-ence** **-ancy** **-ency**	Sustantivo abstracto Acción o estado de Sustantivo abstracto Estado o cualidad de	Disturb disturbance Adhere adherence Conservancy Complacency	Disturbar disturbio Adherir adherencia adhesion Conservaciòn Complacencia
-ant **-ent**	Sustantivo Adjetivo (derivados de verbos)	Inhabit- inhabitant Adhere – adherent Resist - resistant	Habitar- habitante Adherir - adherente Resistir – resistente
-ar -iar	Adjetivo	Family- familiar	Familia- familiar
-ary **-ory**	Adjetivo	Elementary Compulsory	Elemental Obligatorio
-ation -ition **-tion** **-ion -xion** **-cion -sion**	Sustantivo (la acción de) O el estado de	Sediment - sedimantation Conduct – conduction Operate – operation Competition Confession	Sedimento sedimentación Conducir conducción Operar – operación Competiciòn Confesión
-ate	Adjetivo (en forma de, que posee) Verbo	Dent - dentate Isolate	Diente dentado Aislar
-cy	Sustantivo	Bureaucrat bureaucracy	Burócrata burocracia
-dom	Sustantivo abstracto	Free- freedom King -kingdom Wise - wisdom	Libre- libertad Rey - reinado Sabio –sabiduría

<u>Al final de un verbo</u> **-ed** **-d** **-ied**	<u>Verbo pasado indefinido</u> (pasado simple) <u>Verbo participio pasado</u> (ado – ido) (tiempos perfectos) <u>participio pasado (ado-ido)</u>	Consider – considered They considered that … Consider - considered They have considered that…	Considerar consideró,consideraba, Consideraron/consideraban que.. Considerar - considerado Han considerado que ...

	Adjetivo (derivado de verbo o sustantivo)	Seen in this light… Record – recorded The recorded data… Skill – skilled Culture - culture	Visto de esta manera... Registrar – registrado/s Los datos registrados Habilidad – experto Cultura – culto/a/s
-ee	Sustantivo (destinatario de una acción) El que es…	Employ- employee Grant- grantee	Emplear- empleado Conceder concesionario/becario
-efy	Verbo	liquid –liquefy	líquido – licuificar
-en **-en**	Adjetivo (hecho de) Verbo	Gold – golden Strength strengthen Length - lengthen	Oro – de oro, dorado Fuerza – fortalecer Largo – alargar
-ence **-ent**	Igual a **–ance- ant**		
-er **-or** **-r** **-er** **Al final de un adjetivo** **-er** **-ier** **-r**	Sustantivo agente (la persona o cosa que realiza la acción o se ocupa de) **Adjetivo o adverbio (comparativo)**	Drive – driver Contain – container High – higher than… Fast – faster than …	Conducir – conductor Contener – contenedor, recipiente Alto – más alto que... Rápido o rápidamente – más rápidamente que ...
-ern	Adjetivo	West – western	Oeste – occidental
-ery **-ry**	Sustantivo	Slave – slavery Machine – machinery	Esclavo – esclavitud Máquina – maquinaria
-ese	Sustantivo Adjetivo (nacionalidad)	China – Chinese	China – chino/a/s
-ess	Sustantivo (femenino)	Actor – actress Tiger - tigress	Actor – actriz Tigre – tigresa
Al final de un adjetivo **-est** **-iest** **-st**	**Adjetivo** **Adverbio** **(superlativo)**	High –the highest Fast – the fastest	Alto – el más alto Rápidamente – más rápidamente que todos.
-fold	Adjetivo (se le agrega a los numerales para significar multiplicado por)	Two – twofold Five - fivefold	Dos – doble Cinco – quíntuple
-fy	Verbo	Glory – glorify Intense - intensify	Gloria – glorificar Intenso – intensificar
-ful	Adjetivo (calidad de)	Use – useful Doubt - doubtful	Usar – útil Dudar – dudoso

-hood	Sustantivo abstracto Derivado de sustantivo	Child – childhood Brother - brotherhood	Niño – niñez Hermano - hermandad
-ian	Adjetivo – nacionalidad o relativo a. Sustantivo (que se ocupa de alguna ciencia o disciplina)	Canada – Canadian Darwin – Darwinian Mathematics-mathematician	Canadá – canadiense Darwin – darwiniano/a Matemáticas – matemático
-ible	Ver -able		
-ic	Adjetivo	Artist – artistic System - systematic	Artista – artístico Sistema – sistemático
-ics	Sustantivo – disciplina o ciencia	Physics – Linguistics - Statistics	Física – Lingüística – Estadística
-id	Adjetivo	Rigid	Rígido/a
-ie **-y**	Sustantivo (diminutivos para personas)	Dad – Daddy	Papá – Papito
-ify -fy	Verbo	Solid – solidify	Sólido – solidificar
-ile	Adjetivo	Infant – infantile	Infante – infantil
-ine	Adjetivo	Saline	Salino/a
-ion	Ver –ation		
-ish	Adjetivo (semejanza)	Yellow – yellowish	Amarillo – amarillento/a
-ism	Sustantivo	Ideal – idealism	Ideal – idealismo
-ist	Sustantivo (ocupación o profesión)	Geology – geologist Dentist -	Geología – geólogo/a Dentista
-ite	Sustantivo (términos científicos de minerales, fósiles, explosivos, etc)	Dynamite anthracite	Dinamita Antracita
-ity **-ty**	Sustantivo (calidad de)	Identity security	Identidad Seguridad
-ive **-ative**	Adjetivo Sustantivo	Select – selective Quantity – quantitative represent – representative	Seleccionar –selectivo/a/s Cantidad –cuantitativo/a/s representar- representante
-ise **-ize**	Verbo (formación de verbos derivados del griego o latín)	Organize organise	Organizar
-less	Adjetivo (privado de, sin)	Care – careless End – endless Doubt – doubless Use – useless	Cuidado – descuidado Fin/final– sin fin /interminable Cierto – indudable Utilidad – inutil
-let	Sustantivo (diminutivos)	Drop – droplet	Gota – gotita
-like	Adjetivo (semejante a)	Child – childlike	Niño – aniñado/a/s
-logy	Sustantivo (ciencias)	Anthropology Pharmacology	Antropología Farmacología
-ly **-ly**	Adjetivo Adverbio (-mente)	Heaven – heavenly Slow – slowly Instant – instantly	Cielo – celestial Lento – lentamente Instantáneo-instantaneamente

		General - generally	generalmente.
-man	Sustantivo – agente	Space – spaceman	Espacio – astronauta
-ment	Sustantivo (la acción de)	Displace – displacememt	Desplazar- desplazamiento
-ness	Sustantivo (estado)	Happy – happiness	Feliz – felicidad
-oid	Adjetivo o Sustantivo	Anthropoid	Antropoide
-ory	Ver –ary		
-our **-or**	Sustantivo	Behave – behaviour Behave – behavior	Comportarse – Comportamiento
-ous **-eous** **-ious**	Adjetivo	Courage – corageous Religion - religious	Coraje,valor- Valeroso, valiente Religión – religioso
-ry (ery)	Sustantivo (ciencia u ocupación)	Chemistry dentistry	Químmica – cirugía dental
Terminación de palabra **-s** **-es** **-ies**	Verbo (tercera persona singular del presente simple) Sustantivo (plural)	Make – makes Pass – passes Study – studies Advantage – advantages Class – classes Activity - activities	Hacer – hace Pasar – pasa Estudiar – estudia Ventajas – ventajas Clase – clases Actividad – actividades
Al final del sustantivo **´s** **s`**	Sustantivo (posesivo)	Darwin Darwin`s theory Teachers – the teachers`protest.	Darwin – la teoría de Darwin La protesta de los maestros.
-ship	Sustantivo abstracto	Friend – friendship Workman - workmanship	Amigo/a – amistad Destreza, pericia
-some	Adjetivo (lo que produce)	Trouble - troublesome	Problema – problemático Penoso, molesto
-th	Sustantivo abstracto o numero ordinal	Grow – growth (sust.abst) Six – sixth (num.ordinal)	Crecer – crecimiento Seis – sexto
-tion	sustantivo	organize- organization	organizar-organización
-ude	Sustantivo	Attitude	Actitud
-ure	Sustantivo	Procedure - nature	Procedimiento -naturaleza
-ward (s)	Adjetivo(en dirección a) (en el mismo sentido que) Adverbio (hacia, en direcciòn)	Down – downward Fore – foreward	Abajo, hacia abajo, descendente Adelante, hacia delante
-wise	Adjetivo Adverbio (en sentidode)	Clock – clockwise	Reloj – en el sentido de las agujas del reloj/ hacia la derecha
-y	Adjetivo (lo que está compuesto de) Sustantivo	Stone – stony Dirt - dirty Assemble - asembly	Piedra – pétreo Suciedad - sucio Reunir,congregar- asamblea

LISTA DE VERBOS IRREGULARES

Arise	Arose	Arisen	Levantarse
Awake	Awoke	Awoken	Despertar
Be *am-is- are*	**Was were**	Been	Ser o estar
Bear	Bore	Borne	Llevar, cargar, sostener, dar a luz
Beat	Beat	Beaten	Golpear
Become	Became	Become	Volverse, hacerse, poners
Begin	Began	Begun	Comenzar, iniciar/se
Bend	Bent	Bent	Doblarse/se, torcer/se, inclinarse.
Bet	Bet	Bet	Apostar, poner
Bid	Bid	Bid Bidden	Invitar, ofrecer, licitar, rematar
Bind	Bound	Bound	Atar, unir, enlazar, trabar
Bite	Bit	Bitten	Morder
Bleed	Bled	Bled	Sangrar
Blow	Blew	Blown	Soplar, inflar, reventar
Break	Broke	Broken	Romper, separar/se, interrumpir
Breed	Bred	Bred	Engendrar, producir, crear
Bring	Brought	Brought	Traer, rendir, producir
broadcast	broadcast	broadcast	Radiar, transmitir, Difundir, emitir
Build	Built	Built	Construir, fabricar, formar
Burn	Burnt	Burnt	Arder, quemar/se,
Burst	Burst	Burst	Estallar, explotar, abrirse
Buy	Bought	bought	Comprar
Cast	Cast	Cast	Lanzar, moldear, fundir,
Catch	Caught	Caught	Atrapar
Choose	Chose	Chosen	Elegir, preferir
cleave	Cleft/ clove	Cleft/ cloven	Partir, dividir, Hender
Cling	Clung	Clung	Agarrarse, Pegarse
Come	Came	Come	Venir, llegar,
Cost	Cost	Cost	Costar, valer
Creep	Crept	Crept	Arrastrarse
Cut	Cut	Cut	Cortar, divider, reducir
Deal	Dealt	Dealt	Repartir, distribuir, encargarse de,
Dig	Dug	Dug	Excavar, extraer
Do	Did	Done	Hacer, producir
Draw	Drew	Drawn	Tirar, dibujar, extraer
Dream	Dreamt	Dreamt	Soñar, imaginar
Drink	Drank	Drunk	Beber
Drive	Drove	Driven	Conducir, manejar, accionar
Dwell	Dwelt	Dwelt	Habitar, extenderse
Eat	Ate	Eaten	Comer
Fall	Fell	Fallen	Caer/se, bajar, desplomarse.
Feed	Fed	Fed	Alimentar/se,nutrirse
Feel	Felt	Felt	Sentir, palpar
Fight	fought	Fought	Pelear, luchar
Find	Found	Found	Encontrar, descubrir
Flee	Fled	Fled	Huir, esquivar, evadir
Fling	Flung	Flung	Arrojar, echar, desechar
Fly	Flew	Flown	Volar, viajar en avión, huir, lanzar
Forbid	Forbade	Forbidden	Prohibir
Forecast	Forecast	Forecast	Predecir, proyectar
forget	forgot	Forgotten	Olvidar
forgive	forgave	forgiven	Perdonar
freeze	froze	frozen	Congelar/se, enfriar
get	got	got-gotten	Obtener y (verbos especiales)
Gild	Gilded	Gilt	Dorar, dar lustre o brillo

Gird	Girt	Girt	Medir la circunferencia ceñir
give	gave	given	Dar, otorgar, mostrar,
go	went	gone	Ir, moverse, funcionar, marcharse
grind	ground	ground	Moler, esmerilar, pulir, afilar
grow	grew	grown	Crecer, desarrollarse
hang	Hung/ hunged	hung	Colgar, suspender
have	had	Had	Tener y verbos especiales
hear	Heard	Heard	Oir, prestar atención, enterarse.
Heave	Hove	Hove	Levantar, henchir, izar, arrojar
Hew	Hewed	Hewn	Tajar, labrar, Picar, separar, Modelar
hide	hid	Hidden	Esconder
Hit	Hit	Hit	Golpear, afectar, alcanzar
Hold	Held	Held	Mantener, tener, sujetar, contener
Hurt	Hurt	Hurt	Lastimar(se)
Keep	Kept	Kept	Guardar, mantener, conserver,
Kneel	Knelt	Knelt	Arrodillarse, Postrarse
Knit	Knit	Knit	Tejer, enlazar, Unir, trabar, soldar
Know	Knew	Known	Saber, conocer, distinguir.
Lade	Laded	Laden	Cargar, desembocar
Lay	Laid	Laid	Colocar
Lead	Led	Led	Guiar,dirigir
Lean	Leant	Leant	Inclinarse, apoyarse, propender
Leap	Leapt	Leapt	Saltar,brotar
Learn	Learnt	Learnt	Aprender, estudiar, saber,
Leave	Left	Left	Dejar,partir
Lend	Lent	Lent	Prestar
Let	Let	Let	Dejar,permitir, dar, asignar
Lie	Lay	Lain	Yacer, echarse, estar ubicado
Light	Lit	Lit	Alumbrar, encender/se
Lose	Lost	Lost	Perder, arruinar
Make	Made	Made	Hacer, fabricar, producir,
Mean	Meant	Meant	Significar, referirse a
Meet	Met	Met	Encontrarse , conocer
mistake	Mistook	mistaken	Engañarse, confundirse
Mow	Mowed	Mown	Segar, cortar, Arrasar
Pay	Paid	Paid	Pagar
Put	Put	Put	Poner, colocar
Quit	Quit	Quit	Abandonar Descontinuar compensar
Read	Read	Read	Leer, interpreter, registrar
Reeve	Rove	Rove	Pasar por una polea, atar,
Rend	Rent	Rent	Arrancar, rasgar, arrebatar
Rid	Rid	Rid	Deshacerse de
Ride	Rode	Ridden	Montar
Ring	Rang	Rung	Sonar
Rise	Rose	Risen	Levantarse, elevarse,
Run	Ran	Run	Correr, accionar, funcionar
Saw	sawed	Sawn	Aserrar, serruchar, cortar
Say	Said	Said	Decir, manifestar
See	Saw	Seen	Ver, comprender, visitar
Seek	Sought	Sought	Buscar
Seethe	Sod	Sodden	Bullir, hervir, empapar
Sell	Sold	Sold	Vender, convencer
Send	Sent	Sent	Eviar, transmitir
Set	Set	Set	Colocar, acomodar, ajustar
Sew	Sewed	Sewn	Coser, asegurarse, Finiquitar

Shake	Shook	Shaken	Sacudir/se, agitar/se, estremecer/se
Shave	Saved	Shaven	Razurar, Rebanar, Descontar
Shear	Shore	Shorn	Cortar con tijera, rapar, Esquilar,
Shed	Shed	Shed	Derramar, Difundir Cambiar,
Shine	Shone	Shone	Brillar, lustrar
Shoot	Shot	shot	disparar
Show	Showed	shown	mostrar
Shrink	Shrank,shrunk	Shrunk/shrunken	encoger
Shoe	Shod	Shod	Calzar, Poner llantas o ruedas
Shut	Shut	shut	cerrar
Sing	Sang	Sung	cantar
Sink	Sank	Sunk	hundir
Sit	Sat	Sat	sentarse
Sleep	Slept	Slept	dormir
Slide	Slid		
Smite	Smote	Smitten	Golpear, Destruir aniquilar
Sow	Sowed	Sown	Sembrar, Diseminar, Esparcir
Speak	Spoke	Spoken	Hablar
Speed	Sped	Sped	Apresurarse, Progresar promover
Spell	Spelt	Spelt	Deletrear Significar, descubrir
Spend	Spent	Spent	Gastar, pasar
Spill	Spilt	Spilt	Derramar, verter
Spin	Spun/ span	Spun	Hilar, hacer girar, retorcer
Spit	Spat/ spit	Spat/ Spit	Escupir, Despedir, encender
split	Split	Split	Hender, partir, dividir
Spread	Spread	Spread	Extender/se diseminar/se, desplegarse
Spoil	Spoilt	Spoilt	Arruinar Mutilar, Viciar
Spread	Spread	Spread	Extender, Expandir, difundir
Spring	Sprang	Sprung	Saltar, Rebotar, estallar
Stand	Stood	Stood	Estar de pie, enderesar/se
Stave	Stove	Stove	Romper, desfondar,
Steal	Stole	Stolen	Robar escabullirse
Stick	Stuck	Stuck	Pegar/se, estar clavado
Sting	Stung	Stung	Picar, Estimular estafar
stink	Stank/ Stunk	Stunk	Oler apestar
Strew	Strewed	Strewn	Esparcir, Diseminar
Stride	Strode	Stridden	Andar con pasos largos
Strike	Struck	Struck	Golpear, chocar con
String	Strung	Strung	Avanzar en linea, extenderse
Strive	Strove	Striven	Esforzarse, competir
Swear	Swore	Sworn	Jurar
Sweat	Sweat	Sweat	Transpirar, Fermentar Fundir
Sweep	Swept	Swept	Barrer Recolectar
Swell	Swelled	Swollen	Hincharse, Expandirse
Swim	Swam	Swum	Nadar Flotar
Swing	Swung	Swung	Columpiar, balancear/se
Take	Took	Taken	Tomar,llevar requerir, ocupar
Teach	Taught	Taught	Enseñar, instruir, educar
Tear	Tore	Torn	Desgarrar, rasgar, despedazar
Tell	Told	Told	Decir
Think	Thought	Thought	Pensar
Thrive	Throve	Thriven	Prosperar Enriquecerse Tener éxito
Throw	Threw	Thrown	Lanzar, arrojar
Thrust	Thrust	Thrust	Empujar con fuerza
Tread	Trod	Trodden	Pisar, cubrir
understand	understood	understood	Entender comprender saber
upset	upset	upset	Volcar(se)
wake	woke	Woken	Despertar(se)

Wear	Wore	Worn	Usar, gastar/se consumer/se
Weave	Wove	Woven	Tejer, Entrelazar forjar
Wed	Wed	Wed	CasarseUnir aunar
Weep	Wept	wept	Llorar exudar
Wet	Wet	Wet	Mojar humedecer
Win	Won	Won	Ganar
Wind	Wound	Wound	Enrollar
Withdraw	Withdrew	Withdrawn	Retirar/se, sacar, apartar
Withhold	withheld	withheld	Detener Impedir abstenerse
Withstand	Withstood	Withstood	Resistir, oponerse,
Work	Wrought	Wrought	Trabajar Labrar calcular
Wring	Wrung	Wrung	Retorcer, arracar
Write	Wrote	Written	Escribir