Lectocomprensión del Inglés
Manual para Matemática, Astronomía y Física

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Módulo de Idioma Inglés **FAMAF** **GUÍA INTRODUCTORIA** **Contenidos**	¤ Introducción a los principales aspectos teóricos y prácticos que sustentan nuestra aproximación a la lectura extranjera en el nivel superior. ¤ Aplicación de diferentes estrategias de lectura, para abordar un texto en español.

ESTRATEGIAS DE LECTURA

Existen diferentes tipos y propósitos de lectura y para ello hay una serie de estrategias que se adecuan a las necesidades de comprensión textual y a la forma de afrontar dicho proceso.

- Las que permiten dotarse de objetivos de lectura y actualizar los conocimientos previos relevantes (*actividades de prelectura y durante ella*).
- Las que permiten establecer inferencias de distintos tipos, revisar y comprobar la propia comprensión mientras se lee y tomar decisiones adecuadas ante errores en la comprensión (*actividades durante la lectura*).
- Las dirigidas a recapitular el contenido, a resumirlo y extender el conocimiento que se ha obtenido mediante la lectura (*actividades de poslectura*) (Solé, 1992).

De acuerdo con los diferentes propósitos podemos identificar, entre otras, las siguientes formas de lectura:

- LECTURA GLOBAL (skimming)
- LECTURA DE INDAGACIÓN O ANALÍTICA (scanning)

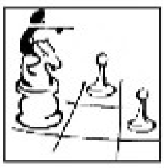
1. Lea las siguientes definiciones para determinar qué tipo de lectura definen, ¿global o analítica?

- Esta lectura es minuciosa y detallada. Nos ayudará a responder aquellas preguntas que se formulen o que se hayan formulado durante la lectura global. LECTURA ..analtica.........
- Este tipo de lectura consiste en leer rápidamente con el objeto de tener una idea general y amplia del tema. LECTURA .global...................

2. Existen algunos procedimientos que nos ayudarán a desarrollar la comprensión a través de la aplicación de técnicas y estrategias de lectura. A continuación, encontrará un listado de esas técnicas/estrategias. Léalas y determine cuáles se ponen en práctica durante la primera etapa de la lectura y cuáles durante la segunda etapa.

ESTRATEGIA	PRIMERA ETAPA DE LECTURA	SEGUNDA ETAPA DE LECTURA
1. Activar el conocimiento previo de un tema.	☒	
2. Hacer esquemas y resúmenes.		
3. Extraer información de gráficos y dibujos.		
4. Buscar en cada párrafo la frase clave.		
5. Subrayar las ideas que creamos importantes.		
6. Buscar las ideas principales leyendo la primera oración de cada párrafo.		
7. Interpretar las diferentes fuentes de información textual.		
8. Ordenar y reordenar ideas en un texto.		
9. Leer las palabras destacadas en negrita o bastardilla.		
10. Utilizar el diccionario.		
11. Identificar nombres o frases relacionas con un dibujo.		
12. Poner en los márgenes palabras clave.		
13. Leer títulos y predecir de qué tratará el texto.		
14. Deducir por el contexto.		
15. Observar imágenes y relacionarlas con el tema sobre el que se leerá.		
16. Leer detalladamente.		
17. Reconocer la estructura del texto.		
18. Leer subtítulos.		
19. Interactuar con el texto.		
20. Leer el primer párrafo.		
21. Indagar en el vocabulario, estructuras gramaticales y puntuación.		

3. Una vez resuelta la actividad 2 puede corroborar sus respuestas al final de esta guía.



APLICACIÓN DE ESTRATEGIAS DE LECTURA

4. Lea el texto de la página a continuación. Observe el paratexto (título, subtítulos, datos del autor, datos de publicación) y responda las preguntas a-c.

ARENAS ALATORRE, Jesús Ángel. "*Contribuciones de la física en la historia de la microscopía*". Revista Digital Universitaria [en línea]. 10 de julio 2005, Vol. 6, No. 7. [Consultada: 11 de julio de 2005]. Disponible en Internet: <http://www.revista.unam.mx/vol.6/num7/art70/int70.htm> ISSN: 1607-6079.

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Responsable de Vinculación en el Laboratorio Central de Microscopía del Instituto de Física, Universidad Nacional Autónoma de México
jarenas@fisica.unam.mx

El doctor Jesús Ángel Arenas Alatorre fue responsable del laboratorio de Microscopía Electrónica de la Universidad Autónoma Metropolitana, Unidad Iztapalapa en el periodo 1994-1995. Ostentó el cargo de investigador del Instituto Nacional de Investigaciones Nucleares (ININ) de 1995 a 1997. Durante ese mismo año, desempeñó la función de Jefe del Departamento de Síntesis y Caracterización de Materiales del ININ hasta el 2002. Realizó una estancia de investigación en Argonne National Laboratory.

El doctor ha dirigido 14 tesis de licenciatura y dos de maestría. Ha publicado 16 artículos referentes al área de nanoestructuras en revistas de circulación internacional; un libro y tres capítulos en diferentes libros.

Sus especialidades son: física del estado sólido; ciencia de materiales: microscopía electrónica, difracción de Rayos-X; películas delgadas, nanoestructuras y arqueometría.

Actualmente, es miembro del Sistema Nacional de Investigadores Nivel 1 y responsable del Laboratorio Central de Microscopia del Instituto de Física de la Universidad Nacional Autónoma de México.

a. ¿Qué datos puede obtener del paratexto?

....

....

b. ¿Qué información se puede obtener acerca del autor?

....

....

c. ¿Qué importancia tiene conocer la nacionalidad del autor?

....

....

La información que brinda el **paratexto** previamente a la lectura propiamente dicha activa en la memoria del lector la red de conocimientos conceptuales, lingüísticos e intertextuales que le facilitarán la construcción del modelo mental del texto.

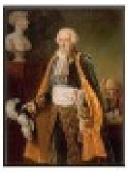
Una lectura atenta del paratexto permite hacer deducciones sobre aspectos temáticos y formales del texto. Fomentar la habilidad lectora de los elementos paratextuales favorece el desarrollo general de la competencia lectora.

Arnoux, E. et al. (2002). *La lectura y la escritura en la universidad*. Buenos Aires: Eudeba.
Alvarado, M. (2006). *Paratexto*. Buenos Aires: Eudeba.

5. Lea los nombres y observe las imágenes del recuadro, para responder las siguientes preguntas en forma oral.

a. ¿Le resultan conocidos estos nombres?

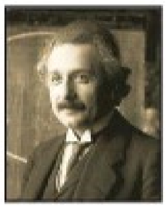
b. ¿Qué relación existe entre los siguientes nombres y su carrera?



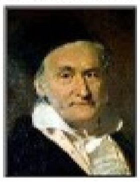
PIERRE–SIMON LAPLACE

JOHANNES KEPLER

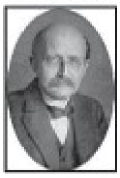
ALBERT EINSTEIN

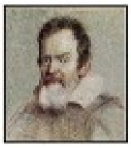


FRIEDRICH GAUSS



MAX PLANCK KARL





GALILEO GALILEI

6. Trabaje en pares, para resolver la actividad a continuación. Lea las siguientes biografías y, basándose en su conocimiento previo, indique a qué persona (del ejercicio anterior) se describe en cada fragmento. Hay DOS NOMBRES que no corresponden a ninguna de las biografías presentadas.

BIOGRAFÍAS

__________________ (Beaumont-en-Auge (Normandía); 23 de marzo de 1749 - París; 5 de marzo de 1827) astrónomo, físico y matemático francés. Fue un creyente del determinismo causal. Nacido en una familia de granjeros de la baja Normandía, marchó a estudiar en la Universidad de Caen donde fue recomendado a D'Alembert, quien, impresionado por su habilidad matemática, lo recomendó para un puesto de profesor en la Escuela Militar de París en 1767, donde tuvo entre sus discípulos a Napoleón[cita requerida]. En 1785 es nombrado miembro de la Academia de Ciencia y en 1795, miembro de la cátedra de matemáticas del Nuevo Instituto de las Ciencias y las Artes, que presidirá en 1812. En 1795 empieza a publicar el primero de los cinco volúmenes que constituirán su Mecánica celeste y en 1796 imprime su *Exposition du système du monde*, donde revela su hipótesis nebular sobre la formación del sistema solar.

________________ nació en Weil der Stadt, cerca de Sttutgart (Alemania), en 1571. De naturaleza frágil y enfermiza, contrajo la viruela a los tres años, lo que debilitó considerablemente su vista. Pero pronto destacó en matemáticas y se interesó por la astronomía. Ingresó en un Seminario protestante en 1584 y estudió después en la Universidad de Tubinga. En 1594 abandona sus estudios de teología y comienza a enseñar matemáticas en una escuela de Graz. En 1600 conoció a Tycho Brahe en Praga y cuando murió este último le sustituyó como **matemático imperial de Rodolfo II**. A partir de 1612 vivió en Linz hasta 1626 cuando tuvo que abandonar la ciudad tras un asedio militar. Murió en 1630 en Ratisbona (Alemania).

________________ era originario de una familia con gran tradición académica: su bisabuelo fueron profesores de teología en la Universidad de Gotinga, su padre fue profesor de derecho en Kiel y Múnich, su tío también jurista en Gotinga y uno de los padres del Código Civil de Alemania.
Nació el 23 de abril de 1858 en Kiel, del matrimonio de Julius Wilhem con su segunda esposa Emma Patzig (1821-1914). Tenía cuatro hermanos (Hermann, Hildegard, Adalbert y Otto) y dos medio hermanos (Hugo y Emma), hijos de su padre con su primera esposa. Pasó en Kiel sus seis primeros años y entonces su familia se mudó a Múnich. Allí se matriculó en el Maximiliansgymnasium. Se matriculó para el curso 1874/75 en la Facultad de Física de la Universidad de Múnich. Allí, bajo la tutela del profesor Jolly, condujo sus propios experimentos (por ejemplo sobre la difusión del hidrógeno a través del platino caliente) antes de encaminar sus estudios hacia la física teórica. Además de sus estudios, fue miembro del coro de la universidad donde en 1876/77 compuso una opereta titulada «Die Liebe im Walde» y en 1877 realizó con otros dos compañeros un viaje por Italia. Visitó Venecia, Florencia, Génova, Pavia, los lagos de Como y Lugano, Lago Maggiore, Brescia y el Lago de Garda.
Sus descubrimientos, que fueron verificados posteriormente por otros científicos, fueron el nacimiento de un campo totalmente nuevo de la física, conocido como mecánica cuántica y proporcionaron los cimientos para la investigación en campos como el de la energía atómica. Reconoció en 1905 la importancia de las ideas sobre la cuantificación de la radiación electromagnética expuestas por Albert Einstein, con quien colaboró a lo largo de su carrera.

________________ (30 de abril de 1777, Brunswick – 23 de febrero de 1855, Göttingen), fue un matemático, astrónomo y físico alemán que contribuyó significativamente en muchos campos, incluida la teoría de números, el análisis matemático, la geometría diferencial, la estadística, el álgebra, la geodesia, el magnetismo y la óptica. Considerado «el príncipe de las matemáticas» y «el matemático más grande desde la antigüedad», ha tenido una influencia notable en muchos campos de la matemática y de la ciencia, y es considerado uno de los matemáticos que más influencia ha tenido en la Historia. Fue de los primeros en extender el concepto de divisibilidad a otros conjuntos.
Fue un niño prodigio, de quien existen muchas anécdotas acerca de su asombrosa precocidad. Hizo sus primeros grandes descubrimientos mientras era apenas un adolescente y completó su magnum opus, *Disquisitiones Arithmeticae* a los veintiún años (1798), aunque no sería publicado hasta 1801. Fue un trabajo fundamental para que se consolidara la teoría de los números y ha moldeado esta área hasta los días presentes.

Existe consenso entre los psicólogos cognitivos y los educadores que sólo se aprende cuando se integra una nueva información dentro de un esquema o estructura cognitiva ya existente. Los esquemas cognitivos o **conocimientos previos**, son estructuras que representan los conceptos almacenados en nuestra memoria a largo plazo. (Bartlett, 1930; Rumelhart, 1980).

La activación de los **conocimientos previos** consiste en permitir que los conocimientos del alumno estén disponibles para ser utilizados durante la lectura; es decir, hacerles tomar conciencia de ellos. Para esto es importante en primer lugar, estimular sus conocimientos. Esta activación es mayor y más enriquecedora cuando se realiza interactivamente, en grupos de alumnos que comparten lo que saben sobre el tema que les interesa.

Extraído y adaptado de http://biblioteca-digital.ucentral.cl/documentos/libros/lintegrado2/Capi5.htm

SECUENCIAS TEXTUALES

Aunque el dominio progresivo de la lengua es requisito significativo en el proceso de la lectocomprensión, no es el único. El lector necesita, además, ciertas habilidades que ponen en marcha esa competencia comunicativa, entre las que se destaca la competencia discursiva, entendida como la capacidad de poner en práctica procesos lingüísticos apropiados con el fin de comprender o producir un texto según las situaciones de comunicación.

La habilidad de producir e interpretar diferentes tipos de textos es una competencia clave en torno de la cual se articula la comprensión lectora. Distinguir las diferencias estructurales que puedan asumir los textos según la situación comunicativa es una habilidad elemental para que el lector pueda interactuar con el texto y asignarle sentido sin mayores dificultades.

La enseñanza de las destrezas de lectura y escritura en lengua materna o en lengua extranjera (...) consiste en buena medida en definir tipos de texto y señalar sus características estructurales, su estructuración sintáctica, su vocabulario, etc. (Bernárdez, 1995 en Rueda de Twentyman y Aurora, 2008). De esta afirmación se desprende la relevancia del reconocimiento de las secuencias prototípicas (Adam, 1992 en Arnoux, 2002) por parte de los alumnos aprehendientes de una lengua extranjera.

7. Lea el siguiente fragmento y trate de responder las preguntas que le siguen.

DIALOGO CON GERARDO DEPAOLA, FISICO E INVESTIGADOR DE LA FAMAF.

Publicado en Página 12, Miércoles 17 de setiembre de 2008.

Por Leonardo Moledo, matemático y periodista, compagina su trabajo como profesor en la Universidad Nacional de Quilmes y la Universidad de Buenos Aires.

Tras la huella del bosón de Higgs

Esta vez el jinete, presionado por las circunstancias, cabalga hacia el límite, hacia la composición última de la materia, hacia la caza del bosón de Higgs que están buscando en el Supercolisionador de hadrones.

—¿En qué trabaja usted?

—En Espectroscopia Atómica y Nuclear, de la Famaf (Facultad de Matemática, Astronomía y Física de la Universidad Nacional de Córdoba) y por esos avatares de la vida he llegado a una rama de la Física que me ha puesto en contacto con la gente del Supercolisionador... en un proyecto en particular que tiene que ver con el desarrollo de un software de simulación.

—Ahora... mire, yo en realidad quería que me contara qué es el "bosón de Higgs". Nosotros tenemos el modelo estándar que describe las partículas elementales.

—Sí: son seis quarks (que forman los protones, los neutrones, etc...) y tenemos seis leptones, que son el electrón, el muón (que es un electrón pesado), y el tau, que es un electrón más pesado todavía y los tres neutrinos correspondientes.

—Más las antipartículas correspondientes. Y las partículas asociadas a fuerzas.

—Sí. Los bosones. Tenemos cuatro fuerzas: el electromagnetismo, que está mediado por los fotones. La fuerza débil, que está mediada por tres partículas: el W +, el W - y el Z0. La fuerza fuerte, que está medida por los gluones.

—Y la gravitatoria, con el gravitón, que no se sabe si existe. ¿Y ahora por qué no me cuenta qué es el campo de Higgs?

—El campo surge como un bosón más... Hay una predicción del modelo estándar sobre mecanismo de producción de cambios de leptones (cuando los electrones se transforman en muones) y esto, según la teoría requiere un bosón especial.

—El modelo estándar predice que en determinado momento los electrones se pueden transformar en muones, y para que eso ocurra tiene que intervenir un bosón...

—Sí. El bosón tiene que actuar como mediador entre el electrón y el muón. El bosón de Higgs es la única partícula que puede cambiar el electrón en otra cosa. La profundidad de la teoría, aparte, le da el poder de explicar por qué las partículas adquieren la masa.

a. En el fragmento que acaba de leer, ¿qué secuencia <u>predomina</u>?

- [ ] Dialogal
- [ ] Descriptiva
- [ ] Argumentativa

b. ¿Qué otra/s secuencia/s encuentra en el fragmento leído?

- [ ] El relato o narración de acontecimientos
- [ ] La explicación de un tema
- [ ] La descripción de elementos

c. En el fragmento leído también se encuentran secuencias explicativas.
Según Marín y Hall (2005), la explicación es el desarrollo de un saber que responde a un interrogante, y ese desarrollo puede adoptar dos formas:
Explicaciones de modo (responden a "¿cómo es?", "¿en qué consiste?")
Explicaciones de causa (responden a "¿por qué?", "¿a qué se debe?")
Cuando se reconoce la estructura de las explicaciones se puede reconstruir su hilo conductor para hacer más fácil la comprensión del texto. Una forma de reconstruirlo es poder reconocer dentro de ellas algunos procedimientos habituales: -definir, -dar ejemplos, -reformular, -citar o mencionar a otros autores/textos.
En el pasaje que acaba de leer, a través de diferentes procedimientos, se explican conceptos. ¿Cuáles de éstos son? Marque en el texto los elementos que le permitieron reconocerlos.

- El bosón de Higgs
- Los quarks
- Los leptones
- El muón
- El tau
- El Campo de Higgs

d. ¿Cuál de estas oraciones mejor resume la situación que presenta el fragmento leído? Justifique su elección.

a) La conversación entre dos miembros de la Academia de Ciencias de Méjico.
b) La conversación entre un investigador y un docente de universidades argentinas.
c) La conversación entre un investigador y un alumno de la FAMAF.

EL USO DE LOS DICCIONARIOS

Para que la consulta del diccionario sea realmente útil es importante buscar el que sea más adecuado, ya que existen distintas clases de diccionarios que cubren diferentes necesidades, dependiendo de los lectores a quienes estén dirigidos.
Si un estudiante que cursa estudios superiores recurre a un diccionario que no está destinado para ese nivel, puede ocurrir que no figure la palabra que busca, o que figure con una acepción que no corresponda al sentido con que está usada. De ese modo, la búsqueda resultará muy poco eficaz. En efecto, cuando el término o la palabra desconocida no figura en un diccionario general, o el significado que está en el diccionario no corresponde al significado con que está usado en el texto, es muy probable que se trate de un término específico de una disciplina. Es preciso, entonces, recurrir a los diccionarios especializados o incluso a algún manual dentro de la disciplina.

(Extraído y adaptado de Marín, M. y Hall, B. (2005). *Prácticas de lectura con textos de estudio*. Buenos Aires: Eudeba.)

8. Lea el siguiente fragmento prestando atención a las palabras resaltadas. ¿Podría tratar de explicar su significado sin consultar el diccionario?

> *Storage devices (floppy or hard disks) provide a permanent storage of both data and programs. Disk **drives** are used to handle one or more floppy disks. Input devices enable data to go into the computer`s memory. The most common input devices are the mouse and the keyboard.*
>
> Remacha, S. (1997). *Infotech English for Computer Users*. Cambridge University Press

9. Ahora, lea los equivalentes de "*drive*" a continuación y responda.

Diccionario Espasa Concise © 2000 Espasa Calpe:

drive [draɪv] ***vtr*** *(ps* ***drove;*** *pp* ***driven)***
1 *(un vehículo)* conducir, manejar
2 *(a una persona)* llevar, forzar, obligar: **His ambition drove him to his death**; Su ambición lo llevó a la muerte
3 *(energía)* impulsar: **It is driven by steam;** funciona a vapor
4 *Dep* lanzar
5 *(un palo)* hincar
(un clavo) clavar
6 llevar en coche: **Would you drive me to the supermarket?**, ¿Me llevas en coche al supermerdado?

vi *Auto* conducir, manejar: **Do you know how to drive?,** ¿Sabes conducir?

nombre
1 *(excursión)* paseo en coche
to go for a drive, dar una vuelta en coche
2 *(delante de una casa)* camino de entrada
3 *Mec* transmisión
Auto tracción
front-wheel drive, tracción delantera

4 *Golf* golpe inicial
5 *(de ventas, etc)* campaña
6 empuje, vigor

7 instinto
sex drive, instinto sexual
8 *Inform* disquetera

♦ LOC: **to drive sb mad,** volver loco,-a a alguien

a. ¿Qué significan las abreviaturas

1) vtr? ___________

2) vi? ___________

3) ps? ___________

b. ¿Qué categorías gramaticales (adjetivo/sustantivo o nombre/ verbo/ adverbio) puede tener la palabra "*drive*"?

....

c. **¿A qué disciplina corresponden el equivalente 4 de la primera entrada y el equivalente 3 de la segunda entrada? ¿Cómo lo sabe?**

....

d. **¿Qué equivalente en español elegiría, según el fragmento que leyó?**

....

e. **¿Cuál de todos los equivalentes dados por el diccionario es el correspondiente para la palabra resaltada? ¿Qué elementos tuvo en cuenta para su elección?**

....

Con este ejemplo, se hace evidente que los diccionarios comunes no suelen satisfacer todas las necesidades de lectura de textos de estudio de nivel superior. Para satisfacer sus necesidades de lectura en este curso, Ud. diseñará un **glosario** de vocabulario de la especialidad.

El glosario se elaborará individualmente. El propósito de esta herramienta de aprendizaje es facilitar el reconocimiento de **palabras o términos de la especialidad** cuando lea textos de su área disciplinar.

Se recomienda:

- Seleccionar **vocabulario de la especialidad** luego de leer los textos de las guías de estudio.
- Ordenar las palabras y los términos alfabéticamente.
- Identificar la categoría gramatical de la palabra o término seleccionado (verbo, sustantivo, adjetivo, adverbio).
- Contextualizar esa palabra o término transcribiendo un ejemplo.
- Dar el equivalente en español de esa palabra o término.

Los conectores (tales como "but", "although", "because") y las preposiciones (por ejemplo: "of", "at", "with") **no** pertenecen al vocabulario específico de la disciplina, por lo tanto, **no deben** incluirse en el glosario.

Buscar palabras en el diccionario requiere ciertos conocimientos específicos:

- el orden alfabético,
- el significado de las abreviaturas,
- el manejo de las remisiones sucesivas (cuando el texto del diccionario indica que debe buscarse otra palabra. Por ejemplo, *"wrote: past tense of write"*)
- el reconocimiento del "lenguaje de diccionario" (*"dícese de…", "a word used for...", "an expression of…"*)
- la habilidad de localizar la definición adecuada al texto en que aparece.

(Extraído y adaptado de Marín, M. y Hall, B. (2005). *Prácticas de lectura con textos de estudio*. Buenos Aires: Eudeba.)

10. ¿Cuál de todos los equivalentes dados por el diccionario es el correspondiente para la palabra resaltada? ¿Qué elementos tuvo en cuenta para su elección?

The most influential component in the Computer System is the Central Processing Unit. Its function is to execute program instructions and coordinate the activities of all the other units. In a **way**, it is the "brain" of the computer. The main memory holds the instructions and data which are currently being processed by the CPU. The peripherals are the physical units attached to the computer. They include storage devices and input/output devices.

Remacha, S. (1997). *Infotech English for computer users*. Cambridge University Press

way *n*	(direction)	camino *nm*
		dirección *nf*
	Which way did you go to get here?	
	¿Qué camino tomaste para llegar aquí?	
way *n*	(manner, how)	forma, manera *nf*
		manera *nf*
		modo *nm*
	How did he do it? In what way?	
	¿Cómo lo hizo? ¿De qué forma?	
	¿Cómo lo hizo? ¿De qué manera?	
	¿Cómo lo hizo? ¿De qué modo?	
way *n*	(valid route)	camino *nm*
	There is a way through the mountains ten kilometres south of here.	
	Hay un camino a través de las montañas a diez kilómetros al sur de aquí.	
way *n*	(street name)	vía *nf*
	The street I live on is called Artren Way.	
	La calle en la que vivo se llama Vía Artren.	
way *n*	(habit)	hábito *nm*
		hábito *nm*
	He has a way of always losing his keys.	
	Tiene el hábito de perder las llaves constantemente.	
	Él tiene el hábito de siempre perder las llaves.	
way *n*	(distance)	distancia *nf*
	distancia larga	lejos *adv*
	distancia corta	cerca *adv*
	Chicago is a long way from here.	
	Chicago está a una larga distancia de aquí.	

Para resumir:

En esta guía introductoria intentamos mostrar que existen diferentes técnicas y estrategias para comprender textos en forma eficiente y para poder hacer una lectura crítica y reflexiva. Y éste es, en realidad, nuestro propósito principal: que los usuarios de este manual logren abordar eficazmente y en forma autónoma un texto de la especialidad o de divulgación en lengua extranjera.

RESPUESTAS DE LA ACTIVIDAD 2

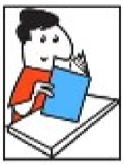
ESTRATEGIAS A PONER EN PRÁCTICA EN LA PRIMERA ETAPA DE LA LECTURA

* Activar el conocimiento previo de un tema.
* Leer títulos y predecir de qué tratará el texto.
* Leer subtítulos.
* Leer las palabras destacadas en negrita o bastardilla.
* Leer el primer párrafo.
* Buscar en cada párrafo la frase clave.
* Buscar las ideas principales leyendo la primera oración de cada párrafo.
* Observar imágenes y relacionarlas con el tema sobre el que se leerá.
* Extraer información de gráficos y dibujos.
* Identificar nombres o frases relacionas con un dibujo.
* Interpretar las diferentes fuentes de información textual.
* Reconocer la estructura del texto.

ESTRATEGIAS A PONER EN PRÁCTICA EN LA SEGUNDA ETAPA DE LA LECTURA

* Leer detalladamente.
* Subrayar las ideas que creamos importantes.
* Interactuar con el texto.
* Deducir por el contexto.
* Ordenar y reordenar ideas en un texto.
* Hacer esquemas y resúmenes.
* Utilizar el diccionario.
* Indagar en el vocabulario, estructuras gramaticales y puntuación.
* Poner en los márgenes palabras clave.

Módulo de Idioma Inglés FAMAF GUÍA 1 Contenidos	**Propósitos de Lectura:** **Aplicar diferentes estrategias de lectura.** **Completar un cuadro que sintetice el contenido del texto.** **Al finalizar la Guía, Ud. habrá puesto en práctica los siguientes contenidos léxico-gramaticales**: ⌗ Palabras estructurales y palabras conceptuales ⌗ Transparencias léxicas ⌗ Definiciones ⌗ Verbo *TO BE* ⌗ Afijación ⌗ Conectores que indican *EJEMPLIFICACIÓN*



ACTIVIDADES DE COMPRENSIÓN

1. Lea el siguiente texto, para responder la siguiente pregunta: ¿puede decir qué se define?

________ ________ ___ ___ ________ in the ________ ________ and ________ ________ but also in the ________ ________; ________, ________, ________ ________, and ________ _____ ________ ______ _____ ________. ________ ________ _____ ______ ______ _______, ________ but not ________ to ________ ________, ________ ________, ________ ________, or ________ ________ ________. _____ and _____ ________ of ______ ___ _____, with a ______ ______ ______ a __________ of ________ ________.

2. Lea el siguiente texto, para responder las preguntas a-c.

Mathematical models are used particularly ___ ___ natural sciences ___ engineering disciplines ___ ____ __ ___ social sciences; physicists, engineers, computer scientists, ___ economists use mathematical models most extensively. Mathematical models can take many forms, including ___ ___ limited __ dynamical systems, statistical models, differential equations, __ game theoretic models. These ___ other types __ models can overlap, ___ _ given model involving _ variety __ abstract structures.

a. ¿En cuál de los dos textos logró mayor comprensión?

b. ¿Por qué es imposible saber de qué trata el primer texto?

c. ¿Tienen el mismo valor informativo las palabras ausentes en los dos textos?

Las palabras presentes en el primer texto son llamadas palabras ***estructurales***. Estas estructuran el texto.
Las palabras presentes en el segundo texto son llamadas palabras ***conceptuales***. Estas llevan la carga de significado, tienen un gran valor informativo.

3. Ahora, lea el texto completo, para responder las preguntas a-b.

Mathematical models are used particularly in the natural sciences and engineering disciplines, but also in the social sciences; physicists, engineers, computer scientists, and economists use mathematical models most extensively.
Mathematical models can take many forms, including but not limited to dynamical systems, statistical models, differential equations, or game theoretic models.
These and other types of models can overlap, with a given model involving a variety of abstract structures.

a. ¿Qué se define en el texto?

b. ¿Qué palabra/s lo ayudaron a responder la pregunta "**a**"?

4. Relea el texto, para identificar palabras transparentes. Señálelas con un color.

5. A partir de lo señalado, complete la siguiente definición:

Existen palabras que comparten **s**___________, **o**___________ **y p**____________ similares en dos idiomas diferentes. Estas palabras son conocidas como **palabras transparentes** o **cognados** y por lo tanto son un puente evidente para entender la lengua extranjera.

Recuerde que la habilidad de leer comprensivamente en lengua extranjera supone un proceso estratégico complejo que permite acceder a la interpretación eficaz de lo escrito sin pasar por la traducción literal, palabra por palabra.

Leer comprensivamente un texto en idioma extranjero no significa traducir. Tampoco significa conocer o saber el significado de todas y cada una de las palabras.

6. Observe el texto a continuación. Preste atención al título, a los subtítulos y a la fuente. ¿De qué tratará el texto que va a leer? Marque una opción:

a- Astronomía   b- Matemática Pura   c- Física   d- Estadística

NUMBER SYSTEMS AND SETS

Mathematics is a basic tool. Some use of mathematics is found in every field, from the simple arithmetic of counting for inventory purposes to the complicated equations encountered in computer and engineering work. Storekeepers need mathematical computation in their bookkeeping. Damage Control men need mathematics to compute stress, centers of gravity, and maximum permissible roll. Electronic principles are frequently stated by means of mathematical formulas. Navigation and engineering also use mathematics to a great extent. From the point of view of the individual there are many incentives for learning the subject. Mathematics better equips him to do his present job. It will help him in attaining promotions and corresponding pay increases. Statistically it has been found that one of the best indicators of a man's potential success is his understanding of mathematics.

COUNTING

Counting is such a basic and natural process that we rarely stop to think about it. The process is based on the idea of ONE-TO-ONE CORRESPONDENCE, which is easily demonstrated by using fingers. When children count on their fingers, they are placing each finger in one-to-one correspondence with one of the objects being counted. Having outgrown finger counting, we use numerals.

NUMERALS

Numerals are number symbols. One of the simplest numeral systems is the Roman numeral system, in which tally marks are used to represent the objects being counted. Roman numerals appear to be a refinement of the tally method still in use today. By this method, one makes short vertical marks until a total of four is reached; when the fifth tally is counted, a diagonal mark is drawn through the first four marks. Grouping by fives in this way is reminiscent of the Roman numeral system, in which the multiples of five are represented by special symbols.

A number may have many "names". For example, the number 6 may be indicated by any of the following symbols: 9-3, 12/2, 5+1, or 2x3. The important thing to remember is that a number is an idea; various symbols used to indicate a number are merely different ways of expressing the same idea.

POSITIVE WHOLE NUMBERS

The numbers which are used for counting in our number system are sometimes called natural numbers. They are positive whole numbers, or to use the more precise mathematical term, positive INTEGERS. The Arabic numerals from 0 to 9 are called digits, and an integer may have any number of digits. For example 5, 32, and 7,049 are all integers. The number of digits in an integer indicates its rank; that is whether it is "in the hundreds", "in the thousands", etc. The idea of ranking numbers in terms of tens, hundreds, thousands, etc., is based on the PLACE VALUE concept.

Extraído de: Niven, I. (1991). *Calculus.* Nostrand C.Princeton: New Jersey.

7. Ahora, lea el texto rápidamente, para confirmar su elección. Resalte las palabras que ayuden a confirmar su predicción.

Anticipar elementos clave del contenido de un texto a través de la observación de elementos paratextuales puede resultar una estrategia útil para la comprensión ya que permite hacer deducciones sobre aspectos temáticos y formales del texto.

La información que brinda el paratexto previamente a la lectura propiamente dicha activa en la memoria del lector la red de conocimientos conceptuales, lingüísticos e intertextuales que le facilitarán la construcción del modelo mental del texto.
Los elementos paratextuales constituyen un conjunto de informaciones necesarias que hay que tener en cuenta para que la lectura de un texto sea más eficaz. Esas informaciones pueden tener diferentes funciones:
(1) **Información orientativa** previa a la lectura. Se trata de datos sobre lo que se va a leer, que se encuentran en el **indice**, la **tapa**, la **contratapa** y / o las **solapas** de un libro y el **prólogo**.
(2) **Información adicional**. Es el caso de los **recuadros** que acompañan a un artículo o las **notas al pie de página** o los **epígrafes** debajo de las imágenes que acompañan a un texto, o los **apéndices**.
(3) **Información redundante.** Ocurre cuando los epígrafes de una ilustración repiten información del texto.

Arnoux, E. et al. (2002). *La lectura y la escritura en la universidad*. Buenos Aires: Eudeba.
Alvarado, M. (2006). *Paratexto*. Buenos Aires: Eudeba.
Marin, M y Hall, B. (2008). *Prácticas de lectura con textos de estudio*. Buenos Aires: Eudeba.

Recuerde que existen distintos tipos y propósitos de lectura.

Para resolver la siguiente actividad, aplicará la estrategia de ***skimming*** o **lectura global,** que consiste en leer rápidamente el texto con la finalidad de captar la idea general de éste. En consecuencia, al aplicar esta estrategia no se leen todas y cada una de las palabras, sino que, por ejemplo, se mira rápidamente el primer párrafo de un texto; luego, las primeras oraciones de cada párrafo y por último, el párrafo final.

8. Lea nuevamente el texto en forma global, para completar las siguientes actividades:

a) **Indique en cuántos párrafos se divide el texto.**

b) **Señale cuáles de los conceptos listados se desarrollan y en qué párrafo se encuentran. (Tenga en cuenta que en el texto no se mencionan todos).**

Concepto en el texto	C	NC	Párrafo #
1.Se dice que los números representan ideas.			
2. Se menciona que las fórmulas matemáticas están incluidas en los principios electrónicos.			
3. Se menciona el rango de los dígitos en un número entero.			
4. Se menciona la causa del uso de los dedos en los niños.			
5. Se dice que los números racionales son aquellos que pueden expresarse como el cociente de dos números enteros.			

ACTIVIDADES SOBRE ELEMENTOS DEL LENGUAJE

9. Observe los siguientes ejemplos:

- Mathematics is a basic tool. (r. 1)
- Numerals are number symbols. (r. 18)

a. ¿Qué estructura comparten esas oraciones?

b. ¿Qué función cumple esa estructura?

LA DEFINICIÓN

Consiste en presentar los significados de una palabra y restringirlos con ciertas especificaciones (rasgos, funciones y/o relaciones con el elemento descripto).
Una definición, entonces, adjudica ciertas características al tema o al objeto colocándolo dentro de una clase y especificando cuáles son sus rasgos particulares. Muchas veces, después de la definición, esos rasgos que se mencionaron se amplían y se desarrollan. Otras veces aparece una clasificación del objeto que se definió.

¿Por qué es necesario NO pasar por alto las definiciones?

- Porque puntualizan conceptos fundamentales para el desarrollo de una explicación.
- Porque hay objetos de estudio y hay conceptos que son definidos de distintas maneras, según las disciplinas y según las teorías dentro de las disciplinas.

La marca lingüística que distingue a la definición es el verbo BE (ser/estar). Cuando BE se encuentra en una definición, se traduce al español como SER.

- *Mathematical operations <u>are</u> certain procedures that take one or more numbers as input and produce a number as output.*
- *Las operaciones matemáticas son procedimientos que…*

La fórmula **<u>básica</u>** en **español** sería:
Sustantivo que nombra el objeto + verbo SER + otro/s sustantivo/s ampliado/s con modificadores que lo especifican

Adaptado de Marín, M. y Hall, B. (2005). *Prácticas de lectura con textos de estudio.* Buenos Aires: Eudeba. 89-90-92.

10. Lea los siguientes ejemplos extraídos del texto, para completar las actividades que se proponen a continuación:

I. Subraye las acciones en cada uno (verbos).
II. Explique qué se define en cada caso y cómo se lo define.

a. Counting is such a basic and natural process. (12)

b. The numbers which are used for counting in our number system are sometimes called natural numbers. They are positive whole numbers, or to use the more precise mathematical term, positive INTEGERS. (29, 30, 31)

III. Busque una definición en el último párrafo. ¿Qué se define?

....
....
....

> En estos casos se empleó el verbo "***to be***" en tiempo presente. Este es un verbo que se usa frecuentemente en inglés y que puede funcionar como verbo principal o como auxiliar junto con otros verbos.
>
> Observe la tabla con las distintas formas del verbo "***to be***" en tiempo presente en el apéndice al final de la Unidad.

11. Subraye el verbo "*to be*" en los renglones 1, 12, 18. ¿Cuál sería su equivalente en español?

....
....
....

12. Observe las siguientes frases extraídas del texto. Preste atención a la parte resaltada de cada palabra.

a) mathematic**al** computa**tion**

b) natur**al** process

c) numer**al** system**s**

d) bas**ic** tool

e) complicat**ed** ecua**tion**

f) electron**ic** principle**s**

g) one-to-one correspond**ence**

- ¿Cómo agruparía las palabras señaladas?

- ¿A cuáles llamaría "adjetivos" y a cuáles "sustantivos"? ¿Por qué?

13. Ahora, observe el siguiente ejemplo:

h) **Computational** complexity theory is a branch of the theory of **computation** in theoretical **computer** science and mathematics that focuses on classifying **computational** problems according to their inherent difficulty.

14. Responda las siguientes preguntas:

1. ¿Qué tienen en común?
2. ¿Cambia el significado al cambiar la terminación?
3. ¿Podría establecer alguna regla?

- Cuando encontramos palabras cuyo significado desconocemos podemos entenderlas si conocemos los procedimientos de formación de palabras.
- En algunos casos, es conveniente ver si la palabra se puede **separar** en partes (**descomponer**) porque puede ocurrir que eso permita deducir su significado.

AFIJOS		
PREFIJOS	**BASE**	**SUFIJOS**
HYPERactivity	ACTIVE	hyperactiv**ITY**

15. Por último, observe el siguiente ejemplo; luego, responda la pregunta a continuación.

i) **<u>Numerals</u>** are number symbols. One of the simplest **<u>numeral</u>** systems is the Roman **<u>numeral</u>** system, in which tally marks are used to represent the objects being counted. Roman **<u>numerals</u>** appear to be a refinement of the tally method still in use today.

- En los ejemplos se repite la palabra "numeral", ¿qué diferencia encuentra entre una y otra?

....

....

- La terminación de la palabra, por una parte, y su ubicación en la oración, por otra, nos indican la categoría gramatical de un vocablo.

Estas palabras que se escriben igual pero que ocupan lugares diferentes en la oración, generalmente, tienen significados diferentes. Es muy importante tener esto en cuenta a la hora de hacer búsquedas en el diccionario.

16. Conectores

a) Observe la siguiente oración:

The Arabic numerals from 0 to 9 are called digits, and an integer may have any number of digits. ***For example*** *5, 32, and 7,049 are all integers.*

¿Por cuál de las siguientes palabras o frases podría reemplazar a la palabra resaltada?

- In addition
- Consequently
- Such as
- And

b) Teniendo en cuenta la respuesta anterior, ¿qué función está cumpliendo la frase subrayada

- expresa un concepto nuevo?
- agrega un ejemplo a modo de ilustración?
- añade otro punto a considerar?

LA EJEMPLIFICACIÓN

El ejemplo es un procedimiento típico en los textos explicativos, que cumple una función esclarecedora con respecto al objeto de explicación. Además permite al que escribe asegurarse de la mejor recepción de su mensaje.

Los autores usan ejemplos para aclarar sus ideas y para ilustrar lo que exponen.

Generalmente, la ejemplificación en INGLÉS es introducida por: **for example, e.g., by way of example, for instance, as can be seen, in particular, such as.**

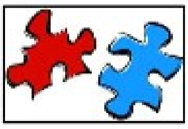
Algunos sustantivos también pueden indicar ejemplificación: **an illustration, as example of this might be...** y algunos verbos como: **this is illustrated by, this is exemplified by...**

En síntesis, el ejemplo cumple la función de establecer una relación entre dos niveles de conocimiento: uno más difícil de elaborar y el otro más específico y claro.

Adaptado de Agostini de Sánchez, M. (2004). *Inglés para arquitectos*. Córdoba: Comunicarte.
Zamudio, B. y Atorresi, A. (2000). *La explicación*. Buenos Aires: Eudeba.

Recuerde que existen distintos tipos y propósitos de lectura.

Para resolver la siguiente actividad, aplicará la estrategia de ***scanning*** o **lectura detallada,** que consiste en tratar de encontrar información específica en el texto. Cuando una persona *escanea* un texto, mueve los ojos rápidamente para buscar ciertas palabras o señales (mayúsculas, números, símbolos, etc.) que le ayuden a encontrar la información que necesita.



A modo de cierre…

17. Lea nuevamente el texto, pero esta vez en forma específica, para completar la siguiente tabla con información del mismo.

Los individuos (o personas) se desempeñan…	
El conteo consiste en…	
El agrupamiento cada cinco es…	
La clasificación de los números en términos de…se basa en…	

RECUERDE EXTRAER LAS PALABRAS, FRASES Y TÉRMINOS QUE CONSIDERE IMPORTANTES DE ESTA GUÍA PARA, LUEGO, INCORPORARLOS EN SU GLOSARIO.

APÉNDICE GRAMATICAL

Tabla de conjugación
Tiempo Presente - Verbo TO BE

	Afirmativo	**Negativo**	**Interrogativo**
1º P.S.	I am… / I'm…	I am not… / I'm not	Am I..?
2º P.S.	You are…../ You're…	You are not…/You aren't…	Are you …?
3º P.S.	He is…/He's… She is…/She's… It is…/It's…	He is not…/He isn't… She is not…./She isn't… It is not…/It isn't…	Is he ….? Is she…? Is it…?
1º P.P.	We are…/We're…	We are not…/We aren't…	Are we …?
2º P.P.	You are…/You'e…	You are not…/You aren't	Are you …?
3º P.P	They are…/They're….	They are not…/They aren't…	Are they…?

Palabras Principales y Palabras Menores
Las palabras pueden ser agrupadas en dos grandes categorías teniendo en cuenta el contenido y la función que cumplen dentro de la oración. Se clasifican en:

PRINCIPALES: Son las palabras conceptuales que expresan una idea o concepto y dan mayor significado o contenido a la oración y además se les puede agregar nuevas palabras. Ellas son:
Verbos comunes: require, contain
Sustantivos: design, computer
Adjetivos: small, personal
Adverbios: directly, very

MENORES: Comprende las palabras estructurales y no encierran concepto o idea en ellas. Se llaman "menores" porque su rol en la oración (estructurar el texto) es más importante que se significado. Normalmente no se les puede agregar nuevas palabras. Ellas son:
Verbos auxiliares: can, have, must
Pronombres: she, us, that
Artículos: the, an
Preposiciones: of, on
Conjunciones: and, but

Existen palabras que comparten significado, ortografía y pronunciación similares en dos idiomas diferentes. Estas palabras son conocidas como palabras transparentes o cognados y por lo tanto son un puente evidente para entender la lengua extranjera. En inglés existen un sin número de palabras que son parecidas y hasta idénticas al español.

Por ejemplo:

Inglés	*Español*
explore	explorar
computer	computadora
analysis	análisis
type	tipo

photo	foto
ability	habilidad
design	diseño/diseñar

Sin embargo, ocurren muchos errores de comprensión por palabras que comparten rasgos morfológicos iguales o parecidos pero con significados parcial o totalmente diferentes. Estas palabras son llamadas falsos amigos.

Por ejemplo:

Inglés	*Español*
exit	salida (~~éxito~~)
fabric	tela (~~fábrica~~)
large	grande (~~largo~~)
file	archivo (~~fila~~)

De La Vega, G. (1998). *Manual de gramática inglesa.* Córdoba: Editorial Atenea
Thornbury, S. (2004). *How to teach vocabulary.* England: Pearson Education Limited.

SUFIJOS QUE FORMAN ADJETIVOS		
Sufijo	Significado	Ejemplo
-AL -AR -IC -ICAL	Tiene la calidad de; Relacionado a	mechanicAL modulAR automatIC theoretICAL
-ABLE -IBLE	Que tiene la capacidad de ser	adjustABLE responsIBLE
-ANT -ENT	Alguien o algo que hace algo	importANT
-OUS	Describe algo que tiene una cualidad particular; Lleno de	continuOUS
-FUL	Lleno de algo; Caracterizado por	useFUL
-LESS	Sin	useLESS
-ISH	Parecido a	GreyISH
-ED (inflexión)	Que tiene una cualidad en particular	extrudED
-ESE	Oriundo de un lugar	ChinESE
-IVE	Calidad de	productIVE
-ING (inflexión)	Capacidad de hacer algo	leadING
-Y	Lleno de algo o cubierto de algo	hungrY

PREFIJOS QUE FORMAN ADJETIVOS		
Prefijo	Significado	Ejemplo
UN- IN- IM- IL- IR-	El opuesto de; negativo	UNcomfortable INcompatible IMperfect ILlogical IRregular
AUTO-	Que puede funcionar por sí mismo; Sólo	AUTOpilot
A-	Con una condición en particular	Asexual
AB-	Negativo	ABnormal
ANTI-	Opuesto	ANTIsocial
DIS-	Negativo	DISinterested
HYPER-	Superior	HYPERactive
FORE-	Anterior; Parte delantera de algo; Que está ubicado adelante	FOREfront
MAL-	Mal hecho, fallado	MALadjusted
MIS-	Que le falta; Mal/o; erróneo	MISapply
NON-	Algo o alguien no es algo	NON-existent
OVER-	Demasiado	OVERflow
PRE-	Antes	PREarranged
PRO-	Que aprueba o está a favor de algo	PRO-war
SUB-	Debajo de	SUB-zero
SUPER-	Más	SUPERhuman
UNDER-	Menos de la cantidad deseada o necesitada; Demasiado poco	UNDERside

SUFIJOS QUE FORMAN SUSTANTIVOS		
Sufijo	Significado	Ejemplo
-ANCE -ENCE	Acción, estado o cualidad de ser o hacer algo	performANCE existENCE
-AR	Una persona que hace algo	beggAR
-ATION/-TION/-ION	El acto, resultado o estado de hacer algo	combinATION execuTION conversION
-DOM	Condición de	freeDOM
-ER/-OR	Una persona que / una cosa que hace algo	designER operatOR liftER accumulatOR
-IAN/-AN	Perteneciente a	electricIAN suburbAN
-ING (inflexión)	Actividad	lightING
-ISM	Condición/estado	magnetISM
-IST	La persona que hace cierto tipo de trabajo	scientIST
-ITY	Algo que tiene una cualidad especial	electricITY
-MENT	Estado/acción	measureMENT
-NESS	Condición de	thickNESS
-SHIP	Condición/estado	relationSHIP
-URE	Indica el resultado o la acción de	failURE
-S/-ES/-IES (inflexiones)	Plural	wallS glassES citIES

Módulo de Idioma Inglés FAMAF GUÍA 2 Contenidos	**Propósito de Lectura: Resolver problemas.** **Al finalizar la Guía, Ud. habrá puesto en práctica los siguientes contenidos léxico-gramaticales:** ⌑ Plurales de sustantivos ⌑ Funciones de la forma –ed ⌑ Tiempo presente de los verbos ⌑ Conectores que indican *EJEMPLIFICACIÓN*

1. Lea el título y observe la Figura 1-1 y la Tabla 1-1, para predecir el tema del texto. ¿De qué le parece que tratará?

2. Lea el título. En el espacio a continuación, escriba las palabras y los conceptos que podrían encontrarse en el texto. Luego, lea el texto completo, para confirmar sus predicciones.

DECIMAL SYSTEM

In the decimal system, each digit position in a number has ten times the value of the position adjacent to it on the right. For example, in the number 11, the 1 on the left is said to be in the “tens place,” and its value is 10 times as great as that of the 1 on the right. The 1 on the right is said to be in the “units place,” with the understanding that the term “unit” in our system refers to the numeral 1. Thus, the number 11 is actually a coded symbol which means “one ten plus one unit.” Since ten plus one is eleven, the symbol 11 represents the number eleven.

Figure 1‑1 shows the names of several digit positions in the decimal system. If we apply this nomenclature to the digits of the integer 235, then this number symbol means “two hundreds plus three tens plus five units”. This number may be expressed in mathematical symbols as follows:

$$2 \times 10 \times 10 + 3 \times 10 + 5 \times 1$$

Notice that this bears out our earlier statement: each digit position has 10 times the value of the position adjacent to it on the right.

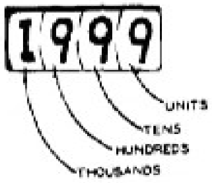


Figure 1.1- Names of digit positions.

The integer 4,372 is a number symbol whose meaning is "four thousand plus three hundreds plus seven tens plus two units". Expressed in mathematical symbols, this number is as follows:

$4 \times 1000 + 3 \times 100 + 7 \times 10 + 2 \times 1$

This presentation may be broken down further, in order to show that each digit position as 10 times the place value of the position on its right, as follows:

$4 \times 10 \times 100 + 3 \times 10 \times 10 + 7 \times 10 \times 1 + 2 \times 1$

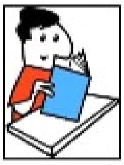
The comma which appears in a number symbol such as 4,372 is used for "pointing off" the digits into groups of three beginning at the right – hand side. The first group of three digits on the right is the units group; the second group is the thousands group; the third group is the millions group; etc. Some of these groups are shown in table 1–1

Table 1-1: Place values and grouping

Billions group			Millions group			Thousands group			Units group		
Hundred billions	Ten billions	Billions	Hundred millions	Ten millions	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Units

By reference to table 1–1, we can verify that 5,432,786 is read as follows: five million, four hundred thirty-two thousand, seven hundred eighty-six. Notice that the word “and” is not necessary when reading numbers of this kind.

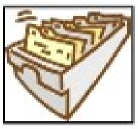
Extraído de Niven, I. (1991). *Calculus*. New Jersey: Nostrand C. Princeton.



ACTIVIDADES DE COMPRENSIÓN

3. Lea el texto en forma específica y, con una cruz ☒, señale si las siguientes ideas se encuentran contenidas (C) en el mismo o no (NC). En caso afirmativo, indique renglones de referencia.

	C / NC	Renglón(es)
a) Se menciona nuestro sistema numérico diciendo que emplean 10 símbolos para representar todos los números.		
b) Se afirma que el conocimiento de los conjuntos numéricos es esencial para un dominio básico del Algebra y el Cálculo.		
c) Se dice que cada dígito tiene 10 veces el valor del que ocupa la posición adyacente del mismo hacia la derecha.		
d) Se brinda información acerca del uso de la coma separando los dígitos en grupos de tres a partir de la derecha.		



VOCABULARIO

4. En la siguiente tabla encontrará algunas palabras y expresiones extraídas del texto. Marque cuál de los equivalentes en español provistos es el más adecuado, según el contexto.

is said to be (3)	a. es dicho ser	b. se dice que	c. se muestra que
on the left (3)	a. en la derecha	b. a la derecha	c. a la izquierda
bears out (12)	a. sostiene	b. sustenta	c. confirma
statement (12)	a. declaración	b. sentencia	c. establecido
thousand (14)	a. fondo	b. mil	c. fundamento
appears (18)	a. aparece	b. parece	c. muestra
show (16)	a. mostrar	b. seleccionar	c. habilitar
times (2)	a. tiempo	b. veces	c. controla
word (23)	a. mundo	c. aquello	c. palabra

Las dificultades que el vocabulario puede presentar pueden sortearse deduciendo el significado de las palabras desconocidas a través de las pistas que el contexto aporta o por la forma de las mismas. Ésto no invalida el uso del diccionario bilingüe, al que se recurrirá cuando *el texto no ayude* y cuando *las deducciones aporten más incertidumbres que certezas.*

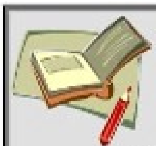
ACTIVIDADES SOBRE ELEMENTOS DEL LENGUAJE

5. Busque en el texto los equivalentes en inglés de las siguientes palabras:

Palabra en español	Equivalente en inglés	
nombres	....	....
grupos	....	....
números	....	....

¿Cuál es el singular de las palabras en inglés?

¿Se construye de igual manera que en español?



Saber cómo se forma el plural de las palabras en inglés le puede servir cuando esté buscando una palabra en el diccionario. Por lo general, el diccionario no presenta las palabras en plural y Ud. deberá deducir la forma singular del vocablo que está buscando.

6. Observe los siguientes ejemplos que contienen palabras terminadas en –"ed". ¿Qué función cumple la –ed en cada caso? Con una cruz, señale la columna correspondiente.

EJEMPLOS	ACCIÓN	CUALIDAD
a. a **coded** symbol (r. 6)		
b. This number may be **expressed** in mathematical symbols. (r. 10)		
c. The comma which appears in a number symbol such as 4,372 is **used** for "pointing off" the digits. (r. 18)		

Con frecuencia es posible deducir el significado de las palabras si uno presta atención a la forma en que las mismas se construyen. Si uno conoce el significado de algunos **sufijos** es posible deducir el significado de la palabra; por ejemplo: **"-ed"** después de un verbo corresponde a las terminaciones "**ado" –"ido"** en español.

7. Observe las siguientes oraciones y responda:

- The term "unit" in our system **refers** to the numeral 1. (r.5)
- Since ten plus one **is** eleven, the symbol 11 **represents** the number eleven. (r.6-7)
- This number symbol **means** "two hundreds plus three tens plus five units". (r. 9-10)
- The first group of three digits on the right **is** the units group; the second group **is** the thousands group. (r. 19-20)

En estos ejemplos, los elementos subrayados son **acciones**, ¿en qué tiempo verbal se encuentran?

TIEMPO PRESENTE DE LOS VERBOS EN INGLÉS

Este tiempo de verbo se usa para:

a. describir rutinas (valor habitual)

Ej. He lives near a ffactory.
I usually start work at 8 a.m.

b. comunicar un saber atemporal (característico de las explicaciones científicas o técnicas)

Ej: A triangle has three straight sides and three angles.

c. describir estados

Ej.: I'm tired.

¤ **¿Cuál de los tres usos presentados es el que predomina en el texto de esta guía?**

....

Antes vimos que la **–s** final puede usarse para indicar ***plural***. Pero este no es el único uso que la **–s** tiene cuando se encuentra en esa posición. También puede ser usada en un verbo y, en este caso, indica que la acción es llevada a cabo en **tiempo presente** por la **3era persona del singular**. Por lo tanto, es conveniente prestar atención a la ubicación de la palabra en la oración y los modificadores que tenga para decidir qué indica la **–s**.

8. Observe los siguientes ejemplos, prestando atención a la parte resaltada. Diga si la "-s" final indica *sustantivo plural* o *verbo*. Luego, dé un equivalente de cada ejemplo.

a. *The term "unit" in our system* ***<u>refers</u>***[1] *to the numeral 1. (r. 5)*

1 sustantivo ❑ verbo ❑
Equivalente en español:

b. *Figure 1–1* ***<u>shows</u>***[1] *the* ***<u>names</u>***[2] *of several digit* ***<u>positions</u>***[3] *in the decimal system. (r. 8)*

1 sustantivo ❑ verbo ❑	**2** sustantivo ❑ verbo ❑	**3** sustantivo ❑ verbo ❑
Equivalente en español:		

c. *Expressed in mathematical* ***<u>symbols</u>***[1]*, this number is as* ***<u>follows</u>***[2]*… (r. 15)*

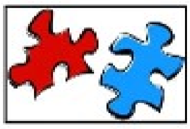
1 sustantivo ❑ verbo ❑	**2** sustantivo ❑ verbo ❑
Equivalente en español:	

d. *Notice that the word "and" is not necessary when reading* ***<u>numbers</u>***[1] *of this kind. (23-24)*

1 sustantivo ❑ verbo ❑
Equivalente en español:

9. Conectores
En la guía anterior vimos conectores que indican EJEMPLIFICACIÓN.
Entre los renglones 3 y 7 hay un conector que cumple esta función. ¿Cuál es? ¿Qué ideas relaciona?

....
....
....
....



A modo de cierre…

10. Con un compañero, resuelva los siguientes problemas de práctica.

Practice problems

(a) Write the number symbol for seven thousand two hundred eighty – one.
....
(b) Write the meaning, in words, of the symbol 23,469.
....
(c) If a number is in the millions, it must have at least how many digits?
....
(d) If a number has 10 digits, to what number group (thousand, millions, etc) does it belong?
....

RECUERDE EXTRAER LAS PALABRAS, FRASES Y TÉRMINOS QUE CONSIDERE IMPORTANTES DE ESTA GUÍA PARA, LUEGO, INCORPORARLOS EN SU GLOSARIO.

APÉNDICE GRAMATICAL
TIEMPO PRESENTE DE LOS VERBOS EN INGLÉS

Las palabras resaltadas en el ejercicio 7 son verbos que se encuentran en tiempo presente. Y su forma varía de acuerdo al sujeto que realiza la acción.

Tabla de Conjugación – Verbo WORK

	Afirmativo	Negativo	Interrogativo
1° P.S.	I work	I don't work	Do I work?
2° P.S.	You work	You don't work	Do you work?
3° P.S.	He works She works It works	He doesn't work She doesn't work It doesn't work	Does he work? Does she work? Does it work?
1° P.P.	We work	We don't work	Do we work?
2° P.P.	You work	You don't work	Do you work?
3° P.P	They work	They don't work	Do they work?

Módulo de Idioma Inglés FAMAF GUÍA 3 Contenidos	**Propósitos de Lectura: Leer, para confirmar predicciones acerca de un tema en particular.** **Identificar y analizar relaciones entre ideas.** **Al finalizar la Guía, Ud. habrá puesto en práctica los siguientes contenidos léxico-gramaticales:** ⌗ Frases sustantivas ⌗ Conectores que indican *RESULTADO*

1. Con un compañero, observe el título y formato del texto para, luego, completar las siguientes actividades:

(A) ¿De dónde se extrajo el presente texto? Marque (✓) una opción.

- ☐ de una publicación científica (*journal*)
- ☐ de un manual de estudio
- ☐ de una enciclopedia

Y por lo tanto, ¿a qué tipo de audiencia está dirigido?

(B) Con el propósito de activar su conocimiento previo, responda: ¿qué conoce acerca del *Sistema Binario*? ¿Cuáles son sus características?

....

....

(C) Ahora, lea el texto, para confirmar sus predicciones.

BINARY SYSTEM

The binary number system is constructed in the same manner as the decimal system. However, since the base in this system is two, only two digit symbols are needed for writing numbers. These two digits are 1 and 0. In order to understand why only two digit symbols are needed in the binary system, we may make some observations about the decimal system and then generalize from these.

One of the most striking observations about number systems which utilize the concept of place value is that there is no single – digit symbol for the base. For example, in the decimal system the symbol for ten, the base, is 10. This symbol is compounded from two digit symbols, and its meaning may be interpreted as "one base plus no units." Notice the implication of this where other bases are concerned: every system uses the same symbol for the base, namely 10. Furthermore, the symbol 10 is not called "ten" except in the decimal system.

Suppose that a number system were constructed with five as a base. Then the only digit symbols needed would be 0, 1, 2, 3, and 4. No single – digit symbol for five is needed, since the symbol 10 in a base – five system with place value means "one five plus no units." In general, in a number system using base N, the largest number for which a single – digit symbol is needed is N minus 1. Therefore, when the base is two the only digit symbols needed are 1 and 0.

An example of a binary number is the symbol 101. We can discover the meaning of this symbol by relating it to the decimal system. Figure 1 – 2 shows that the place value of each digit position in the binary system is two times the place value of the position adjacent to it on the right. Compare this with figure 1 – 1, in which the base is ten rather than two.

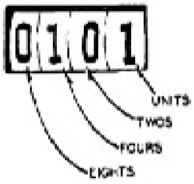


Figure 1 – 2.-digit positions in the binary system

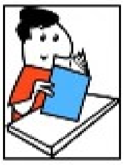
Placing the digits of the number 101 in their respective blocks on figure 1 – 2, we find that 101 means "one four plus no twos plus one unit." Thus 101 is the binary equivalent of decimal 5. If we wish to convert a decimal number, such as 7, to its binary equivalent, we must break it into parts which are multiples of 2. Since 7 is equal to 4 plus 2 plus 1, we say that it "contains" one 4, one 2, and one unit. Therefore the binary symbol for decimal 7 is 111.

The most common use of the binary number system is in electronic digital computers. All data fed to a typical electronic digital computer is converted to binary form and the computer performs its calculations using binary arithmetic rather than decimal arithmetic. One of the reasons for this is the fact that electrical and electronic equipment utilizes many switching circuits in which there are only two operating conditions. Either the circuit is "on"or it is "off," and a two – digit number system is ideally suited for simbolizing such a situation.

Extraido de: Stewart, James. (2008). *Calculus: Early trascendental.* Thompson Brooks/Cole.

Resulta muy útil predecir el tema de un texto antes de iniciar su lectura. Dicha predicción surge no sólo de observaciones preliminares sino también del conocimiento previo que se tenga.

Mientras más se sepa sobre el tema, más fácil resultará comprender un texto. Por lo cual es importante activar nuestros conocimientos previos antes de empezar la lectura. Si se tiene poco conocimiento del tema abordado, habrá que recurrir a otras estrategias.



ACTIVIDADES DE COMPRENSIÓN

2. Lea el texto en forma global, para descubrir qué representa cada binario de acuerdo a su posición en la Fig. 1.2.

3. Lea el texto en forma específica, para responder las siguientes preguntas. Indique renglones de referencia.

a. ¿Qué número decimal representa en binario de acuerdo a su posición?

....

....

....

.... (Renglones: ____________)

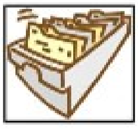
b. ¿Cuál es la razón del por qué los equipos eléctricos y electrónicos utilizan muchos circuitos con interruptores?

....

....

....

.... (Renglones: ____________)



VOCABULARIO

4. Encuentre en el texto palabras o frases en inglés que sean equivalentes a las siguientes:

a) es igual a ________________________________

b) decimos que ________________________________

c) suponer que/suponga que ________________________________

ACTIVIDADES SOBRE ELEMENTOS DEL LENGUAJE

5. Elija el equivalente correcto en español de las siguientes frases en inglés:

a) *some observations about the decimal system (r. 5)*
1. algunos sistemas decimales observados
2. algunas observaciones acerca del sistema decimal

b) *the place value of each digit position in the binary system (r. 20)*
1. el valor del lugar de cada posición del dígito en el sistema binario
2. la posición del lugar de cada dígito en el sistema binario

c) *the concept of place value (r. 7/8)*
1. el valor del concepto del lugar
2. el concepto de lugar de posición

d) ***only two digit symbols (r. 4)***
1. solamente dos símbolos dígitos
2. solamente dígitos de dos símbolos

e) ***the same symbol for the base (r. 11)***
1. el mismo símbolo para la base
2. la misma base para el símbolo

f) ***the largest number (r. 16)***
1. el número más largo
2. el número más grande

⌑ **¿Qué lo ayudó a reconocer el equivalente correcto?**

Recuerde que la frase sustantiva básica en **inglés** consta de un núcleo (que es el sustantivo) al cual generalmente se le anteponen uno o más modificadores:

a decimal number
m1 m2 n

En el caso anterior, el modificador es un adjetivo. También podemos encontrar sustantivos actuando como modificadores:

the binary number system
m1 m2 m3 n

En resumen, el núcleo de la frase sustantiva es un sustantivo y sus modificadores pueden ser tanto adjetivos como sustantivos.

En **español**, las frases anteriores se interpretan según la secuencia n + m1; es decir, los modificadores se mencionan, en general, a continuación del núcleo.

➯ ¿Cuál sería el equivalente en español de la siguiente frase? Identifique su núcleo y sus modificadores:

- electronic digital computers (r. 27)

____

A menudo las frases sustantivas suelen tener **posmodificadores**. Los posmodificadores generalmente se unen al NÚCLEO de la frase sustantiva a través de una preposición, por ejemplo "**of**", de la siguiente manera:

[the	meaning]	**of**	[this symbol]
	N		
[the most common	use]	**of**	[the binay number system]
	N		

6. Conectores

(A) Observe la siguiente oración:

> *...in a number system using base N, the largest number for which a single-digit symbol is needed is N minus 1.* **Therefore**, *when the base is two the only digit symbols needed are 1 and 0.* (r. 15-17)

¿Qué función está cumpliendo en este caso la palabra subrayada? (Elija una opción)

- Expresa nuevamente el concepto anterior con otras palabras.
- Introduce un concepto nuevo.
- Expresa el resultado de lo dicho anteriormente.

> Este conector presenta el **efecto** o **resultado** de lo que se estaba diciendo. Otros conectores que tienen la misma función son: **so, thus, hence, as a result.**

(1° idea) *...in a number system using base N, the largest number for which a single-digit symbol is needed is N minus 1.*

Therefore,

(2° idea) *..., when the base is two the only digit symbols needed are 1 and 0.*

(B) Dé un equivalente en español de las ideas relacionadas por "therefore" en el ejercicio anterior.

....

....

(C) En el renglón 26 aparece nuevamente este conector. ¿Cuál es el resultado que se expresa?

....

....

(D) Incluir ejemplos, en muchos casos, ayuda al lector a entender más claramente un concepto abstracto o una idea. Volviendo al texto de esta guía, en los renglones 8 y 18 se emplean conectores o frases para introducir ejemplos, ¿podría identificarlos/as? Luego, complete la siguiente tabla:

	¿Cuál es el conector?	¿Qué idea o concepto ilustra?
(a)		
(b)		

A modo de cierre…

7. Lea el siguiente texto, para identificar un conector que indica resultado. Luego, escriba ese resultado en español y en el espacio provisto.

The Binary System

The number system now in use throughout the civilized world is a decimal system based on successive powers of 10. The digit at the extreme right of any number stands for a multiple of 10^0, or 1.
The second digit from the right indicates a multiple of 10^1; the third digit, a multiple of 10^2; and so on. Thus 789 expresses the sum of $(7 \times 10^2) + (8 \times 10^1) + (9 \times 10^0)$. The widespread use of 10 as a number base is almost certainly due to the fact that we have 10 fingers; the very word "digit" reflects this. If a planet is inhabited by humanoids with 12 fingers, it is a good bet that their arithmetic uses a notation based on 12.

Resultado……………………………………………………………………………………………..

RECUERDE EXTRAER LAS PALABRAS, FRASES Y TÉRMINOS QUE CONSIDERE IMPORTANTES DE ESTA GUÍA PARA, LUEGO, INCORPORARLOS EN SU GLOSARIO.

A continuación encontrará un texto extra que puede utilizar como práctica complementaria de lectura.

Chapter II

OF SIGNS IN GENERAL, AND OF THE SIGNS APPROPRIATE TO THE SCIENCE OF LOGIC IN PARTICULAR; ALSO OF THE LAWS TO WHICH THAT CLASS OF SIGNS ARE SUBJECT

1. That Language is an instrument of human reason, and not merely a medium for the expression of thought, is a truth generally admitted. It is proposed in this chapter to inquire what it is that renders Language thus subservient to the most important of our intellectual faculties. In the various steps of this inquiry we shall be led to consider the constitution of Language, considered as a system adapted to an end or purpose; to investigate its elements; to seek to determine their mutual relation and dependence; and to inquire in what manner they contribute to the attainment of the end to which, as co-ordinate parts of a system, they have respect. In proceeding to these inquiries, it will not be necessary to enter into the discussion of that famous question of the schools, whether

Language is to be regarded as an essential instrument of reasoning, or whether, on the other hand, it is possible for us to reason without its aid. I suppose this question to be beside the design of the present treatise, for the following reason, viz., that it is the business of Science to investigate laws; and that, whether we regard signs as the representatives of things and of their relations, or as the representatives of the conceptions and operations of the human intellect, in studying the laws of signs, we are in effect studying the manifested laws of reasoning. If there exists a difference between the two inquiries, it is one which does not affect the scientific expressions of formal law, which are the object of investigation in the present stage of this work, but relates only to the mode in which those results are presented to the mental regard. For though in investigating the laws of signs, `a posteriori, the immediate subject of examination is Language, with the rules which govern its use; while in making the internal processes of thought the direct object of inquiry, we appeal in a more immediate way to our personal consciousness,—it will be found that in both cases the results obtained are formally equivalent. Nor could we easily conceive, that the unnumbered tongues and dialects of the earth should have preserved through a long succession of ages so much that is common and universal, were we not assured of the existence of some deep foundation of their agreement in the laws of the mind itself.

2. The elements of which all language consists are signs or symbols. Words are signs. Sometimes they are said to represent things; sometimes the operations by which the mind combines together the simple notions of things into complex conceptions; sometimes they express the relations of action, passion, or mere quality, which we perceive to exist among the objects of our experience; sometimes the emotions of the perceiving mind. But words, although in this and in other ways they fulfil the office of signs, or representative symbols, are not the only signs which we are capable of employing. Arbitrary marks, which speak only to the eye, and arbitrary sounds or actions, which address themselves to some other sense, are equally of the nature of signs, provided that their representative office is defined and understood. In the mathematical sciences, letters, and the symbols +, −, =, &c., are used as signs, although the term "sign" is applied to the latter class of symbols, which represent operations or relations, rather than to the former, which represent the elements of number and quantity. As the real import of a sign does not in any way depend upon its particular form or expression, so neither do the laws which determine its use. In the present treatise, however, it is with written signs that we have to do, and it is with reference to these exclusively that the term "sign" will be employed. The essential properties of signs are enumerated in the following definition.

Definition.—A sign is an arbitrary mark, having a fixed interpretation, and susceptible of combination with other signs in subjection to fixed laws dependent upon their mutual interpretation.

3. Let us consider the particulars involved in the above definition separately.

(1.) In the first place, a sign is an arbitrary mark. It is clearly indifferent what particular word or token we associate with a given idea, provided that the association once made is permanent. The Romans expressed by the word "civitas" what we designate by the word "state." But both they and we might equally well have employed any other word to represent the same conception. Nothing, indeed, in the nature of Language would prevent us from using a mere letter in the same sense. Were this done, the laws according to which that letter would require to be used would be essentially the same with the laws which govern the use of "civitas" in the Latin, and of "state" in the English language, so far at least as the use of those words is regulated by any general principles common to all languages alike.

(2.) In the second place, it is necessary that each sign should possess, within the limits of the same discourse or process of reasoning, a fixed interpretation. The necessity of this condition is obvious, and seems to be founded in the very nature of the subject. There exists, however, a dispute as to the precise nature of the representative office of words or symbols used as names in the processes of reasoning. By some it is maintained, that they represent the conceptions of the mind alone; by others, that they represent things. The question is not of great importance here, as its decision cannot affect the laws according to which signs are employed. I apprehend, however, that the general answer to this and such like questions is, that in the processes of reasoning, signs stand in the place and fulfil the office of the conceptions and operations of the mind; but that as those conceptions and operations represent things, and the connexions and relations of things, so signs represent things with their connexions and relations; and lastly, that as signs stand in the place of the conceptions and operations of the mind, they are subject to the laws of those conceptions and operations. This view will be more fully elucidated in the next chapter; but it here serves to explain the third of those particulars involved in the definition of a sign, viz., its subjection to fixed laws of combination depending upon the nature of its interpretation.

4. The analysis and classification of those signs by which the operations of reasoning are conducted will be considered in the following Proposition:

Proposition I.

All the operations of Language, as an instrument of reasoning, may be conducted by a system of signs composed of the following elements, viz.:

1st. *Literal symbols, as x, y, &c., representing things as subjects of our conceptions.*

2nd. *Signs of operation, as +, −, ×, standing for those operations of the mind by which the conceptions of things are combined or resolved so as to form new conceptions involving the same elements.*

3rd. *The sign of identity, =.*

And these symbols of Logic are in their use subject to definite laws, partly agreeing with and partly differing from the laws of the corresponding symbols in the science of Algebra.

http://www.gutenberg.org/files/15114/15114-pdf.pdf

Módulo de Idioma Inglés FAMAF GUÍA 4 Contenidos	**Propósito de Lectura: Reconocer distancias y velocidades en un movimiento circular.** **Al finalizar la Guía, Ud. habrá puesto en práctica los siguientes contenidos léxico-gramaticales:** ¤ Referencia textual

1. Lea el título del texto a continuación, para intercambiar ideas con un compañero y escribir por lo menos 5 ideas que creen se desarrollarán en el mismo.

a) ....

b) ....

c)...

d) ....

e) ....

2. Observe detenidamente cómo se organizó la información en el texto; preste atención al título y a la información en negrita, para responder, en forma oral, las siguientes preguntas:

a) ¿A qué clase textual pertenece?

b) ¿Cuáles son sus autores? ⇨ *¿Qué puede predecir a partir de esta información?*

c) ¿En qué año fue escrito?

3. Ahora, lea el texto rápidamente, para comprobar si alguna de las ideas que escribió en el ejercicio 1 aparece en el mismo. En caso afirmativo, tilde ✓ la idea.

VELOCITY OF THE BALL

At time t, which direction is the ball going? Calculus watches the motion between t and $t + h$. For a ball on a string, we don't need calculus-just let go. *The direction of motion is tangent to the circle.* With no force to keep it on the circle, *the ball goes off on a tangent.* If the ball is the moon, the force is gravity. If it is a hammer swinging around on a chain, the force is from the center. When the thrower lets go, the hammer takes off -and it is an art to pick the right moment. (I once saw a friend hit by a hammer at **MIT**. He survived, but the thrower quit track.) Calculus will find that same tangent direction, when the points at t and $t + h$ come close.

The "***velocity triangle***" is in Figure 1.16b. It is the same as the position triangle, but rotated through 90º. The hypotenuse is tangent to the circle, in the direction the ball is moving. Its length equals 1 (the speed). The angle t still appears, but now it is the angle with the vertical. ***The upward component of velocity is*** cos t, ***when the upward component of position is*** sin t. That is our common sense calculation, based on a figure rather than a formula. The rest of this section depends on it -and we check $v = \cos t$ at special points.

At the starting time $t = 0$, the movement is all upward. The height is sin 0 = 0 and the upward velocity is cos 0 = 1. At time ¶/12, the ball reaches the top. The height is sin ¶/ 2 = 1 and the upward velocity is cos ¶/2 = 0. At that instant the ball is not moving up or down.

The horizontal velocity contains a minus sign. At first the ball travels to the *left*.

The value of x is cos t, but *the speed in the x direction is* -sin t. Half of trigonometry is in that figure (the good half), and you see how $\sin^2 t + \cos^2 t = 1$ is so basic. That equation applies to position and velocity, at every time.

Application of plane geometry: The right triangles in Figure 1.16 are the same size and shape. They look congruent and they are -the angle t above the ball equals the angle t at the center. That is because the three angles at the ball add to 180º.

Extraído de Strang, Gilbert. (2010). *Calculus. MIT*
Wellesley: Cambridge University Press.

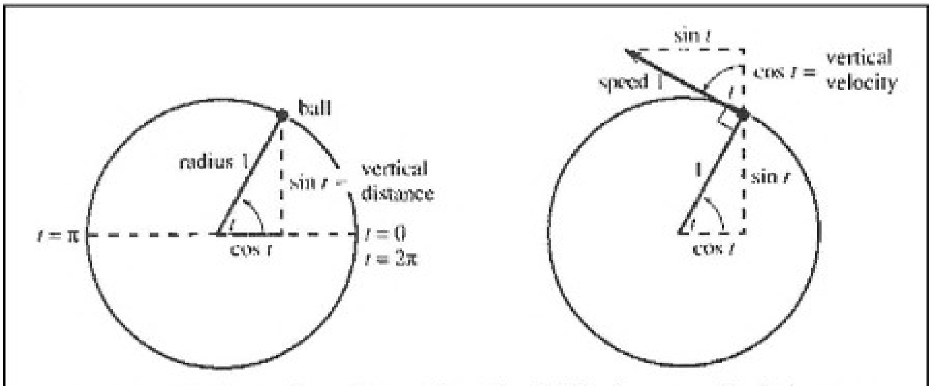
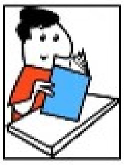


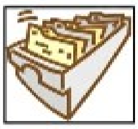
Fig. 1.16 Circular motion with speed 1, angle t, height sin t, upward velocity cos t.



ACTIVIDADES DE COMPRENSIÓN

4. Marque correspondencia entre ideas. La primera está resuelta a modo de ejemplo:

A	La dirección de movimiento es	**1**	$t = 0$, el movimiento es ascendente.	***A-3***
B	La pelota se sale de	**2**	hacia la izquierda.	
C	A la hora del inicio	**3**	tangente al círculo.	
D	Al principio la pelota viaja	**4**	el mismo tamaño y forma.	
E	Los triángulos rectos en la Fig. 1.16 son	**5**	por la tangente.	
F	Se observa que los triángulos rectos son	**6**	el ángulo t en el centro.	
G	El ángulo t por encima de la pelota es igual a	**7**	congruente.	

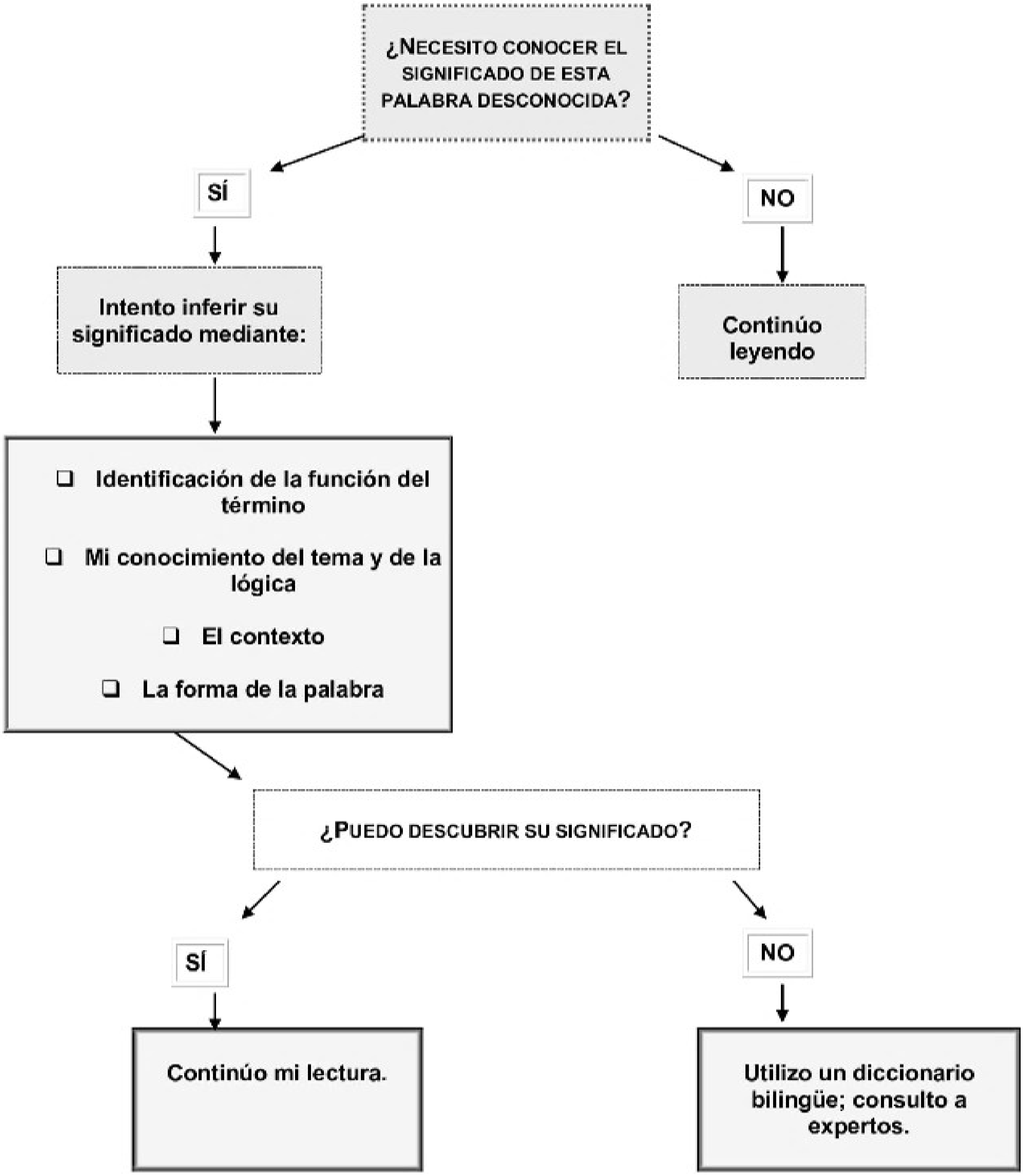


VOCABULARIO

5. Según el contexto, ¿qué significado tienen las siguientes palabras? Si no puede inferirlo, observe el cuadro en la página a continuación.

PALABRAS	SIGNIFICADO
a) length (9)	______________________
b) size (21)	______________________
c) shape (21)	______________________
d) string (2)	______________________
e) height (14-15)	______________________

➔ **Observe atentamente el esquema a continuación, que es una representación gráfica de las estrategias que podríamos aplicar si no conociéramos el significado de una palabra.**



Adaptado de Agostini de Sanchez, M. (2004). *Inglés para arquitectos. Curso de lectura comprensiva*. Córdoba: Comunicarte.

→ **Ejemplificaremos las etapas del esquema anterior con una palabra del ejercicio 5:**

a. Cuando lee la oración: "For a ball on a string, we don't need calculus-just let go." ¿Puede por el contexto derivar el significado de cada palabra para dar un equivalente adecuado de las mismas?

b. Suponiendo que necesita buscar "*string*", ¿Qué rasgos presenta esta palabra en cuanto a su forma? ¿Presenta sufijos / prefijos?

c. Veamos ahora la posición que esta palabra ocupa en la frase, ¿qué función gramatical cumple? Recuerde que la elección de la acepción del diccionario dependerá del correcto reconocimiento de la función gramatical.

d. Una vez determinada la función gramatical correcta, deberá ver cuántas entradas presenta el término; ¿qué **entrada** es la adecuada para este contexto?; ¿qué **subentrada** es la que se ajusta al contexto?

e. Observe el ejemplo tomado de un diccionario bilingüe, resalte en el mismo la acepción apropiada para nuestro caso.

STRING

sustantivo

1 cuerda , cordel
a balloon on a string un globo atado a una cuerda
I need some thick string. Necesito una cuerda gruesa.

2 (Música) cuerda
string quartet cuarteto de cuerda
the strings la cuerda

3
(a) (perlas, etc.) sarta
(b) (ajos, etc.) ristra

4 (de personas, coches, etc.) hilera
He owns a string of hotels. Tiene una cadena de hoteles.

5 (Informática) cadena

6 (de éxitos, excusas, cartas, etc.) serie

7 (Botánica) hebra

LOC
first/second string primera/segunda opción
We've got Mary as our second string if Jean doesn't turn up. Podemos recurrir a Mary si Jean no aparece.

verbo transitivo (pt , pp strung)

1 (violín, raqueta) encordar

2
(a) (perlas, etc.) ensartar
(b) (ajos, etc.) enristrar

3 string sth (up) colgar algo (con una cuerda)

f. **Escriba el equivalente en español de "For a ball on a string, we don't need calculus-just let go." compárelo con el que proporcionó en el punto "a", ¿resultó correcta su inferencia a partir del contexto?**

ACTIVIDADES SOBRE ELEMENTOS DEL LENGUAJE

6. Observe las siguientes oraciones. Señale las acciones (verbos) en cada una y el sujeto responsable de esa acción.

A)

- The right triangles in Figure 1.16 are the same size and shape. (r. 21)
- They look congruent ... (r. 22)

B)

- I once saw a friend hit by a hammer at MIT. (r. 5-6)
- He survived, but the thrower quit track. (r. 6)

- **¿Es el participante (sujeto) de la primera oración el mismo que el de la segunda?**
- **¿Qué diferencia existe entre ellos?**

Para construir el sentido del texto, una de las estrategias que el lector necesita es rastrear de quién o de qué se habla. Generalmente, al comienzo del texto los participantes se nombran, pero luego se puede hacer referencia a ellos a través de elementos referenciales, como por ejemplo los pronombres personales.

- *I once saw **a friend** hit by a hammer at **MIT**. **He** survived, but the thrower quit track. (6/7)*

7. Lea las siguientes oraciones. Elija la opción correcta prestando especial atención a las palabras en negrita.

1. With no force to keep ***it*** on the circle… (r.3)

It hace refernci a:

a. fuerza
b. círculo
c. pelota
d. movimiento

2. ***Its*** length equals 1 (r. 9)

Its hace referencia a:

a. círculo
b. hipotenusa
c. pelota
d. triangulo

3. Half of trigonometry is in ***that*** figure (r. 18)

That hace referencia a:

a. velocidad
b. figura
c. pelota
d. dirección

4. ...and ***you*** see how $\sin^2 t + \cos^2 t = 1$ is so basic. (r. 19)

You hace referencia a:

a. velocidad
b. dirección
c. punto de vista
d. lector del texto

Referencia Textual
En general, los autores evitan repetir las mismas palabras. A tal fin, usan otras palabras que significan lo mismo y es trabajo del lector asegurarse que cuando encuentre estas palabras sepa reconocer el **referente** en el texto, y así, poder captar el mensaje correcto.

La recuperación de la identidad del participante (sujeto que realiza la acción) puede hacerse de dos formas dependiendo del lugar donde se encuentre la información relevante.
En un texto podemos buscar esa información mirando hacia atrás:

“I once saw a friend hit by a hammer at MIT. He survived, but the thrower quit track.”

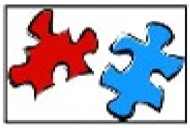
El referente de **HE** es **a friend**, que en el texto ya se nombró anteriormente.

O mirando hacia adelante:

“With no force to keep it on the circle, ***the ball*** *goes off on a tangent.*”

El referente de **IT** es **the ball**, que en el texto se nombra con posterioridad.

El término técnico que se utiliza para nombrar a estos recursos de coherencia textual es referencia ANAFÓRICA (hacia atrás) y referencia CATAFÓRICA (hacia delante).



A modo de cierre…
8. Lea el siguiente texto, para completar las actividades a continuación.

VELOCITY vs. DISTANCE: SLOPE vs. AREA

How do you compute *f* from *v*? The point of the question is to see *f* = *vt* on the graphs. We want to start with the graph of *v* and discover the graph of *f*. Amazingly, the opposite of slope is area.

The distance *f* is the area under the *v-graph*. When *v* is constant, the region under the graph is a rectangle. Its height is *v*, its width is *t*, and its area is *v* times *t*. This is *integration*, to go from *v* to *f* by computing the area. We are glimpsing two of the central facts of calculus.

> **1A.** *The slope of the f-graph gives the velocity v. The area under the v-graph gives the distance f.*

That is certainly not obvious, and I hesitated a long time before I wrote it down in this first section. The best way to understand it is to look first at more examples. The whole point of calculus is to deal with velocities that are *not* constant, and from now on *v* has several values.

Extraído de Strang, Gilbert. (2010). *Calculus*. MIT Wellesley: Cambridge University Press.

a. ¿A qué hacen referencias las palabras resaltadas?

Palabra Resaltada	Referente (En Español)
a- ***We*** want to start ...(r. 1-2)	
b- ***Its*** height is *v* (r. 4)	
c- ***I*** hesitated a long time… (r. 8)	
d- …before I wrote ***it*** (r. 8)	
e- The best way to understand ***it*** ... (r. 9)	

b. Responda las siguientes preguntas en español, de manera completa. Indique, luego, los renglones de donde extrajo la información.

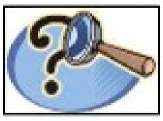
i) ¿Cuáles son los dos hechos centrales del cálculo?

....
....
....
.... (Renglones: ____________)

ii) ¿Qué sucede si *v* es constante?

....
....
....
.... (Renglones: ____________)

RECUERDE EXTRAER LAS PALABRAS, FRASES Y TÉRMINOS QUE CONSIDERE IMPORTANTES DE ESTA GUÍA PARA, LUEGO, INCORPORARLOS EN SU GLOSARIO.



APÉNDICE GRAMATICAL
ALGUNOS ELEMENTOS QUE INDICAN REFERENCIA TEXTUAL

Pronombres Personales

Inglés	Español
▪ I	▪ Yo
▪ You	▪ Tú /Vos /Usted
▪ He	▪ Él
▪ She	▪ Ella
▪ It	▪ Él /Ella
▪ We	▪ Nosotros / Nosotras
▪ You	▪ Ustedes / Vosotros /Vosotras
▪ They	▪ Ellos /Ellas

Adjetivos Posesivos

Inglés	Español
▪ My	▪ Mi / mis
▪ Your	▪ Tu / tus / su / sus
▪ His	▪ Su / sus
▪ Her	▪ Su / sus
▪ Its	▪ Su /sus
▪ Our	▪ Nuestro / nuestra
▪ Your	▪ Su / sus / vuestro / vuestros / vuestra / vuestras
▪ Their	▪ Su / su

Pronombres Objetivos

Inglés	Español
▪ Me	▪ Me /mí
▪ You	▪ Te / ti / la / le / usted
▪ Him	▪ Lo / le / él
▪ Her	▪ La /le /ella
▪ It	▪ Le / lo / la /él / ello/ella
▪ Us	▪ Nos / nosotros / nosotras
▪ You	▪ Os / les / ustedes / vosotros /vosotras
▪ Them	▪ Los /las / les / ellos/ellas

Pronombres y Adverbios Relativos

Inglés	Español
▪ Who	▪ Que / Quien /Cual
▪ Whom	▪ Que / Quien /Cual
▪ Which	▪ Que / Cual
▪ That	▪ Que
▪ Whose	▪ Cuyo / cuya / cuyos / cuyas
▪ Where	▪ Donde

Forma de los pronombres personales, objetivos, posesivos, reflexivos y adjetivos posesivos en inglés:

Pronombres	Personales	Posesivos		Pronombres
Sujeto	**Objeto**	**Adjetivos**	**Pronombres**	**Reflexivos**
I	Me	My	Mine	Myself
You	You	Your	Yours	Yourself
He	Him	His	His	Himself
She	Her	Her	Hers	Herself
It	It	Its		Itself
We	Us	Our	Ours	Ourselves
You	You	Your	Yours	Yourselves
They	Them	Their	Theirs	Themselves

A continuación encontrará un texto extra que puede utilizar como práctica complementaria de lectura.

Classifying Polynomials by their Graphs

When presented with the graph of a polynomial function, there are several pieces of information we can get from the graph of the polynomial, without ever actually seeing the equation.

First, though, we must establish some terminology. When given a polynomial in the form:

$$f(x)=a_n x^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + \dots + a_1 x + a_0 ,\ a_n \neq 0 ,$$

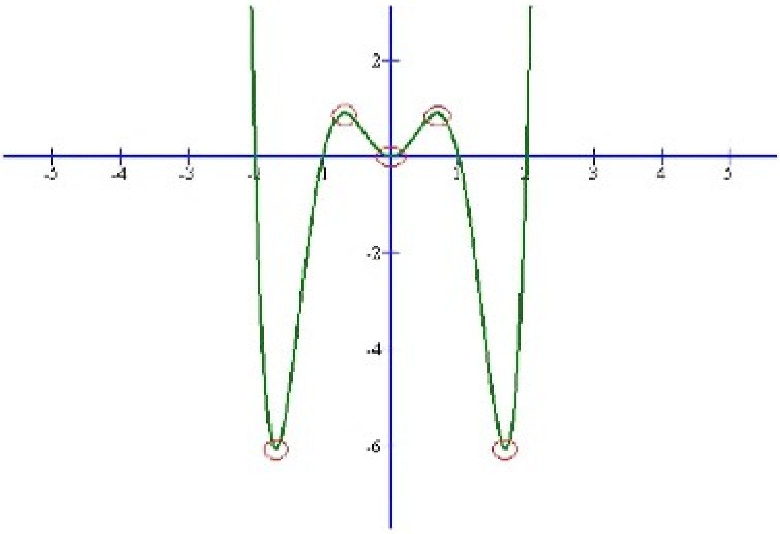
We refer to the degree of the polynomial as n, because n is the highest non-zero power of x in the polynomial. We need to be clear that all exponents on the variable x must be nonnegative integers in order for f(x) above to be a polynomial.

We call   the leading coefficient, since it accompanies the x with the highest power.

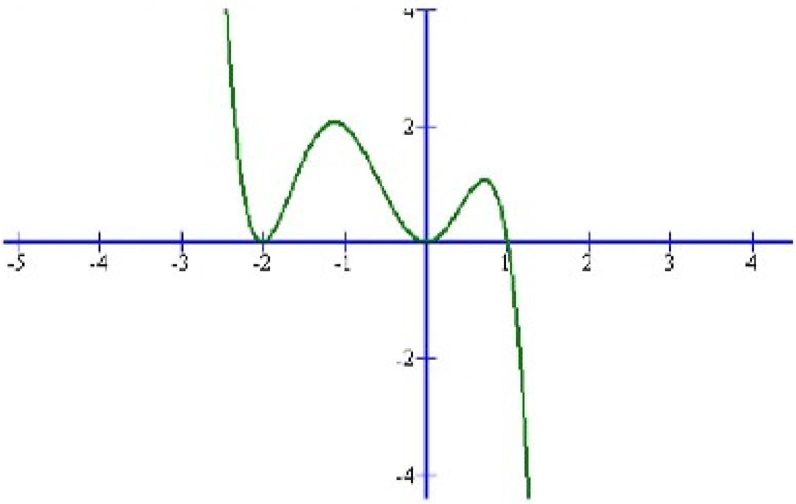
For example, in the polynomial $f(x) = -13x^4 + 9x^3 - 6x + 5$, the degree is 4, and the leading coefficient is -13.

The first piece of information we can extract is whether the degree of a polynomial is odd or even. In order to do this, we look at both “sides” of the graph: if they both go up or both go down, the degree is even. If they go opposite directions, that is, one goes up and one goes down, then the degree is odd.

For instance, since both ends go up in this graph, we know the degree is even. Think about it: as x gets bigger, both positively and negatively, the associated y-values get bigger. This could only happen if the degree is even, because, for example, (-100) raised to an even power, gives a large positive value.



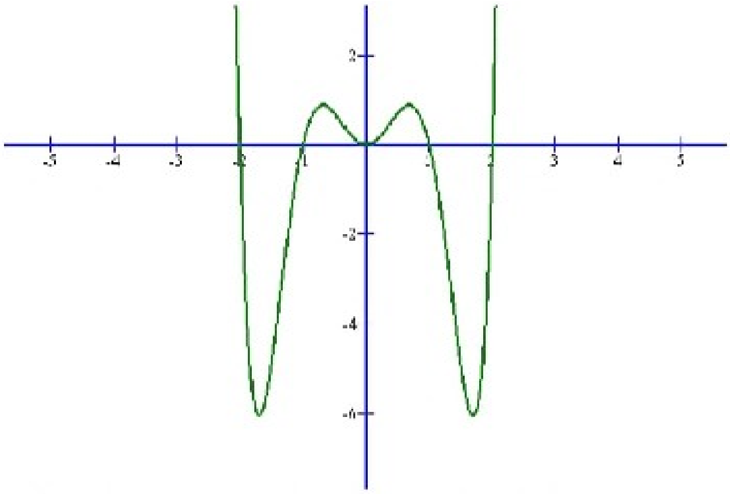
And in this graph, since they go opposite directions, the degree must be odd. Think about this: odd powers of negative numbers are negative, while odd powers of positive numbers are positive. So for large positive numbers, odd powers would still be positive, while odd powers of large negative numbers would be negative. This graph seems to behave opposite from this analysis, but the leading coefficient is at work here. The leading coefficient happens to be negative for this graph. We'll explain more about that soon.



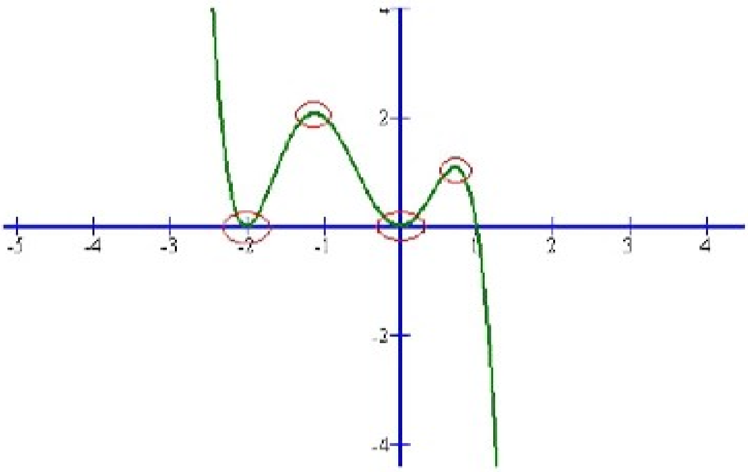
In addition to determining whether the degree is odd or even, we can also determine the minimum value of the degree by looking at the graph. To do this, we count the number of places where the graph changes direction; these places are called critical points. The number of critical points is always less than the degree of the polynomial.

Let's think of a few simple polynomials. y=2x+5 is a straight line, and there are no places where it changes direction and the degree is 1. On a parabola, such as y = x2+1, there is one turning point, and notice that the degree is 2. With polynomials, each time you add a degree, then, you can add a turning point.

Here are the same two graphs, with the critical points indicated.

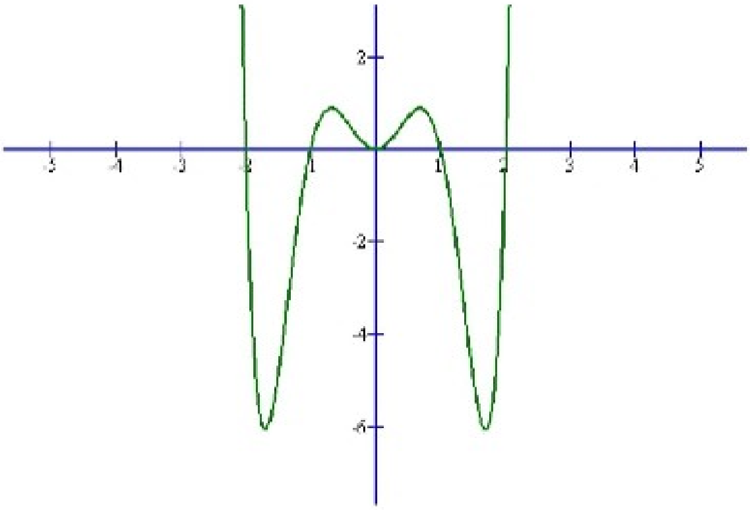


In the graph above, since there are 5 critical points, and we know the degree is even, we know that the degree must be an even number greater than or equal to 6.

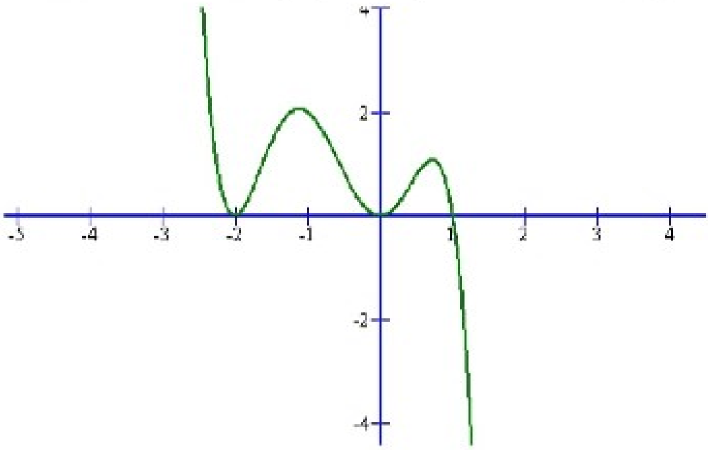


In the graph above, there are 4 critical points, and the degree is odd, so the degree is an odd number greater than or equal to 5. Of course, the degree could be much bigger. What this provides, though, is a lowest bound for the degree.

Finally, let us address the effect of the leading coefficient as mentioned earlier. All the graph tells us about the leading coefficient is whether it is positive or negative. If the graph goes down to the right, then the leading coefficient is negative. If the graph goes up to the right, then the leading coefficient is positive.



In the function above, we can see that the leading coefficient must be positive since the right-hand side of the function is rising upward as you look from left to right.



In the function above, the leading coefficient must be negative since the graph falls to the right.

http://www.uiowa.edu/~examserv/mathmatters/tutorial_quiz/arithmetic/basicarithmetic.html

Módulo de Idioma Inglés FAMAF GUÍA 5 Contenidos	**Propósito de Lectura: Revisar contenidos anteriormente presentados.** **Al finalizar la Guía, Ud. habrá revisado los siguientes contenidos gramaticales:** ¤ Conectores (de diferentes tipos) ¤ Referentes ¤ Frases sustantivas

1. **Observe los elementos paratextuales del texto, para anticipar su contenido.**
2. **De acuerdo a su conocimiento sobre el tema, indique cuáles de las siguientes palabras, términos o frases podrían aparecer en el texto.**

supuestos	*patrones/modelos*	*fórmula algebraica*	*estudio de funciones*
valores	*radio*	*masa*	*en la parte inferior*
la curva de distancia		*velocidad*	*realidad*

3. **Ahora lea el texto para:**
   a. **confirmar sus predicciones.**
   b. **completar las actividades propuestas a continuación del mismo.**

MATHEMATICAL MODELS: A CATALOG OF ESSENTIAL FUNCTIONS

A **mathematical model** is a mathematical description (often by means of a function or an equation) of a real-world phenomenon such as the size of a population, the demand for a product, the speed of a falling object, the concentration of a product in a chemical reaction, the life expectancy of a person at birth, or the cost of emission reductions. The purpose of the model is to understand the phenomenon and perhaps to make predictions about future behavior.

Figure 1 illustrates the process of mathematical modeling. Given a real-world problem, our first task is to formulate a mathematical model by identifying and naming the independent and dependent variables and making assumptions that simplify the phenomenon enough to make it mathematically tractable. We use our knowledge of the physical situation and our mathematical skills to obtain equations that relate the variables. In situations where there is no physical law to guide us, we may need to collect data (either from a library or the Internet or by conducting our own experiments) and examine the data in the form of a table in order to discern patterns. From this numerical representation of a function we may wish to obtain a graphical representation by plotting the data. The graph might even suggest a suitable algebraic formula in some cases.

The second stage is to apply the mathematics that we know (such as the calculus that will be developed throughout this book) to the mathematical model that we have formulated in order to derive mathematical conclusions. Then, in the third stage, we take those mathematical conclusions and interpret them as information about the original real-world phenomenon by way of offering explanations or making predictions. The final step is to test our predictions by checking against new real data. If the predictions don't compare well with reality, we need to refine our model or to formulate a new model and start the cycle again.

A mathematical model is never a completely accurate representation of a physical situation— it is an idealization. A good model simplifies reality enough to permit mathematical calculations but is accurate enough to provide valuable conclusions. It is important to realize the limitations of the model. In the end, Mother Nature has the final say.

There are many different types of functions that can be used to model relationships observed in the real world. In what follows, we discuss the behavior and graphs of these functions and give examples of situations appropriately modeled by such functions.

LINEAR MODELS

When we say that *y* is a linear function of *x*, we mean that the graph of the function is a line, so we can use the slope-intercept form of the equation of a line to write a formula for the function as

$$y = f(x) = mx + b$$

where m is the slope of the line and b is the y-intercept.

A characteristic feature of linear functions is that they grow at a constant rate. For instance, Figure 2 shows a graph of the linear function f (x) = 3 x -2 and a table of simple values. Notice that whenever x increases by 0.1, the value of f (x) increases by 0.3. So f (x) increases three times as fast as x. Thus the slope of the graph y = 3 x - 2 namely 3, can be interpreted as the rate of change of y with respect to x.

Extraído de: Stewart, James. (2008). *Calculus. Early Trascendental.* Thompson Brooks/Cole.

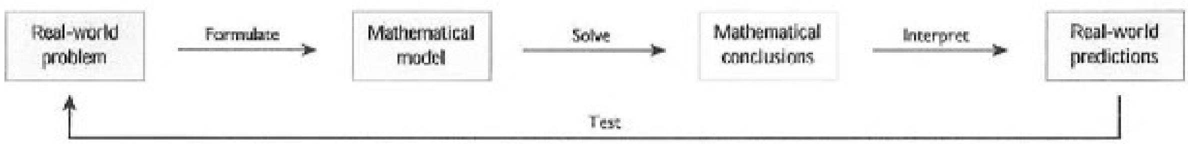
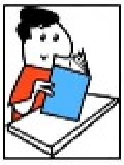


FIGURE 1 The modeling process



ACTIVIDADES DE COMPRENSIÓN

4. Indique si los siguientes enunciados son verdaderos (V) o falsos (F), según la información ofrecida por el texto.
a) En caso de ser falsos (F), corríjalos en español.
b) En ambos casos, (V y F), indique renglones de referencia.

Enunciados	V/F	Renglones
a. Usamos nuestro conocimiento de las Física y de las Matemáticas para obtener ecuaciones que establecen relaciones entre variables. Corrección:		
b. La tercera tarea es aplicar las Matemáticas al Modelo que hemos formulado para llegar a una conclusión matemática. Corrección:		
c. Las limitaciones del modelo no son de mucha importancia. Corrección:		
d. Queremos decir que el gráfico de la función es una recta cuando decimos que *y* es una función linear de *x*. Corrección:		

5. Responda las siguientes preguntas en español, de manera completa. Indique, luego, los renglones de donde extrajo la información.

a. ¿Cuál es el propósito del modelo presentado en el texto?

....
....

Renglones: _________

b. ¿Qué debemos hacer primero cuando se nos plantea un problema de la vida real?

....
....

Renglones: _________

ACTIVIDADES SOBRE ELEMENTOS DEL LENGUAJE

6. Dé un equivalente en español de las siguientes frases.

a) the demand for the product (r.3) ______________________________

b) the concentration of a product in a chemical reaction (r. 4) ______________

c) the life expectancy of a person at birth (r. 4-5) ______________________

d) the cost of emission reductions (r. 5) ____________________________

e) the speed of a falling object (r. 3-4) ____________________________

7. Complete los espacios en blanco en español y en forma completa:

a. La palabra FOR INSTANCE (r. 35) establece una relación de ________________ entre las ideas.
   El autor de este texto lo utiliza para conectar las siguientes ideas:
   Idea 1: ....
   ....
   ....

   Idea 2: ....
   ....
   ....

b. La palabra SO (r. 37) establece una relación de ________________ entre las ideas.
   El autor de este texto lo utiliza para conectar las siguientes ideas:
   Idea 1: ....
   ....
   ....

   Idea 2: ....
   ....
   ....

8. ¿Cuál es el referente de las palabras resaltadas?

	REFERENTE (en español)
a) no physical law to guide **us** (r.11)	
b) interpret **them** (r. 19)	
c) **it** is an idealization (r. 23-24)	
d) **these functions** (r. 28)	

Vocabulario

9. En la siguiente tabla encontrará definiciones en español y términos en inglés. Una el término con su correspondiente definición. (Hay un ejemplo al comienzo.) Luego, dé un equivalente en español del término en inglés.

A	***La coordenada x, o primera coordenada de un par ordenado.***	***1***	***Abscissa***	***A-1-***	***Abscisa***
B	Propiedad algebraica de una operación.	2	Coefficient		
C	Un número o expresión que se eleve a una potencia.	3	Integers		
D	La constante que multiplica a la variable en un término algebraico.	4	Null Set		
E	Un número natural no primo y mayor que uno; es decir, que tiene factores naturales a parte de sí mismo y 1.	5	Associative Property		
F	Propiedad algebraica que relaciona dos operaciones.	6	Whole Numbers		
G	El conjunto {… -3, -2, -1, 0, 1, 2, 3, …} de todos números naturales más cero, y sus negativos.	7	Composite Number		
H	Un número que expresa un valor como la suma de número entero y una fracción.	8	Place Value		
I	Conjunto que no tiene elementos.	9	Base		
J	Valor asociado a la ubicación de un dígito en la representación decimal de un número.	10	Mixed Number		
K	El conjunto {0,1,2,3,…}	11	Distributive Property		

AUTOEVALUACIÓN I

¿Cuáles de las siguientes estrategias y técnicas de lectura aplicadas hasta el momento le resultó más útil? Marque con una tilde ✓

ESTRATEGIA / TÉCNICA	¿CUÁN ÚTIL HA SIDO ESTA ESTRATEGIA?		
	MUY ÚTIL	ÚTIL	POCO ÚTIL
↳ Activar el conocimiento previo del tema			
↳ Inferir el significado por la forma			
↳ Scanning (Lectura Detallada)			
↳ Skimming (Lectura Global)			
↳ Usar el diccionario bilingüe			
↳ Utilizar el paratexto para deducir aspectos temáticos del texto			

Lea nuevamente los contenidos de las guías 1 a 5. Marque con una tilde✓ los objetivos de la primera columna que alcanzó. Luego, califique el nivel que considera haber alcanzado en cada uno.

CONTENIDOS Y OBJETIVOS	NIVEL		
	MB	B	R
☐ Reconocer transparencias léxicas.			
☐ Identificar palabras estructurales y conceptuales.			
☐ Deducir el significado de las palabras por su forma y su posición en la oración.			
☐ Comprender la estructura de la frase sustantiva en inglés y dar un equivalente en español.			
☐ Reconocer el *tiempo presente* de los verbos y comprender sus funciones.			
☐ Identificar conectores que indican *ejemplificación* y *resultado*. Comprender las ideas que relacionan.			
☐ Reconocer vocabulario especializado y dar su equivalente en español.			

Módulo de Idioma Inglés **FAMAF** **GUÍA 6** **Contenidos**	**Propósitos de Lectura:** - **Identificar eventos que ocurrieron en el pasado y comprender su secuencia.** - **Reconocer léxico especializado en L2 y dar su equivalente en L1.** - **Responder preguntas sobre el contenido del texto.** **Al finalizar la Guía, Ud. habrá puesto en práctica los siguientes contenidos léxico-gramaticales:** - Tiempo pasado de los verbos - Voz pasiva - Referentes

1. Lea el título del texto y observe las siguientes imágenes, para responder estas preguntas:

- ¿Qué puede anticipar respecto al tema del texto que leerá en esta guía?

  ....

- ¿Qué conoce acerca de lo que se ilustra en las imágenes?

  ....

- ¿Con qué materia de su plan de estudios relacionaría este texto?

  ....

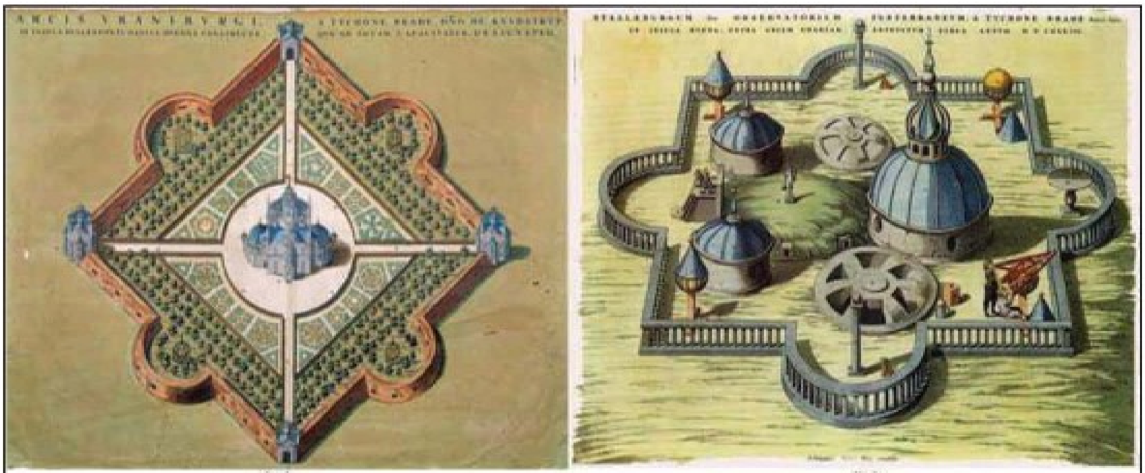

(a) (b)

Figure 1.10 Tycho Brahe's castle, Uraniborg (a), and his observatory, Stjerneborg (b), on the Island of Hven. Image: Wikipedia Commons.

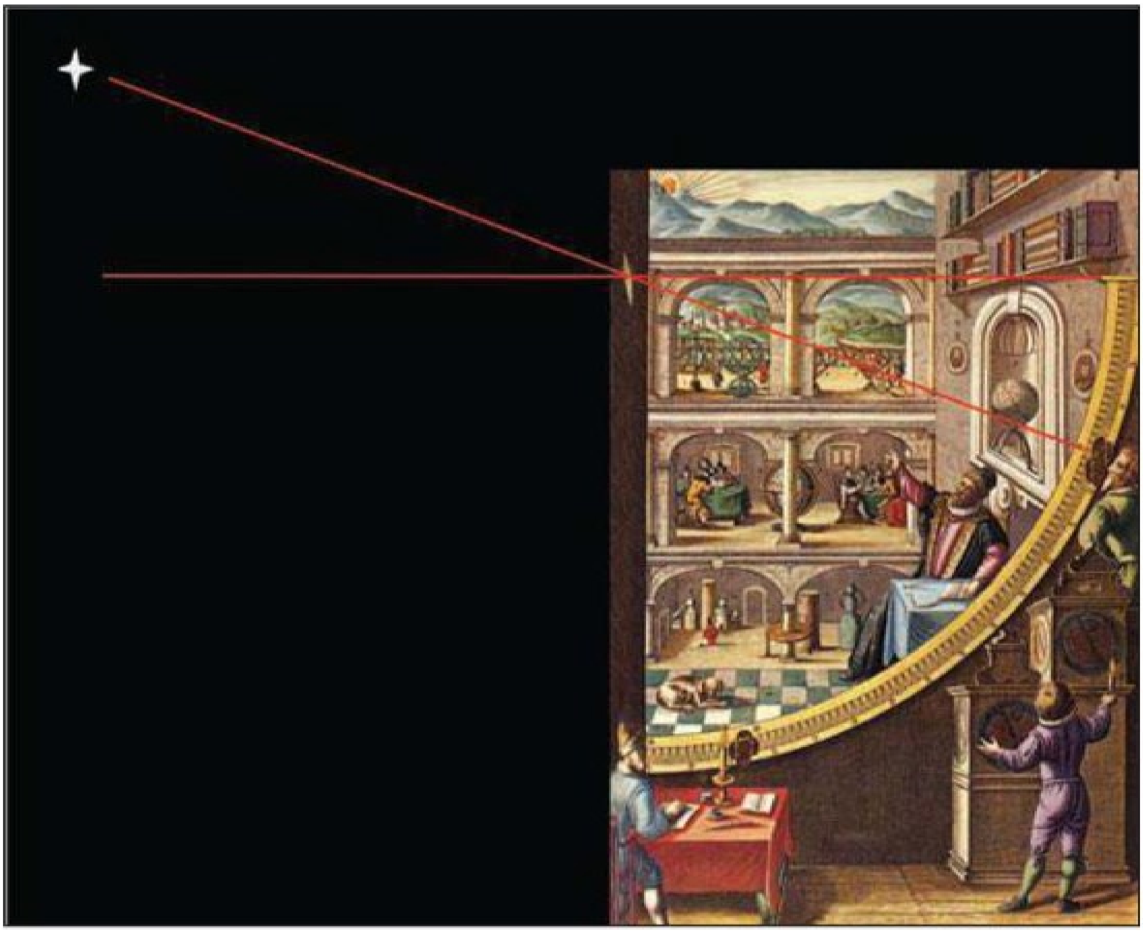


Figure 1.11 Observing the elevation of a star as it transited due south. Observatory image: Wikipedia Commons. Note, on the original, the window is too high.

2. **Lea el texto en forma global, para determinar cuál es la idea general que se desarrolla en el mismo. Elija una opción y justifique su respuesta.**

- Detalles de la vida de Tycho Brahe
- Aciertos y dificultades asociadas a las investigaciones que emprendieron Tycho y sus colaboradores
- Causas y consecuencias de sus investigaciones
- Relevamientos actuales en las mediciones de las estrellas y planetas

Tycho Brahe's observations of the heavens

In 1572, Tycho Brahe, a young Danish nobleman whose passion was astronomy, observed a supernova (a very bright new star) in the constellation of Cassiopeia.

His published observations of the new 'star' shattered the widely held belief that the heavens were immutable and he became a highly respected astronomer.

He realised that in order to show when further changes in the heavens might take place it was vital to have a first class catalogue of the visible stars. Four years later, Tycho was given the Island of Hven by the King of Denmark and money to build a castle that he called Uraniborg, named after Urania, the Greek Goddess of the heavens. In the castle's grounds, he built a semi-underground observatory called Stjerneborg. For a period of 20 years, his team of observers made positional measurements of the stars and, critically important, the planets.

Figure 1.10b shows the observatory and Figure 1.11 indicates how the measurements were made. An observer sighted a star (or planet) through a small window on a south facing wall. He did two things. First, he was able to indicate to his assistants when the star crossed the meridian. (The meridian is the half-circle that runs across the sky through the zenith between the north and south poles and intersects the horizon due south.) Secondly, by using a giant quadrant equipped with vernier scales, he was able to measure the elevation (angular height above the horizon) of the star at the moment of transit. One assistant is standing beside the clock at the lower right of the diagram to measure the time at which the star transits and a second assistant is seated at a table at the lower left who would then note the elevation of the star and time of transit in the logbook. From Figure 1.12 you can see that, given its observed elevation and the latitude of the observatory, the declination of the star can be found directly.

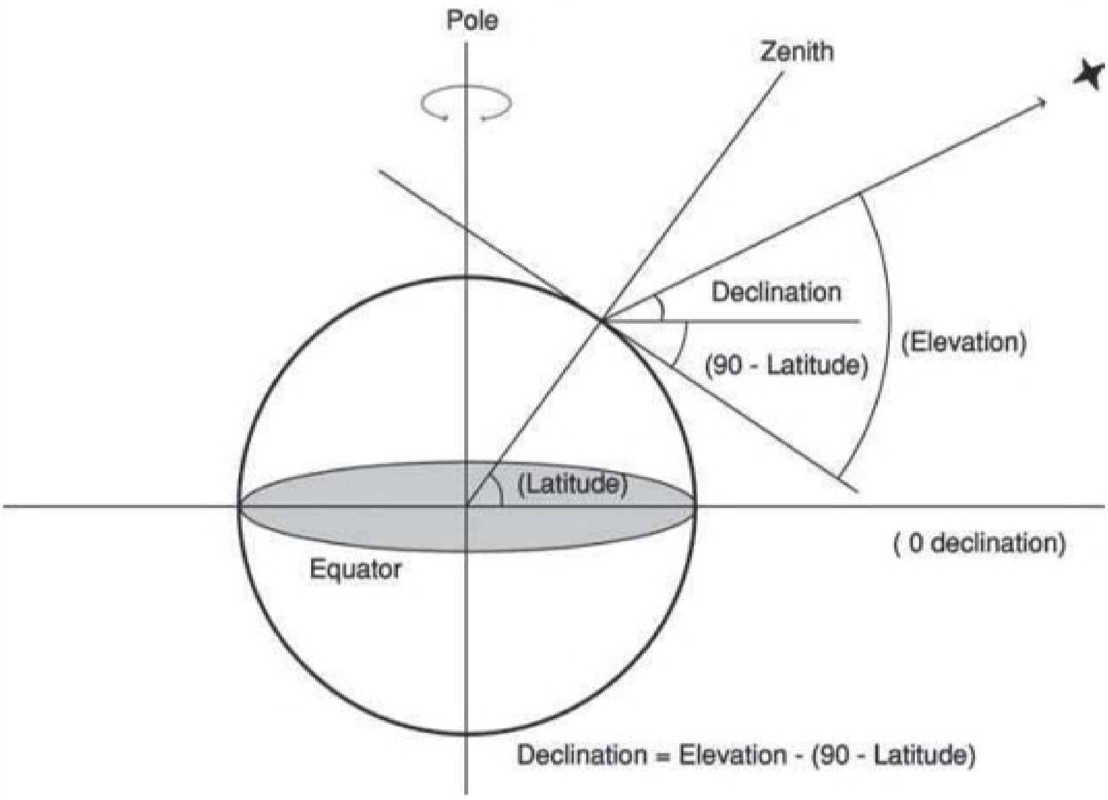


Figure 1.12 The geometry showing how the declination of a star is derived. The zenith is the point directly above the observer.

The time of the transit gives the RA. Let us now suppose that Tycho Brahe set his clock to measure sidereal time. If he now set his clock to read 0:00 h at the time when the First Point of Aries crossed the meridian, then the time when a star crossed the meridian would directly give the RA! You can now see how the convention that RA is measured in units of time and increases to the east came about.

Today, transit telescopes, such as that at the Royal Greenwich Observatory, are used to measure stellar positions. These can only observe due south and, like Tycho's quadrant, are used to measure the elevation of a star as it transits the meridian. It is observations made by this type of telescope that have shown that, gradually, the rotation rate of the Earth has been slowing down, and they are used to decide when a 'leap second' should be added.

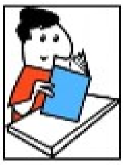
The time of transit would now be measured in UT but, given the value of the sidereal time at the previous midnight, 'GST at midnight' (GST is Greenwich Sidereal Time), the sidereal time at the moment of observation, and hence the RA can be easily calculated as follows.

Suppose a star is observed to transit at 02:23:36 UT and given that the GST at the previous midnight, as found in the Nautical Almanac, was 19:16:21, a ball-park figure of the RA could be found by just adding these two times together to give 21:39:57. However, this simple calculation neglects to account for the fact that sidereal seconds are shorter than UT seconds, so that the increase in sidereal time since midnight will be slightly greater than the increase in UT. To the nearest second, there are (23 x 3600) + (56 x 60) + 4 = 86 164 UT second in 1 sidereal day. A sidereal second is thus 86 164/86 400 times shorter than a UT second (86 400 = 24 x 3600).

The accurate calculation:
The transit was 7200 +1380 + 36 = 8616 UT seconds after midnight.
This would equate to 8616 x 86 400/86 164 = 8639 sidereal seconds.
This is 02:23:59 as measured in sidereal time.
The RA of the star would thus be 19:16:21 + 02:23:59 = 21:40:20.
(This is 23 s greater in RA than the ball-park figure.)

Not only had Tycho produced a star catalogue 10 times more precise than any previous astronomer – the errors of the 777 star positions never exceeded 4 arcmin – he had also charted the movement of the planets during the 20 year period of his observations. It was these planetary observations that led to the second major triumph of observational astronomy in the sixteenth and seventeenth centuries: Kepler's three laws of planetary motion.

Extraído de Morison, I. (2008). *Introduction to astronomy and cosmology*. UK : Wiley and Sons.



ACTIVIDADES DE COMPRENSIÓN

3. Lea la primera parte del texto en forma detallada de (hasta el renglón 10), para responder las siguientes preguntas. Indique renglones de referencia.

a. ¿Quién era Tycho Brahe?

....
....
....

Renglón/es: ....

b. ¿Cuál era su pasión?

....
....
....

Renglón/es: ....

c. ¿Cómo tomaban las distintas mediciones Tycho y sus colaboradores?

....
....
....

Renglón/es: ....

d. ¿Cómo se llamaba el observatorio que Tycho creó?

....
....
....

Renglón/es: ....

e. ¿Qué instrumentos se utilizaban en las mediciones?

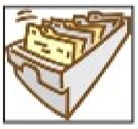
....
....
....

Renglón/es: ....

f. ¿Qué tipo de mediciones realizaron Tycho y su equipo durante 20 años?

....
....
....
....

Renglón/es: ....



VOCABULARIO

4. Complete los espacios en blanco en estas oraciones con los términos de la segunda columna. Escriba el equivalente en español del término seleccionado. Hay <u>DOS</u> términos extra. El primero está resuelto a modo de ejemplo.

a. Greenwich Mean Time was formally replaced by _____**UT**______ in 1928 (although the title has not yet come into common usage) but was essentially the same as GMT until 1967 when the definition of the second was changed!

Español: ___UT (Universal Time)___

b. If one started an electronic stop watch running on UT as the star Rigel, in Orion, was seen to cross the meridian and stopped it the following night when it again crossed the meridian, it would be found to read 23 h, 56 min and 4.09 s, not 24 h.
This period is called the ____________________ and is the length of the day as measured with respect to the apparent rotation of the stars.

Español: ______________________________

c. The path of the Sun gives two defined points along the Celestial Equator that might sensibly be used as the zero of __________________ the points where the ecliptic crosses the Celestial Equator at the vernal and autumnal equinoxes.

Español: ______________________________

d. The ________________ commonly refers to everything that lies a certain distance above the surface of Earth, including the atmosphere and the rest of outer space.

Español: ______________________________

e. A ____________________ is a stellar explosion that is more energetic than a nova.

Español: ______________________________

f. A __________________ is an imaginary line on the Earth's surface from the North Pole to the South Pole that connects all locations along it with a given longitude.

Español: ______________________________

g. _____________________ is the process or the result of determining the ratio of a physical quantity, such as a length, time, temperature etc., to a unit of measurement, such as the meter, second or degree Celsius.

Español: ______________________________

- **SUPERNOVA**
- **THE HEAVENS**
- **MERIDIAN**
- **MEASUREMENT**
- **STAR**
- **SKY**
- **HORIZON**
- **SIDEREAL DAY**
- **RATE**
- **UT**
- **RA**
- **GST**

h. The _________________ is the apparent line that separates earth from sky, the line that divides all visible directions into two categories: those that intersect the Earth's surface, and those that do not.

Español: ______________________________

i. ___________________is a measurement of the change in a quantity in a stated period, e.g. the ___________(same word) of a chemical reaction is measured by the change in amount of the reactants in a given period of time.

Español: ______________________________

j. A __________________ is a massive, luminous sphere of plasma held together by gravity. At the end of its lifetime, it can also contain a proportion of degenerate matter.

Español: ______________________________

✐ Agregue estas palabras en su **glosario.**

ACTIVIDADES SOBRE ELEMENTOS DEL LENGUAJE

5. Vuelva a leer la oración que seguramente utilizó, para responder la pregunta a. Subraye el sujeto de la oración y las acciones.

In 1572, Tycho Brahe, a young Danish nobleman whose passion was astronomy, observed a supernova (a very bright new star) in the constellation of Cassiopeia. (r. 2, 3)

6. Ahora responda lo siguiente:

¿En qué tiempo verbal se encuentra este fragmento del texto? ¿Qué elementos le permitieron reconocer ese tiempo verbal?

Tiempo pasado de los verbos

A. Verbo "to be"

Su forma cambia con respecto a número: singular o plural; (también cambia cuando negamos (**wasn't / weren't**). Cuando este verbo funciona como verbo principal puede tener diferentes significados, por ejemplo: **ser, estar, tener, costar**.

B. Otros verbos

Su forma varía de acuerdo con el tipo de verbo que expresa la acción: **regular o irregular** y de acuerdo con lo que queremos expresar: afirmar, negar o preguntar.
Los **verbos regulares** forman su pasado agregando **–ed/-d/-ied** al verbo en infinitivo cuando afirmamos. Ej: invent - invent**ed** / use– use**d** / study -stud**ied.**

Cuando preguntamos y negamos usamos el auxiliar **did / didn't** y el verbo volverá a su forma infinitiva. Ej: He creat**ed** the battery – He **didn't** create the battery – **Did** he create the battery?

Los **verbos irregulares no** agregan la terminación **–ed/-d/-ied.** Ej: **take-took**/ **begin-began** pero sí siguen el mismo patrón para preguntar o negar.

7. Observe los siguientes verbos extraídos del texto.

was (r.2)	built (r.9)	led (r.50)
were (r.4)	made (r.10)	realised (r.6)
became (r.5)	observed (r.2)	did (r.13)

a. **Clasifíquelos en la tabla a continuación según sean regulares o irregulares.**
b. **Provea el infinitivo de los irregulares.**

Verbos regulares	**Verbos irregulares**	
	Infinitivo	**Pasado**

8. Lea la siguiente oración, subraye el sujeto y las acciones.

Tycho was given the Island of Hven by the King of Denmark and money to build a castle that he called Uraniborg. (r. 7-8)

9. Ahora, tilde el/los enunciado/s correcto/s:

- ❑ El sujeto de la oración ejecuta la acción expresada.
- ❑ El sujeto de la oración recibe la acción del verbo.
- ❑ El agente del verbo, es decir, la persona que ejecuta la acción, está mencionado.
- ❑ El tiempo verbal de esta oración es el presente.
- ❑ La frase verbal está formada por el verbo "ser" + el participio de un verbo, que es donde reside el significado del acontecimiento.
- ❑ El verbo "ser" es el que se conjuga en cualquiera de los tiempos.

LA VOZ PASIVA DE LOS VERBOS EN INGLÉS

La voz pasiva es la forma verbal que se utiliza cuando el sujeto recibe la acción del verbo. Observe que el complemento directo del "verbo activo" se convierte en sujeto paciente del "verbo pasivo". El sujeto activo a veces se omite y en ocasiones no es importante saber quién o qué realizó la acción.

En inglés la voz pasiva se forma y se usa de la misma manera que en español.

FORMA: Se forma normalmente con el verbo **TO BE + PARTICIPIO PASADO** del verbo principal. La voz pasiva puede aparecer en cualquier tiempo verbal y generalmente la preposición **BY (por)** indica cuál es el sujeto agente del verbo.

USO:
La voz pasiva puede utilizarse:

a. cuando el agente (la persona que realiza la acción) es desconocido, obvio o no es importante en el contexto.

Ej: *This church* ***was built*** *in 1815.* (el agente no es importante)

b. para realizar un enunciado de manera más formal o cortés.

Ej: *The car* ***hasn't been cleaned.*** (Es más cortés que "You haven't cleaned the car")

c. cuando la acción es más importante que el agente como por ejemplo en instrucciones, procesos, informes, títulos, etc.

Ej: *Different materials and colours* ***are mixed****.*

Extraído y adaptado de Farrell, E. & Farrell, C. (1998). *Lado a lado. Gramática inglesa y española.* Illinois: Passport Books.
Evans, V. (2000). *Round up. English grammar practice.* England: Pearson Education Limited.

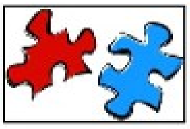
10. Subraye formas pasivas en las siguientes oraciones extraídas del texto. Luego responda, ¿en qué tiempo verbal se encuentran las formas que identificó? ¿Qué elementos le permiten identificar los tiempos verbales?

a. Figure 1.10b shows the observatory and Figure 1.11 indicates how the measurements were made. (r.12)
b. You can now see how the convention that RA is measured in units of time and increases to the east came about. (r. 24-25)
c. Today, transit telescopes, such as that at the Royal Greenwich Observatory, are used to measure stellar positions. (r. 26-27)

11. Escriba el equivalente en español de las oraciones del ejercicio anterior.

12. ¿A qué hacen referencia las palabras resaltadas?

Palabra Resaltada	Referente (En Español)
a- ***his*** published observations (r. 4)	
b- ***he*** became (r. 5)	
c- ***its*** observed elevation (r. 20-21)	
d- ... by ***this type of telescope*** (r. 28)	
e- ***these* planetary observations** (r. 50)	



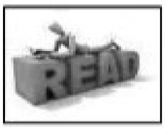
A MODO DE CIERRE...
13. Junto con un compañero, elija uno de los tres problemas y resuélvalo en español.

1. The observed brightness of a luminous object falls off as the square of its distance from us (the inverse square law). Two stars of identical luminosity are observed: the apparent brightness of the further one is 10 000 times less than the nearer.
(a) What is the difference in apparent magnitude?
(b) How many times further away is it?

2. A star is observed to cross the meridian at an elevation of 67°, as seen from an observatory at a latitude of 52° north. What is the declination of the star?
What would be the declination of a star observed to transit at an elevation of 20°?

3. A star is observed to cross the meridian (due south) at an elevation of 34°, as seen from an observatory sited at a latitude of 42° north. What is the declination of the star? At the moment of transit, a clock running on Universal Time (UT) read 03 h 16 min 24s. At the previous midnight, the sidereal time was 14 h 38 min 54 s. Calculate the Right Ascension of the star.

Recuerde extraer las palabras, frases y términos que considere importantes de esta guía para, luego, incorporarlos en su glosario.



A continuación encontrará un texto extra que puede utilizar como práctica complementaria de lectura.

Is Plato's mathematical world "real"?

This was an extraordinary idea for its time, and it has turned out to be a very powerful one. But does the Platonic mathematical world actually exist, in any meaningful sense? Many people, including philosophers, might regard such a "world" as a complete fiction – a product merely of our unrestrained imaginations. Yet the Platonic viewpoint is indeed an immensely valuable one. It tells us to be careful to distinguish the precise mathematical entities from the approximations that we see around us in the world of physical things. Moreover, it provides us with the blueprint according to which modern science has proceeded ever since. Scientists will put forward model of the world – or, rather, of certain aspects of the world – and these models may be tested against previous observation and against the results of carefully designed experiment. The models are deemed to be appropriate if they survive such rigorous examination and if, in addition, they are internally consistent structures. The important point about these models, for our present discussion, is that they are basically purely abstract *mathematical* models. The very question of the internal consistency of a scientific model, in particular, is one that requires that the model be precisely specified. The required precision demands that the model be a mathematical one, for otherwise one cannot be sure that these questions have well-defined answers.

If the model itself is to be assigned any kind of "existence", then this existence is located within the Platonic world of mathematical forms. Of course, one might take a contrary viewpoint: namely that the model is itself to have existence only within our various minds, rather than to take Plato's world to be in any sense absolute and "real". Yet, there is something important to be gained in regarding mathematical structures as having a reality of their own. For our individual minds are notoriously imprecise, unreliable, and inconsistent in their judgments. The precision, reliability, and consistency that are required by our scientific theories demand something beyond any one of our individual (untrustworthy) minds. In mathematics, we find a far greater robustness that can be located in any particular mind. Does this not point to something outside ourselves, with a reality that lies beyond what each individual can achieve?

Nevertheless, one might still take the alternative view that the mathematical world has no independent existence, and consists merely of certain ideas which have been distilled from our various minds and which have been found to be totally trustworthy and are agreed by all. Yet even this viewpoint seems to leave us far short of what is required. Do we mean "agreed by all", for example, or "agreed by those who are in their right minds", or "agreed by all those who have a Ph.D. in mathematics" (not much use in Plato's day) and who have a right to venture an "authoritative" opinion? There seems to be a danger of circularity here; for to judge whether or not someone is "in his or her right mind" requires some external standard. So also does the meaning of "authoritative", unless some standard of an unscientific nature such as "majority opinion" were to be adopted (and it should be made clear that majority opinion, no matter how important it may be for democratic government, should in no way be used as the criterion for scientific acceptability). Mathematics itself indeed seems to have a robustness that goes far beyond what any individual mathematician is capable of perceiving. Those who work in this subject, whether they are actively engaged in mathematical research or just using results that have been obtained by others, usually feel that they are merely explorers in a world that lies far beyond themselves – a world which possesses an objectivity that transcends mere opinion, be that opinion their own or the surmise of others, no matter how expert those others might be.

It may be helpful if I put the case for the actual existence of the Platonic world in a different form. What I mean by this "existence" is really just the objectivity of mathematical truth. Platonic existence, as I see it, refers to the existence of an objective external standard that is not dependent upon our individual opinions nor upon particular culture. Such "existence" could also refer to things other than mathematics, such as to morality or aesthetics, but I am here concerned just with mathematical objectivity, which seems to be a much clearer issue.

Let me illustrate this issue by considering one famous example of a mathematical truth, and relate it to the question of "objectivity". In 1637, Pierre de Fermat made his famous assertion now known as "Fermat's Last Theorem" (that no positive *n*th power [3] of an integer, i.e of a whole number, can be the sum of two other positive *n*th power if *n* is an integer greater than 2), which he wrote down in the margin of his copy of the *Arithmetica*, a book written by the 3rd-century Greek mathematician Diophantos. In this margin, Fermat also noted: "I have discovered a truly marvelous proof of this, which this margin is too narrow to contain." Fermat's mathematical assertion remained unconfirmed for over 350 years, despite concerted efforts by numerous outstanding mathematicians. A proof was finally published in 1995 by Andrew Wiles (depending on the earlier work of various other mathematicians), and this proof has now been accepted as a valid argument by the mathematical community.

Extraído de Morison, I. (2008). *Introduction to Astronomy and Cosmology*. UK : Wiley and Sons.

APÉNDICE GRAMATICAL

TIEMPO PASADO DE LOS VERBOS EN INGLÉS

En inglés, el *pasado (simple past)* se usa para:

- Expresar acciones que ocurrieron en un momento en particular; es decir, cuando sabemos exactamente cuándo ocurrió ese hecho.
- *They graduated four years ago.*

- Expresar acciones que ocurrieron con cierta frecuencia pero que ya no ocurren.
- *He often played football with his dad when he was five.*

- Expresar acciones que ocurrieron una inmediatamente después de la otra.
- *They cooked the meal first. Then they ate with their friends. After that, they watched a film.*

- Hablar de gente que ya murió.
- *Princess Diana visited many countries.*

En Español, el *simple past* puede ser traducido como pretérito imperfecto o como pretérito perfecto simple (pretérito indefinido)
El pretérito imperfecto expresa acciones pasadas, sin referencia a su principio ni a su fin. Admite matices descriptivos, durativos y reiterativos.

- *Corría el año 1936.*
- *Los niños crecían.*
- *Juan salía al anochecer.*

El pretérito perfecto simple expresa acciones pasadas independientes de cualquier otra acción. Admite matices absolutos y matices temporales.

- *Luché y fui vencido.*
- *El 2 de mayo estalló la sublevación.*

De Evans, V. (1999). *Grammar way 2*. Berkshire: Express Publishing.
Enciclopedia temática Argos. (1970). Barcelona.

Tabla de conjugación del pasado del Verbo BE

	Afirmativo	Negativo	Interrogativo
1° P.S.	I was...	I was not../wasn't	Was I..?
2° P.S.	You were....	You were not.../weren't...	Were you ...?
3° P.S.	He was... She was... It was...	He was not.../wasn't She was not.../wasn't... It was not.../wasn't...	Was he ....? Was she...? Was it...?
1° P.P.	We were...	We were not.../weren't	Were we ...?
2° P.P.	You were...	You were not.../weren't...	Were you ...?
3° P.P	They were...	They were not.../weren't	Were they...?

Tabla de Conjugación de un Verbo Regular

	Afirmativo	Negativo	Interrogativo
1° P.S.	I invented	I didn't invent	Did I invent
2° P.S.	You invented	You didn't invent	Did you invent
3° P.S.	He invented She invented It invented	He didn't invent She didn't invent It didn't invent	Did he invent Did she invent Did it invent
1° P.P.	We invented	We didn't invent	Did we invent
2° P.P.	You invented	You didn't invent	Did you invent
3° P.P	They invented	They didn't invent	Did they invent

Tabla de Conjugación de un Verbo Irregular

	Afirmativo	Negativo	Interrogativo
1° P.S.	I found…	I didn't find …	Did I find..?
2° P.S.	You found …	You didn't find …	Did you find …?
3° P.S.	He found … She found … It found …	He didn't find …. She didn't find …. It didn't find ….	Did he find ….? Did she find …? Did it find…?
1° P.P.	We found …	We didn't find …	Did we find…?
2° P.P.	You found …	You didn't find …	Did you find…?
3° P.P	They found …	They didn't find …	Did they find…?

VOZ PASIVA: FORMA

Tiempo	Voz activa	Voz pasiva
Present Simple	He writes a paper.	A paper is written.
Past Simple	He wrote a paper.	A paper was written.
Present Perfect	He has written a paper.	A paper has been written.
Future Simple	He will write a paper.	A paper will be written.
Past Perfect	He had written a paper.	A paper had been written.
Present Continuous	He is writing a paper.	A paper is being written.
Past Continuous	He was writing a paper.	A paper was being written.
Modals **(Modal + be + part. pas.)**	He may write a paper. He must write a paper.	A paper may be written. A paper must be written.

Módulo de Idioma Inglés FAMAF Guía 7 Contenidos	**Propósito de Lectura:** ¤ **Identificar eventos que ocurrieron en el pasado y comprender su secuencia.** **Al finalizar la Guía, Ud. habrá puesto en práctica los siguientes contenidos léxico-gramaticales:** ¤ Tiempo pasado de los verbos ¤ Conectores de diferentes tipos

1. **Observe los elementos paratextuales del siguiente texto. ¿Qué le permiten anticipar sobre el mismo?**

2. **¿Qué conoce sobre el tema?**

3. **Lea el texto en forma global, para corroborar si lo que respondió en la pregunta anterior se desarrolla en el mismo. De ser así, ¿dónde se encuentra esa información?**

Isaac Newton and his Universal Law of Gravity

Isaac Newton was born in the manor house of Woolsthorpe, near Grantham, in 1642, the same year Galileo died. His father, also called Isaac Newton, had died before his birth and his mother, Hannah, married the minister of a nearby church when Isaac was 2 years old. Isaac was left in the care of his grandmother and effectively treated as an orphan. He attended the Free Grammar School in Grantham but showed little promise in academic work and his school reports described him as 'idle' and 'inattentive'. His mother later took Isaac away from school to manage her property and land, but he soon showed that he had little talent and no interest in managing an estate.

An uncle persuaded his mother that Isaac should prepare for entering university and so, in 1660, he was allowed to return to the Free Grammar School in Grantham to complete his school education. He lodged with the school's headmaster who gave Isaac private tuition and he was able to enter Trinity College, Cambridge in 1661 as a somewhat more mature student than most of his contemporaries. He received his bachelor's degree in April 1665 but then had to return home when the University was closed as a result of the Plague. It was there, in a period of 2 years and whilst he was still under 25, that his genius became apparent.

There is a story (which is probably apocryphal) that Newton was sitting under the apple tree in the garden of Woolsthorpe Manor. He might well have been able to see the first or last quarter Moon in the sky. It is said that an apple dropped on his head (or thudded to the ground beside him) and this made him wonder why the Moon did not fall towards the Earth as well.

Newton's moment of genius was to realise that the Moon *was* falling towards the Earth! He was aware of Galileo's work relating to the trajectories of projectiles and, in his great work *Principia* published in 1686, he considered what would happen if one fired a cannon ball horizontally from the top of a high mountain where air resistance could be ignored. The cannon ball would follow a parabolic path to the ground. As the cannon ball was fired with greater and greater velocity it would land further and further away from the mountain. As the landing point becomes further away the curvature of the Earth must be considered. In a more popular work published in the 1680s called *A Treatise of the System of the World*, he included Figure 1.17. The mountain is impossibly high in order for it to reach above the Earth's atmosphere. However, this is a thought experiment, not a real one. One can see from this that, if the velocity is gradually increased there would come a point when the cannon ball would never land – and would be in an orbit around the Earth.

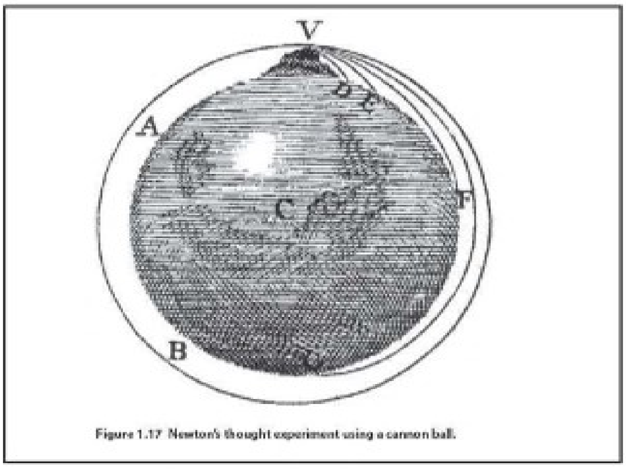


Figure 1.17 Newton's thought experiment using a cannon ball.

Let us first treat this experiment quantitatively and use modern day values and units to extend Newton's arguments to encompass the Moon. You can calculate that the surface of the Earth falls below a flat horizontal line by approximately 5 m over a distance of 8 km. If one drops a mass from rest at the surface of the Earth, it will drop a height of $\frac{1}{2}gt^2$ in a time t, where g is the acceleration due to gravity at the Earth's surface. The value of g is 9.8 m s^{-2} so the fall would be 4.9 m. So, if we fired the cannon ball with a speed of about 8000 m s^{-1}, its fall after 8 km would match the falling away of the Earth's surface and the cannon ball would remain in orbit. Newton applied the same logic to the motion of the Moon, realising that, if the gravitational attraction between the Earth and Moon caused it to fall by just the right amount, it too would remain in orbit around the Earth. He knew enough about the Moon to be able to calculate the value of the acceleration of gravity at the distance of the Moon. For this, he needed to know the radius of the Moon's orbit (assumed to be circular) about the centre of the Earth, and also the period of its orbit around the Earth. Newton used a value of the radius of the Moon's orbit of 384 000 km and a period of 27.32 days or 2.36 $\times 10^6$s. Referring to Figure 1.18 (which is not to scale) one can easily calculate the distance, L (the length AB), and direction (tangential to the radius vector) that the Moon would travel in 1 s if suddenly there were no gravitational attraction between the Earth and the Moon.

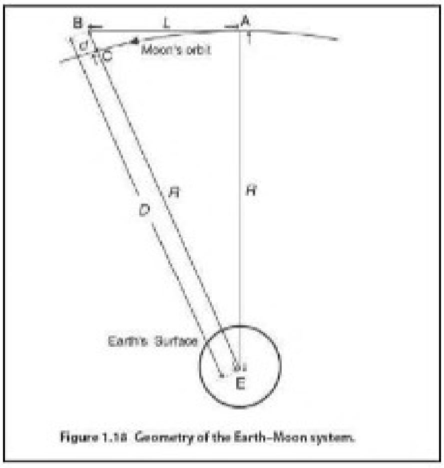


Figure 1.18 Geometry of the Earth. Moon system.

Using the small angle approximation, where sin θ =θ (in radians), then L _ R _ θ, so

$$\theta = (1/2.36\times 10^5)\times 2\times \pi = 2.66\times 10^{-6}\ \text{rad}.$$

Giving $L = 1.022$ km.

As a result of the mutual attraction of the Earth and the Moon, the Moon will actually follow the curved path AC which can be thought of as being made up of the straight line motion AB and a fall BC, the distance fallen by the Moon in 1 s.

Let the distance from the centre of the Earth, point E, to A be *R* and from E to B be *D*. Finally let the distance from B to C be *d*. As the orbit is circular, the distance from E to C is also *R*.

With this notation, $d = D - R$

In the right-angled triangle ABE, $R/D = \cos\theta$,

or

$$D = R/\cos\theta.$$

Hence,

$$d = D - R = R/\cos\theta - R = R\,[(1/\cos\theta) - 1].$$

Now θ is a very small angle, so we may write:

$$\cos\theta = 1 - (\theta^2/2)$$

where θ is in radians.

Using the binomial theorem to find 1/cosθ, and ignoring all but the first two terms (θ is *very* small) we get:

$$1/\cos\theta = 1 + (\theta^2/2).$$

Substituting in the expression for BC, we obtain:

$$\begin{aligned} d &= R\times\theta^2/2 \\ &= [3.84\times 10^8\,\text{m}\times(2.66\times 10^{-6})^2]/2 \\ &= 1.36\times 10^{-3}\,\text{m}. \end{aligned}$$

So, in 1 s, the Moon falls vertically towards the Earth by just over 1 mm.

Let us assume that the acceleration due to gravity at the distance of the Moon is g_m, then this fall would be equal to $\frac{1}{2}g_m t^2$ so that g_m is 0.00272 m s^{-2}. This is considerably less than the value of 9.81 at the Earth's surface, so the force of gravity must fall off as the distance between the two objects increases. The value of *g* at the distance of the Moon compared with that at the Earth's surface was 0.00272/9.81 = 2.77 x 10^{-4}. This is a ratio of 1/3606. Newton knew that the radius of the Earth was 6400 km, so that the Moon, at a distance of 384 000 km, was precisely 60 times further away from the centre of the Earth than the Earth's surface. Hence, the value of g at the distance of the Moon had fallen almost precisely by the ratio of the distances *from the centre of the Earth* squared!

This led Newton to his famous inverse square law: the force of gravitational attraction between two bodies decreases with increasing distance between them as the inverse of the square of that distance.

However, Newton had a problem: he felt that he could not publish his law until he could prove that the gravitational pull exerted by a spherical body was precisely the same as if all the mass were concentrated at its centre. This can only be proved by calculus and it took Newton a while to develop the ideas of calculus, which he called 'fluxions'. It was only then that he felt confident enough to present his theory to the world.

The proof is not difficult, but rather long: as a sphere can be regarded as set of thin nested shells, the required proof is to show that the gravitational attraction of a thin shell is as if all its mass were concentrated at its geometrical centre.

You will thus see that there is no requirement that the body is uniformly dense (the Earth certainly is not) but it does require that the density at a given distance from the centre is constant – the body must have a spherically symmetric mass distribution.

Newton realized that the force of gravity must also be directly proportional to the object's mass. Also, based on his third law of motion, he knew that when the Earth exerts its gravitational force on an object, such as the Moon, that object must exert an equal and opposite force on the Earth. He thus reasoned that, due to this symmetry, the magnitude of the force of gravity must be proportional to both the masses.

His law thus stated that the force, F, between two bodies is directly proportional to the product of their masses and inversely proportional to the distance between their centres. This can be written as:

$$F \alpha M_1 M_2/d^2$$

where M_1 and M_2 are the masses of the two bodies and d is their separation. Thus one can write:

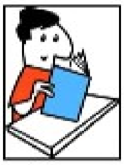
$$F = G \times M_1\, M_2/d^2$$

which is Newton's **Universal Law of Gravitation**, where G is the constant of proportionality called the universal constant of gravitation.

Why Universal? Using his second law (force = mass x acceleration) and his Law of Gravity, Newton was able to deduce Kepler's third law of planetary motion.

This deduction showed him that his law was valid throughout the whole of the then known Solar System. To him that was Universal!

Extraído de Morison, I. (2008). *Introduction to astronomy and cosmology*. UK : Wiley and Sons.



ACTIVIDADES DE COMPRENSIÓN

4. Lea el texto nuevamente, para completar las actividades a continuación.
a. En el texto que acaba de leer, ¿qué predomina?

☐ El relato o narración de acontecimientos

☐ La explicación de un tema

☐ La descripción de un objeto

b. ¿Qué elementos del texto le permitieron responder la pregunta anterior?

....

....

c. ¿Qué otra/s secuencia/s encuentra en el texto leído?

☐ Dialogal

☐ Descriptiva

☐ Argumentativa

d. ¿Qué elementos del texto le permitieron responder la pregunta anterior?

....

....

5. Lea el texto en forma detallada, para responder las siguientes preguntas. Indique renglones de referencia.

a. ¿En qué universidad Isaac Newton recibió el título de "*bachelor*"?

....

....

....

Renglones.......................

b. ¿Qué se puede calcular en la Fig. 1.18?

....

....

....

Renglones....................

c. ¿Qué papel jugó el cálculo en la demostración de la Ley de Gravitación Universal?

....

....

....

Renglones....................

ACTIVIDADES SOBRE ELEMENTOS DEL LENGUAJE

6. Lea el siguiente fragmento, para responder las preguntas a continuación:

The mountain is impossibly high in order for it to reach above the Earth's atmosphere. ***However****, this is a thought experiment, not a real one. (r. 25, 26, 27)*

¿Qué indica la palabra resaltada? (Elija una opción.)

a. Adición
b. Contraste
c. Causa/razón
d. Propósito

En sus palabras, ¿cuáles son las dos ideas relacionadas por ese conector?

1º idea..

2º idea..

7. En el r. 71 aparece un conector que indica contraste; subraye las ideas que conecta y dé un equivalente en español sólo de la segunda idea.

Idea 2...

Recordamos

Los conectores son palabras o frases que tienen por función relacionar y poner en contacto dos enunciados o secuencia de enunciados. Es decir, son elementos lingüísticos que enlazan las distintas partes de un texto y especifican cómo lo que sigue está sistemáticamente conectado con lo anterior.
Su finalidad se centra fundamentalmente en servir de guía o instrucción para la interpretación adecuada del texto.
En este caso, las palabras **however, but,** entre otros, conectan ideas opuestas.

8. La siguiente oración plantea una relación de condición-resultado entre dos ideas. Leála para resolver las actividades a y b.

If one drops a mass from rest at the surface of the Earth, it will drop a height of $\frac{1}{2}gt^2$ in a time t, where g is the acceleration due to gravity at the Earth's surface. (r. 31-32)

a. ¿Cuál es la palabra/frase que introduce la condición en la oración?

....

b. Complete el siguiente esquema con la idea que falta.

Condición:
Si uno deja caer una masa a partir del reposo en la superficie de la tierra,

Resultado:
....
....
....

9. Lea el siguiente fragmento del texto para, luego, responder las preguntas a - f, a continuación.

Newton realized that the force of gravity must also be directly proportional to the object's mass. Also, based on his third law of motion, he knew that when the Earth exerts its gravitational force on an object, such as the Moon, that object must exert an equal and opposite force on the Earth. He thus reasoned that, due to this symmetry, the magnitude of the force of gravity must be proportional to both the masses. (r. 74/77)

a. ¿De qué se dio cuenta Newton?

....

....

b. ¿A qué conclusión llegó Newton basándose en su tercera ley de movimiento?

....

....

c. ¿Qué relación encuentra entre las respuestas a las preguntas anteriores? (Elija una opción.)

CAUSA-CONSECUENCIA; CONTRASTE; ADICIÓN

d. ¿Qué palabra/frase de la relación indica esa relación entre ambas ideas?

....

....

e. ¿Cuál fue la razón por la que Newton llegó a la conclusión de que la magnitud de la fuerza de gravedad debe ser proporcional a ambas masas?

....

....

f. ¿Qué palabra/frase ayudó a ver la relación entre las ideas en el fragmento?

....

....

9. En el renglón 39 hay un conector que indica adición. Subraye las dos ideas que conecta y dé un equivalente en español sólo de la segunda idea.

2da idea..

10. Observe el siguiente fragmento extraído del texto:

Hannah **married** the minister of a nearby church when Isaac **was** 2 years old. Isaac **was left** in the care of his grandmother and effectively treated as an orphan. He **attended** the Free Grammar School in Grantham but **showed** little promise in academic work and his school reports **described** him as 'idle' and 'inattentive'. His mother later **took** Isaac away from school to manage her property and land, but he soon **showed** that he **had** little talent and no interest in managing an estate. (r. 3-8)

➔ ¿En qué momento tuvieron lugar las acciones mencionadas en negrita? Marque su respuesta.

PRESENTE	PASADO	FUTURO

¿Que diferencia encuentra entre la segunda y la tercera oración? ¿A qué se debe esa diferencia? (Revise los contenidos de la guía anterior).

11. Ahora, lea las siguientes oraciones, para elegir la opción correcta en español del verbo conjugado.

a) Hannah, **married** the minister of a nearby church.
i) se casó ii) estaba casada iii) se casaría

b) (Newton) **showed** little promise in academic work.
i) demostró ii) mostró iii) mostraba

c) ....he **had** little talent and no interest in managing an estate.
i) había ii) tenía iii) tuvo

12. Lea el fragmento a continuación, para completar los espacios en blanco con los siguientes verbos:
obtained - did not know – gave - observed
Luego, dé un equivalente en español de las partes resaltadas.

Newton Estimated the Earth's Mass. Newton ____________ [1] the mass of the earth[a], but he ____________ [2] a good estimate using the following reasoning. The mass of a spherical object of volume[b] $(4\pi R_e^3/3)$ is given by

$$M = \left(\frac{4}{3}\pi R_e^3\right)\rho,$$

where ρ is the average density of the earth and R_e its known radius.

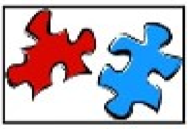
To estimate the average density of the earth[c], Newton ____________ [3] that the density of water is 1 g/cm^3, and the density of a heavy metal like iron is about 7 g/cm^3. A reasonable guess for the average density of the earth would thus be about 5 g/cm^3. This approach ____________ [4] Newton an estimate of G[d] which was within 10% of the present accepted value of

$G = 6.673 \times 10^{-11}$ N m^2 /kg^2 .

The smallness of G[e] requires that at least one of two gravitationally attracting objects be massive (like the earth) for the gravitational force to be readily apparent. Attractive forces between smaller objects, like two persons, are negligibly small (at least the gravitational kind) and are therefore completely masked by the gravitational attraction of the earth[f] on each person.

Parker, P. (2002). *Newton's Law of Universal Gravitation*. Michigan State University.

a. ....
b. ....
c. ....
d. ....
e. ....
f. ....



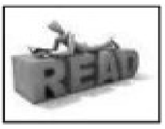
A MODO DE CIERRE…

13. Junto con un compañero, responda la siguiente pregunta con información que se presenta en el texto de esta guía.

¿Qué problemas tuvo que enfrentar Newton para completar la demostración de la ley de gravitación universal?

VUELQUE EN ESTA TABLA LAS PALABRAS, FRASES Y TÉRMINOS QUE CONSIDERE IMPORTANTES DE ESTA GUÍA PARA, LUEGO, INCORPORARLOS EN SU GLOSARIO.

Palabra / Término / Frase	Ejemplo	Equivalente en español
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		



A continuación encontrará un texto extra que puede utilizar como práctica complementaria de lectura.

A Short History of Black Holes

Understanding our solar system has been the most important single impetus to the development of modern science. Newton's comprehensive description in *Principia Mathematica*--founded on his gravitational law and laws of motion--absorbed the work of Kepler, Copernicus, Galileo, and many others. The profound influence of Newton's ideas, in science and beyond, made it difficult--two centuries later--to accept the growing evidence that a flaw existed in the Newtonian model of the solar system. The flaw was small but it persisted. After the most careful estimates of the perturbations produced by the other planets, the predicted position of the perihelion of Mercury was still falling behind its observed position at the rate of about 43 seconds of arc per century.

1915. Where Newton had used the motion of the moon around the earth as a guiding example in his work, Einstein used this deviation of Mercury. The central ideas of general relativity were already in place; at issue was the exact form of the curvature term G in the Einstein equation $G=kT$. A precise relativistic model of the sun's gravitational field was not needed--Einstein used a simple polynomial approximation. Late in this year he suceeded, and the 43 second lag was eliminated.

1916. A few weeks later, Einstein, working in Berlin, received a paper from Karl Schwarzschild, an astronomer who, though no longer young, was serving in the German army in Russia. Hospitalized by an illness that soon proved mortal, Schwarzschild had time to discover the desired precise relativistic model, and *Schwarzschild spacetime* replaced the Newtonian model as the best description of the gravitational field of an isolated spherically symmetrical star. But only a few theorists were familiar with relativity, and significant experimental tests were not possible in earth-borne laboratories.

1920s. With the end of the World War, further astronomical tests of general relativity were begun, notably by an expedition led by the British physicist Arthur Eddington. The goal was to compare two observations of a star, one near the sun, the other far from it, to see if gravity could in fact "bend" light as Einstein had predicted. The successful result led to enormous popular and scientific interest in relativity, and the cooperative development of astronomy and relativity in this decade was explosive.

A crucial area of study was stellar evolution. The gravitational collapse of a normal star such as our sun is prevented by nuclear burning. As its fuel is used up, the star must contract, and many end as white dwarfs. These are about the size of the earth but with masses comparable to that of the sun--thus with densities of thousands of tons per cubic inch.

1931. The first relativistic model of the interior of a white dwarf, by the astrophysicist S. Chandrasekhar, produced a simple curve relating its mass and radius. Surprisingly, the larger the mass the smaller the radius. In fact, if the mass is more than about 1.2 solar masses the radius is so small that the star cannot stabilize: further collapse is inevitable.

1934. W. Baade and F. Zwicky predicted that this collapse strips the atoms of their electrons, packing the nucleii together as a *neutron star*. These are only 10-15 miles in diameter, with densities on the order of a billion tons per cubic inch. While general relativity is useful in the study of white dwarfs, for the superdense neutron stars it is a necessity--Newtonian physics no longer applies.

1939. The first theoretical appearance of black holes, in a paper by Robert Openheimer and H. Snyder: "When all thermonuclear sources of energy are exhausted, a sufficiently heavy star will collapse. Unless [something can somehow] reduce the star's mass to the order of that of the sun, this contraction will continue indefinitely"...past white dwarfs, past neutron stars, to an object cut off from communication with the rest of the universe.

Such discoveries redirected attention to the Schwarzschild model of the exterior of a star. Heretofore it had generally been assumed that the model becomes singular at the Schwarzschild radius $r^*=2m$. This seemed of no great significance since in the case of our sun, for example, whose radius is about 700,000 km, the Schwarzschild model's presumed singularity is buried in at $r^*=3$ km. But for black holes it was gradually realized that radius $r^*=2m$ is not a singularity but rather the "horizon" from which nothing, not even light, can emerge.

1954. The Reports of the State University of Kazan (a city 300 miles east of Moscow in the then Soviet Union) contained this year a classification of spacetimes given by the young physicist A.Z. Petrov. The families of radially ingoing and outgoing light rays in the Schwarzschild model show that it has what is now called Petrov type D. Petrov's classification was slow in making its way into the mainstream, but was crucial to the next major development.

All stars rotate. For a very slowly turning star like our sun this is not very important, but when a star collapses, conservation of angular momentum implies that its rate of rotation increases. Thus a neutron star, for example, can be expected to rotate at a fantastic rate. It is believed that *pulsars* are rapidly rotating neutron stars.

But the star producing Schwarzschild spacetime does not rotate. In I915 this static model had been found in only a few weeks, so it must have been considered fairly easy to set it spinning. However, years passed without success.

1963. The British-educated New Zealand physicist Roy Kerr, working at the University of Texas, adopted a shrewd strategy: Bearing in mind that Schwarzschild spacetime has Petrov type *D*, he did not aim directly at the elusive rotating model, but instead examined an algebraically simple class of type *D* metric tensors. The long-sought metric appeared.

Kerr's minimal one-and-a-half page announcement of his discovery was followed two years later by elaborate detailed calculations.

1967-68. R.H. Boyer and R.W. Lindquist (1967) made Kerr spacetime more accessible by introducing the elegant coordinate system that now bears their names. In the same paper they found the maximally extended Kerr spacetimes and investigated their geodesics. However, a full analysis of Kerr geodesics become possible only with the discovery of a fourth geodesic first-integral by Brandon Carter, a student of Stephen Hawking at the University of Cambridge. Carter's paper (1968) remains the best brief exposition of the global properties of Kerr spacetime.

1968-1978. From the 1960s theoretical and astronomical evidence mounted for the existence of black holes, including very massive ones formed by the collapse of great clusters of stars at the center of galaxies. Speculatively, the high densities following the big bang may have formed *primordial* holes, including tiny ones. But even for single collapsing stars their wide variety of physical properties might be expected to produce a diversity of black holes. However, a series of results principally by Werner Israel, Brandon Carter, Stephen Hawking, and David Robinson leads to the conclusion that a collapsing star loses its individual characteristics, settling down to a final state uniquely determined by mass and rate of rotation--thus leaving the Kerr model as the prime black hole of nature.

http://www.math.ucla.edu/~bon/kerrhistory.html

APÉNDICE GRAMATICAL

CONECTORES QUE INDICAN CONTRASTE

El autor de un texto usa contraste cuando quiere resaltar o destacar las **diferencias** que existen entre las cosas. Para interpretar correctamente un contraste se debe reconocer en qué aspecto son diferentes los elementos que se contrastan (apariencia, funcionamiento, efectos, etc.)

➔En inglés, los conectores que indican contraste son: **but, although, even though, though, in spite of, despite, however, yet, while, whereas, nevertheless.**

- **But**

"The theory was correct, but no one believed in it."

- **Although / Even though / Though**

"Although / Even though / Though the theory was correct, no one believed in it."

- **In spite of / Despite**

"In spite of / Despite being correct, no one believed in the theory"

- **However / Nevertheless**

"He was well-qualified for the job. However / Nevertheless, he did not get it."

- **While / Whereas**

"Your theory is controversial, while / whereas mine is not."

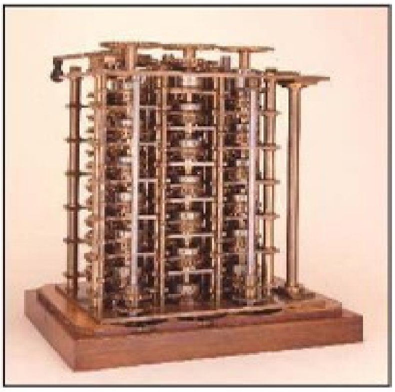
➔En español estos conectores representan las oposiciones u objeciones que le hacen a la idea principal.

- **Pero, sino, aunque, sin embargo, no obstante** unen ideas donde la segunda plantea oposición u objeción directa a la primera.
- **Por el contrario, al contrario, por oposición** unen ideas donde la segunda plantea oposición total a la primera.
- **Antes que, más bien que, en vez de, mientras que** unen ideas donde la segunda plantea oposición comparativa a la primera.

De Agostini de Sánchez, M. (2004). *Inglés para arquitectos*. Córdoba: Comunicarte. 132.
Sosa de Montyn, S. y Conti de Londero, M. (1993). *Hacia una gramática del texto*. Córdoba: Comunicarte. 248.

Módulo de Idioma Inglés FAMAF GUÍA 8 Contenidos	**Propósito de Lectura: Identificar eventos en una secuencia de tiempo.** **Al finalizar la Guía, Ud. habrá puesto en práctica los siguientes contenidos léxico-gramaticales**: ⌗ Funciones de la forma -ing ⌗ Tiempo Verbal *Past Perfect* ⌗ Conectores que indican *PROPÓSITO*

1. Observe las siguientes imágenes, ¿qué puede predecir sobre el contenido del texto?



2 Lea el título, para, luego, escribir en el espacio provisto las palabras y los conceptos relacionados con el tema que piensa va a encontrar en el texto.

3. Lea rápidamente el texto, para corroborar lo que predijo acerca del contenido del mismo.

Charles Babbage (Dec. 1791 – Oct. 1871)

Mathematician, philosopher and (proto-) computer scientist who originated the idea of a programmable computer.

Biography and Education

Charles Babbage was born in London Dec. 26, 1791, St. Stephan day, in London. He was son of Benjamin Babbage, a banking partner of the Praeds who owned the Bitton Estate in Teignmouth and Betsy Plumleigh Babbage. It was about 1808 when the Babbage family decided to move into the old Rowdens house, located in East Teignmouth, and Benjamin Babbage became a warden of the nearby church of St. Michael.

The father of Charles was a rich man, so it was possible for Charles to receive instruction from several elite schools and teachers during the course of his elementary education. He was about eight when he had to move to a country school to recover from a dangerous fever. His parents sentenced that his "brain was not to be taxed too much"; Babbage wrote: "this great idleness may have led to some of my childish reasonings."

Then, he joined King Edward VI Grammar School in Totnes, South Devon, a thriving comprehensive school that's still operative today, but his fragile health status forced him back to private teaching for a period. Then, he finally joined a 30-student closed number academy managed by Reverend Stephen Freeman. The academy had a big library, where Babbage used to study mathematics by himself, and learned to love it. He had two more personal tutors after leaving the academy. One was a clergyman of Cambridge, and about him Babbage said: "I fear I did not derive from it all the advantages that I might have done." The other one was an Oxford tutor who taught Babbage the Classics, so that he could be accepted to Cambridge.

Babbage arrived at Trinity College, Cambridge in October 1810. He had a big culture - he knew Lagrange, Leibniz, Lacroix, and Simpson... and he was seriously disappointed about the math programs available at Cambridge. So he, with J.Herschel, G.Peacock, and other friends, decided to form the Analytical Society.

When, in 1812, Babbage transferred to Peterhouse, Cambridge, he was the best mathematician; but he failed to graduate with honours. He received an honorary degree later, without even being examinated, in 1814.

In 1814, Charles Babbage married Georgiana Whitmore at St. Michael's Church in Teignmouth, Devon. His father, for some reason, never gave his approvation. They lived in tranquility at 5

Devonshire Street, Portland Place, London. Only Three of their 8 children became adult. Tragically, Charles' father, his wife and one of his sons all died in 1827.

Difference engine

Babbage presented something that he called "difference engine" to the Royal Astronomical Society on Jun 14, 1822 and in a paper entitled "Note on the application of machinery to the computation of astronomical and mathematical tables."

It was able to calculate polynomials by using a numerical method called the differences method.

The Society approved the idea, and the government granted him £1500 to construct it, in 1823. Charles Babbage converted one of the rooms in his home to a workshop and hired Joseph Clement to oversee construction of the engine. Every part had to be formed by hand using custom machine tools, many of which Babbage himself designed. He took extensive tours of industry to better understand manufacturing processes. Based on these trips and his experience with the difference engine, Babbage published On the Economy of Machinery and Manufacture in 1832. It was the first publication on what we would now call operations research.

The death of Georgiana, Babbage's father, and an infant son interrupted construction in 1827. Work had already taxed Babbage heavily and he was on the edge of a breakdown. John Herschel and several other friends convinced Babbage to take a trip to Europe to recuperate. He passed through the Netherlands, Belgium, Germany, and Italy visiting universities and manufacturing facilities.

In Italy he learned he had been named the Lucasian Professor of Mathematics. He initially wanted to turn down the position but several friends convinced him to accept. He moved to 1 Dorset Street upon returning to England in 1828.

The difference engine project had come under fire during Babbage's absence. Rumours had spread that Babbage had wasted the government's money; that the machine did not work; and that it had no practical value if it did. John Herschel and the Royal Society publicly defended the engine. The government continued its support, advancing £1500 on April 29, 1829, £3000 on December 3, and £3000 on February 24, 1830. Work continued, but Babbage would have continual difficulty getting money from the treasury.

Babbage's problems with the treasury coincided with numerous disagreements with Clement. Babbage had built a two-story, 50 foot long workshop behind his house. It had a glass roof for lighting, and a fireproof, dust-free room to contain the machine. Clement refused to move his operations to the new workshop and demanded more money for the difficulty of travelling across town to oversee construction. In response, Babbage suggested that Clement draw his pay directly from the treasury. Before then, Babbage would get money from the government that he would use to pay Clement. He often had to pay Clement out of his own pocket when the bureaucracy lagged behind Clement's pay schedule. Clement refused the request and stopped working.

Clement further refused to turn over the drawings and tools used to build the difference engine.

After an investment of £23000, including £6000 of Babbage's own money, work on the unfinished machine ceased in 1834. Charles wrote, "The drawings and parts of the Engine are at length in a place of safety—I am almost worn out with disgust and annoyance at the whole affair." In 1842 the government officially abandoned the project.

Analytical engine

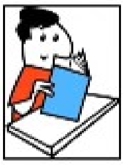
While he was separated from the difference engine, Babbage began to think about an improved calculating engine. Between 1833 and 1842 he tried to build a machine that would be programmable to do any kind of calculation, not just ones relating to polynomial equations. The first breakthrough came when he redirected the machine's output to the input for further equations. He described this as the machine "eating its own tail". It did not take much longer for him to define the main points of his analytical engine.

The mature analytical engine used punched cards adapted from the Jacquard loom to specify input and the calculations to perform. The engine consisted of two parts: the mill and the store. The mill, analogous to a modern computer's CPU, executed the operations on values retrieved from the store, which we would consider memory. It was the world's first general-purpose computer.

A design for this emerged by 1835. The scale of the work was truly incredible. Babbage and a handful of assistants created 500 large design drawings, 1000 sheets of mechanical notation, and 7000 sheets of scribbles. The completed mill would measure 15 feet tall and 6 feet in diameter. The 100 digit store would stretch to 25 feet long. Babbage constructed only small test parts for his new engine; a full engine was never completed. In 1842, following repeated failures to obtain funding from the First Lord of the Treasury, Babbage approached Sir Robert Peel for funding. Peel refused, and offered Babbage a knighthood instead. Babbage refused. He would continue modifying and improving the design for many years to come.

In October 1842, Federico Luigi, Conte Menabrea, an Italian general and mathematician, published a paper on the analytical engine. Augusta Ada King, Countess of Lovelace, a longtime friend of Babbage, translated the paper into English. Charles suggested that she add notes to accompany the paper. In a series of letters between 1842 and 1843, the pair collaborated on seven notes, the combined length of which was three times longer than the actual paper. In one note Ada prepared a table of execution for a program that Babbage wrote to calculate the Bernoulli numbers. In another, she wrote about a generalized algebra engine that could perform operations on symbols as well as numbers. Lovelace was perhaps the first to grasp the more general goals of Babbage's machine, and some consider her the world's first computer programmer. She began working on a book describing the analytical engine in more detail, but it was never finished.

http://www.charlesbabbage.net/



ACTIVIDADES DE COMPRENSIÓN

4. Responda las siguientes preguntas en español, de manera completa. Indique, luego, los renglones de donde extrajo la información.

a. ¿Dónde cursó Charles Babbage sus estudios superiores?

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

Renglón/es: ……………………

b. ¿Estaba de acuerdo con los programas de Matemáticas en Cambridge? ¿Qué acción realizó para salvar esta situación?

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

Renglón/es: ……………………

c. ¿Cuáles eran los principios básicos que Babbage tuvo en cuenta para la fabricación de la máquina de diferencia?

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

Renglón/es: ……………………

b. ¿Qué diferencia había entre la máquina de diferencia y el motor analítico?

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

Renglón/es: ……………………

ACTIVIDADES SOBRE ELEMENTOS DEL LENGUAJE

5. Observe los siguientes ejemplos y decida cuál de las opciones propuestas se aproxima más al significado de la palabra en negrita.

- He was son of Benjamin Babbage, a **banking** partner of the Praeds … (r. 7/8)
  - (i) banquero
  - (ii) bancario

- He took extensive tours of industry to better understand **manufacturing** processes. (r. 44-45)
  - (i) fabricante
  - (ii) fabricación

6. Dé un equivalente en español la parte subrayada en los siguientes fragmentos:

a) […] he joined King Edward VI Grammar School in Totnes, South Devon, a thriving comprehensive school... (r. 17-18)

b) […] Babbage began to think about an improved calculating engines. (r. 75-76)

> Según el caso, la –**ing** cumplirá la función de sustantivo (gerundio) o de adjetivo (participio).

7. Observe el siguiente ejemplo:

...after **leaving** the academy [...] (r. 21-22)
***Preposición* + -ING**

> La–**ING** también puede aparecer **después de una preposición**. En español se usa la siguiente construcción: *preposición + verbo en infinitivo*.
>
> ...after **leaving** the academy
> ...**después de dejar** la universidad

8. Subraye otro ejemplo donde encuentre la construcción *preposición + ing* en el renglón 70 y dé su equivalente en español.

....

....

9. Observe los siguientes ejemplos para, luego, elegir la opción correcta.

(a) [...] Babbage wrote: "this great idleness may have led to some of

my childish **reasonings**." (r. 16)
sustantivo

razonando	razonamientos	razonar	razonó

(b) She began working on a book **describing** the analytical engine in more detail... (r. 101-102)

adjetivo

descripción	decribiendo	descripto	que describía

10. ¿Cuál es el equivalente en español correcto de las palabras subrayadas? ¿Cuál es la función de esa palabra en inglés?

Ejemplo en inglés	Equivalente en español
1) … his fragile health status forced him back to private **teaching** for a period... (19)	a) su estado de salud frágil le obligó a regresar a la enseñanza privada durante un período… b) su estado de salud frágil le obligó a regresar a enseñar en privado durante un período…
2) He passed through the Netherlands, Belgium, Germany, and Italy **visiting** universities and **manufacturing** facilities. (51)	a) Pasó a través de los Países Bajos, Bélgica, Alemania, Italia y visitó las universidades y las instalaciones de fabricación. b) Pasó a través de los Países Bajos, Bélgica, Alemania, Italia que visitan las universidades y las instalaciones de fabricación.
3) ... (demanded more money for) the difficulty of **travelling** across town to oversee construction. (64)	a)…la dificultad de viajando por la ciudad para supervisar la construcción. b)…la dificultad de viajar por la ciudad para supervisar la construcción.
4) ...the **drawings** and tools used to build the difference engine. (69)	a) …los dibujos y las herramientas utilizadas para construir el motor de diferencia. b) …dibujar y usar las herramientas para construir el motor de diferencia.
5) ... to obtain **funding** from the First Lord of the Treasury... (89-90)	a) …para obtener la fundación del Primer Lord del Tesoro,… b) …para obtener financiación del Primer Lord del Tesoro,…

11. Observe los siguientes ejemplos extraídos del texto. Luego, responda las preguntas:

*a) The difference engine project **had come** under fire during Babbage's absence.*

- ¿Qué acción ocurrió durante la ausencia de Babbage?

*b) Rumours **had spread** that Babbage **had wasted** the government's money...*

- ¿Cuáles eran los rumores acerca de Babbage?

¿Cuál es la diferencia entre esas acciones?

....

¿Cuál sería el equivalente en español de las acciones resaltadas?

....

En inglés este tiempo verbal se llama **Past Perfect** y se utiliza para relatar hechos anteriores a otras acciones pasadas.
Tengamos en cuenta que ***had*** aquí no significa "tener" sino "haber". Este tiempo verbal se forma, entonces con el auxiliar" *had" y un participio pasado (-ed o 3º columna de lista de verbos irregulares)*. En español, corresponde al Pretérito Pluscuamperfecto (había) o al Pretérito Anterior (hube) del Modo Indicativo.

12. Identifique qué acción ocurrió primero en el tiempo.

Babbage's problems with the treasury **coincided** with numerous disagreements with Clement. Babbage **had built** a two-story, 50 foot long workshop behind his house.

13. Observe los siguientes ejemplos extraídos del texto:

- *The Society approved the idea, and the government granted him £1500* ***to construct*** *it, in 1823. Charles Babbage converted one of the rooms in his home to a workshop and hired Joseph Clement* ***to oversee*** *construction of the engine.*

- *John Herschel and several other friends convinced Babbage* ***to take*** *a trip to Europe to recuperate...*

a) ¿Por cuál de las siguientes palabras o frases podría reemplazar a la palabra resaltada?

- consequently
- such as
- in order to
- and

b) Teniendo en cuenta la respuesta anterior, ¿qué función está cumpliendo la frase subrayada

- expresa un concepto nuevo?
- expresa un propósito?
- añade otro punto a considerar?

La construcción **TO + INFINITIVO** en los ejemplos anteriores se usa para indicar **propósito** y puede encontrarse al comienzo de la oración: ***To obtain*** *good results the treatment must be repeated daily.*

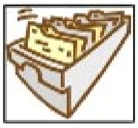
En español, se usa **PARA + infinitivo**

Existen otras expresiones/ estructuras que indican propósito, por ejemplo:
in order to +infinitivo;
so as to + infinitivo

c) Dé el equivalente en español de la parte resaltada.

- *The mature analytical engine used punched cards adapted from the Jacquard loom* ***to specify*** *input and the calculations to perform. (r. 81)*

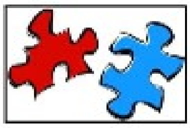
  ……………………………………………………………………………………………



14. VOCABULARIO. ¿Qué equivalente en español daría de las siguientes palabras? Utilice las siguientes estrategias:

- Inferencia por contexto
- Inferencia por la forma
- Si las herramientas anteriores no fueran suficientes, identifique la categoría gramatical de la palabra (sustantivo, adjetivo, verbo, adverbio) y busque el significado en el diccionario.

A	B
health status (r.18)	
joined (r. 17-19)	
managed (r. 20)	
available (r. 27)	
granted (r. 41)	
workshop (r. 42)	
tools (r. 44)	
designed (r. 44)	
research (r. 47)	
engine (r. 43-46)	
draw his pay (r. 65)	
retrieved (r. 83)	
general-purpose computer (r. 84)	
failures (r. 89)	
length (r. 97)	



A MODO DE CIERRE…

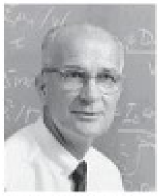
15. Vuelva a leer el texto para completar la línea de tiempo que sintetiza los eventos más destacados de la vida de Charles Babbage. Se han provisto fechas como guía.

- 1791 →
- 1829 →
- 1834 →
- Entre 1833 y 1842 →
- 1835 →
- Entre 1842 y 1843 →

RECUERDE EXTRAER LAS PALABRAS, FRASES Y TÉRMINOS QUE CONSIDERE IMPORTANTES DE ESTA GUÍA PARA, LUEGO, INCORPORARLOS EN SU GLOSARIO.

A continuación encontrará un texto extra que puede utilizar como práctica complementaria de lectura.

Why was William Shockley Important?



In 1947, American physicist and nobel prize winner, William Shockley co-invented the transistor, an influential little invention that changed the course of history for computers and electronics in a big way.

William Schockley Education

William Schockley received a B.Sc. degree from the California Institute of Technology in 1932. He received a Ph.D. degree from Massachusetts Institute of Technology in 1936. His doctoral thesis was on the energy band structure of sodium chloride entitled "Calculations of Wave Functions for Electrons in Sodium Chloride Crystals."

William Shockley Biography: February 13, 1910 – August 12, 1989

William Shockley was born in London, England, in 1910. He was the son of American parents, William Hillman Shockley a mining engineer, and Mary Shockley a former deputy mineral surveyor. In 1913, the family returned to the United States.

In 1936, William Shockley began working at Bell Telephone Laboratories, where he remained until 1955, becoming the Director of the Transistor Physics Department. John Bardeen, Walter Brattain and William Shockley co-invented the transistor in 1947 at Bell Labs.

In 1950, Shockley published a book "Electrons and Holes in Semiconductors".

The Silicon in Silicon Valley

After William Shockley left Bell, he founded and served as Director of the Shockley Transistor Corporation in Mountain View, California, doing R&D and managing the production of new transistors and other semiconductor devices. Shockley was a significant force behind the widespread commercialization of the transistor.

Early transistors were made with germanium because it was easier to prepare in pure form but it was a rare element. Silicon could operate at higher temperatures, and was more common and cheap. However, silicon processing was at that time difficult to do. William Shockley began the R&D at his laboratory to invent a silicon transistor, however, he abandoned the project. Several of his employees abandoned Shockley and formed their own company Fairchild Semiconductor Corporation where the silicon based transistor was invented.

The Colorful Side of William Shockley

William Shockley was not always an easy man to work with and was considered to be paranoid by some. At Shockley Laboratory, the boss once made all his employees take a polygraph test to settle a minor dispute. His behavior was probably one reason why so many of his employees quit.

In 1963, Shockley retired from business for an academic position (Emeritus Professor of Electrical Engineering) at Stanford University. At Stanford he formulated his theory of what he termed dysgenics. William Shockley advocated that individuals with IQs below 100 be paid to undergo voluntary sterilization, supported a Nobel sperm bank for geniuses, and suggested that certain racial groups might be smarter than others. Dysgenics as a science was never well received, however, William Shockley considered dysgenics his greatest achievement. In 1989, William Shockley died in San Francisco of prostate cancer.

Why was John Bardeen Important?

American physicist, electrical engineer, and nobel prize winner, John Bardeen was the co-inventor of the transistor (1947), an influential invention that changed the course of history for computers and electronics. John Barden co-developed a fundamental theory of conventional superconductivity known as the BCS theory.

John Bardeen Biography: May 23, 1908 – January 30, 1991

John Bardeen was born in Madison, Wisconsin in 1908. His parents were Doctor Charles Russell Bardeen, dean of the University of Wisconsin medical school, and artist Althea Harmer Bardeen.

In 1945, John Bardeen began working at Bell Labs, as a member of a Solid State Physics Group. John Bardeen, William Shockley, and Walter Brattain, were researching the behavior of crystals as semi-conductors in an attempt to replace vacuum tubes as mechanical relays in telecommunications. The team's research lead to the 1947 invention of the "point-contact" transistor amplifier, and receiving the 1956 Nobel Prize in Physics.

John Bardeen Education

John Bardeen received his B.S. (1928) and M.S. (1929) in electrical engineering from the University of Wisconsin-Madison. In 1936, he received his Ph.D. in mathematical physics from Princeton University. He received numerous honorary degrees during his lifetime.

In 1951 after leaving Bell Labs, John Bardeen became Professor of Electrical Engineering and of Physics at the University of Illinois at Urbana-Champaign.

In 1957, John Bardeen, Leon Cooper and John Robert Schrieffer, proposed the standard theory of superconductivity known as the BCS theory. Their model suggested that electrons in a superconductor condense into a quantum ground state and travel together collectively and coherently. In 1972, Bardeen, Cooper, and Schrieffer received the Nobel Prize in Physics for their theory of superconductivity. In 1991, John Bardeen died of cardiac arrest.

http://inventors.about.com/od/bstartinventors.htm

APÉNDICE GRAMATICAL

FUNCIONES DE LA FORMA -ING

INGLÉS	EQUIVALENTE EN ESPAÑOL
Verbo BE + -ing *He is <u>working</u> hard these days.*	ESTAR + -ando -endo -iendo
Sustantivo • Preposición + -ing *He left without <u>finishing</u> the project.*	• Preposición + infinitivo
• Posición inicial / Sujeto de la oración *<u>Reading</u> is a popular form of entertainment.*	• Infinitivo o sustantivo
• Derivación Base + -ing *Another <u>building</u> has been demolished.*	• Sustantivo

↳ **Adjetivo**

- Sustantivo + adjetivo (-ing)

The man <u>standing</u> at the door is my boss.

- Sustantivo + que + verbo conjugado

- Adjetivo (-ing) + sustantivo

A <u>tiring</u> job
An <u>interesting</u> paper

- Sustantivo + de / para + sustantivo
- Adjetivo

TIEMPO VERBAL: PAST PERFECT

El pretérito pluscuamperfecto (*Past Perfect*) nos dice que una acción (o estado) se completó antes de otra acción pasada (o estado).
Se forma con el pretérito simple del verbo auxiliar ***to have*** + el ***participio pasado*** del verbo principal.

Tabla de conjugación de un verbo regular

	Afirmativo		**Negativo**	**Interrogativo**
	Long form	**Short form**		
1° P.S.	I had waited	I'd waited	I hadn't waited	Had I waited?
2° P.S.	You had waited	You'd waited	You hadn't waited	Had I waited?
3° P.S.	He had waited / She had waited / It had waited	He'd waited / She'd waited / It'd waited	He hadn't waited / She hadn't waited / It hadn't waited	Had he waited? / Had she waited? / Had it waited?
1° P.P.	We had waited	We'd waited	We hadn't waited	Had we waited?
2° P.P.	You had waited	You'd waited	You hadn't waited	Had you waited?
3° P.P	They had waited	They'd waited	They hadn't waited	Had they waited?

Módulo de Idioma Inglés FAMAF GUÍA 9 Contenidos	**Propósito de Lectura: Identificar eventos relacionados con diferentes invenciones.** **Al finalizar la Guía, Ud. habrá puesto en práctica los siguientes contenidos léxico-gramaticales**: ¤ Funciones de la forma -ING ¤ Voz pasiva ¤ Modales ¤ Verbos con partículas

1. Lea el título del texto y sus correspondientes subtítulos, para responder estas preguntas:

- ¿Qué puede anticipar respecto al tema del texto que leerá en esta guía?
- ¿Qué conoce acerca de los transistores?
- ¿Con qué materia de su plan de estudios relaciona este caso?

2. Lea el texto rápidamente, sin detenerse en cada palabra, para responder lo siguiente: ¿cuál es el propósito del autor en este texto? Marque la opción correcta:

a) **brindar ejemplos para ilustrar conceptos**
b) **describir los primeros dispositivos electrónicos que aparecieron según el texto**
c) **incluir algunos ejercicios relacionados con el tema**

The Transistor in a Century of Electronics

A Three Terminal Device

Vacuum tubes were made containing several three terminal devices called triodes.

The transistor is a three terminal, solid state electronic device. In a three terminal device we can control electric current or voltage between two of the terminals by applying an electric current or voltage to the third terminal. This three terminal character of the transistor is what allows us to make an amplifier for electrical signals, like the one in our radio. With the three-terminal transistor we can also make an electric switch, which can be controlled by another electrical switch. By cascading these switches (switches that control switches that control switches, etc.) we can build up very complicated logic circuits.

These logic circuits can be built very compact on a silicon chip with 1,000,000 transistors per square centimeter. We can turn them on and off very rapidly by switching every 0.000000001 seconds. Such logic chips are at the heart of your personal computer and many other gadgets you use today.

Light Bulbs and Vacuum Tubes

The transistor was not the first three terminal device. The vacuum tube triode preceded the transistor by nearly 50 years. Vacuum tubes played an important role in the emergence of home electronics and in the scientific discoveries and technical innovations which are the foundation for our modern electronic technology.

Thomas Edison's light bulb was one of the first uses of vacuum tubes for electrical applications. Soon after the discovery of the light bulb, a third electrode was placed in the vacuum tube to investigate the effect that this electrode would have on "cathode rays," which were observed around the filament of the light bulb.

Joseph John Thomson developed a vacuum tube to carefully investigate the nature of cathode rays, which resulted in his discovery, published in 1897. He showed that the cathode rays were really made up of particles, or "corpuscles" as Thomson called them, that were contained in all material. Thomson had discovered the electron, for which he received the Nobel Prize in Physics 1906.

Lee De Forest and The Radio

At the same time as physicists were trying to understand what cathode rays were, engineers were trying to apply them to make electronic devices. In 1906, an American inventor and physicists, Lee De Forest, made the vacuum tube triode, or audion as he called it. The triode was a three terminal device that allowed him to make an amplifier for audio signals, making AM radio possible. Radio revolutionized the way in which information and entertainment reached the great majority of people.

The vacuum tube triode also helped push the development of computers forward a great deal. Electronic tubes were used in several different computer designs in the late 1940's and early 1950's. But the limits of these tubes were soon reached. As the electric circuits became more complicated, one needed more and more triodes. Engineers packed several triodes into one vacuum tube (that is why the tube has so many legs) to make the tube circuits more efficient.

Early Computers

The vacuum tubes tended to leak, and the metal that emitted electrons in the vacuum tubes burned out. The tubes also required so much power that big and complicated circuits were too large and took too much energy to run. In the late 1940's, big computers were built with over 10,000 vacuum tubes and occupied over 93 square meters of space.

The problems with vacuum tubes lead scientists and engineers to think of other ways to make three terminal devices. Instead of using electrons in vacuum, scientists began to consider how one might control electrons in solid materials, like metals and semiconductors.

Already in the 1920's, scientists understood how to make a two terminal device by making a point contact between a sharp metal tip and a piece of semiconductor crystal. These point-contact diodes were used to rectify signals (change oscillating signals to steady signals), and make simple AM radio receivers (crystal radios). However, it took many years before the three terminal solid state device - the transistor - was discovered.

The First Transistor

In 1947, John Bardeen and Walter Brattain, working at Bell Telephone Laboratories, were trying to understand the nature of the electrons at the interface between a metal and a semiconductor. They realized that by making two point contacts very close to one another, they could make a three terminal device - the first "point contact" transistor.

They quickly made a few of these transistors and connected them with some other components to make an audio amplifier. This audio amplifier was shown to chief executives at Bell Telephone Company, who were very impressed that it didn't need time to "warm up" (like the heaters in vacuum tube circuits). They immediately realized the power of this new technology.

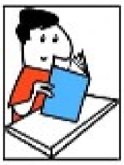
This invention was the spark that ignited a huge research effort in solid state electronics. Bardeen and Brattain received the Nobel Prize in Physics, 1956, together with William Shockley, "for their researches on semiconductors and their discovery of the transistor effect." Shockley had developed a so-called junction transistor, which was built on thin slices of different types of semiconductor material pressed together. The junction transistor was easier to understand theoretically, and could be manufactured more reliably.

The Integrated Circuit

In 1958 and 1959, Jack Kilby at Texas Instruments and Robert Noyce at Fairchild Camera, came up with a solution to the problem of large numbers of components, and the integrated circuit was developed. Instead of making transistors one-by-one, several transistors could be made at the same time, on the same piece of semiconductor. Not only transistors, but other electric components such as resistors, capacitors and diodes could be made by the same process with the same materials.

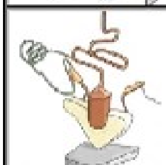
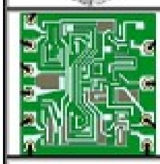
For more than 30 years, since the 1960's, the number of transistors per unit area has been doubling every 1.5 years. This fantastic progression of circuit fabrication is known as Moore's law, after Gordon Moore, one of the early integrated circuit pioneers and founders of Intel Corporation. The Nobel Prize in Physics 2000 was awarded to Jack Kilby for the invention of the integrated circuit.
From the dawn of the vacuum tube triode, to the discovery of the transistor and the development of the integrated circuit, the 20th century has certainly been the century of electronics.

http://www.nobelprize.org/educational/physics/transistor/history/



ACTIVIDADES DE COMPRENSIÓN

3. En la columna A encontrará imágenes que fueron extraídas del texto y que corresponden a cada uno de los subtítulos. En la columna B encontrará los epígrafes que acompañan a cada imagen. Junto con un compañero, marque la correspondencia entre columna A y columna B. Justifique sus elecciones. (Una de las opciones de la Columna B no corresponde al texto.)

A	B
	*Radio brought information rapidly to the masses and was the first widely used electronic device in the home.*
	*Integrated circuits placed all components in one chip, drastically reducing the size of the circuit and its components.*
	*The first point contact transistor made use of the semiconductor germanium. Paper clips and razor blades were used to make the device.*
	*Vacuum tubes were made containing several three terminal devices called triodes.*
	*Individual electronic components were soldered on to printed circuit boards.*
	The largest computers based on vacuum tubes had racks and racks of tubes filling large rooms.

4. Indique si los siguientes enunciados son verdaderos (V) o falsos (F), según la información ofrecida por el texto.

- **a) En caso de ser falsos (F), corríjalos (en español).**
- **b) En ambos casos, (V y F), indique renglones de referencia.**

Enunciados	V/F	Renglón/es
Los transistores amplifican las señales eléctricas.		
Thomson llamó corpúsculos a los transistores de los rayos catódicos.		
Los tubos de vacío fueron utilizados en algunas computadoras de los años 1940.		
Los ejecutivos de la Compañía *Bell Telephone* fabricaron el primer amplificador de audio.		
La ley de Moore de 1960 dice que el número de transistores por área se duplica cada 30 años.		

ACTIVIDADES SOBRE ELEMENTOS DEL LENGUAJE

5. Las siguientes oraciones han sido extraídas de *The Transistor in a Century of Electronics.* Use frases de ese texto para completarlas. Luego, dé un equivalente en español de las mismas, prestando especial atención a la construcción que usó para completarlas.

ORACIÓN	EQUIVALENTE EN ESPAÑOL DE LA FRASE
1. Vacuum tubes .... containing several three terminal devices called triodes. (r. 3)	
2. Soon after the discovery of the light bulb, a third electrode .... in the vacuum tube to investigate the effect that this electrode would have on "cathode rays," which .... around the filament of the light bulb. (r. 18, 19, 20)	
3. Shockley had developed a so-called junction transistor, which .... on thin slices of different types of semiconductor material pressed together. (r. 60-61)	

➔ **¿De qué construcción se trata? ¿Por qué se usó esa construcción y no otra?**

....

6. **Observe las oraciones extraídos del texto y responda las siguientes preguntas:**
   - **¿Qué diferencia encuentra entre ellas?**
   - **¿Qué función cumple la forma -ING en cada caso? (Elija una opción.)**
     - I. **Sustantivo**
     - II. **Adjetivo**
     - III. **Verbo (no conjugado)**

In a three terminal device we can control electric current or voltage between two of the terminals **by applying** an electric current or voltage to the third terminal. (r. 4,5,6)

By cascading these switches (switches that control switches that control switches, etc.) we can build up very complicated logic circuits. (r. 8,9)

At the same time as physicists **were trying** to understand what cathode rays were, engineers **were trying** to apply them to make electronic devices. (r. 26,27)

7. Observe la siguiente oración que se encuentra en el ejercicio anterior, ¿cuál sería el equivalente en español de la palabra resaltada?

...we can ***build up*** very complicated logic circuits. (r. 9) ______________________________

Verbos con partícula/s o verbos preposicionales/adverbiales

Existen verbos que tienen dos o tres partes y que a menudo tienen dos significados: uno figurado y otro literal. En inglés, se conocen como *phrasal verbs.*

¿Cómo se forman?

- Un verbo y una preposición (to agree with / estar de acuerdo)
- Un verbo y un adverbio (to back away / evitar)
- Un verbo seguido por un adverbio y una preposición (to do away with / deshacerse de)

Farrell, E. & Farrell, C. (1998). *Lado a lado. Gramática inglesa y española*. Illinois: Passport Books.

8. Ahora, lea las siguientes oraciones, para elegir la opción correcta.

a) *He showed that the cathode rays were really made up of particles,... (r. 22, 23)*

i) se hicieron ii) estaban compuestos de iii) se fabricaron

b) *We can turn them on and off very rapidly.... (r. 11)*

i) volverlos a encender ii) encendido y apagado iii) encenderlos y apagarlos

c) *The vacuum tubes tended to leak, and the metal that emitted electrons in the vacuum tubes burned out. (r. 37)*

i) son quemados ii) se incendian iii) se quemaba o extinguía

d) *This audio amplifier was shown to chief executives at Bell Telephone Company, who were very impressed that it didn't need time to "warm up" (like the heaters in vacuum tube circuits). (r. 55)*

i) animarse ii) calentarse iii) precalentarse

9. Observe el siguiente conjunto de oraciones extraídas del texto y subraye la frase verbal en cada caso. Luego, identifique la intención del escritor en cada ejemplo.

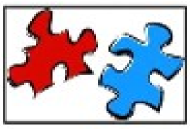
	Expresar posibilidad remota	*Expresar capacidad o habilidad*
… we can control electric current or voltage […] (r. 4-5)		
… one might control electrons in solid materials […] (r. 42-43)		
... they could make a three terminal device... (r. 52)		

ALGUNAS CARACTERÍSTICAS Y USOS DE ALGUNOS VERBOS MODALES

Los verbos auxiliares modales (tales como can, could, should, must, etc.) van seguidos del verbo lexical o principal en su forma infinitiva sin "to", a excepción de los verbos llamados "semimodales", tal es el caso de "ought to, has/have to, need , dare, be able to". La elección de un verbo auxiliar en particular permite expresar distintos significados y funciones, haciendo referencia al tiempo presente, al pasado o al futuro (según corresponda) tanto en la voz activa como en la pasiva, utilizando tanto el registro formal como el informal.

Según el ejercicio 9,

- MIGHT puede expresar: ....
- COULD puede expresar: ....
- CAN puede expresar: ....



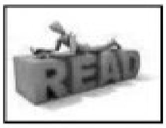
A MODO DE CIERRE…

10. Elabore un cuadro comparativo entre las invenciones presentadas en el texto de esta guía, teniendo en cuenta sus características distintivas.

Válvulas y tubos de vacío	La radio	El primer transistor	Circuito integrado
•	•	•	•
•	•	•	•
•	•	•	•
•	•	•	•

RECUERDE VOLCAR EN ESTA TABLA LAS PALABRAS, FRASES Y TÉRMINOS QUE CONSIDERE IMPORTANTES DE ESTA GUÍA PARA, LUEGO, INCORPORARLOS EN SU GLOSARIO.

Palabra / Término / Frase	Ejemplo	Equivalente en español
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		



A continuación encontrará un texto extra que puede utilizar como práctica complementaria de lectura.

The Eniac Computer
U.S. Army Photo

The History of the ENIAC Computer
John Mauchly and John Presper Eckert

"...With the advent of everyday use of elaborate calculations, speed has become paramount to such a high degree that there is no machine on the market today capable of satisfying the full demand of modern computational methods." - from the ENIAC patent (U.S.#3,120,606) filed on June 26, 1947.

The ENIAC I

In 1946, John Mauchly and John Presper Eckert developed the ENIAC I (Electrical Numerical Integrator And Calculator). The American military sponsored their research; the army needed a computer for calculating artillery-firing tables, the settings used for different weapons under varied conditions for target accuracy.

The Ballistics Research Laboratory, or BRL, the branch of the military responsible for calculating the tables, heard about John Mauchly's research at the University of Pennsylvania's Moore School of Electrical Engineering. John Mauchly had previously created several calculating machines, some with small electric motors inside. He had begun designing (1942) a better calculating machine based on the work of John Atanasoff that would use vacuum tubes to speed up calculations.

Partnership of John Mauchly & John Presper Eckert

On May 31, 1943, the military commission on the new computer began; John Mauchly was the chief consultant and John Presper Eckert was the chief engineer. Eckert was a graduate student studying at the Moore School when he met John Mauchly in 1943. It took the team about one year to design the ENIAC and 18 months and 500,000 tax dollars to build it. By that time, the war was over. The ENIAC was still put to work by the military doing calculations for the design of a hydrogen bomb, weather prediction, cosmic-ray studies, thermal ignition, random-number studies and wind-tunnel design.

What Was Inside The ENIAC?

The ENIAC contained 17,468 vacuum tubes, along with 70,000 resistors, 10,000 capacitors, 1,500 relays, 6,000 manual switches and 5 million soldered joints. It covered 1800 square feet (167 square meters) of floor space, weighed 30 tons, consumed 160 kilowatts of electrical power. There was even a rumor that when turned on the ENIAC caused the city of Philadelphia to experience brownouts, however, this was first reported incorrectly by the Philadelphia Bulletin in 1946 and since then has become an urban myth.

In one second, the ENIAC (one thousand times faster than any other calculating machine to date) could perform 5,000 additions, 357 multiplications or 38 divisions. The use of vacuum tubes instead of switches and relays created the increase in speed, but it was not a quick machine to re-program. Programming changes would take the technicians weeks, and the machine always required long hours of maintenance. As a side note, research on the ENIAC led to many improvements in the vacuum tube.

Contributions of Doctor John Von Neumann

In 1948, Doctor John Von Neumann made several modifications to the ENIAC. The ENIAC had performed arithmetic and transfer operations concurrently, which caused programming difficulties. Von Neumann suggested that switches control code selection so pluggable cable connections could remain fixed. He added a converter code to enable serial operation.

Eckert-Mauchly Computer Corporation

In 1946, J Presper Eckert and John Mauchly started the Eckert-Mauchly Computer Corporation. In 1949, their company launched the BINAC (BINary Automatic) computer that used magnetic tape to store data.

In 1950, the Remington Rand Corporation bought the Eckert-Mauchly Computer Corporation and changed the name to the Univac Division of Remington Rand. Their research resulted in the UNIVAC (UNIVersal Automatic Computer), an important forerunner of today's computers.

In 1955, Remington Rand merged with the Sperry Corporation and formed Sperry-Rand. Eckert remained with the company as an executive and continued with the company as it later merged with the Burroughs Corporation to become Unisys.

John Presper Eckert and John Mauchly both received the IEEE Computer Society Pioneer Award in 1980.

At 11:45 p.m., October 2, 1955, with the power finally shut off, the ENIAC retired.

http://inventors.about.com/od/estartinventions/a/Eniac.htm

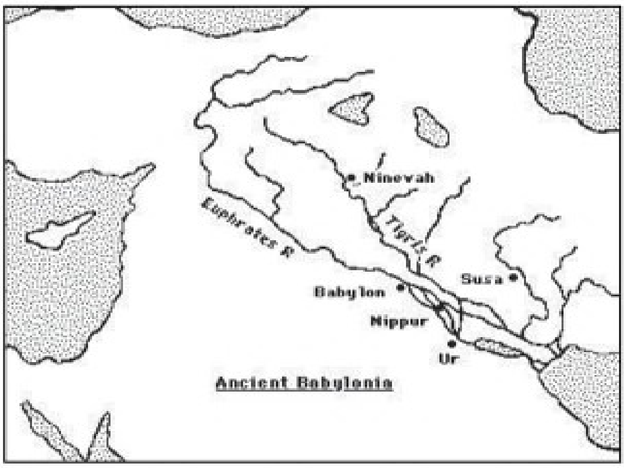
APÉNDICE GRAMATICAL
VERBOS MODALES en inglés y sus posibles significados

Verbo Modal	Ejemplo	Significado
Must $_1$	• They **must** evaluate the prototype.	Indica **obligación.**
Must not [mustn't]	• The name of the product **must not** contain a trade mark. • This company **must not** mention advantages of its product which it does not have.	Indica **prohibición.**
Must $_2$	• The owner **must** be dissatisfied. • He **must** have done that before moving to a new research project.	Puede indicar **deducciones** o **inferencias** casi certeras en relación al presente o al pasado.
Should $_2$	• They **should** be at the lab by now.	Puede indicar **deducciones** probables en relación al presente.
Can $_1$	• Designers **can** create products which are safer, cheaper and easy to assemble.	Indica una **capacidad** o **habilidad** aprendida.
Could $_1$	• When I was young, I **could** write very fast. • In the late 70s, they **could** only work at departments within companies.	Indica una **capacidad** en el pasado.
Can $_2$	• There **can** be new requirements for design processes.	Indica **posibilidad** en relación a un evento en el presente o futuro.

May	• This **may** be a bad idea. • Despite of the economic crisis, this company **may** continue working.	Indica una acción que puede pasar en el presente o en el futuro.
Could $_2$ / Might	• This project **could / might** be dangerous. • **Could** she be the owner?	Indica una **posibilidad** más remota en el presente o el futuro.
Can $_3$	• Who **can** answer the next question? • When **can** we get back the results?	En preguntas, se utiliza "can" para solicitar **permiso** de hacer algo.
Could $_3$	• **Could** you open your window? • **Could** we use your office today?	En las preguntas de sí o no, se emplea para **solicitar** algo de forma cortés.

Módulo de Idioma Inglés FAMAF GUÍA 10 Contenidos	**Propósito de Lectura: Revisar contenidos anteriormente presentados** **Al finalizar la Guía, Ud. habrá puesto en práctica los siguientes contenidos léxico-gramaticales:** ⌗ Conectores (de diferentes tipos) ⌗ Referentes ⌗ Frases sustantivas

1. Observe la imagen, para sugerir un tema sobre el que podría tratar el texto que leerá en esta guía.



Here is a map of the region where the civilisation flourished.

Tema:...

2. Ahora lea el texto sin detenerse en vocabulario desconocido, para corroborar sus predicciones.

An overview of Babylonian mathematics

The Babylonians lived in Mesopotamia, a fertile plain between the Tigris and Euphrates rivers. The region had been the centre of the Sumerian civilisation which flourished before 3500 BC. This was an advanced civilisation building cities and supporting the people with irrigation systems, a legal system, administration, and even a postal service. Writing developed and counting was based on a sexagesimal system, that is to say base 60. Around 2300 BC the Akkadians invaded the area and for some time the more backward culture of the Akkadians mixed with the more advanced culture of the Sumerians. The Akkadians invented the abacus as a tool for counting and they developed somewhat clumsy methods of arithmetic with addition, subtraction, multiplication and division all playing a part. The Sumerians, however, revolted against Akkadian rule and by 2100 BC they were back in control. The Babylonian civilisation, whose mathematics is the subject of this article, replaced that of the Sumerians from around 2000 BC. The Babylonians were a Semitic people who invaded Mesopotamia defeating the Sumerians and by about 1900 BC establishing their capital at Babylon.

The Sumerians had developed an abstract form of writing based on cuneiform (i.e. wedge-shaped) symbols. Their symbols were written on wet clay tablets which were baked in the hot sun and many thousands of these tablets have survived to this day. It was the use of a stylus on a clay medium that led to the use of cuneiform symbols since curved lines could not be drawn. The later Babylonians adopted the same style of cuneiform writing on clay tablets.

Many of the tablets concern topics which, although not containing deep mathematics, are fascinating. For example we mentioned above the irrigation systems of the early civilisations in Mesopotamia. These are discussed in where Muroi writes:-

It was an important task for the rulers of Mesopotamia to dig canals and to maintain them, because canals were not only necessary for irrigation but also useful for the transport of goods and armies. The rulers or high government officials must have ordered Babylonian mathematicians to calculate the number of workers and days necessary for the building of a canal, and to calculate the total expenses of wages of the workers.

There are several Old Babylonian mathematical texts in which various quantities concerning the digging of a canal are asked for. They are YBC 4666, 7164, and VAT 7528, all of which are written in Sumerian ..., and YBC 9874 and BM 85196, No. 15, which are written in Akkadian ... . From the mathematical point of view these problems are comparatively simple ...

The Babylonians had an advanced number system, in some ways more advanced than our present systems. It was a positional system with a base of 60 rather than the system with base 10 in widespread use today.

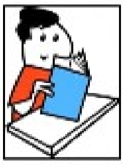
The Babylonians divided the day into 24 hours, each hour into 60 minutes, each minute into 60 seconds. This form of counting has survived for 4000 years. To write 5h 25' 30", i.e. 5 hours, 25 minutes, 30 seconds, is just to write the sexagesimal fraction, $5\ ^{25}/_{60}\ ^{30}/_{3600}$. We adopt the notation 5; 25, 30 for this sexagesimal number. As a base 10 fraction the sexagesimal number 5; 25, 30 is $5\ ^{4}/_{10}\ ^{2}/_{10}{}^{5}/_{1000}$ which is written as 5.425 in decimal notation.

Perhaps the most amazing aspect of the Babylonian's calculating skills was their construction of tables to aid calculation. Two tablets found at Senkerah on the Euphrates in 1854 date from 2000 BC. They give squares of the numbers up to 59 and cubes of the numbers up to 32. The table gives $8^2 = 1,4$ which stands for

$$8^2 = 1, 4 = 1 \times 60 + 4 = 64$$

and so on up to $59^2 = 58, 1$ $(= 58 \times 60 + 1 = 3481)$.

http://www-history.mcs.st-andrews.ac.uk/HistTopics/Babylonian_mathematics.html



ACTIVIDADES DE COMPRENSIÓN

3. Indique si los siguientes enunciados son verdaderos (V) o falsos (F), según la información ofrecida por el texto.
a) En ambos casos (V y F), indique renglones de referencia.
b) En caso de ser falsos (F), corríjalos (en forma completa y en español)

Enunciados	**V/F**	**Renglones**
a- La civilización sumeria desarrolló un sistema numérico decimal. *Corrección:*		
b- Los acadios inventaron métodos aritméticos sofisticados y eficientes. *Corrección:*		
c- Las tablas de escritura cuneiforme fueron desarrolladas por los sumerios. *Corrección:*		
d- Los gobernantes de la Mesopotamia ordenaron a sus matemáticos efectuar los cálculos referentes a la construcción de canales y a los gastos en los sueldos de los trabajadores. *Corrección:*		

2. Responda las siguientes preguntas en español y en forma completa. Indique, luego, los renglones de donde extrajo la información.

a- ¿Cómo era el sistema de numeración sexagesimal usado por los babilonios?

....
....
....
....

(Renglones: ________)

b- ¿Qué civilizaciones ocuparon el territorio de la Mesopotamia y cuáles fueron sus aportes a la matemática?

....
....
....
....

(Renglones: ________)

ACTIVIDADES SOBRE ELEMENTOS DEL LENGUAJE

3. Dé un equivalente en español de las siguientes frases.

a) a fertile plain between the Tigris and Euphrates rivers (r. 2)

b) a tool for counting (r.8)

c) clumsy methods of arithmetic with addition, subtraction, multiplication and division (r. 9)

d) the use of a stylus on a clay medium (r.16)

e) the Babylonian's calculating skills (r.39)

4. Complete los espacios en blanco en español y en forma completa:

a. La palabra **although** (r.19) establece una relación de ____________________ entre las ideas.

El autor de este texto lo utiliza para conectar las siguientes ideas:

Idea 1: ....
....
....

Idea 2: ....
....
....

b. La palabra **because** (r.22) establece una relación de ____________________ entre las ideas.

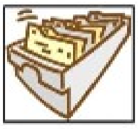
El autor de este texto lo utiliza para conectar las siguientes ideas:

Idea 1: ....
....
....

Idea 2: ....
....
....

5. ¿Cuál es el referente de las siguientes palabras?

	Referente (en español)
a- **whose** (r.11)	
b- **this article** (r.11)	
c- **who** (r.12)	
d- **their** (r.13)	



6. VOCABULARIO. Identifique a qué términos/frases del cuadro corresponden las siguientes definiciones. Luego, dé el equivalente en español del término/frase. (Hay más opciones de las necesarias.)

an insulator - a label – a glass chemistry beaker – a feature - a hard error - a local area network - a peripheral device - linking loader – Andromeda Galaxy - a coil – an overflow – a prompt - backing store

a) It is the closest major galaxy.
PALABRA DEFINIDA: ………………..…… EQUIVALENTE EN ESPAÑOL: …………………..

b) It is any kind of tag attached with adhesive to something so as to identify the object or its contents. Labels come in many forms and can be [...]
PALABRA DEFINIDA: ………………..…… EQUIVALENTE EN ESPAÑOL: …………………..

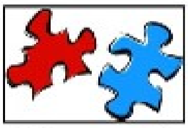
c) It is an error caused by some malfunction in the hardware.
PALABRA DEFINIDA: ………………..…… EQUIVALENTE EN ESPAÑOL: …………………..

d) It is a material that resists the flow of electric current
PALABRA DEFINIDA: ………………..…… EQUIVALENTE EN ESPAÑOL: …………………..

e) It is part of a hard disk that is used to store info [...]
PALABRA DEFINIDA: ………………..…… EQUIVALENTE EN ESPAÑOL: …………………..

f) It is attached to a computer. A display device (or graphics device), for visual or tactile presentation of images and/or text.
PALABRA DEFINIDA: ………………..…… EQUIVALENTE EN ESPAÑOL: …………………..

g) It is a network arrangement in which signals pass through nodes [...]
PALABRA DEFINIDA: ………………..…… EQUIVALENTE EN ESPAÑOL: …………………..



A MODO DE CIERRE…

7. Junto con un compañero, responda la siguiente pregunta con información extraída del texto.

¿Qué elementos desarrollados por las diferentes culturas presentadas en el texto se utilizan en la actualidad?

....

....

....

....

....

AUTOEVALUACIÓN II

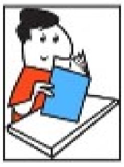
¿Cuáles de las siguientes estrategias y técnicas de lectura aplicadas hasta el momento le resultó más útil? Marque con una tilde ✓

ESTRATEGIA / TÉCNICA	¿CUÁN ÚTIL HA SIDO ESTA ESTRATEGIA?		
	MUY ÚTIL	ÚTIL	POCO ÚTIL
↳ Activar el conocimiento previo del tema			
↳ Inferir el significado por la forma			
↳ Scanning (Lectura Detallada)			
↳ Skimming (Lectura Global)			
↳ Usar el diccionario bilingüe			
↳ Utilizar el paratexto para deducir aspectos temáticos del texto			

Lea nuevamente los contenidos de las guías 6 a 10. Marque con una tilde✓los objetivos de la primera columna que alcanzó. Luego, califique el nivel que considera haber alcanzado en cada uno.

CONTENIDOS Y OBJETIVOS	NIVEL		
	MB	B	R
❑ Reconocer el tiempo pasado de los verbos en inglés y comprender sus funciones.			
❑ Reconocer el tiempo "past perfect" de los verbos en inglés y comprender sus funciones.			
❑ Reconocer la *voz pasiva* de los verbos en inglés y comprender su función.			
❑ Reconocer y comprender el significado de los *verbos con partículas.*			
❑ Identificar conectores que indican *contraste, propósito, causa-consecuencia, condición* y comprender las ideas que relacionan.			
❑ Reconocer vocabulario especializado y dar su equivalente en español.			

Módulo de Idioma Inglés **FAMAF** **GUÍA 11** **Contenidos**	**Propósitos de Lectura:** **Identificar eventos que ocurrieron en diferentes momentos del pasado y comprender su secuencia.** **Reconocer cómo están relacionadas las ideas del texto.** **Al finalizar la Guía, Ud. habrá puesto en práctica los siguientes contenidos léxico-gramaticales:** ⌑ Tiempo verbal *Present Perfect* ⌑ Conectores de diferentes tipos



ACTIVIDADES DE COMPRENSIÓN

1. **Responda las siguientes preguntas en forma oral, para anticipar el contenido del texto.**

   a. ¿Cuáles son las limitaciones de la Física Cuántica?
   b. ¿Qué es un superconductor?
   c. ¿Qué podría decir sobre las superposiciones cuánticas?
   d. ¿Qué diferencias hay entre un átomo, un electrón y una microonda?

2. **Lea el texto en forma global, para completar las siguientes actividades:**
   a. Indique en cuántos párrafos se divide el texto.
   b. Las ideas/conceptos de la tabla a continuación se desarrollan en algunos de los párrafos del texto. Indique en qué párrafos se encuentra cada una.

IDEAS/CONCEPTOS	PÁRRAFO Nº
1. Respuesta a varios interrogantes del experimento.	
2. Descripción física y del proceso del experimento de SUNY-Stony Brook.	
3. Concepción original de Erwin Schrodinger sobre su experimento.	
4. Propuesta de Erwin Schrodinger sobre un experimento en el cual un gato estaba vivo o muerto dentro de una caja.	
5. Física clásica vs. Física cuántica.	

Schrodinger's cat comes into view

Jul 5, 2000

In 1935 Erwin Schrodinger proposed a famous thought experiment in which a cat was somehow both alive and dead at the same time. Schrodinger was attempting to demonstrate the limitations of quantum mechanics: quantum particles such as atoms can be in two or more different quantum states at the same time but surely, he argued, a classical object made of a large number of atoms, such as a cat, could not be in two different states. Now Jonathan Friedman and co-workers at the State University of New York (SUNY) in Stony Brook have demonstrated a macroscopic Schrodinger cat state for the first time (Nature 406, 43). In their experiment a superconducting device is placed in a quantum superposition of two states: one that corresponds to a current flowing through the device in a clockwise direction, and another that corresponds to an anti-clockwise current.

In his original thought experiment, Schrodinger imagined that a cat is locked in a box, along with a radioactive atom that is connected to a vial containing a deadly poison. If the atom decays, it causes the vial to smash and the cat to be killed. When the box is closed we do not know if the atom has decayed or not, which means that it can be in both the decayed state and the non-decayed state at the same time.

Therefore, the cat is both dead and alive at the same time - which clearly does not happen in classical physics.

The SUNY-Stony Brook experiment uses superconducting quantum interference devices (SQUIDs). These are ring-shaped devices in which persistent currents, made of billions of pairs of electrons, can circulate in either a clockwise or an anti-clockwise direction without decaying. Their device is made from niobium, which is superconducting at the temperatures of 40 millikelvin used in the experiment, and aluminium oxide, which acts as a barrier. A palladium-gold shield protects the device from interactions with the environment that would otherwise wipe out the quantum superpositions being studied.

The system can be represented as a potential well with two minima, both of which contain several bound states, separated by a barrier. Friedman and co-workers start with a current of about 1 microamp flowing in, say, the clockwise direction. Next they illuminate the SQUID with microwaves which excite the system to a clockwise state with higher energy. The system can now tunnel from the clockwise state into the anti-clockwise state, and back.

The question is essentially whether the system remembers or forgets its quantum state as it tunnels. To answer this, the Stony Brook team measures the probability of finding the current flowing in the anti-clockwise direction as the shape of the double-well potential is changed. The results are exactly as predicted by assuming that the system is in a macroscopic superposition of states. The difference between the two states corresponds to a current of 2 to 3 microamps or a magnetic moment of 10 billion Bohr magnetons, which is "truly macroscopic" according to Friedman and co-workers.

http://physicsworld.com/cws/article/news/2815

3. Ahora lea el texto, para buscar cifras /números. Transcríbalos y, teniendo en cuenta las palabras transparentes, explique a qué hace referencia cada cifra/número.

Renglón	Cifras	¿A qué hacen referencia?

ACTIVIDADES SOBRE ELEMENTOS DEL LENGUAJE

4. Observe las siguientes oraciones. Señale la acción en cada una. Luego, responda las preguntas a continuación.

a. Schrodinger was attempting to demonstrate the limitations of quantum mechanics: quantum particles such as atoms can be in two or more different quantum states at the same time... (r. 4, 5, 6)

b. Now Jonathan Friedman and co-workers at the State University of New York (SUNY) in Stony Brook have demonstrated a macroscopic Schrodinger cat state for the first time... (r. 7, 8, 9)

- **¿En qué tiempo verbal se encuentran las acciones señaladas? (Elija una opción.)**

  a. presente
  b. pasado
  c. futuro

- ¿Corresponden ambos ejemplos al mismo tiempo verbal o a un tiempo verbal distinto?

  ....

- Teniendo en cuenta la acción resaltada en la segunda oración (b), ¿cuál de las siguientes afirmaciones es la correcta?

  - ☐ Los verbos se encuentran en tiempo presente.
  - ☐ Los verbos denotan una acción que ocurrió en un momento determinado del pasado.
  - ☐ Los verbos denotan una acción que comenzó o sucedió en el pasado y sus consecuencias pueden advertirse en el presente o esta acción continúa en el presente.

- ¿Qué equivalente en español daría de las acciones señaladas en ambas oraciones?

  ....
  ....
  ....

Tiempo Verbal *Present Perfect*

Este tiempo verbal se utiliza en inglés para indicar:

- que una acción comenzó en el pasado y que aún continúa.
- que una acción comenzó en el pasado y que sus consecuencias pueden advertirse en el presente.
- que una acción acaba de finalizar.

Se lo reconoce por las siguientes estructuras:

Voz activa:	verbo auxiliar have/has + participio pasado del verbo principal
Voz pasiva:	verbo auxiliar have/has + been + participio pasado del verbo principal

El equivalente en español del verbo auxiliar *have* es el verbo auxiliar *haber*.

Recuerde que el participio pasado puede tener la terminación -ed en el caso de los verbos regulares. De lo contrario, si es un verbo irregular, el participio pasado no presentará dicha terminación y podrá encontrarlo en la tercera columna de la tabla de verbos irregulares. En español el participio pasado se lo asocia comúnmente con las terminaciones **-ado/-ido.**

5. Lea el segundo párrafo del texto, para identificar una acción en *Present Perfect*. Señálela con un color.

6. Conectores. Complete las actividades propuestas a continuación:

a) Observe la siguiente oración:

In their experiment a superconducting device is placed in a quantum superposition of two states: one that corresponds to a current flowing through the device in a clockwise direction, and another that corresponds to an anti-clockwise current. (r. 9,10,11)

b) ¿Qué palabra relaciona las dos últimas cláusulas?

c) ¿Por cuál de las siguientes palabras o frases podría reemplazar a la palabra resaltada?

- In addition
- Consequently
- Such as

d) Teniendo en cuenta la respuesta anterior, ¿qué función cumple la frase subrayada? (Elija una opción.)

- expresa un concepto nuevo
- agrega un ejemplo a modo de ilustración
- añade otro punto a considerar

e) Dé un equivalente en español de la segunda idea:

Idea 2...

f) En la siguiente oración hay un conector que indica CONDICIÓN. Identifíquelo.

If the atom decays, it causes the vial to smash and the cat to be killed. (r. 14, 15)

g) Ahora, complete el siguiente cuadro:

Condición:
Resultado:

h) ¿Qué función cumplen las palabras subrayadas en la siguiente oración? (Elija una opción.)

These are ring-shaped devices in which persistent currents, made of billions of pairs of electrons, can circulate in ***either*** *a clockwise* ***or*** *an anti-clockwise direction without decaying. (r. 21,22)*

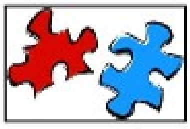
a. expresan nuevamente el concepto anterior en otras palabras
b. dan alternativas
c. contrastan las ideas relacionadas

i. ¿Cuáles son las alternativas que ofrece el autor?

....

....

....



A modo de cierre…

8. Teniendo en cuenta las explicaciones sobre frase sustantiva presentadas en la Guía 5, y a modo de repaso de vocabulario técnico de esta guía, elija el equivalente en español más adecuado para cada sección resaltada.

1. […] **a quantum state** […] (r. 5/6)

a. la cuántica de estado	b. estado cuántico	c. estado de cantera

2. […] **a current flowing through a device** […] (r. 10/11)

a. un invento que fluye a través de la corriente	b. un flujo de corriente en un dispositivo	c. una corriente que fluye a través de un dispositivo

3. […] **a clockwise direction** […] (r. 11)

a. dirección horaria	b. dirección inteligente	c. hora mundial

4. […] **an anti-clockwisee current** […] (r. 11/12)

a. corriente alterna	b. corriente negativa	c. corriente anti-horaria

5. [...] **a vial containing a deadly poison** [...] (r.14)

a. un frasco venenoso que contiene algo mortal	b. un frasco que contiene un veneno mortal	c. un veneno contenido en un frasco

6. [...] **ring-shaped devices** [...] (r.21)

a. dispositivos con forma de anillo	b. un anillo con un dispositivo	c. dispositivos con anillos incluidos

7. [...] **a palladium-gold shield** [...] (r. 24)

a. un escudo de oro pálido	b. un escudo amarillo pálido	c. un escudo de paladio y oro

8. [...] **a potential well** [...] (r. 27)

a. un bien potencial	b. un pozo potencial	c. un pozo de potencial

9. [...] the device from interactions with **the environment** that [...] (r. 25)

a. mitad	b. medio ambiente	c. medio de almacenamiento

10. [...] **several bound states** [...] (r. 27/28)

a. varios estado ligados	b. severos estrados ligados	c. varias uniones de estado

11. [...] **the shape of the double-well potential** [...] (r. 34)

a. un potencial con forma de pozo	b. la forma de un potencial bien doble	c. la forma de un pozo de potencial doble

RECUERDE VOLCAR EN ESTA TABLA LAS PALABRAS, FRASES Y TÉRMINOS QUE CONSIDERE IMPORTANTES DE ESTA GUÍA PARA, LUEGO, INCORPORARLOS EN SU GLOSARIO.

Palabra / Término / Frase	Ejemplo	Equivalente en español
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

A continuación encontrará un texto extra que puede utilizar como práctica complementaria de lectura.

Adam Riess, an astronomer at the Space Telescope Science Institute (STScI) and Krieger-Eisenhower Professor in Physics and Astronomy at The Johns Hopkins University in Baltimore.

Observations made by NASA's Hubble Space Telescope of a special type of supernovae contributed to research on the expansion of the universe that today was honored with the 2011 Nobel Prize in Physics.

Adam Riess, an astronomer at the Space Telescope Science Institute and Krieger-Eisenhower professor in physics and astronomy at The Johns Hopkins University in Baltimore, was a member of a team awarded the Nobel Prize in Physics by the Royal Swedish Academy of Sciences. The academy recognized him for leadership in the High-z Team's 1998 discovery that the expansion rate of the universe is accelerating, a phenomenon widely attributed to a mysterious, unexplained "dark energy" filling the universe. Critical parts of the work were done with NASA's Hubble Space Telescope.

Riess shares the prize with Saul Perlmutter, an astrophysicist at the University of California, Berkeley, and the Lawrence Berkeley National Laboratory, whose Supernova Cosmology Project team published similar results shortly after those published by Riess and High-z teammate Brian Schmidt of the Australian National University. Both teams shared the Peter Gruber Foundation's 2007 Cosmology Prize -- a gold medal and $500,000 – for the discovery of dark energy, which Science Magazine called "The Breakthrough Discovery of the Year" in 1998.

"The work of Riess and others has completely transformed our understanding of the universe," said Waleed Abdalati, NASA chief scientist. "This award also recognizes the tremendous contributions of the technological community that engineered, deployed, and serviced the Hubble Space Telescope, which continues to open new doors to discovery after more than 20 years of peering deep into the universe. With the future launch of the even more powerful James Webb Space Telescope, NASA is ensuring more revolutionary science discoveries like these."

Space Telescope Science Institute director Matt Mountain added, "The power of this discovery is that NASA has kept Hubble going for 20 years. This meant that Adam was able to track the history of the universe using science instruments that were upgraded from one servicing mission to the next. That is why this work has been recognized with the Nobel Prize."

Riess led the study for the High-z Supernova Search Team of highly difficult and precise measurements of objects that spanned 7 billion light years that resulted in the 1998 discovery that many believe has changed astrophysics forever: an accelerated expansion of the universe propelled by dark energy.

"We originally set out to use a special kind of exploding star called 'supernovae' to measure how fast the universe was expanding in the past and to compare it to how fast it is expanding now," Riess recalled. "We anticipated finding that gravity had slowed the rate of expansion over time. But that's not what we found." Instead, Riess' team was startled to discern that the rate of expansion was actually speeding up.

Richard Griffiths, Hubble program scientist in the Astrophysics Division at NASA Headquarters, Washington, said, "The role of the Hubble Space Telescope in this work was to measure how the brightness of some of the most distant supernovae changed over time. This established the acceleration of the universe and by inference that the agent of acceleration is 'dark energy.'"

The importance of Hubble was to obtain images of the high-redshift supernovae of type Ia, exploding white dwarfs that have accreted gas from their companion stars in a binary system and reached a mass limit beyond which they can no longer support themselves against gravity. Since the brightness of these supernovae change with time in a way that correlates with their intrinsic peak brightness, observations of their light can point to how bright, and therefore how distant, their host galaxies are.

The precision of Hubble measurements of the high redshift supernovae, which had been discovered from the ground, was crucial in the demonstration that distant supernovae were fainter than expected, and that the initial deceleration of the universe has astoundingly transformed into an accelerating expansion due to the effects of dark energy.

Although Hubble played a critical role in the discovery of dark energy, nearly every major observatory on Earth also contributed to the study of this mysterious energy. Ground-based telescopes run by the National Optical Astronomy Observatories, especially the 4-meter Blanco telescope at the Cerro Tololo International Observatory in Chile, and at the Kitt Peak National Observatory in Arizona, as well as European telescopes on the Canary Islands, are credited with discovering of the majority of the supernovae ultimately used to track the expansion rate of the universe. The astronomers also used the W. M. Keck Observatory in Hawaii, the MMT Observatory in Arizona, and European Southern Observatory's 3.6-meter telescope in Chile to measure the spectra of the discovered supernovae and the distances of their host galaxies.

"One of the most exciting things about dark energy is that it seems to live at the very nexus of two of our most successful theories of physics: quantum mechanics, which explains the physics of the small, and Einstein's Theory of General Relativity, which explains the physics of the large, including gravity," Riess said.

"Currently, physicists have to choose between those two theories when they calculate something. Dark energy is giving us a peek into how to make those two theories operate together. Nature somehow must know how to bring these both together, and it is giving us some important clues. It's up to us to figure out what [those clues] are saying."

Riess is continuing his Hubble Space Telescope observations of distant supernovae to characterize

dark energy. He also is involved in searching for the exploding stars with the Panoramic Survey Telescope and Rapid Response System, a series of ground-based telescopes at the University of Hawaii's Institute for Astronomy. The sky survey is expected to find thousands of new supernovae.
The Hubble Space Telescope is a project of international cooperation between NASA and the European Space Agency. NASA's Goddard Space Flight Center manages the telescope. The Space Telescope Science Institute conducts Hubble science operations and is operated for NASA by the Association of Universities for Research in Astronomy, Inc.

http://www.nasa.gov/mission_pages/hubble/news/hubble-nobel.html

APÉNDICE GRAMATICAL
TIEMPO VERBAL *PRESENT PERFECT*

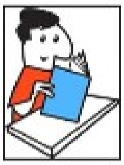
Tabla de conjugación de un verbo regular

	AFIRMATIVO	NEGATIVO	INTERROGATIVO
1° P.S.	I have investigated …	I have not investigated…	Have I investigated ...?
2° P.S.	You have investigated …	You have not investigated …	Have you investigated ...?
3° P.S.	He / She has investigated…	He / She has not investigated…	Has he / she investigated...?
1° P.P.	We have investigated …	We have not investigated …	Have we investigated ...?
2° P.P.	You have investigated…	You have not investigated …	Have you investigated ...?
3° P.P	They have investigated …	They have not investigated…	Have they investigated ...?

Tabla de conjugación de un verbo irregular

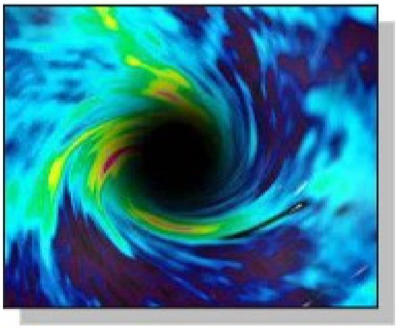
	AFIRMATIVO	NEGATIVO	INTERROGATIVO
1° P.S.	I have grown …	I have not grown…	Have I grown ...?
2° P.S.	You have grown …	You have not grown …	Have you grown ...?
3° P.S.	He / She / It has grown…	He / She / It has not grown …	Has she / she / it grown...?
1° P.P.	We have grown …	We have not grown …	Have we grown ...?
2° P.P.	You have grown …	You have not grown …	Have you grown ...?
3° P.P	They have grown …	They have not grown…	Have they grown ...?

Módulo de Idioma Inglés FAMAF Guía 12 Contenidos	**Propósitos de Lectura:** **Identificar perspectivas que se fueron concatenando en el tiempo con respecto al tema central de la guía.** **Al finalizar la Guía, Ud. habrá puesto en práctica los siguientes contenidos léxico-gramaticales:** ⌑ Grado comparativo y grado superlativo de los adjetivos. ⌑ El condicional



ACTIVIDADES DE COMPRENSIÓN

1. **Observe la siguiente imagen, para sugerir un tema para el texto que leerá a continuación.**



Tema:...

2. **Lea ahora el título del texto, para confirmar si sus predicciones estaban acertadas.**

3. **Teniendo en cuenta sus conocimientos previos sobre este tema, seleccione los enunciados que se relacionen con el mismo.**

- ☐ Their intense gravitational field prevents any light or other electromagnetic radiation from escaping.
- ☐ They are responsible for the manufacture and distribution of heavy elements such as carbon, nitrogen, and oxygen, and their characteristics are intimately tied to the characteristics of the planetary systems that may coalesce about them.
- ☐ Scientists think supermassive ones were made at the same time as the galaxy they are in.
- ☐ Scientists think the smallest ones formed when the universe began.
- ☐ They are born within the clouds of dust and scattered throughout most galaxies.
- ☐ Stellar ones are made when the center of a very big star falls in upon itself, or collapses. When this happens, it causes a supernova.
- ☐ This is a region where matter collapses to infinite density, and where, as a result, the curvature of spacetime is extreme.

Black holes

What is a black hole? Roughly speaking, it is a region of spacetime that has resulted from the inward gravitational collapse of material, where the gravitational attraction has become so strong that even light cannot escape. To get an intuitive picture of why such a situation might come about, think of a Newtonian notion of *escape velocity*. If a stone is hurled upwards from the ground at a certain speed *v*, then it will fall back to the ground after it has reached a certain height, this height being that for which the kinetic energy of the stone has been entirely used up in overcoming the gravitational potencial energy from ground level. The height from the ground is entirely dependent upon the speed of projection, ignoring the effect of air resistance. However, for a speed exceeding $(2GM / R)1/1$, reffered to as the *escape velocity*, the stone would escape completely from the Earth's gravitational field. (Here *M* and *R* are the Earth's mass and radius, respectively, *G* being Newton's gravitational constant.) Now suppose that, in place of the Earth, we have a much more massive and concentrated body.Then the escape velocity will be larger (since *M/R* goes up if *M* increases and if *R* decreases), and we could imagine that the mass and concentration might be so huge that the escape velocity at the surface even exceeds the speed of light.

We can believe that when this happens, in Newtonian theory, the body would appear to be completely dark when viewed from large distances, because no light from it could escape – and this indeed was the conclusion that the notable English astronomer and clergyman John Mitchell came to in 1784. Later in 1799, the great French mathematical physicist Pierre Simon Laplace came to the same conclusion. However, the situation does not seem to me to be that clear, because the speed of light has no absolute status in Newtonian theory, and one can argue a good case that for such a body, the speed of light at its surface, ought to be considerable greater than that measured in free space, and that light could escape to infinity, no matter how massive and concentrated that body might be. Thus Mitchell's "dark star", though prescient precursor of the black-hole concept, does not, to my mind provide a persuasive case for "invisible" gravitating objects in Newtonian theory.

This issue is much more pertinent in the context of relativity theory, since there the speed of light is fundamental and indeed represents the limiting speed for all signalling. Since we are concerned with a gravitational phenomenon, however, we require a *general*-relativistic spacetime, rather than just Minkowski space. In general relativity the expectations are indeed that situations will occur in which the escape velocity exceeds the speed of light, resulting in what we now call a *black hole.*

A black hole is to be expected when a large massive body reaches a stage where internal pressure forces are insufficient to hold the body apart against the relentless inward pull of its own gravitational influence. Indeed, such gravitational collapse is to be expected when a large star of a total mass several times that of the Sun – let us say 10*M* 0 (where 1*M* 0 is a solar mass, the Sun`s mass) – uses up all its available internal sources of energy, so that it cools and cannot keep up sufficient pressure to avoid collapse. When this happens, the collapse may become unstoppable, as the gravitational effects mount relentlessly.

Extraído de: Penrose, R. (2007). *The road to reality.* N.Y.: Vintage Books.

4. **Lea el texto en forma detallada, en un tiempo no mayor a diez minutos, para marcar correspondencia entre las ideas de la columna A y las ideas de la columna B.**

Columna A	Columna B
Isaac Newton	Teoría de la estrella oscura
Pierre Simon Laplace	La velocidad de escape es la velocidad mínima con la que debe lanzarse un cuerpo para que escape de la atracción gravitatoria de la Tierra o de cualquier otro astro.
John Mitchell	En relatividad especial es más conveniente hablar de espacio-tiempo, más que de ambos por separado. Para ello se usa el siguiente elemento de línea $ds^2 = c^2\, dt^2 - [dx^2 + dy^2 + dz^2]$ que puede en cierta manera entenderse como un espacio-tiempo euclídeo donde la cuarta coordenada es el número imaginario *i c t*, donde *c* representa la velocidad de la luz.
Hermann Minkowski	Pensó que el colapso gravitatorio de una nebulosa podría haber dado origen a la formación del Sol y que el material orbitando en torno al Sol podría condensarse para formar una familia de planetas.

ACTIVIDADES SOBRE ELEMENTOS DEL LENGUAJE

5. **Observe las siguientes frases y oraciones. Concéntrese en las palabras y frases en negrita, para responder las preguntas a y b.**

- Now suppose that, in place of the Earth, we have a **much more massive and concentrated** body. (r.13-14)
- Then the escape velocity will be **larger** (since *M/R* goes up if *M* increases and if *R* decreases),...(r. 14/15)
- ... one can argue a good case that for such a body, the speed of light at its surface, ought to be considerable **greater than** that measured in free space,... (r. 23-24)
- This issue is **much more pertinent** in the context of relativity theory, ...(r. 28)

a. ¿A qué categoría gramatical pertenecen las palabras subrayadas: adjetivo – sustantivo – verbo?

b. ¿En qué grado se encuentran esas palabras: de igualdad – de superioridad – de inferioridad?

6. Lea las siguientes explicaciones, para resolver las actividades a continuación:

La comparación de adjetivos en inglés

Los tres grados posibles de comparación son los siguientes:
el positivo - el comparativo - el superlativo

1. Las comparaciones regulares añaden **"-er" y "-est"** a los adjetivos comunes que por lo general son **"cortos"**. A veces estas terminaciones implican también algunos cambios ortográficos la "y" se transforma en "i" antes de "-er" o "-est".

new *newer* *newest*
pretty *prettier* *prettiest*

2. Los adjetivos que se consideran más **"largos"** comparan al usar **more** y **most** para indicar un grado mayor, **(just) as** para indicar igualdad y **less / the least** para indicar un grado inferior.

(grado mayor) *modern* *more modern* *most modern*

(igualdad) *just as formal as* ("tan formal como" – just pone énfasis en la igualdad)

(grado menor) *determined* *less determined* *the least determined*

3. Algunos adjetivos tienen comparaciones irregulares
good *better* *best*
bad *worse* *worst*

4. Las siguientes palabras presentan el segundo elemento de una comparación:

He is taller than I am. / The movie is less interesting than the book. (comparativo)
Él es más alto que yo. / La película es menos interesante que el libro.

He s the tallest boy in the class. / He s the tallest of all my students. (superlativo)
Él es el más alto de la clase. / Él es el más alto de todos mis alumnos.

Extraído y adaptado de Farrell, E. & Farrell, C. (1998). *Lado a lado. Gramática inglesa y española.* Illinois: Passport Books.

a- ¿Qué comparación se establece en esta oración?

- ... one can argue a good case that for such a body, the speed of light at its surface, ought to be considerable **greater than** that measured in free space,... (r. 23-24)

b- ¿Qué información se proporciona sobre la velocidad de escape?

- Then the escape velocity will be **larger** (since *M/R* goes up if *M* increases and if *R* decreases),...(r. 14)

7. Lea el siguiente ejemplo. ¿A qué evento hace referencia el fragmento subrayado? ¿Cuándo tendrá lugar el evento descrito: presente, pasado o futuro?

- In general relativity the expectations are indeed that <u>situations will occur in which the escape velocity exceeds the speed of light, resulting in what we now call a *black hole*</u>. (r. 31-33)

8. Analice las siguientes ideas extraídas del texto, para seleccionar la opción correcta. Luego, subraye en el texto la correspondiente expresión en inglés.

- La piedra ***escapó/escapará /escaparía*** del campo gravitacional de la Tierra [...] (r.11)
- El cuerpo ***pareció/parecería/puede parecer*** ser completamente oscuro cuando se vitalizaba desde grandes distancias [...] (r.17-18)
- La luz ***podría/debería/puede*** escapar al infinito, sin importar cuán masiva y concentrad ***podría/debería/pudo*** ser. (r.25)

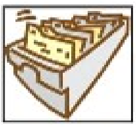
¿Qué diferencias encuentra entre estas oraciones?

Una de las formas de indicar el **potencial o condicional** en inglés es empleando el auxiliar ***would*** seguido del *verbo en infinitivo*. En español, el potencial se forma a partir de infinitivo, al igual que el futuro simple. Las terminaciones son iguales para verbos que terminan en –ar, -er, -ir: caminaría, comería, viviría.

9. Reconozca en el texto la palabra o idea al que remiten los siguientes elementos referenciales. Luego, únalos con una flecha.

Palabra o idea a la cual se hace referencia	
a.	una gran estrella
b.	el cuerpo
c.	agujero negro
d.	piedra
e.	la velocidad de escape excede la velocidad de la luz
f.	el lector

Elemento referencial	
i.	it (r.2)
ii.	it (r.6)
iii.	this (r.19)
iv.	its (r.24)
v.	one (r.23)
vi.	its (r.38)



10. En las siguientes oraciones/fragmentos extraídos del texto encontrará palabras/frases resaltadas. Trabaje con esas palabras de la siguiente manera:

a. intente inferir su significado de acuerdo al contexto.

b. determine su función gramatical.

c. búsquelas en el diccionario y determine su significado según el contexto. Compare esta respuesta con la que usted dio según su inferencia.

Luego, comente con un compañero o en grupo lo siguiente:

- ¿Qué dificultades encontró en este proceso?
- ¿Pudo resolver esas dificultades? Si pudo, ¿cómo lo logró?

i. If a stone is **hurled** upwards from the ground at a certain speed *v*, then it will fall back to the ground after it has reached a certain **height**, this height being that for which the kinetic energy of the stone has been entirely used up in **overcoming** the gravitational potencial energy from **ground level.** (r. 5 - 8)

Palabra/Frase	Inferencia	Función gramatical	Significado
hurled			
height			
overcoming			
ground level			

ii. **...** the escape velocity at the surface even exceeds the **speed of light**. (r. 16)

Palabra/Frase	Inferencia	Función gramatical	Significado
speed of light			

iii. ...the speed of light ...ought to be... **measured** in **free space**, ... (r. 23-24)

Palabra/Frase	Inferencia	Función gramatical	Significado
measured			
free space			

iv. **...**we require a ***general*-relativistic spacetime**,...(r.30-31)

Palabra/Frase	Inferencia	Función gramatical	Significado
general-relativistic spacetime			

v. A black hole is to be expected when a large massive body **reaches** a **stage** where **internal pressure forces** are insufficient to **hold** the body apart against the **relentless inward pull** of its own gravitational influence. (r. 34-36)

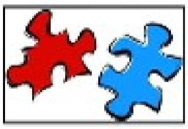
Palabra/Frase	Inferencia	Función gramatical	Significado
reaches			
stage			
internal pressure forces			
hold			
relentless inward pull			

vi. ...the Sun... uses up all its available **internal sources of energy**, ... (r. 38)

Palabra/Frase	Inferencia	Función gramatical	Significado

vii. ...the collapse may become **unstoppable**, as the gravitational effects **mount relentlessly**. (r. 39-40)

Palabra/Frase	Inferencia	Función gramatical	Significado
unstoppable			
mount relentlessly			



A modo de cierre...

11. Responda las siguientes preguntas en español, de manera completa. Indique, luego, los renglones de donde extrajo la información.

a) ¿Qué entiende por agujero negro?

....

....

....

....Renglones: ____________

b) ¿Cuál es la suposición que presenta el autor?

....

....

....

....Renglones: ____________

c) ¿En qué circunstancias se espera un colapso gravitacional según el texto?

....

....

....

....Renglones: ____________

RECUERDE VOLCAR EN ESTA TABLA LAS PALABRAS, FRASES O TÉRMINOS QUE CONSIDERE IMPORTANTES DE ESTA GUÍA PARA LUEGO ELABORAR SU GLOSARIO.

Palabra / Término / Frase	Ejemplo	Equivalente en español
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

A continuación encontrará un texto extra que puede utilizar como práctica complementaria de lectura.

2.1 Software Process

In an organization whose major business is software development, there are typically many processes simultaneously executing. Many of these do not concern software engineering, though they do impact software development. These could be considered nonsoftware- engineering process models [RV95]. Business process models, social process models, and training models, are all examples of processes that come under this. These processes also affect the software development activity but are beyond the purview of software engineering.

The process that deals with the technical and management issues of software development is called a *software process.* Clearly, many different types of activities need to be performed to develop software. As we have seen earlier, a software development project must have at least development activities and project managment activities. All these activities together comprise the *software process.* As different type of activities are being performed, which are frequently done by different people, it is better to view the software process as consisting of many component processes, each consisting of a certain type of activity. Each of these component processes typically has a different objective, though these processes obviously cooperate with each other to satisfy the overall software engineering objective.

In this section we will define the major component processes of a software process and what their objectives are. Before we do that, let us first clearly understand the three important entities that repeatedly occur in software engineering—software processes, software projects, and software products – and their relationship.

2.1.1 Processes, projects and products

A software process, as mentioned earlier, specifies a method of developing software. A software project, on the other hand, is a development project in which a software process is used. And software products are the outcomes of a software projects. Each software development projects starts with some needs and (hopefully) ends with some software that satisfies those needs. A software process specifies the abstract set of activities that should be performed to go from user needs to final product. The actual act of executing the activities for some specific user needs is a software project. And all the outputs that are produced while the activities are being executed are the products (one of which is the final software). One can view the software process as an abstract type, and each projects is done using that process as an instance of this type. In other words,there can be many projects por a process (i.e., many projects can be done using a process), and there can be many products produced in a project. This relationship is shown in figure 2.1.

A pertinent question that comes up is if the sequence of activities is provided by the process, what is the difficulty in following it in a project? First the sequence of activities specified by the process is typically at an abstract level because they have to be usable for a wide range of projects. Hence, "implementing" them in a projects is not straightforward. To clarify this, let us take the example of travelling. A process for travelling to a destination will be something like this: Set objectives for the travel (tourism, business, metting friends, etc.), determine the optimal means of travelling (this depend on the objective), if driving is best determine what type of vehicle is most desire (car, truck, or camper), get a detailed map to reach de destination, plan details of the trip, get sufficient money, rent the car, etc. If flying to the destination is best, then book flights, reserve a car at the destination if needed, etc. In a sense, the process provides a "checklist" with an ordering constraint (e.g., renting a car as a first step is suboptimal). If one has to go from New York to Orlando (a specific project), then even with this process, a considerable effort is required to reach Orlando. And this effort is not all passive; one has to be alert and active to achieve this goal (e.g., preparing a map and following the map ar not passive or trivial tasks).

Overall, the process specifies activities at an abstract level that are not project-specific. It is a generic set of activities that does not provide a detailed road map for a particular project. The detailed roadmap for a particular project is the *project plan* that specifies what specific activities to perform for this particular project, when and how to ensure that the project progresses smoothly. In our travel example, the project plan to go from New York to Orlando will be the detailed marked map showing the route, with other details like plans for night halts, getting gas and breaks.

It should be clear that it is a process that drives a project. A process limits the degrees of freedom for a project by specifying what types of activities must be done and in what order. Further restriction on the degrees of freedom for a particular project are specified by the project plan, which, in itself, is within the boundaries established by the process (i.e., a project plan cannot include performing an activity that is not there in the process). With this, the hope is that one has the "shortest" (or the most efficient) path from the user needs to the software satisfying these needs.

As each project is an instance of the process it follows, it is essentially the process that determines the expected outcomes of a project. Due to this, the focus of software engineering is heavily on the process.

Extraido de: An Integrated Approach to Software Engineering by Pankaj Jalote. Springer 1997.

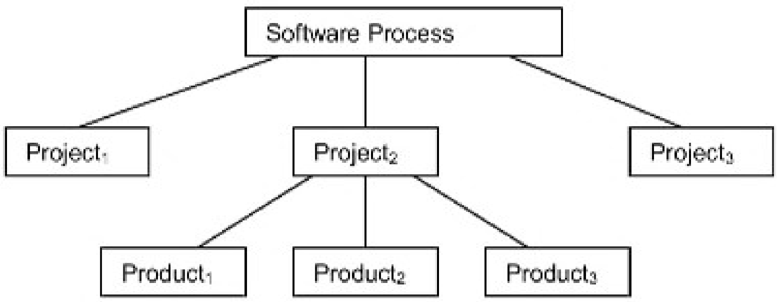


FIGURE 2.1. Processes, projects, and products.

Módulo de Idioma Inglés FAMAF GUÍA 13 Contenidos	**Propósito de Lectura: Identificar la estructura retórica de un *abstract* escrito en inglés.** ⌗ Al finalizar esta guía, Ud. habrá logrado identificar el modo en el que se distribuye la información en un *abstract* escrito en inglés.

1. Observe el siguiente texto. Luego, responda en forma oral las siguientes preguntas:

- ¿Dónde puede aparecer esta clase textual?
- ¿Qué propósito tiene?
- ¿Qué información incluye?

The sharp peaks present in the diffraction pattern of a one-dimensional Fibonacci quasicrystal are explained physically. The explanation rests upon the discovery of periodically positioned spatial regions, with mutually incommensurable spacings, which completely or partially exclude the atoms of the quasicrystal. These sets of periodic exclusion zones act individually as gratings. A ruler-like optical analog of a 1-D quasicrystal, in which grating lines replace the hypothetical atoms of the quasicrystal, provides an opportunity to observe quasicrystal diffraction directly. Such a grating can be produced by hand with simple equipment.

McIrvin, M. (1993). The Fibonacci ruler. *American Journal of Physics, 61*, 1, 36.

ABSTRACT (resumen) de un Artículo de Investigación

Dentro de la comunidad académica circulan diversas clases textuales y el *abstract* es una de las más corrientes. Se lo define como resumen del artículo de investigación al cual remite sucinta y directamente y del cual forma parte (Swales, 1990). Su función más usual es la de exponer o resumir brevemente el trabajo, con la finalidad de dar al lector un conocimiento relativamente exacto de dicho trabajo.

Los *abstracts* de casi todas las disciplinas se escriben de manera similar; especialmente de las ciencias experimentales. La información que se incluye y el orden en el cual se la presenta son muy convencionales. Suele constar de cinco partes reconocidas y se considera que informar sobre los **resultados** es **obligatorio**.

ORDEN DE LOS ELEMENTOS TÍPICOS INCLUIDOS EN UN ABSTRACT EN INGLÉS

B= Background Information

P= Principal activity or **Purpose** of the study and its scope

M= Some information about the **Methodology** used in the study

R= The most important **Results** of the study

C= A statement of **Conclusion** or **recommendation**

De Weissberg, R. & S. Buker. (1990). *Writing up research. Experimental research report writing for students of English.* New Jersey: Prentice Hall Regents.

2. Lea el siguiente *abstract*, para identificar las oraciones que corresponden a los elementos B, P, M, R, y C del cuadro anterior.

Scalar quantum field theory on fractals

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Spin chain models
Wiener measure

ABSTRACT

We investigate scale invariant measures over multiple variables for scalar field theories by imitating Wiener's construction of the measure on the space of functions of one variable. We assign random fields values on the vertices of simple geometric shapes (triangles, squares, tetrahedra) which are subdivided into a finite number of similar shapes. We find several Gaussian measures with anomalous scaling associated with these field variables. A non-Gaussian fixed point arises from the Ising model on a fractal. In the continuum limit, we construct correlation functions that vary as a power of the distance. It is either a positive power (analogous to the Wiener process) or a negative power depending on the subdivision scheme used; however it is an irrational number for all the examples. This suggests that in the continuum limits it corresponds to quantum field theories (random fields) on spaces of fractional dimension.

3. Ordene las siguientes oraciones. Una vez ordenadas, responda: ¿cuál de ellas corresponde a "background information", cuál a "methodology" y cuál a "conclusions/recommendations"? ¿Qué palabras ayudaron a responder la pregunta anterior?

Illumination conditions at the Asteroid 4 Vesta: Implications for the presence of water ice.

(a) However, under present day conditions, it is predicted that about half of Vesta's surface has an average temperature of less than 145 K, which, based on previous thermal modeling of main belt asteroids, suggests that water ice could survive in the top few meters of the vestal regolith on billion-year timescales.

(b) The mean illumination conditions and surface temperatures over one orbital period are calculated for the Asteroid 4 Vesta using a coarse digital elevation model produced from Hubble Space Telescope images.

(c) Even with the anticipated effects of finer-scale topography taken into account, it is unlikely that any significant permanently shadowed regions currently exist on Vesta due to its large axial tilt ($\approx 27^{o}$).

1.____ **2. ____** **3. ____**

Stubbs, T. and Wang, Y. (2012). Illumination conditions at the Asteroid 4 Vesta: Implications for the presence of water ice. *Icarus*, 272-276.

4. Lea el cuadro a continuación sobre el uso de tiempos verbales en el *abstract*, para, luego, completar la actividad propuesta a continuación.

Tiempos Verbales

B Background Information (present tense)

*Example: One of the basic principles of communication **is** that the message should be understood by the intended audience.*

P Principal activity (past tense / present perfect tense)

*Example: In this study the readability of tax booklets from nine states **was evaluated**.*

*Example: Net energy analyses **have been carried** out for eight trajectories which convert energy source into heated domestic water.*

M Methodology (past tense)

*Example: Older workers **surpassed** younger ones in both speed and skill jobs.*

C Conclusions (present tense / tentative verbs /modal auxiliaries)

*Example: The results **suggest** that the presence of unique sets of industry factors **can be used** to explain variation in economic growth.*

De Weissberg, R. y S. Buker. (1990). *Writing up research. Experimental research report writing for students of English.* New Jersey: Prentice Hall Regents.

a. Lea el siguiente *abstract*. Subraye los verbos de la siguiente manera: si se encuentran en *presente*, una vez; si se encuentran en *pasado*, dos veces. Luego, responda la siguiente pregunta: ¿Están los tiempos verbales de los textos usados como se indica en el cuadro anterior?

A B S T R A C T

The IRTF/CSHELL observations in February 2006 at $L_S = 10°$ and 63–93°W show ~10 ppb of methane at 45°S to 7°N and ~3 ppb outside this region that covers the deepest canyon Valles Marineris. Observations in December 2009 at $L_S = 20°$ and 0–30°W included spectra of the Moon at a similar airmass as a telluric calibrator. A technique for extraction of the martian methane line from a combination of the Mars and Moon spectra has been developed. The observations reveal no methane with an upper limit of 8 ppb. The results of both sessions agree with the observations by Mumma et al. (Mumma, M.J. et al. [2009]. Science 323, 1041–1045) at the same season in February 2006 and are smaller than those in the PFS and TES maps. Production and removal of the biological methane on Mars do not significantly change the redox state of the atmosphere and the balance of hydrogen. A search for ethane at 2977 cm^{-1} results in an upper limit of 0.2 ppb. However, this limit does not help to establish the origin of methane on Mars. Reanalysis of our search for SO_2 using TEXES confirms the recently established upper limit of 0.3 ppb. Along with the lack of hot spots and gas vents with endogenic heat sources in the THEMIS observations, the very low upper limit to SO_2 on Mars does not favor geological methane that is less abundant than SO_2 in the outgassing from the terrestrial planets.

Krasnopolsky, V. (2012). Search for methane and upper limits to ethane and SO2 on Mars. *Icarus 217*, 144-152.

5. A modo de cierre, lea el *abstract* a continuación para completar las siguientes actividades:

a. Identifique las partes del texto. Señale las palabras clave que le ayudaron a identificarlas.
b. Responda, en español, las siguientes preguntas:
- **I. ¿Cuál fue el objetivo?**
- **II. ¿Cuál es la conclusión a la que llegan los autores?**

Abstract

We introduce the theory of monoidal Gröbner bases, a concept which generalizes the familiar notion in a polynomial ring and allows for a description of Gröbner bases of ideals that are stable under the action of a monoid. The main motivation for developing this theory is to prove finiteness results in commutative algebra and applications. A basic theorem of this type is that ideals in infinitely many indeterminates stable under the action of the symmetric group are finitely generated up to symmetry. Using this machinery, we give new streamlined proofs of some classical finiteness theorems in algebraic statistics as well as a proof of the independent set conjecture of Hoşten and the second author.

Keywords: Gröbner basis; Algebraic statistics; Semigroup ring; Well-partial order; Symmetric group; Markov basis

Hillar, C. and Sullivant, S. (2012). Finite Gröbner bases in infinite dimensional polynomial rings and applications. *Advances in Matematics* 229, 1-25.

Módulo de Idioma Inglés FAMAF GUÍA 14 Contenidos	**Propósito de Lectura: Analizar los niveles macro y microestructurales de un *abstract*.** ⌗ Al finalizar esta guía, Ud. habrá logrado identificar las principales características macro y microestructurales de un abstract escrito en inglés.

1. Lea el siguiente pasaje sobre las funciones de los *abstracts* en los artículos de investigación científica (AIC) para, luego, responder, en forma oral, las preguntas a continuación.

According to Hucking (2001), RA abstracts have at least four distinguishable functions to which we have added a fifth:

1. They function as stand-alone *mini-texts* giving readers a short summary of a study's topic, methodology and main findings;
2. They function as *screening devices*, helping readers decide whether they wish to read the whole article or not;
3. They function as *previews* for readers intending to read the whole article, giving them a road-map for their reading;
4. They provide *indexing help* for professional abstract writers and editors;
5. They provide *reviewers with an immediate oversight* of the paper they have been asked to review.

From Swales, J. and Feak, C. (2010). From text to task: Putting research on abstracts to work. In Garrido, M.; Palmer-Silveira, J. and Fortanet-Gómez, I. (Eds.), *English for academic purposes* (pp. 167-187). Amsterdam-New York: Rodopi.

a. ¿Cuál de las funciones enumeradas en el texto considera Ud. que es la más importante en su disciplina y cuál la menos importante?

b. ¿Cree que en su disciplina existe otra función que no ha sido mencionada?

2. Lea el siguiente abstract, para, luego, responder las preguntas a continuación.

a. ¿Cuál cree Ud. que es la oración principal en este texto? Subráyela.

....

....

....

b. ¿Cuáles son los principales tiempos verbales usados en este *abstract*? ¿Por qué cree que son esos los tiempos verbales usados?

....

....

A R T I C L E   I N F O

Keywords:
Model construction
Geometric processing
Surgical planning
Stent
Stent graft
Bypass graft
Aortic aneurysm
Aortic coarctation
Coronary artery stenosis
Blood flow computation

A B S T R A C T

Image-based blood flow computation provides great promise for the evaluation of vascular devices and assessment of surgical procedures. However, many previous studies employ idealized arterial and device models or only patient-specific models from the image data after device deployment, since the tools for model construction are unavailable or limited and tedious to use. Moreover, in contrast to retrospective studies from existing data, there is a pressing need for prospective analysis with the goal of surgical planning. Therefore, it is necessary to construct models with deployed devices in a fast, virtual and interactive fashion. The goal of this paper is to develop new geometric methods to deploy stents or stent grafts virtually to patient-specific geometric models constructed from a 3D segmentation of medical images. A triangular surface representing the vessel lumen boundary is extracted from the segmentation. The diseased portion is either clipped and replaced by the surface of a deployed device or rerouted in the case of a bypass graft. For diseased arteries close to bifurcations, bifurcated device models are generated. A method to map a 2D strut pattern on the surface of a device is also presented. We demonstrate three applications of our methods in personalized surgical planning for aortic aneurysms, aortic coarctation, and coronary artery stenosis using blood flow computation. Our approach enables prospective model construction and may help to expand the throughput required by routine clinical uses in the future.

Xiong, G.; Choi, G, and Taylor, C. (2012). Virtual interventions for image-based blood flow computation. *Computer Aided Design,* 3-14

3. En esta sección, se revisarán los usos de los tiempos verbales en el *abstract*. Observe los siguientes ejemplos. Luego, complete los espacios en blanco.

Para presentar el problema central argumentado o la hipótesis, el tiempo verbal usado es: ________________________________.

* The main problem, however, is…
* We examine why these models have difficulty with…
* However, this assumption is not valid when…
* This is complicated by…
* However, this assessment cannot be based solely on…
* Although it is known theoretically that…

Cuando se hace referencia al tema presentado / tratado en el artículo de investigación, se usan verbos en ________________________________.

* This paper presents a new methodology for…
* In this paper we apply…
* This study reports an improved design for…
* In this paper we extend an existing approach to…
* We consider a novel system of…

El método generalmente se redacta usando verbos en ________________________.

- * Samples were prepared for…
- * The effect of pH was investigated by means of…
- * The data obtained were evaluated using…
- * Subjects were examined in order to…

Los resultados o hallazgos pueden expresarse en ________________________.o, más comúnmente en ________________________.

- * We show that this theory also applies to…
- * The most accurate readings are obtained from…
- * We find that this does not vary…
- * The Y-type was found to produce…
- * The subjects analysed showed a marked increase in…
- * No changes were observed…
- * This was consistent with…
- * These profiles were affected by…
- * This finding correlated with…
- * The results demonstrated that…

Ejemplos adaptados de Glasman-Deal, H. (2010). *Science research writing for non-native speakers of English*. London: World Scientific Publishing Co.

4. En esta sección se analizará el vocabulario más comúnmente usado en las diferentes secciones del *abstract*.
¿En qué sección pueden generalmente aparecer los siguientes vocablos/frases? Coloque una de las siguientes opciones en el espacio correspondiente:

- ✓ Aims / Purposes
- ✓ Background / Introduction
- ✓ Conclusions / Implications / Recommendations
- ✓ Methodology and Materials / Subjects / Procedures
- ✓ Results / Findings
- ✓ What the paper does

a-

* a number of studies
* is/are assumed to
* is/are based on
* is/are determined by
* is/are influenced by
* is/are related to
* it has recently been shown that
* it is known that
* it is widely accepted that
* recent studies/recent research

b-

* in order to
* our approach
* the aim of this study
* to compare
* to examine
* to investigate
* to study
* with the aim of

c-

* In this paper/ In this study / In this investigation we address analyse argue compare consider describe discuss emphasise examine extend introduce present propose review show	* This paper/ This study /This investigation considers describes examines includes presents reports reviews

d-
* was/were analysed * was/were calculated * was/were evaluated * was/were examined * was/were formulated * was/were measured * was/were performed * was/were recorded * was/were studied * was/were treated * was/were used

e-
* resulted in * showed * was identified * was/were achieved * was/were found * was/were identical * was/were observed * was/were obtained * was/were present * there was evidence of / for

f-
* These results indicate that… * These results suggest that… * We conclude that… * We suggest that…

Ejemplos adaptados de Glasman-Deal, H. (2010). *Science research writing for non-native speakers of English*. London: World Scientific Publishing Co.

5. ¿Aparece alguna de estas palabras/frases en el *abstract* del ejercicio 2? Si su respuesta es afirmativa, señálelas con un color.

6. Lea los siguientes *abstracts* para, luego, completar las actividades a continuación.

A B S T R A C T

We investigate scale invariant measures over multiple variables for scalar field theories by imitating Wiener's construction of the measure on the space of functions of one variable. We assign random fields values on the vertices of simple geometric shapes (triangles, squares, tetrahedra) which are subdivided into a finite number of similar shapes. We find several Gaussian measures with anomalous scaling associated with these field variables. A non-Gaussian fixed point arises from the Ising model on a fractal. In the continuum limit, we construct correlation functions that vary as a power of the distance. It is either a positive power (analogous to the Wiener process) or a negative power depending on the subdivision scheme used; however it is an irrational number for all the examples. This suggests that in the continuum limits it corresponds to quantum field theories (random fields) on spaces of fractional dimension.

Arnab, K and Rajeev, S.G. (2011). Scalar quantum field theory on fractals. *Annals of Physics*, 102-117.

a. ¿Cuál es la actividad principal llevada a cabo en este estudio? ¿Qué palabra/s le permitió/le permitieron identificarla?

....

....

....

b. ¿Qué implicancias/consecuencias tiene este estudio? ¿Qué palabra/s le permitió/le permitieron identificarla?

....

....

....

c. En este *abstract* se encuentra la palabra HOWEVER. Este conector establece una relación de .... entre las siguientes ideas ....

....

....

....

Abstract

Quantum physics challenges our understanding of the nature of physical reality and of space-time and suggests the necessity of radical revisions of their underlying concepts. Experimental tests of quantum phenomena involving massive macroscopic objects would provide novel insights into these fundamental questions. Making use of the unique environment provided by space, MAQRO aims at investigating this largely unexplored realm of macroscopic quantum physics. MAQROhas originally been proposed as a medium-sized fundamental-science space mission for the 2010 call of Cosmic Vision. MAQRO unites two experiments: DECIDE (DECoherence In Double-Slit Experiments) and CASE (Comparative Acceleration Sensing Experiment). The main scientific objective of MAQRO, which is addressed by the experiment DECIDE, is to test the predictions of quantum theory for quantum superpositions of macroscopic objects containing more than 108 atoms. Under these conditions, deviations due to various suggested alternative models to quantum theory would become visible. These models have been suggested to harmonize the paradoxical quantum phenomena both with the classical macroscopic world and with our notion of Minkowski space-time. The second scientific objective of MAQRO, which is addressed by the experiment CASE, is to demonstrate the performance of a novel type of inertial sensor based on optically trapped microspheres. CASE is a technology demonstrator that shows how the modular design of DECIDE allows to easily incorporate it with other missions that have compatible requirements in terms of spacecraft and orbit. CASE can, at the same time, serve as a test bench for the weak equivalence principle, i.e., the universality of free fall with test-masses differing in their mass by 7 orders of magnitude.

Keywords: ESA's cosmic vision · Space mission · Fundamental physics · Quantum mechanics · Macrorealism · Quantum optomechanics · Equivalence principle

Kaltenbaek, R. et al. (2012). Macroscopic quantum resonators (MAQRO) Testing quantum and gravitational physics with massive mechanical resonators. *Experimental Astronomy,* 1-42

a. Señale con un color la oración/las oraciones donde se informa sobre el contexto de la investigación.

b. ¿Qué objetivo persiguió esta investigación?

....

....

....

c. En el renglón 14 se encuentra la frase "these conditions", ¿cuáles son esas condiciones?

....

....

....

d. En el renglón 24 hay una abreviatura que cumple la función de ACLARAR algo que se ha mencionado. ¿Cuál es esa abreviatura? ¿Qué se aclara? ¿Qué aclaración se brinda?

....

....

....

7. A modo de cierre, seleccione un *journal* de la Biblioteca Electrónica de Secyt (Mincyt) que sea de su interés y, luego, un artículo de su interés, para analizar su correspondiente *abstract* teniendo en cuenta los contenidos de esta guía y los de la anterior.

Módulo de Idioma Inglés **FAMAF** **GUÍA 15** **Contenidos**	**Propósito de Lectura: Revisar contenidos anteriormente presentados** **Al finalizar la Guía, Ud. habrá puesto en práctica los siguientes contenidos léxico-gramaticales:** ⌗ Conectores (de diferentes tipos) ⌗ Referentes ⌗ Frases sustantivas ⌗ Vocabulario específico de la disciplina

1. Lea la siguiente la siguiente introducción, para responder, en forma oral, las preguntas a continuación:

Mutation analysis is a fault-based testing technique that uses mutation operators to introduce small changes into a program or specification, producing mutants, and then chooses test cases to distinguish the mutants from the original. Mutation operators differ in the coverage they get. They also differ in the number of mutants they generate. Consequently, selecting mutation operators is an important problem whose solution affects the effectiveness and cost of mutation testing.
Our experiments show that specification-based mutation can be applied to test programs; it gets good program-based coverage. Our method for guaranteeing fault visibility is very effective for black-box testing of programs which have a large intermediate state.

a. ¿Qué se define?
b. ¿Cuáles son las diferencias que se presentan?
c. ¿Qué demuestra el experimento?

2. Ahora, lea el texto a continuación en forma específica, para completar las actividades que le siguen.

Chapter 1
Introduction and Motivation

Few users are satisfied with reliability of their software. Even though the quality assurance budgets of software makers are increasing, program failures with possible data loss remain quite common. Failures are especially dangerous in safety-critical systems, such as aeronautics and medical applications.

A program failure is caused by a *fault*, that is, a defect in the code, informally, a bug. Testing is a way to find faults in software. It is a process of supplying a system under test with some values and making conclusions on the basis of its behavior. A *test case* consists of inputs together with the expected results. Although generating test inputs can be as simple as selecting numbers randomly, deriving the corresponding expected results is often labor intensive.

Testing criteria define, in a quantifiable way, what should be tested and when the objective of testing is achieved. For example, statement coverage requires that every statement in the program is executed at least once during testing. Test sets may be chosen according to a number of different testing criteria.

The testing criteria can be compared based on their relative effectiveness and cost. The effectiveness of a criterion is determined by its ability to detect faults. Since the number of faults can be infinite, we may choose to concentrate, on detecting a limited subset of faults; mutation analysis is an example of this approach.

Alternatively, we may concentrate on the behavior instead of the code and attempt to systematically cover the entire domain of a system. *Pairwise coverage* requires that for each pair of inputs, every combination of valid values of these two inputs be covered by at least one test case.

Testing criteria can be classified into program-based and specification-based categories. Program-based (or white-box) testing is based on the code without consideration of design. Thorough white-box testing is prohibitively expensive for large software systems. Additionally, it provides no information about whether the code is doing what it is supposed to be doing.

In contrast, specification-based (or black-box) testing derives test cases from the specification of a system. A specification provides valuable information about the intended behavior of the implementation, and therefore about the expected test results.

Automated test generation from formal specifications promises to improve our ability to test software that has to be highly reliable, as well as lower the cost of testing off-the-shelf software. A novel way was developed to automatically produce tests from formal specifications and measure test coverage using a combination of specification-based mutation testing criterion and model checking. Mutation generation is an important part of the method.

Mutation analysis is a method for developing sets of test cases which are sensitive to small syntactic structural changes. A mutation analysis system defines a set of mutation operators. Each operator is a pattern for a small syntactic change; it models a particular class of faults. A mutant is produced by applying a single mutation operator exactly once to the original specification (program). For instance, the insertion mutation operator can replace a Boolean variable with a disjunction of the variable and another Boolean variable. Applying the set of operators systematically generates a set of mutants. If a test set can distinguish a specification from each slight variation, the test set is exercising the specification adequately.

Accordingly, mutation adequacy is a testing criterion which specifies the percentage of the mutants distinguished by the test set. The method automatically generates a mutation adequate test set, that is, a test set able to detect mutants generated by a chosen set of mutation operators. Mutation operators differ in the number of mutants they generate. They also differ in the coverage they get. Consequently, the cost and effectiveness of mutation testing depend on which mutation operators are used.

This is a study of specification mutation. Although program-based mutation has been extensively studied over the years, previous specification-based mutation work does not systematically compare the effectiveness and cost of different mutation operators and does not give a prescription for which sets of mutation operators should be used.

1.1 Thesis Statement

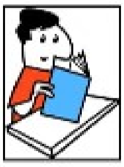
Specification-based mutation analysis can be used to economically generate effective tests. Comparing mutation operators based on their coverage and the number of mutants generated allows us to select subsets of operators which have lower cost while maintaining high fault detection capabilities of the test set.

To ensure that choice of mutation operators is appropriate in most situations, the comparison must be independent of a particular experimental base. Mutation operators can be compared theoretically, so that the results do not depend on a chosen experimental base; moreover, these results apply to arbitrary logic expressions, not just those in disjunctive normal form.

Mutation operators form a hierarchy with respect to detection capability; we can skip a test for a mutation from an easier-to-detect mutation operator in the hierarchy, provided that we detect a corresponding mutation from a harder-to-detect operator. In practice, tests generated by harder-to-detect operators are either more effective, or likely to be as effective while being less costly, than those generated by easier-to-detect operators.

A practical goal of testing is to reduce the number of faults in the programs corresponding to the specifications. To detect a fault in a program, a test case must cause the fault to affect the program output, not just intermediate variables. A model checker can be used to select tests that cause detectable output failures. Specification-based mutation can be applied to test programs; it gets good program-based coverage.

Extraído de: *Specification mutation for test generation and analysis* by Vadim Okun. University of Maryland Baltimore County, 2004.



ACTIVIDADES DE COMPRENSIÓN

1. Indique si los siguientes enunciados son verdaderos (V) o falsos (F), según la información ofrecida por el texto.

a) En ambos casos (V y F), indique renglones de referencia.

b) En caso de ser falsos (F), corríjalos (en forma completa y en español)

Enunciados	V/F	Renglones
a. La cobertura por pares exige que para cada par de entrada se deben cubrir cinco entradas en cada caso. *Corrección:*		
b. Las evaluaciones producidas por operadores son más costosas y menos efectivas. *Corrección:*		

c. Una meta importante en la evaluación es reducir los errores en los programas. *Corrección:*		
d. Para detectar un error en el programa, se compara usando métodos teóricos y prácticos. *Corrección:*		

2. Responda las siguientes preguntas en español y en forma completa. Indique, luego, los renglones de donde extrajo la información.

a- ¿Cuál es la definición que presenta el autor sobre *evaluación*?

....
....
....
....

(Renglones: ________)

b- ¿Cómo se clasifica el *criterio de evaluación*? Dé características de cada uno.

....
....
....
....

(Renglones: ________)

ACTIVIDADES SOBRE ELEMENTOS DEL LENGUAJE

3. Dé un equivalente en español de las siguientes frases.

a. the quality assurance budgets of software makers (r. 1-2)

b. a combination of specification-based mutation (r.34-35)

c. a mutation adequate test set (r.47-48)

d. the effectiveness and cost of different mutation operators (r.54)

4. Complete los espacios en blanco en español y en forma completa:

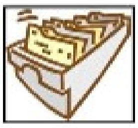
a. La palabra **although** (r. 8) establece una relación de ____________________ entre las ideas.
El autor de este texto lo utiliza para conectar las siguientes ideas:
Idea 1: ....
....
....
Idea 2: ....
....
....

b. La palabra **since** (r. 16) establece una relación de ____________________ entre las ideas.
El autor de este texto lo utiliza para conectar las siguientes ideas:
Idea 1: ....
....
....
Idea 2: ....
....
....

5. ¿Cuál es el referente de las siguientes palabras?

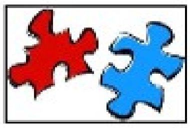
	Referente (en español)
a- **its** (r.16)	
b- **which** (r.37)	
c- **it** (r.39)	
d- **those** (r.71)	

6. VOCABULARIO. Las siguientes oraciones fueron extraídas del texto. Elija el equivalente adecuado en español para cada una de las palabras resaltadas (y enumeradas).



a. **Failures**[1] are especially dangerous in **safety-critical systems**[2] ... **(r. 3-4)**
b. Comparing mutation operators based on their coverage and the number of mutants generated allows us to select **subsets**[3] of operators which have lower cost while maintaining high **fault**[4] detection capabilities of the **test set**[5]. **(r.59-61)**
c. Each operator is a **pattern**[6] for a small syntactic change... **(r. 39-40)**
d. Few users are satisfied with **reliability**[7] of their software. **(r. 1)**
e. ...program failures with possible **data loss**[8] remain quite common. **(r. 2-3)**
f. Automated test generation from formal specifications promises to improve our ability to test software that has to be **highly reliable**[9]... **(r. 31-32)**

1	a. fallas	b. fracasos	c. quiebra
2	a. críticos sistemas de seguridad	b. sistemas de seguridad críticos	c. seguridad de sistemas críticos
3	a. superconjuntos	b. conjuntos inferiores	c. subconjuntos
4	a. error	b. falla	c. defecto
5	a. conjunto de evaluaciones	b. evaluaciones de conjunto	c. evaluaciones de sets
6	a. patrón/modelo	b. partido	c. dibujo
7	a. confiable	b. confiabilidad	c. seguridad
8	a. falta de datos	b. datos perdidos	c. pérdida de datos
9	a. altamente confiable	b. seguridad alta	c. alta reconocimiento



A modo de cierre…

7. Relacione el contenido de la columna A con el de la columna B.

Table 1. Mutation Operators and their Illustrative Mutants.
Operators and Example Mutants

Columna A	Columna B
ORO	Logical Operator Replacement AG (request &AF state=busy)
SNO	Operand Replacement AG (request →AF state=ready
ENO	Simpe Expression Negation AG (!request → AF state=busy)
LRO	Relational Operator Replacement AG (WaterPres<=100)
RRO	Expression Negation AG (!(request → AF state=busy))
MCO	Stuck-At AG (request → AF 1)
STO	Associative Shift AG (x & (y →z))
ASO	Missing Condition AG AF state=busy

8. Con un compañero, comente acerca de los operandos que corresponden a la esta tabla. Si conoce algún lenguaje similar o diferente, escriba un ejemplo dando similitudes o diferencias con lo anterior.

………

………

AUTOEVALUACIÓN III

¿Cuáles de las siguientes estrategias y técnicas de lectura aplicadas hasta el momento le resultó más útil? Marque con una tilde ✓

ESTRATEGIA / TÉCNICA	¿CUÁN ÚTIL HA SIDO ESTA ESTRATEGIA?		
	MUY ÚTIL	ÚTIL	POCO ÚTIL
↳ Activar el conocimiento previo del tema			
↳ Inferir el significado por la forma			
↳ Scanning (Lectura Detallada)			
↳ Skimming (Lectura Global)			
↳ Usar el diccionario bilingüe			
↳ Utilizar el paratexto para deducir aspectos temáticos del texto			

Lea nuevamente los contenidos de las guías 11 a 15. Marque con una tilde✓ los objetivos de la primera columna que alcanzó. Luego, califique el nivel que considera haber alcanzado en cada uno.

CONTENIDOS Y OBJETIVOS	NIVEL		
	MB	B	R
☐ Reconocer el tiempo "present perfect" de los verbos en inglés y comprender sus funciones.			
☐ Reconocer el tiempo condicional y comprender sus funciones.			
☐ Identificar y comprender el grado comparativo y el grado superlativo de los adjetivos.			
☐ Reconocer el modo en el que se distribuye la información en un *abstract* escrito en inglés			
☐ Reconocer las principales características microestructurales de un *abstract* escrito en inglés.			
☐ Reconocer vocabulario especializado y dar su equivalente en español.			

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