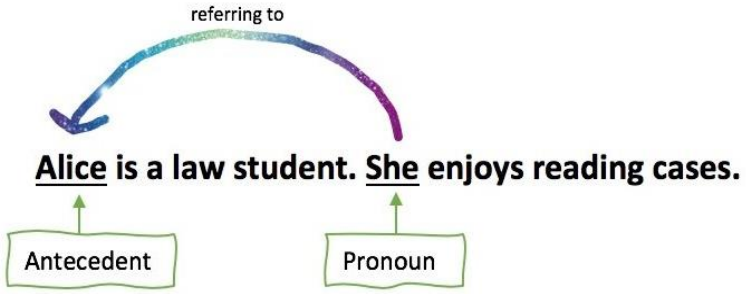
LESSON 2

COMPREHENSION STRATEGY: Reference

Reference: The relationship between a grammatical unit (usually a pronoun) that refers to another grammatical unit (usually a noun or noun phrase). The noun or noun phrase that a pronoun refers to is called the antecedent, which can be before (anaphoric) or after (cataphoric) the pronoun.



Read the following passages and choose the best answer.

TEXT 1

Most sources of illumination generate light over an appreciable period and indeed, if an object is lit for a very brief time (less that 1/25 second), the human eye will not react in time to see the object. A photographic emulsion -that is, a light-sensitive coating on photographic film, paper, or glass- will, however, record much shorter bursts of light. A photographic flash can therefore be used to capture high-speed movement on film as well as to correct deficiencies of the normal surrounding lighting. Photoflash is now generated electronically, but the earliest form, first used in 1864, was a paper bag containing magnesium wire and some oxygen-rich substance, such as potassium chlorate. When the bag was ignited, the metal burned with an intense flash. A contemporary observer reported that "this quite unsafe device seems to have done nothing worse that engulf the room in dense smoke and lead to pictures of dubious quality and odd poses."

The evolution of the photoflash was slow, flashbulbs, containing fine wire made of a metal, such as magnesium or aluminum, capable of being ignited in an atmosphere of pure oxygen at low pressure, were introduced only in the 1920's. In the earliest type, the metal was separated from the oxygen by a thin glass bulb. The flash was fired by piercing the bulb and allowing the oxygen to come into contact with the metal, which ignited spontaneously. Later bulbs were fired by an electric battery, which heated the wire by passing a small current through **it**. Other

combinations, such as the pairing of oxygen difluoride with zirconium, have also been used. In each case enough energy is given out to heat the oxidizable metal momentarily to a white-hot emission of visible light. The smoke particles are so small that they cool rapidly; but since they are white, they contribute to the brilliance by reflecting the light from their still-glowing neighbors. A slightly bigger form

The word "it" highlighted in the text refers to...

a. oxygen.
b. battery.
c. wire.
d. current.

TEXT 2

The interrelationship of science, technology, and industry is taken for granted_today – summed up, not altogether accurately, as "research and development." Yet historically this widespread faith in the economic virtues of science is a relatively recent phenomenon, dating back in the United States about 150 years, and in the Western world as a whole not over 300 years at most. Even in this current era of large scale, intensive research and development, the interrelationships involved in this process are frequently misunderstood. Until the coming of the Industrial Revolution, science and technology evolved for the most part independently of each other.

Then as industrialization became increasingly complicated, the craft techniques of preindustrial society gradually gave way to a technology based on the systematic application of scientific knowledge and scientific methods. This changeover started slowly and progressed unevenly. Until late in the nineteenth century, only a few industries could use scientific techniques or cared about using them. The list expanded noticeably after 1870, but even then much of what passed for the application of science was "engineering science" rather than basic science.

Nevertheless, by the middle of the nineteenth century, the rapid expansion of scientific knowledge and of public awareness-if not understanding-of **it** had created a belief that the advance of science would in some unspecified manner automatically generate economic benefits. The widespread and usually uncritical acceptance of this thesis led in turn to the assumption that the application of science to industrial purposes was a linear process, starting with fundamental science, then proceeding to applied science or technology, and through them to industrial use.

This is probably the most common pattern, but it is not invariable. New areas of science have been opened up and fundamental discoveries made as a result of attempts to solve a specific technical or economic problem. Conversely, scientists who mainly do basic research also serve as consultants on projects that apply research in practical ways. In sum, the science-technology-industry relationship may flow in several different ways, and the particular channel it will follow depends on the individual situation. It may at times even be multidirectional.

The word "it" highlighted in the text refers to...

a. understanding.
b. public awareness.
c. scientific knowledge.
d. expansion.

TEXT 3

The work of the railroad pioneers in America became the basis for a great surge of railroad building halfway through the nineteenth century that linked the nation together as never before. Railroads eventually became the nation's number one transportation system, and remained so until the construction of the interstate highway system halfway through the twentieth century. They were of crucial importance in stimulating economic expansion, but **their** influence reached beyond the economy and was pervasive in American society at large.

By 1804, English as well as American inventors had experimented with steam engines for moving land vehicles. In 1920, John Stevens ran a locomotive and cars around in a circular track on his New Jersey estate, which the public saw as an amusing toy. And in 1825, after opening a short length of track, the Stockton to Darlington Railroad in England became the first line to carry general traffic. American businesspeople, especially those in the Atlantic coastal region who looked for better communication with the West, quickly became interested in the English experiment. The first company in America to begin actual operations was the Baltimore and Ohio, which opened a thirteen- mile length of track in 1830. It used a team of horses to pull a train of passenger carriages and freight wagons along the track. Steam locomotive power didn't come into regular service until two years later.

However, for the first decade or more, there was not yet a true railroad system. Even the longest of the lines was relatively short in the 1830's, and most of them served simply to connect water routes to each other, not to link one railroad to another. Even when two lines did connect, the tracks often differed in width, so cars from one line couldn't fit onto tracks of the next line. Schedules were unreliable and wrecks were frequent. Significantly, however, some important developments during the 1830's and 1840's included the introduction of heavier iron rails, more flexible and powerful locomotives, and passenger cars were redesigned to become more stable, comfortable, and larger. By the end of 1830 only 23 miles of track had been laid in the country. But by 1936, more than 1,000 miles of track had been laid in eleven States, and within the decade, almost 3,000 miles had been constructed. By that early age, the United States had already surpassed Great Britain in railroad construction, and particularly from the mid-1860's, the late nineteenth century belonged to the railroads.

The word "their" highlighted in the text refers to...

a. railroad pioneers.
b. railroads.
c. the interstate highway system.
d. American society.

TEXT 4

Some pioneering work that began as an attempt to discover ways to increase production efficiency led to the founding of the human relations movement in industry and to the development of motivational skills and tools for managers. In 1927 researchers were involved in determining the optimum amount of lighting, temperature, and humidity (with lighting being considered the most important) for the assembly of electronic components at Western Electric. The researchers found that lighting had no consistent effect on production. In fact, production sometimes increased when lighting was reduced to the level of ordinary moonlight! The important part of this experiment began when two Harvard researchers, Elton Mayo and Fritz Roethlisberger, were brought in to investigate these unexpected results further. They found that workers were responding not to the level of lighting but to the fact that they were being observed by the experimenters.

This phenomenon came to be known as the Hawthorne effect since the experiments were conducted at the Western Electric Hawthorne plant. This was the first documented and widely published evidence of the psychological effects on doing work, and **it** led to the first serious effort aimed at examining psychological and social factors in the workplace. Further experiments were continued for five years. Generally, the researchers concluded from their experiments that economic motivation (pay) was not the sole source of productivity and, in some cases, not even the most important source. Through interviews and test results, the researchers focused on the effects of work attitudes, supervision, and the peer group and other social forces, on productivity.

Their findings laid the groundwork for modern motivation theory, and the study of human factors on the job, which continues to this day in such common practices as selection and training, establishing favorable work conditions, counseling, and personnel operations. The contributions of this experiment shifted the focus of human motivation from economics to a multifaceted approach including psychological and social forces.

The word "it" highlighted in the text refers to...

a. the experiment
b. economic motivation
c. the Western Electric Hawthorn plant
d. the Hawthorne effect

TEXT 5

Researchers in the field of psychology have found that one of the best ways to make an important decision, such as choosing a university to attend or a business to invest in, involves the utilization of a decision worksheet. Psychologists who study optimization compare the actual decisions made by people to theoretical ideal decisions to see how similar they are. Proponents of the worksheet procedure believe that it will yield optimal, that is, the best decisions. Although there are several variations on the exact format that worksheets can take, they are all similar in their essential aspects.

Worksheets require defining the problem in a clear and concise way and then listing all possible solutions to the problem. Next, the pertinent considerations that will be affected by each decision are listed, and the relative importance of each consideration or consequence is determined. Each consideration is assigned a numerical value to reflect its relative importance. A decision is mathematically calculated by adding these values together. The alternative with the highest number of points emerges as the best decision.

Since most important problems are multifaceted, there are several alternatives to choose from, each with unique advantages and disadvantages. One of the benefits of a pencil and paper decision-making procedure is that it permits people to deal with more variables than their minds can generally comprehend and remember. On the average, people can keep about seven ideas in their minds at once. A worksheet can be especially useful when the decision involves a large number of variables with complex relationships. A realistic example for many college students is the question "What will I do after graduation?" A graduate might seek a position that offers specialized training, pursue an advanced degree, or travel abroad for a year.

A decision-making worksheet begins with a succinct statement of the problem that will also help to narrow it. **It** is important to be clear about the distinction between long-range and immediate goals because long-range goals often involve a different decision than short-range ones. Focusing on long-range goals, a graduating student might revise the question above to "What will I do after graduation that will lead to a successful career?"

The word "it" highlighted in the text refers to...

a. worksheet.
b. problem.
c. distinction.
d. decision.

TEXT 6

Fungi, of which there are over 100,000 species, including yeasts and other single-celled organisms as well as the common molds and mushrooms, were formerly classified as members of the plant kingdom. However, in reality they are very different from plants and today they are placed in a separate group altogether.

The principal reason for this is that none of them possesses chlorophyll, and since they cannot synthesize their own carbohydrates, they obtain their supplies either from the breakdown of dead organic matter or from other living organisms. Furthermore the walls of fungal cells are not made of cellulose, as those of plants are, but of another complex sugarlike polymer called chitin, the material from which the hard outer skeletons of shrimps, spiders, and insects are made. The difference between the chemical composition of the cell walls of fungi and those of plants is of enormous importance because it enables the tips of the growing hyphae, the threadlike cells of the fungus, to secrete enzymes that break down the walls of plant cells without having any effect on **those** of the fungus itself. It is these cellulose - destroying enzymes that enable fungi to attack anything made from wood, wood pulp, cotton, flax, or other plant material.

The destructive power of fungi is impressive. They are a major cause of structural damage to building timbers, a cause of disease in animals and humans, and one of the greatest causes of agricultural losses. Entire crops can be wiped out by fungal attacks both before and after harvesting. Some fungi can grow at + 50OC, while others can grow at -5C, so even food in cold storage may not be completely safe from them. On the other hand, fungi bring about the decomposition of dead organic matter, thus enriching the soil and returning carbon dioxide to the atmosphere. They also enter into a number of mutually beneficial relationships with plants and other organisms. In addition, fungi are the source of many of the most potent antibiotics used in clinical medicine, including penicillin.

The word "those" highlighted in the text refers to...

a. tips.
b. hyphae.
c. enzymes.
d. walls.

GRAMMAR TOPIC: Words with "ing"

Read the following text and do the activities that follow.

SMART ENERGY

The next few decades will see great changes in the way energy is supplied and used. In some major oil producing nations, 'peak oil' has already been reached, and there are increasing fears of global warming. Consequently, many countries are focusing on the switch to a low carbon economy. This transition will lead to major changes in the supply and use of electricity. Firstly, there will be an increase in overall demand, as consumers switch from oil and gas to electricity to power their homes and vehicles. Secondly, there will be an increase in power generation, not only in terms of how much is generated, but also how it is generated, as there is growing electricity generation from renewable sources. **There is also likely more electricity generation centers, as households and communities take up the opportunity to install photovoltaic cells and small scale wind turbines.** To meet these challenges, countries are investing in Smart Grid technology. This system aims to provide the electricity industry with a better understanding of power generation and demand, and to use this information to create a more efficient power network.

Smart Grid technology basically involves the application of a computer system to the electricity network. The computer system can be used to collect information about supply and demand and improve engineer's ability to manage the system. With better information about electricity demand, the network will be able to increase the amount of electricity delivered per unit generated, leading to potential reductions in fuel needs and carbon emissions. Moreover, the computer system will assist in reducing operational and maintenance costs.

Smart Grid technology offers benefits to the consumer, too. They will be able to collect real-time information on their energy use for each appliance. Varying tariffs throughout the day will give customers the incentive to use

appliances at times when supply greatly exceeds demand, leading to great reductions in bills. For example, they may use their washing machines at night. Smart meters can also be connected to the internet or telephone system, allowing customers to switch appliances on or off remotely. Furthermore, if houses are fitted with the apparatus to generate their own power, appliances can be set to run directly from the on-site power source, and any excess can be sold to the grid.

With these changes comes a range of challenges. The first involves managing the supply and demand. Sources of renewable energy, such as wind, wave and solar, are notoriously unpredictable, and nuclear power, which is also set to increase as nations switch to alternative energy sources, is inflexible. With oil and gas, it is relatively simple to increase the supply of energy to match the increasing demand during peak times of the day or year. With alternative sources, this is far more difficult, and may lead to blackouts or system collapse. Potential solutions include investigating new and efficient ways to store energy and encouraging consumers to use electricity at off-peak times.

A second problem is the fact that many renewable power generation sources are located in **remote** areas, such as windy uplands and coastal regions, where there is currently a lack of electrical infrastructure. New infrastructures therefore must be built. Thankfully, with improved smart technology, this can be done more efficiently by reducing the reinforcement or construction costs.

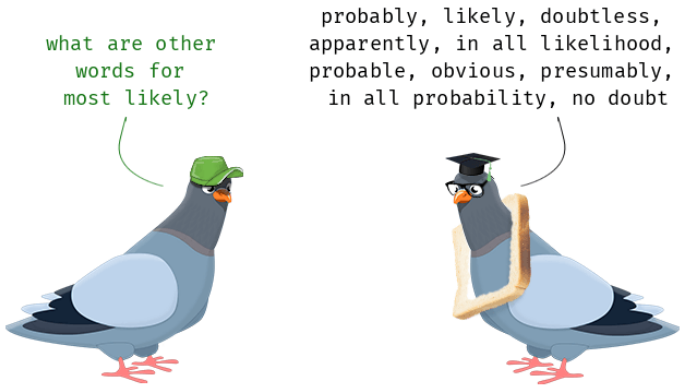
Although Smart Technology is still in its infancy, pilot schemes to promote and test it are already **underway**. Consumers are currently testing the new smart meters which can be used in their homes to manage electricity use. There are also a number of demonstrations being planned to show how the smart technology could practically work, and trials are in place to test the new electrical infrastructure. **It is likely that technology will be added in 'layers', starting with 'quick win' methods** which will provide initial carbon savings, to be followed by more advanced systems at a later date. Cities are prime candidates for investment into smart energy, due to the high population density and high energy use. It is here where Smart Technology is likely to be promoted first, utilising a range of sustainable power sources, transport solutions and an infrastructure for charging electrically powered vehicles. The infrastructure is already changing fast. By the year 2050, changes in the energy supply will have transformed our homes, our roads and our behaviour.

What kind of words are the following? Nouns, verbs, adjectives, or adverbs? Remember that these words have different functions depending on their location within the sentence and hence their correct translation. The first one is done for you. Use the grammar booklet to solve this exercise.

In some major oil **producing** nations, 'peak oil' has already been reached (...)	
(...) there are **increasing** fears of global warming.	
(...) there are increasing fears of global **warming**.	
(...) there is **growing** electricity generation from (...)	
(...) countries are **investing** in Smart Grid technology.	

This system aims to provide the electricity industry with a better **understanding** (…)	
The first involves **managing** the supply and demand.	
It is here where Smart Technology is likely to be promoted first, **utilising** a range of (…)	
The infrastructure is already **changing** fast.	

REVISION TOPIC 1: Likely / Unlikely



It probably will / will not happen

It's likely/unlikely that + clause

It's likely that he will win the game tonight.

It's unlikely that they will find who did it.

Subject + be likely/unlikely + to infinitive

He is likely to win the game tonight.

They are unlikely to find who did it.

Translate the following sentences from the text. How do you translate the word "(un)likely"?

- There is also likely more electricity generation centers, as households and communities take up the opportunity to install photovoltaic cells and small scale wind turbines.

……

- It is likely that technology will be added in 'layers', starting with 'quick win' methods (…)

……

More sentences to translate (not in the text)

- By looking at a climograph you can begin to guess what the typical or likely weather is going to be in that place during each month of the year.

……

- Propositionally, we've demonstrated that monotheism is more credible than polytheism, and that supernaturalism is more likely than mere naturalism.

.....

- The most likely scenario is that he goes back to school in the fall.

.....

- The President is least likely to be nominated for a second term.

.....

REVISION TOPIC 2: Phrasal Verbs

Phrasal Verb: An idiomatic phrase consisting of a verb and another element, typically either an adverb, as in *break down*, or a preposition, for example *see to*, or a combination of both, such as *look down on*. Phrasal verbs are informal.

Remember! You have to look at the whole sentence. If the two words can be understood literally, it is a verb and a preposition. If they have to be taken together with a meaning that has little or nothing to do with the meaning of the verb alone, then it is a phrasal verb.

Read the following excerpt and underline all phrasal verbs. Once you are done, look them up in the dictionary if you cannot understand what they mean. The first one has been done for you.

When I set off for work this morning, my car broke down, so I ended up taking the bus. As soon as I got off, I bumped into an old schoolmate, Mark. While we were talking, he brought up something I had already found out from some mutual friends- that he had come into some money and had set up his own business. He told me that there was a lot to sort out, and offered to take me on, but I turned him down straight away.

When I clocked in, my boss had a go at me, telling me off in front of everyone. When I got over the initial shock, I told her I'd make up for being late, but it turned out that she had blown up over a deal that had fallen through, after a client of mine had pulled out of a contract. She told me that I wouldn't get away with it, that I'd let everybody down, and just went on and on....

Eventually, I ran out of patience and answered back– I said I was not going to put up with it anymore, and if she wanted to lay me off, she should go ahead. Anyway, to cut a long story short, I stormed out, phoned Mark's secretary, who put me through to him. I told Mark I'd like to take him up on his offer. So, in the end, everything has worked out perfectly!

Answers will be available next week!