Reading

READING PASSAGE 1

You should spend about 20 minutes on ***Questions 1–14****, which are based on Reading Passage 1 below.*

Candle Making in Colonial America

The primary material used in making candles today is paraffin[1] wax, which is derived from petroleum. In the process of refining crude oil, refiners "crack" the oil, thereby separating it into different products such as gasoline, heating oil, and kerosene. Paraffin wax, originally produced by plants that lived 100 to 700 million years ago to protect their leaves, is inert and remains suspended in the decayed vegetable matter that eventually becomes crude oil. In the refining process, paraffin wax is separated out and sold as a by-product.

Paraffin was not discovered until the early 1800s. At that time, paraffin was derived by a process of distilling bituminous schist, now known as shale oil. In 1850, Dr. James Young, a Scottish industrial chemist, applied for a patent for obtaining paraffin oil and paraffin from bituminous coals. Shortly after that, under a license from Young, paraffin was being produced from coal on a large scale in the United States. Because petroleum is now readily available, Young's original process for obtaining parrafin is no longer profitable, and paraffin is currently produced from crude oil.

Before the discovery of paraffin, candle making had for centuries relied on different materials. Chemically, those materials were also hydrocarbons; however, they were derived directly from insects, animals, or plants.

In colonial times in America, beeswax was highly valued for making candles. Even today beeswax, though more expensive, is highly regarded because pure beeswax candles emit no smoke when burning, whereas paraffin candles produce a black, slightly oily soot. Beeswax is secreted only by female worker bees. As a worker bee eats honey, her wax glands exude the wax as oval flakes that form on the underside of her last four abdominal segments. The bee then removes the wax flakes and chews them, mixing the wax flakes with her saliva to soften them. When the wax is sufficiently pliable, she attaches it to the honeycomb. As the wax comb is built up, each pocket is filled with honey and then sealed with more wax.

Given the numerous uses and considerable value not only of honey but also of the bees themselves and their beeswax, beekeeping was an important part of American life in the seventeenth and eighteenth centuries. Many of the early settlers brought honeybee hives with them from Europe. Not indigenous to North America, the European honeybees nonetheless thrived and often escaped into the wild. In 1785, writing in *Notes on the State of Virginia*, Thomas Jefferson

[1] *This parrafin is different from the British word* parrafin, *which is called* kerosene *in the United States.*

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observed, "The bees have generally extended themselves into the country, a little in advance of the white settlers. The Indians therefore call them the white man's fly, and consider their approach as indicating the approach of the settlements of the whites." Eventually, the Native Americans as well as the colonists used beeswax and honey in the frontier bartering system that grew up in the absence of readily available coinage.

Another source of colonial candle material was animal fat or tallow. Cattle and sheep were the most common sources of tallow. Pork fat was not used because candles made from it dripped too much and were dangerous. Additionally, the odor[1] of burning pork tallow was particularly offensive. Chicken and duck fat were too soft to make candles. The tallow was rendered—heated in a cauldron until the fat melted—and then strained numerous times to remove any gristle, meat fibers,[2] and as many impurities as possible. Straining reduced, but did not entirely eliminate, the extent to which the candles smoked and emitted a noxious odor. Tallow candles needed to be stored in tightly closed containers, usually made of tin or wood, to keep out rodents and other animals that might eat them.

In the New World, the colonists discovered a native plant high in a natural waxy substance that could be extracted and used for candle making. The plant is the bayberry shrub, also known as candleberry. Bayberry shrubs are dense and semievergreen. The plants are extremely hardy, grow to as much as nine feet high, and do well even in salt-laden, coastal soil unsuitable for other horticulture. In winter, the female plants bear clusters of blue–gray berries, which lend their color to the wax. The colonists boiled the berries to separate the waxy matter from the pulp and then skimmed the wax off the top. Although making bayberry candles was more labor[3] intensive than making tallow candles, bayberry candles were considerably superior, burning longer and producing less smoke. Further recommending them, they had a pleasing scent. Compared to beeswax, bayberries were available in greater quantities, and the colonists found that bayberry wax was harder than beeswax and thus also burned longer.

Because the bayberry clusters were harvested in winter and because making the candles was very time-consuming, the candles were often saved for special occasions, particularly Christmas and New Year's Eve. Eventually, they became a holiday tradition and gave rise to the saying, "Bayberry candles burned to the socket, puts luck in the home, food in the larder, and gold in the pocket." Fortunate indeed was the colonial household with brightly burning candles and a holiday feast.

[1] *British: odour*

[2] *British: fibres*

[3] *British: labour*

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Questions 1–3

*Write the correct letter, **A**, **B**, or **C**, on lines 1–3 on your answer sheet.*

1 Paraffin is

A a petroleum by-product.
B found in rocks.
C from a type of vegetable.

2 Paraffin was first obtained from

A crude oil.
B rotten vegetables.
C bituminous coal.

3 James Young was

A a candle maker.
B an oil producer.
C a scientist.

Questions 4–14

Classify the following as descriptive of

A	paraffin
B	beeswax
C	tallow
D	bayberry wax

*Write the correct letter, **A**, **B**, **C**, or **D**, in boxes 4–14 on your answer sheet.*

4 was often made from the fat of cows

5 is made from a bush that grows near the sea

6 needs to be filtered before being made into candles

7 was not used before the nineteenth century

8 produces smokeless candles

9 produced candles that were attractive to hungry mice and rats

10 is bluish in color

11 was brought to colonial America by European settlers

12 was often reserved for holiday use

13 has a pleasing aroma

14 was often used for trading in place of money

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READING PASSAGE 2

You should spend about 20 minutes on ***Questions 15–27****, which are based on Reading Passage 2 below.*

Caffeine

Almost 200 years ago, a young German chemist named Friedrich Ferdinand Runge isolated a molecule from coffee beans; he named the substance *kaffein.* Today, scientists are still studying the properties of this bitter, white powder. More than sixty plants are known to produce caffeine, whose pungent taste helps protect them from insect predators.

Caffeine is probably the most widely used drug in the world. Humans have been consuming caffeine for hundreds of years, primarily in the form of coffee, tea, and cocoa. Today, it is also added to soft drinks and energy drinks and is a component of some over-the-counter medications. Many of the world's people, including children, ingest it in some form daily.

The body absorbs caffeine in less than an hour, and it remains in the system for only a few hours, passing from the gastrointestinal tract into the bloodstream within about ten minutes and circulating to other organs, including the brain. Caffeine molecules are small and soluble in fat, properties that allow them to pass through a protective shield known as the blood–brain barrier and directly target the central nervous system.

Caffeine acts on the body in many ways, some of them probably still unknown. However, caffeine accomplishes its principal action as a stimulant by inhibiting adenosine, a chemical that binds to receptors on nerve cells and slows down their activity. Caffeine binds to the same receptors, robbing adenosine of the ability to do its job and leaving caffeine free to stimulate nerve cells, which in turn release epinephrine (also known as adrenaline), a hormone that increases heart rate and blood pressure, supplies an energy boost, and in general makes people feel good.

For all its popularity, caffeine retains a somewhat negative image. It is, after all, a mildly habit-forming stimulant that has been linked to nervousness and anxiety and that causes insomnia. It affects most of the body's major organs. Recent research casts doubt on the magnitude of many of these seemingly undesirable effects and even suggests that a daily dose of caffeine may reduce the risk of some chronic diseases, while providing short-term benefits as well.

Daily caffeine consumption has been associated with lowered incidence of type II diabetes, Parkinson's disease, and Alzheimer's disease. How caffeine works to thwart diabetes, a condition characterized[1] by high levels of glucose in the blood, remains unknown, but glucose tolerance or more efficient glucose metabolism may be involved. Parkinson's disease, a central nervous system

[1] *British: characterised*

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disorder that causes tremor and joint stiffness, is linked to insufficient amounts of a substance called dopamine in the brain. Caffeine may interact with brain cells that produce dopamine and help maintain a steady supply. The role of caffeine in Alzheimer's disease, which damages the brain and causes memory loss and confusion, may be related to a problem in the blood–brain barrier, possibly a contributor in Alzheimer's, if not the major cause. Caffeine has been found to protect the barrier against disruption resulting from high levels of cholesterol.

Habitual coffee and tea drinkers had long been observed to have a lower incidence of non-melanoma skin cancers, although no one knew why. A recent study found that caffeine affects skin cells damaged by ultraviolet radiation, a main cause of skin cancer. Caffeine interferes with a protein that cancerous cells need to survive, leaving the damaged cells to die before they become cancerous. Drinking caffeinated coffee has also been associated with a decreased incidence of endometrial cancer—that is, cancer of the cells lining the uterus. The strongest effect appears to be in overweight women, who are at greatest risk for the disease. Researchers believe blood sugar, fat cells, and estrogen may play a role. Although the mechanism remains unknown, people who drink more than two cups of coffee or tea a day reportedly have about half the risk of developing chronic liver disease as those who drink less than one cup of coffee daily; caffeinated coffee has also been associated with lowered risk of cirrhosis and liver cancer.

While many of caffeine's undesirable effects, such as elevated heart rate and blood pressure, are brief, some short-term benefits, including pain relief, increased alertness, and increased physical endurance, have also been attributed to caffeine. As a component of numerous over-the-counter diet pills and pain relievers, caffeine increases their effectiveness and helps the body absorb them more quickly. By constricting blood vessels in the brain, it can alleviate headaches—even migraines—and can help counter the drowsiness caused by antihistamines.

Caffeine does not alter the need for sleep, but it does offer a temporary solution to fatigue for people who need to stay alert. Research has shown that sleep-deprived individuals who consumed caffeine had improved memory and reasoning abilities, at least in the short term. Studies of runners and cyclists have shown that caffeine can improve their stamina—hence its addition to energy-boosting sports drinks.

People who consume a lot of caffeine regularly may develop temporary withdrawal symptoms, headache being the most common, if they quit or cut back on it abruptly. Fortunately, these symptoms last only a day or two in most cases. Individuals who are more sensitive to the stimulatory side effects of caffeine may want to avoid it, but most doctors agree that the equivalent of three cups of coffee a day does not harm healthy people. There is no medical basis to give up daily caffeine and many reasons to include a moderate amount in one's diet.

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Questions 15–23

Do the following statements agree with the information given in the passage? On lines 15–23 on your answer sheet, write

TRUE	if the statement agrees with the information
FALSE	if the statement contradicts the information
NOT GIVEN	if there is no information on this

15 Before 200 years ago, people did not drink coffee regularly.

16 Children generally do not consume caffeine.

17 The nervous system is affected by caffeine.

18 Caffeine causes the heart to beat faster.

19 Caffeine can be addictive.

20 Alzheimer's disease may be caused in part by caffeine consumption.

21 Drinking coffee can help protect against some skin cancers.

22 Caffeine may increase the incidence of endometrial cancer.

23 Caffeine can help some medications work faster.

Questions 24–27

*Write the correct letter, **A**, **B**, or **C**, on lines 24–27 on your answer sheet.*

24 Caffeine is used to treat

A high blood pressure.
B liver cancer.
C headaches.

25 Some athletes use caffeine to

A increase their endurance.
B improve their speed.
C maintain their alertness.

26 Symptoms of caffeine withdrawal

A can become an ongoing problem.
B may last as long as a week.
C are usually short-lived.

27 Drinking three cups of coffee a day

A may be recommended by a doctor.
B will probably not cause problems.
C is harmful to the health.

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READING PASSAGE 3

You should spend about 20 minutes on ***Questions 28–40****, which are based on Reading Passage 3 below.*

Animal Camouflage

The theory of natural selection, proposed by Charles Darwin almost 150 years ago, hypothesizes[1] that organisms with traits that give them a survival advantage tend to live longer and produce more offspring. Over many thousands of years of evolution, those beneficial characteristics dominate the gene pool. Animals that use camouflage to conceal themselves from their enemies, predator and prey alike, provide a classic example of natural selection at work. Creatures with some type of protective coloring pass along the genes responsible, with each generation fine-tuning them along the way, eventually providing the most effective coloring for their environment and lifestyle. Scientists have described four types of camouflage that animals use: background matching, disruptive coloration, countershading, and mimicry.

From dirt-colored chipmunks and gophers to leaf-green praying mantises and tree frogs to ocean-gray mackerel and sharks, all sorts of wildlife use background matching, also known as *crypsis*, to blend in with their surroundings. Some animals have the ability to alter their coloring as their environment changes seasonally or as they change locations. The arctic fox and the snowshoe hare both have white winter fur that matches the snow and ice around them, but a brown pelt in warmer weather blends in with their woodland environs. Some reptiles and fish can alter their surface appearance instantly as they move from place to place. The green anole lizard changes from green to brown as it travels among leaves and branches, whereas the flounder and other types of flatfish are able to match not just the color but also the silty or mottled sandy texture of the ocean floor beneath them.

Most animals, though, cannot change their appearance so easily. Because background matching works only for a specific setting and often requires animals to remain motionless for long periods, a somewhat more effective strategy involves having a camouflage that works on many backgrounds, blending in with all, but not perfectly matching any of them.

Disruptive coloration uses a pattern such as stripes or spots to disrupt the body's outline. The pattern breaks up the contour of the animal's body, confusing observers and making it difficult to distinguish an individual shape. Colors with more contrast, like a tiger's stripes, tend to increase the disruptive effect. This type of camouflage works well for animals that travel in herds. It helps zebras blend in not so much with their background as with each other. Their major predator, the lion, sees a mass of moving stripes and has trouble targeting

[1] *British: hypothesises*

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a specific animal. A single zebra, on the other hand, may use background matching when hiding in tall grass, where its black and white stripes merge with the green and yellow stalks. The different colors of the grasses and zebra are no help to a lion, which is color-blind.[1]

Animals with countershading typically have a dark backside and a light belly, which affect an onlooker's perception of their three-dimensional appearance and help decrease their visibility in sunlight. Countershading also can create a more uniformly dark appearance, presenting an apparent lack of depth. Caterpillars make good use of this effect, which gives them a flat look that blends in with tree bark.

Countershading is useful to birds and marine animals that are typically seen against a light environment from below and against dark surroundings from above. Predatory birds like hawks take advantage of it to conceal themselves from the small birds and rodents they hunt. While in flight, a dark back absorbs the sunlight above them and a light underside reflects the light below, diminishing telltale shadows that might give them away. On the ground or in a tree, their mottled brown feathers blend in with branches and leaves. Penguins also use countershading. Their white chests and black backs stand out on land but disappear in water where penguins spend most of their time. They are almost invisible to an observer looking down into dark water, while a creature in deeper water looking up sees a splash of white that looks like a beam of sunlight.

Mimicry, or masquerading, works not by hiding a creature but by making it appear to be something else. Walking stick insects are virtually indistinguishable from twigs, and katydids look so much like green leaves that leaf-eating insects have been observed trying to chew on them.

A type of mimicry known as *aposematism* involves masquerading as an animal that is undesirable or even dangerous. Predators bypass the foul-tasting monarch butterfly, but they also avoid the tasty look-alike viceroy butterfly. Coral snake impersonators, like the harmless scarlet snake, have the same red, black, and yellow bands but in a different order: black, yellow, red, yellow on the coral snake and red, black, yellow, black on the scarlet snake. Different types of moths use aposematism to scare off predators; some species have a big spot on each wing to mimic the eyes of a large animal, while the hawk moth caterpillar has a pattern on its rear that looks like a snake head.

Some predators use what is known as aggressive mimicry to disguise themselves as something harmless so they can catch prey off guard. Small animals are not afraid of turkey vultures, which are scavengers, not predators. So when the similar zone-tailed hawk flies with a group of turkey vultures, it has an easy time locating and zeroing in on its living prey.

No single type of camouflage works best in all situations, and many animals use more than one technique to enhance their ability to avoid detection by predator and prey alike.

[1] *British: colour-blind*

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Questions 28–36

Complete the summary below. Choose ***NO MORE THAN THREE WORDS*** *from the passage for each answer.*
Write your answers on lines 28–36 on your answer sheet.

Camouflage helps animals hide from both **28** _____ .
Animals pass on their **29** _____ through their genes.
There are four different types of camouflage. In background matching, an animal's appearance helps it **30** _____ with its environment. The arctic fox and snowshoe hare are examples of animals that **31** _____ with the seasons. However, not all animals can easily change their appearance. Many use a different strategy, having camouflage that helps them disguise themselves **32** _____. Animals with disruptive coloration have marking such as **33** _____ that make it difficult for a predator to discern the shape of the body. Therefore, the predator has a hard time targeting one animal out of a group. Although zebras are black and white, they can hide in tall grass because their major predator is **34** _____. **35** _____ is a type of camouflage that helps hide animals that are seen from above or below. Penguins, for example, have **36** _____, which help them blend in with the dark water from the point of view of an observer standing above.

Questions 37–40

Do the following statements agree with the information in the passage? On lines 37–40 on your answer sheet, write:

TRUE	if the statement agrees with the information
FALSE	if the statement contradicts the information
NOT GIVEN	if there is no information on this

37 The walking stick insect looks like a small stick.

38 The viceroy butterfly is similar in appearance to the monarch butterfly.

39 The scarlet snake is extremely poisonous.

40 The hawk moth caterpillar is brightly colored.

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