**Industrialization in the Netherlands and Scandinavia**

While some European countries, such as England and Germany, began to industrialize in the eighteenth century, the Netherlands and the Scandinavian countries of Denmark, Norway, and Sweden developed later. All four of these countries lagged considerably behind in the early nineteenth century. However, they industrialized rapidly in the second half of the century, especially in the last two or three decades. In view of their later start and their lack of coal—undoubtedly the main reason they were not among the early industrializers—it is important to understand the sources of their success.

All had small populations. At the beginning of the nineteenth century, Denmark and Norway had fewer than 1 million people, while Sweden and the Netherlands had fewer than 2.5 million inhabitants. All exhibited moderate growth rates in the course of the century (Denmark the highest and Sweden the lowest), but all more than doubled in population by 1900. Density varied greatly. The Netherlands had one of the highest population densities in Europe, whereas Norway and Sweden had the lowest Denmark was in between but closer to the Netherlands.

Considering human capital as a characteristic of the population, however, all four countries were advantaged by the large percentages of their populations who could read and write. In both 1850 and 1914, the Scandinavian countries had the highest literacy rates in Europe, or in the world, and the Netherlands was well above the European average. This fact was of enormous value in helping the national economies find their niches in the evolving currents of the international economy.

Location was an important factor for all four countries. All had immediate access to the sea, and this had important implications for a significant international resource, fish, as well as for cheap transport, merchant marines, and the shipbuilding industry. Each took advantage of these opportunities in its own way. The people of the Netherlands, with a long tradition of fisheries and mercantile shipping, had difficulty in developing good harbors suitable for steamships: eventually they did so at Rotterdam and Amsterdam, with exceptional results for transit trade with Germany and central Europe and for the processing of overseas foodstuffs and raw materials (sugar, tobacco, chocolate, grain, and eventually oil). Denmark also had an admirable commercial history, particularly with respect to traffic through the Sound (the strait separating Denmark and Sweden). In 1857, in return for a payment of 63 million kronor from other commercial nations, Denmark abolished the Sound toll dues the fees it had collected since 1497 for the use of the Sound. This, along with other policy shifts toward free trade, resulted in a significant increase in traffic through the Sound and in the port of Copenhagen.

The political institutions of the four countries posed no significant barriers to industrialization or economic growth. The nineteenth century passed relatively peacefully for these countries, with progressive democratization taking place in all of them. They were reasonably well governed, without notable corruption or grandiose state projects, although in all of them the government gave some aid to railways, and in Sweden the state built the main lines. As small countries dependent on foreign markets, they followed a liberal trade policy in the main, though a protectionist movement developed in Sweden. In Denmark and Sweden agricultural reforms took place gradually from the late eighteenth century through the first half of the nineteenth, resulting in a new class of peasant landowners with a definite market orientation.

The key factor in the success of these countries (along with high literacy, which contributed to it) was their ability to adapt to the international division of labor determined by the early industrializers and to stake out areas of specialization in international markets for which they were especially well suited. This meant a great dependence on international commerce, which had notorious fluctuations; but it also meant high returns to those factors of production that were fortunate enough to be well placed in times of prosperity. In Sweden exports accounted for 18 percent of the national income in 1870, and in 1913, 22 percent of a much larger national income. In the early twentieth century, Denmark exported 63 percent of its agricultural production: butter, pork products, and eggs. It exported 80 percent of its butter, almost all to Great Britain, where it accounted for 40 percent of British butter imports.

Paragraph 1 supports which of the following ideas about England and Germany?

|  |  |
| --- | --- |
| A | They were completely industrialized by the start of the nineteenth century. |
| B | They possessed plentiful supplies of coal. |
| C | They were overtaken economically by the Netherlands and Scandinavia during the early nineteenth century. |
| D | They succeeded for the same reasons that the Netherlands and Scandinavia did. |

Paragraph 2 suggests which of the following about the importance of population density in the industrialization of the Netherlands and Scandinavia?

|  |  |
| --- | --- |
| A | It was a more important factor than population size. |
| B | It was more influential than the rate of population growth. |
| C | It was more important in the early stages than it was later. |
| D | It was not a significant factor. |

According to paragraphs 2 and 3, which of the following contributed significantly to the successful economic development of the Netherlands and of Scandinavia?

|  |  |
| --- | --- |
| A | The relatively small size of their populations |
| B | The rapid rate at which their populations were growing |
| C | The large amount of capital they had available for investment |
| D | The high proportion of their citizens who were educated |

According to paragraph 4, because of their location, the Netherlands and the Scandinavian countries had all of the following advantages when they began to industrialize EXCEPT

|  |  |
| --- | --- |
| A | low-cost transportation of goods |
| B | access to fish |
| C | shipbuilding industries |
| D | military control of the sea |

The word "exceptional" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | extraordinary |
| B | surprising |
| C | immediate |
| D | predictable |

The word "abolished" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | ended |
| B | raised |
| C | returned |
| D | lowered |

According to paragraph 5, each of the following contributed positively to the industrialization of the Netherlands and Scandinavia EXCEPT

|  |  |
| --- | --- |
| A | generally liberal trade policies |
| B | huge projects undertaken by the state |
| C | relatively uncorrupt governments |
| D | relatively little social or political disruption |

The word "progressive" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | rapid |
| B | partial |
| C | increasing |
| D | individual |

The author includes the information that "a protectionist movement developed in Sweden" in order to

|  |  |
| --- | --- |
| A | support the claim that the political institutions of the four countries posed no significant barriers to industrialization or economic growth |
| B | identify an exception to the general trend favoring liberal trade policy |
| C | explain why Sweden industrialized less quickly than the other Scandinavian countries and Netherlands |
| D | provide evidence that agricultural reforms take place more quickly in countries that have a liberal trade policy than in those that do not |

Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

|  |  |
| --- | --- |
| A | The early industrializes controlled most of the international economy, leaving these countries to stake out new areas of specialization along the margins. |
| B | Aided by their high literacy rates these countries were able to claim key areas of specialization within established international markets. |
| C | High literacy rates enabled these countries to take over international markets and adapt the international division of labor to suit their strengths. |
| D | The international division of labor established by the early industrializers was suited to these countries, a key factor in their success. |

According to paragraph 6, a major problem with depending heavily on international markets was that they

|  |  |
| --- | --- |
| A | lacked stability |
| B | were not well suited to agricultural products |
| C | were largely controlled by the early industrializers |
| D | led to slower growth of local industries |

According to paragraph 6, what advantage could a country gain from being heavily involved in international commerce?

|  |  |
| --- | --- |
| A | A steadily rising national income |
| B | Greater control over market fluctuations |
| C | High returns when things went well |
| D | A reduced need for imports |

During this period, Sweden had the highest rate of growth of output per capita of any country in Europe, and Denmark was second.

|  |  |
| --- | --- |
| A | 1 |
| B | 2 |
| C | 3 |
| D | 4 |

**Directions:** An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THERR answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.**This question is worth 2 points.**

Although the Netherlands and Scandinavia began to industrialize relatively late, they did so very successfully.

**1**Although these countries all started with small, uneducated populations, industrialization led to significant population growth and higher literacy rates.

**2**Thanks to their ready access to the sea, these countries enjoyed advantages in mercantile shipping, fishing, and shipbuilding.

**3**Because they all started with good harbors for steamships, these countries started with an important advantage in the competition for transit trade.

**4**These countries were helped by the fact that their governments were relatively stable and honest and generally supported liberal trade policies.

**5**These countries were successful primarily because their high literacy rates helped them fill specialized market niches.

**6**Because they were never fully dependent on international commerce, these countries were able to survive notorious fluctuations in international markets.

**The mystery of yawning**

According to conventional theory, yawning takes place when people are bored or sleepy and serves the function of increasing alertness by reversing, through deeper breathing, the drop in blood oxygen levels that are caused by the shallow breathing that accompanies lack of sleep or boredom. Unfortunately, the few scientific investigations of yawning have failed to find any connection between how often someone yawns and how much sleep they have had or how tired they are. About the closest any research has come to supporting the tiredness theory is to confirm that adults yawn more often on weekdays than at weekends, and that school children yawn more frequently in their first year at primary school than they do in kindergarten.

Another flaw of the tiredness theory is that yawning does not raise alertness or physiological activity, as the theory would predict. When researchers measured the heart rate, muscle tension and skin conductance of people before, during and after yawning, they did detect some changes in skin conductance following yawning, indicating a slight increase in physiological activity. However, similar changes occurred when the subjects were asked simply to open their mouths or to breathe deeply. Yawning did nothing special to their state of physiological activity. Experiments have also cast serious doubt on the belief that yawning is triggered by a drop in blood oxygen or a rise in blood carbon dioxide. Volunteers were told to think about yawning while they breathed either normal air, pure oxygen, or an air mixture with an above-normal level of carbon dioxide. If the theory was correct, breathing air with extra carbon dioxide should have triggered yawning, while breathing pure oxygen should have suppressed yawning. In fact, neither condition made any difference to the frequency of yawning, which remained constant at about 24 yawns per hour. Another experiment demonstrated that physical exercise, which was sufficiently vigorous to double the rate of breathing, had no effect on the frequency of yawning. Again the implication is that yawning has little or nothing to do with oxygen.

A completely different theory holds that yawning assists in the physical development of the lungs early in life, but has no remaining biological function in adults. It has been suggested that yawning and hiccupping might serve to clear out the fetuses airways. The lungs of a fetus secrete a liquid that mixes with its mother's amniotic fluid. Babies with congenital blockages that prevent this fluid from escaping from their lungs are sometimes born with deformed lungs. It might be that yawning helps to clear out the lungs by periodically lowering the pressure in them. According to this theory, yawning in adults is just a developmental fossil with no biological function. But, while accepting that not everything in life can be explained by Darwinian evolution, there are sound reasons for being skeptical of theories like this one, which avoid the issue of what yawning does for adults. Yawning is distracting, consumes energy and takes time. It is almost certainly doing something significant in adults as well as in fetuses. What could it be?

The empirical evidence, such as it is, suggests an altogether different function for yawning—namely, that yawning prepares us for a change in activity level. Support for this theory came from a study of yawning behavior in everyday life. Volunteers wore wrist-mounted devices that automatically recorded their physical activity for up to two weeks: the volunteers also recorded their yawns by pressing a button on the device each time they yawned. The data showed that yawning tended to occur about 15 minutes before a period of increased behavioral activity. Yawning bore no relationship to sleep patterns, however. This accords with anecdotal evidence that people often yawn in situations where they are neither tired nor bored, but are preparing for impending mental and physical activity. Such yawning is often referred to as "incongruous" because it seems out of place, at least on the tiredness view: soldiers yawning before combat, musicians yawning before performing, and athletes yawning before competing. Their yawning seems to have nothing to do with sleepiness or boredom—quite the reverse—but it does precede a change in activity level.

Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

|  |  |
| --- | --- |
| A | It is the conventional theory that when people are bored or sleepy, they often experience a drop in blood oxygen levels due to their shallow breathing. |
| B | The conventional theory is that people yawn when bored or sleepy because yawning raises blood oxygen levels, which in turn raises alertness. |
| C | According to conventional theory, yawning is more likely to occur when people are bored or sleepy than when they are alert and breathing deeply. |
| D | Yawning according to the conventional theory, is caused by boredom or lack of sleep and can be avoided through deeper breathing. |

In paragragh1, what point does the author make about the evidence for the tiredness theory of yawning?

|  |  |
| --- | --- |
| A | There is no scientific evidence linking yawning with tiredness. |
| B | The evidence is wide-ranging because it covers multiple age-groups. |
| C | The evidence is reliable because it was collected over a long period of time. |
| D | The evidence is questionable because the yawning patterns of children and adults should be different. |

The word "flaw" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | fault |
| B | aspect |
| C | confusion |
| D | mystery |

In the paragraph 2, why does the author note that there were physiological changes when subjects opened their mouths or breathed deeply?

|  |  |
| --- | --- |
| A | To present an argument in support of the tiredness theory |
| B | To cast doubt on the reliability of the tests that measured heart rate, muscle tension and skin conductance |
| C | To argue against the hypothesis that yawning provides a special way to improve alertness or raise physiological activity |
| D | To support the idea that opening the mouth or breathing deeply can affect blood oxygen levels |

The word "triggered" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | removed |
| B | followed |
| C | increased |
| D | caused |

Paragraph 2 answers all of the following questions about yawning EXCEPT

|  |  |
| --- | --- |
| A | Does yawning increase alertness or physiological activity? |
| B | Does thinking about yawning increase yawning over not thinking about yawning? |
| C | Does the amount of carbon dioxide and oxygen in the air affect the rate at which people yawn? |
| D | Does the rate of breathing affect the rate at which people yawn? |

The word "periodically" in the passage is closest in the meaning to

|  |  |
| --- | --- |
| A | continuously |
| B | quickly |
| C | regularly |
| D | carefully |

According to the developmental theory of yawning presented in paragraph 3, what is the role of yawning?

|  |  |
| --- | --- |
| A | It caused hiccups, which aid in the development of the lungs. |
| B | It controls the amount of pressure the lungs place on other developing organs. |
| C | It prevents amniotic fluid from entering the lungs. |
| D | It removes a potentially harmful fluid from the lungs. |

Paragraph 3 supports which of the following statements about the development theory of yawning?

|  |  |
| --- | --- |
| A | The theory is attractive because it explains yawning from the perspective of Darwinian evolution. |
| B | The theory is unsatisfactory because it cannot explain the lung deformities of infants. |
| C | The theory is questionable because it does not explain why a useless and inconvenient behavior would continue into adulthood. |
| D | The theory is incomplete because it does not explain all the evolutionary stages in the development of yawning. |

The word "empirical" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | reliable |
| B | based on common sense |
| C | relevant |
| D | based on observation |

The study of yawning behavior discussed in paragraph 4 supports which of the following conclusions?

|  |  |
| --- | --- |
| A | Yawning is associated with an expectation of increased physical activity. |
| B | Yawning occurs more frequently when people are asked to record their yawning. |
| C | People tend to yawn about fifteen minutes before they become tired or bored. |
| D | Mental or physical stress tends to make people yawn. |

Why does the author mention "soldiers yawning before combat, musicians yawning before performing, and athletes yawning before competing"?

|  |  |
| --- | --- |
| A | To argue that just the expectation of physical activity can make some people feel tired |
| B | To explain how the view that people yawn because they are tired accounts for yawning before stressful situations |
| C | To support the view that yawning helps prepare a person for mental or physical exertion |
| D | To provide anecdotal evidence that conflicts with the experience of the volunteers in the study |

This, however, was not the case

|  |  |
| --- | --- |
| A | 1 |
| B | 2 |
| C | 3 |
| D | 4 |

**Directions:** An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THERR answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. **This question is worth 2 points.**

The tiredness theory of yawning does not seem to explain why yawning occurs.

**1**Although earlier scientific studies strongly supported the tiredness theory, new evidence has cast doubt on these findings.

**2**Evidence has shown that yawning is almost completely unrelated to amount of oxygen in the blood and is unrelated to sleep behavior.

**3**Some have proposed that yawning plays a role in the development of the lungs before birth but that it serves no purpose in adults.

**4**Fluids in the lungs of the fetus prevent yawning from occurring, which disproves the developmental theory of yawning.

**5**New studies, along with anecdotal evidence, have shown that the frequency of yawning increases during extended periods of inactivity.

**6**There is some evidence that suggests that yawning prepares the body and mind for a change in activity level.

**Lightning**

Lightning is a brilliant flash of light produced by an electrical discharge from a storm cloud. The electrical discharge takes place when the attractive tension between a region of negatively charged particles and a region of positively charged particles becomes so great that the charged particles suddenly rush together. The coming together of the oppositely charged particles neutralizes the electrical tension and releases a tremendous amount of energy, which we see as lightning. The separation of positively and negatively charged particles takes place during the development of the storm cloud.

The separation of charged particles that forms in a storm cloud has a sandwich-like structure. Concentrations of positively charged particles develop at the top and bottom of the cloud, but the middle region becomes negatively charged. Recent measurements made in the field together with laboratory simulations offer a promising explanation of how this structure of charged particles forms. What happens is that small (millimeter-to centimeter-size) pellets of ice form in the cold upper regions of the cloud. When these ice pellets fall, some of them strike much smaller ice crystals in the center of the cloud. The temperature at the center of the cloud is about -15℃ or lower. At such temperatures, the collision between the ice pellets and the ice crystals causes electrical charges to shift so that the ice pellets acquire a negative charge and the ice crystals become positively charged. Then updraft wind currents carry the light, positively charged ice crystals up to the top of the cloud. The heavier negatively charged ice pellets are left to concentrate in the center. This process explains why the top of the cloud becomes positively charged, while the center becomes negatively charged. The negatively charged region is large: several hundred meters thick and several kilometers in diameter. Below this large, cold, negatively charged region, the cloud is warmer than -15℃, and at these temperatures, collisions between ice crystals and falling ice pellets produce positively charged ice pellets that then populate a small region at the base of the cloud.

Most lightning takes place within a cloud when the charge separation within the cloud collapses. However, as the storm cloud develops, the ground beneath the cloud becomes positively charged and lightning can take place in the form of an electrical discharge between the negative charge of the cloud and the positively charged ground. Lightning that strikes the ground is the most likely to be destructive, so even though it represents only 20 percent of all lightning, it has received a lot of scientific attention.

Using high-speed photography, scientists have determined that there are two steps to the occurrence of lightning from a cloud to the ground. First, a channel, or path, is formed that connects the cloud and the ground. Then a strong current of electrons follows that path from the cloud to the ground, and it is that current that illuminates the channel as the lightning we see.

The formation of the channel is initiated when electrons surge from the cloud base toward the ground. When a stream of these negatively charged electrons comes within 100 meters of the ground it is met by a stream of positively charged particles that comes up from the ground. When the negatively and positively charged streams meet, a complete channel connecting the cloud and the ground is formed. The channel is only a few centimeters in diameter, but that is wide enough for electrons to follow the channel to the ground in the visible form of a flash of lightning. The stream of positive particles that meets the surge of electrons from the cloud often arises from a tall pointed structure such as a metal flagpole or a tower. That is why the subsequent lightning that follows the completed channel often strikes a tall structure.

Once a channel has been formed, it is usually used by several lightning discharges, each of them consisting of a stream of electrons from the cloud meeting a stream of positive particles along the established path. Sometimes, however, a stream of electrons following an established channel is met by a positive stream making a new path up from the ground. The result is a forked lightning that strikes the ground in two places.

According to paragraph 1, all of the following take place in the development of a flash of lightening except

|  |  |
| --- | --- |
| A | great tension between two oppositely charged regions |
| B | an increase in negatively charged particles over positively charged particles |
| C | oppositely charged particles coming together |
| D | the release of electrical energy in the form of visible light |

The word "tremendous" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | distinct |
| B | growing |
| C | huge |
| D | immediate |

According to paragraph2, what causes ice crystal to become positively charged?

|  |  |
| --- | --- |
| A | Collisions with ice pellets |
| B | Collisions with negatively charged ice crystals at the base of the cloud |
| C | Becoming concentrated in the central region of the cloud |
| D | Forming at a temperature greater than -15℃ |

The word "acquire" in the passage is closest in meaning to

|  |  |
| --- | --- |
| A | reject |
| B | obtain |
| C | need |
| D | produce |

According to paragraph2, why are positively charged ice pellets produced in the lower part of the cloud?

|  |  |
| --- | --- |
| A | Collisions between ice crystals and ice pellets increase in number in the lower part of the cloud. |
| B | The lower part of the cloud is smaller than the region above it. |
| C | More ice pellets than ice crystals reach the lower part of the cloud. |
| D | Temperature in the lower part of the cloud are warmer than -15℃. |

According to paragraph2, the middle region of a cloud becomes negatively charged due to all of the following EXCEPT

|  |  |
| --- | --- |
| A | a shift of electrical charged between ice pellets and ice crystals |
| B | negatively charged ice pellets that remain in the middle |
| C | a temperature of -15℃ or less |
| D | the development of a positive charge at the base of the cloud |

The author remarks that "Lightning that strikes the ground is the most likely to be destructive" in order to explain why

|  |  |
| --- | --- |
| A | this form of lightning has been investigated so much |
| B | this form of lightning is not as common as lightning within a cloud |
| C | scientific understanding of this form of lightning is important |
| D | the buildup of positive charge on the ground beneath a storm cloud can have serious consequences |

The word "illuminates" in the passage is closet in meaning to

|  |  |
| --- | --- |
| A | opens |
| B | completes |
| C | lights |
| D | electrifies |

According to paragraph5, which of the following is true of the stream of charged particles from the ground?

|  |  |
| --- | --- |
| A | It prevents streams of electrons from the cloud from striking the ground. |
| B | It completes a channel that connects the storm cloud with the ground. |
| C | It produces a stream of electrons from the cloud. |
| D | It widens the path made by the initial stream of electrons from the cloud. |

Which of the following claims about lightning strikes can be inferred from paragraph 5?

|  |  |
| --- | --- |
| A | During a lightning strike the diameter of the channel the electrons follow is considerably enlarged beyond a few centimeters. |
| B | A building is unlikely to be hit by lightning unless it is at least 100 meters tall. |
| C | A building is hit by a lightning strike because the building itself has first determined the path the lightening then takes to it. |
| D | The light of a lightning strike first appears at the point where the streams of negative and positive particles meet. |

It can be inferred from paragraph 2 that part of the reason that the top of a storm cloud becomes positively charged is that

|  |  |
| --- | --- |
| A | the top of the cloud is warmer than the middle of the cloud |
| B | the middle of the cloud is already occupied by positively charged particles |
| C | the negatively charged ice pellets are too heavy to be carried by the updrafts that move ice crystals |
| D | collisions between ice pellets in the top of the cloud produce mainly positively charged particles |

The word "nitiated" is closet in meaning to

|  |  |
| --- | --- |
| A | started |
| B | intensified |
| C | finished |
| D | expected |

The descending stream of electrons divides at the point where the new positive-stream channel intersects the established path.

|  |  |
| --- | --- |
| A | 1 |
| B | 2 |
| C | 3 |
| D | 4 |

**Directions:** An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THERR answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.**This question is worth 2 points.**

Lightning takes place when a separation of a positive and negative electrical particles that develops in a storm could suddenly collapses.

**1**A storm cloud first develops a positively charged layer at the top, then a negatively charged middle layer, and finally, a positively charged layer at the bottom.

**2**A separation of oppositely charged particles in clouds develops from collisions of falling ice pellets with ice crystals, from updrafts, and from temperature variations.

**3**Lightning from cloud to ground follows a channel that forms when a stream of electrons moving down meets a stream of positive particles coming up from the ground.

**4**Field studies, laboratory simulations, and high-speed photography have all been used to investigate the way charge separations develop in clouds.

**5**Lightning from a cloud to the ground is more likely to be destructive than is lightning that takes place within a cloud.

**6**Once a channel has been formed, it is usually used by several successive electrical discharges that illuminate the channel as flashes of lightning.