

英 語

問 題

2019年度

〈H31130017〉

注 意 事 項

1. この科目では、この問題冊子のほかに、マーク解答用紙を配付します。
2. 試験開始の指示があるまで、問題冊子および解答用紙には手を触れないでください。
3. 問題は2～11ページに記載されています。試験中に問題冊子の印刷不鮮明、ページの落丁・乱丁および解答用紙の汚損等に気付いた場合は、手を挙げて監督員に知らせてください。
4. 解答はすべて、HBの黒鉛筆またはHBのシャープペンシルで記入してください。
5. マーク解答用紙記入上の注意
 - (1) 印刷されている受験番号が、自分の受験番号と一致していることを確認したうえで、氏名欄に氏名を記入してください。
 - (2) マーク欄にははっきりとマークしてください。また、訂正する場合は、消しゴムで丁寧に、消し残しがないようによく消してください。

マークする時	<input checked="" type="radio"/> 良い	<input type="radio"/> 悪い	<input type="radio"/> 悪い
マークを消す時	<input type="radio"/> 良い	<input type="radio"/> 悪い	<input type="radio"/> 悪い

6. 解答はすべて所定の解答欄に記入してください。所定の欄以外に受験番号・氏名を記入した解答用紙は採点の対象外となる場合があります。
7. 試験終了の指示が出たら、すぐに解答をやめ、筆記用具を置き解答用紙を裏返しにしてください。
8. 問題冊子は持ち帰ってください。
9. いかなる場合でも、解答用紙は必ず提出してください。

Part I. Read Text I, Text II, and Text III and choose the best option from a – d for questions 1 – 15.

Text I

[1] In the classic psychometric view, intelligence is defined operationally as the ability to answer items on tests of intelligence. The inference from the test scores to some underlying ability is supported by statistical techniques. These techniques compare responses of subjects at different ages; the apparent correlation of these test scores across ages and across different tests confirms the notion that the general faculty of intelligence does not change much with age, training, or experience. It is an inborn attribute or faculty of the individual.

[2] Multiple intelligences (MI) theory, on the other hand, pluralizes the traditional concept. An intelligence is a computational capacity—a capacity to process a certain kind of information—that originates in human biology and human psychology. Humans have certain kinds of intelligences, whereas rats, birds, and computers foreground other kinds of computational capacities. An intelligence entails the ability to solve problems or fashion products that are of consequence in a particular cultural setting or community. The problem-solving skill allows one to approach a situation in which a goal is to be obtained and to locate the appropriate route to that goal. The creation of a cultural (A) allows one to capture and transmit knowledge or to express one's conclusions, beliefs, or feelings. The problems to be solved range from creating an end for a story to anticipating a winning move in chess to repairing a quilt. Products range from scientific theories to musical compositions to successful political campaigns.

[3] MI theory is framed in light of the biological origins of each problem-solving skill. Only those skills that are universal to the human species are considered (again, we differ from rats, birds, or computers). Even so, the biological tendency to participate in a particular form of problem solving must also be coupled with the (a)cultural nurturing of that domain. For example, language, a universal skill, may manifest itself particularly as writing in one culture, as speech skills in another culture, and as the secret language composed of anagrams or tongue twisters in a third.

[4] Given the (b)desideratum of selecting intelligences that are rooted in biology and that are valued in one or more cultural settings, how does one actually identify an intelligence? In coming up with the list of intelligences, I reviewed evidence from various sources: knowledge about normal development and development in gifted individuals; information about the breakdown of cognitive skills under conditions of brain damage; studies of exceptional populations, including prodigies, savants, and autistic children; data about the evolution of cognition over the millennia; cross-cultural accounts of cognition; psychometric studies, including examinations of correlations among tests; and psychological training studies, particularly measures of transfer and generalization across tasks. Only those candidate intelligences that satisfied all or a healthy majority of the criteria were selected as genuine intelligences.

[5] In addition to satisfying the aforementioned criteria, each intelligence must have an identifiable core operation or (c)set of operations. As a neurally based computational system, each intelligence is activated or triggered by certain kinds of internal or external information. For example, one core of musical intelligence is the sensitivity to pitch relations, and one core of linguistic intelligence is the sensitivity to the phonological features of a language.

[6] An intelligence must also be susceptible to encoding in a (d)symbol system—a culturally contrived system of meaning that captures and conveys important forms of information. Language, picturing, and mathematics are but three nearly worldwide symbol systems that are necessary for human survival and productivity. The relationship of an intelligence to a human symbol system is no accident. In fact, the existence of a core computational capacity anticipates the actual or potential creation of a symbol system that exploits that capacity. While it may be possible for an intelligence to develop without an accompanying symbol system, a primary characteristic of human intelligence may well be its gravitation toward such an embodiment.

[Adapted from Gardner, H. (2006) *Multiple Intelligences: New Horizons in Theory and Practice*, New York: Basic Books.]

Questions 1 – 9 refer to Text I.

1. Which of the following is the best description of the traditional concept of intelligence?
 - a. the ability to take any test well
 - b. the capability to process certain information
 - c. an inborn attribute or faculty of an individual
 - d. a plurality of intelligences
2. Which of the following words fits in blank A?
 - a. problem
 - b. product
 - c. conclusion
 - d. computation

3. The example of ^(a)cultural nurturing mentioned in Text I involves language. Which of the following would serve as another example of ^(a)cultural nurturing?
 - a. Rock music is popular all over the world.
 - b. There are famous chess players like Bobby Fischer.
 - c. Intelligence-developing books and games are very popular.
 - d. Sumo is a popular sport in Japan and cricket is a popular sport in England.
4. Which of the following expresses the meaning of ^(b)desideratum?
 - a. the fact that a theory has biological origins
 - b. a choice between biological and cultural intelligences
 - c. an object or circumstance to be wished for
 - d. the identification of an intelligence for study
5. Which of the following describes the meaning of “computation” as used in Text I (mainly in the derived word “computational”)?
 - a. the representation of mathematical formulas and equations
 - b. the systematic processing of informational input or output
 - c. the programming language of the human brain
 - d. the capacity and speed of human computers
6. Which of the following is true about the ^(c)set of operations and the ^(d)symbol system?
 - a. An intelligence must have both a set of operations and a symbol system.
 - b. The operations react to the symbol system in a highly susceptible way.
 - c. Both the symbols and the operations are culturally contrived.
 - d. Human intelligence seems likely to embody both operations and symbols.
7. Which of the following can be inferred from Text I?
 - a. Some intelligences are not rooted in biology or are not universal to all humans.
 - b. The intelligences are not interrelated.
 - c. Every symbol system embodies only one of the human intelligences.
 - d. Symbol systems in (non-human) animals do not derive from intelligence.
8. The paragraphs in Text I can be grouped into three parts: Part A = [1], Part B = [2][3], and Part C = [4][5][6]. Which of the following best describes the roles of these three parts?
 - a. Part A explains the traditional concept of intelligence, Part B introduces two criteria that define computational capacity, and Part C explains the procedure for the study that the author performed.
 - b. Part A introduces certain computational methods related to intelligence, Part B describes the culture and skills of multiple intelligences theory, and Part C explains the different multiple intelligences.
 - c. Part A introduces the basic concept of intelligence, Part B explains how the basic concept is realized in multiple intelligences, and Part C describes the criteria to help decide the intelligences.
 - d. Part A describes intelligence test procedures, Part B explains how biology relates to multiple intelligences, and Part C lists the evidence and criteria in favor of multiple intelligences theory.
9. Which of the following would be the best title for Text I?
 - a. The original set of intelligences
 - b. What constitutes an intelligence?
 - c. Is intelligence the same as computation?
 - d. The contrast between single and multiple intelligences

Text II

Interpersonal intelligence builds on a core capacity to notice distinctions among others—in particular, contrasts in their moods, temperaments, motivations, and intentions. In more advanced forms, this intelligence permits a skilled adult to read the intentions and desires of others, even when they have been hidden. This skill appears in a highly sophisticated form in religious or political leaders, salespersons, marketers, teachers, therapists, and parents. The Helen Keller–Anne Sullivan story suggests that this interpersonal intelligence does not depend on language. All indices in brain research suggest that the frontal lobes* play a prominent role in interpersonal knowledge. Damage in this area can cause profound personality changes while leaving other forms of problem solving unharmed—after such an injury, a person is often not the “same person.”

Alzheimer's disease, a form of dementia, appears to attack posterior* brain zones with a special fury, leaving spatial, logical, and linguistic computations severely damaged. Yet people with Alzheimer's often remain well groomed, socially proper, and continually apologetic for their errors. In contrast, Pick's disease, a variety of dementia that is localized in more frontal regions of the brain cortex, entails a rapid loss of social graces.

Biological evidence for interpersonal intelligence encompasses two additional factors often cited as unique to humans. One factor is the prolonged childhood of primates such as humans and monkeys, including the close attachment to the mother. In cases where the mother (or a substitute figure) is not available and engaged, normal interpersonal development is in serious jeopardy. The second factor is the relative importance in humans of social interaction. Skills such as hunting, tracking, and killing in prehistoric societies required the participation and cooperation of large numbers of people. The need for group cohesion, leadership, organization, and solidarity follows naturally from this.

[Adapted from Gardner, H. (2006) *Multiple Intelligences: New Horizons in Theory and Practice*, New York: Basic Books.]

*frontal lobe = one of the four major divisions of the cerebrum of the brain, located behind the forehead

*posterior = located behind, or towards the rear of an object

Questions 10 – 12 refer to Text I and Text II.

10. What can be inferred from the contrast between patients with Alzheimer's disease and those with Pick's disease?
 - a. The frontal lobe is responsible for the operations related to interpersonal knowledge.
 - b. People with Alzheimer's disease can solve problems better than those with Pick's disease.
 - c. Pick's disease is caused by a different intelligence than is Alzheimer's disease.
 - d. The intelligences cannot be localized to certain parts of the brain or cortex.
11. Which of the following was considered by the author in coming up with a list of multiple intelligences (in Text I), but was NOT presented as evidence for interpersonal intelligence (in Text II)?
 - a. cases of exceptional people
 - b. results of psychological training studies
 - c. types of cognitive breakdown
 - d. occupational examples
12. The author implies that interpersonal intelligence does not always depend on spoken language. If so, which of the following could be a likely symbol system for interpersonal intelligence?
 - a. taste sensation
 - b. political rhetoric
 - c. binary numbering
 - d. body language

Text III

The workings of the human brain are more than a bit confusing. How can we be so ingenious at some tasks and so clueless at others? Beethoven wrote his incredible ninth symphony while he was deaf, but we would not be at all surprised if we learned that he often misplaced his house keys. How can people be simultaneously so smart and so dumb? Many psychologists and neuroscientists have been nearing consensus on a description of the brain's functioning that helps us make sense of these seeming contradictions. The approach involves a distinction between two kinds of thinking, one that is intuitive and automatic, and another that is reflective and rational. We will call the first the Automatic System and the second the Reflective System.

The Automatic System is rapid and is or feels instinctive, and it does not involve what we usually associate with the word *thinking*. When you duck because a ball is thrown at you unexpectedly, or get nervous when your airplane hits turbulence, or smile when you see a cute puppy, you are using your Automatic System. Brain scientists are able to say that the activities of the Automatic System are associated with the oldest parts of the brain, the parts we share with lizards (as well as puppies).

The Reflective System is more deliberate and self-conscious. We use the Reflective System when we are asked, "How much is 411 times 37?" Most people are also likely to use the Reflective System when deciding which route to take for a trip and whether to go to law school or business school.

[Adapted from Thaler, R.H. & Sunstein, C.R. (2009) *Nudge: improving decisions about health, wealth, and happiness*, London: Penguin Books.]

Questions 13 – 15 refer to Text I, Text II, and Text III.

13. How are the ^(e)distinction discussed in Text III and multiple intelligences theory similar?
 - a. Both seek to explain why humans may solve different problems in different ways.
 - b. Both state that different ways of thinking require different symbol systems to express them.
 - c. Neither explains why a person may solve a problem differently at different times.
 - d. Neither indicates that animals and humans have different computational capacities.
14. What might be inferred about withdrawn, anti-social grandmaster chess players?
 - a. They use their Reflective System during a chess game, but their Automatic System otherwise.
 - b. They have low interpersonal intelligence, but are capable of playing chess with their Automatic System.
 - c. Their Reflective System encodes and decodes the symbols of chess through interpersonal intelligence.
 - d. If they were to develop Alzheimer's disease, their chess-playing ability would likely not be affected.
15. Which of the following is true based on Text I, Text II, and Text III?
 - a. Interpersonal intelligence, automatic thinking, and reflective thinking are all of the intelligences.
 - b. Each type of intelligence is potentially reflected in both automatic and reflective thinking.
 - c. Automatic and reflective thinking do not have an evolutionary and biological basis.
 - d. People with high interpersonal intelligence easily switch between automatic and reflective thinking.

Part II. Read the passage and rearrange the seven units in 1 – 5 in the correct order. Then choose from a – d the option that contains the third and fifth words.

If you had driven north on Highway 101 toward San Francisco a few summers ago, you might have noticed a banner hanging from a freeway bridge. “What have future generations done for us?” it asked. The question not only answers itself, but implies a follow-up question, as was presumably the intention of the anonymous provocateur who posted it. If future generations have given us nothing, should ¹(trying / money / to / spend / hard-earned / our / we) make the world better for them? This issue has long hovered over discussions of climate change, but it ²(past / came / the / focus / into / over / acute) few weeks as two new reports were released by the Intergovernmental Panel on Climate Change, the United Nations body that periodically reviews the science and economics of the issue. Scientists have struggled for decades to understand what might happen to the earth, physically, ³(we / the / into / if / continue / greenhouse gases / pouring) atmosphere at ever-rising rates. They have made some headway, but the uncertainties remain substantial. The worst-case possibilities are deeply frightening, but the likelihood ⁴(will / they / a / is / become / unknown / reality). All the more difficult, then, is the task of figuring out what the projected climatic changes might do to human society, which is in large part an economic question. How severe will the damages be; what present-day policies might reduce them; and are they ⁵(a / the / to / worthwhile / compared / many / investment) alternatives for spending our money? Some economists are bravely tackling these issues.

[Adapted from Gillis, J. (2014) What does today owe tomorrow? *The New York Times*, D3, April 29, 2014.]

- | | | | |
|--|---|---------------------------------------|-----------------------------------|
| 1. a. 3rd: hard-earned
5th: trying | b. 3rd: our
5th: money | c. 3rd: money
5th: to | d. 3rd: spend
5th: hard-earned |
| 2. a. 3rd: the
5th: focus | b. 3rd: focus
5th: the | c. 3rd: acute
5th: over | d. 3rd: the
5th: over |
| 3. a. 3rd: continue
5th: into | b. 3rd: continue
5th: greenhouse gases | c. 3rd: into
5th: greenhouse gases | d. 3rd: pouring
5th: into |
| 4. a. 3rd: will
5th: unknown | b. 3rd: is
5th: become | c. 3rd: reality
5th: unknown | d. 3rd: become
5th: reality |
| 5. a. 3rd: worthwhile
5th: compared | b. 3rd: compared
5th: the | c. 3rd: the
5th: worthwhile | d. 3rd: investment
5th: to |

Part III. Answer the questions in Sections A and B.

Section A: Read the text and choose the best option from a – d for questions 1 – 6.

There is (I) paradox at the heart of the Internet. The Internet technical platform is a highly controlled and regulated environment. It is almost certainly (II) largest example of a commonly agreed technical solution that depends upon everyone using the same technical standards, with 1 billion unique users and probably another billion with access to it. The content expressed (A) Web pages, e-mails, and increasingly social networking sites built on this platform is often perceived to be a wildly unregulated environment, portrayed as a kind of virtual Wild West, with everyone joining in (III) gold rushes of the dot-com boom and e-commerce, showing little respect for the rules. The popular media emphasizes the evil purposes to (B) it is put, including financial scams, pornography, terrorism, and unreliable medications to improve sexual performance. Almost without (IV) exception, when a major scandal, (C) a network of pedophiles or a terrorist group, is uncovered, they will have used the Internet in some form to communicate. They will also certainly have used other means such as telephones, mobile and fixed line, but these seem to attract (D) negative attention. The Internet is often implied to be encouraging people to commit crimes, (C) *The Sun* headline from 14 October 2009: “A PREGNANT mother of eight who is the latest alleged pervert seized over a Facebook pedophile ring is a SECOND nursery nurse, *The Sun* can reveal.” According to the security firm Symantec, (B) obviously has a vested interest in talking up the story, spam e-mails now (E) 86% of global e-mails (October 2009). Many of these spam e-mails are designed to extract personal details in order to facilitate identity theft in the practice known as phishing.

[Adapted from Gillies, A. (2012) Internet, Regulation and Censorship. *Encyclopedia of Applied Ethics* (Second Edition), edited by R. Chadwick, London: Academic Press.]

1. In which blanks from I – IV is the word ‘a’ or ‘an’ most likely used?
a. I only b. I and II only c. I, III, and IV only d. II and III only
2. Which of the following best fits in the blank labeled A?
a. around b. through c. of d. to
3. Which of the following best fits in the two blanks labeled B?
a. that b. where c. this d. which
4. Which of the following best fits in the two blanks labeled C?
a. however b. for example c. since d. but
5. Which of the following best fits in the blank labeled D?
a. all b. the c. much d. less
6. Which of the following best fits in the blank labeled E?
a. include in b. combine c. account for d. determine

Section B: The five paragraphs [A] – [E] given below make up a passage but are not properly ordered. Moreover, the five sentences (1) – (5) in paragraph [A] are not properly ordered, either. Read the passage and choose the best option from a – d for questions 7 and 8.

- [A] (1) This means that we're accepting anxiety into our world, not turning it away.
(2) What is interesting about this approach is that one doesn't suppress the anxiety, or try to turn it into something else.
(3) A number of studies have shown mindfulness meditation to be an effective treatment for anxiety disorders.
(4) The key to these forms of assistive technologies seems to be then to allow ourselves to experience a certain amount of anxiety without becoming debilitating.
(5) Rather, one simply notices the anxiety, acknowledges it, labels it, and then turns the focus elsewhere.

[B] Another powerful technology, this one using only breath and awareness, is mindfulness meditation practice (also useful for depression). The practitioner sits in a comfortable position in a chair or on a pillow with feet flat on the floor and back straight. Then, for a period of twenty to thirty minutes or more, she trains her attention on the breath. Perhaps focusing on the rising or falling of the belly, or on the rush of air through the nostrils, she stays in the "now" with the incoming and outgoing of breath.

[C] There is a range of assistive technologies that can help people cope with anxiety. One form of assistive technology is available to help individuals with specific phobia or post-traumatic stress disorder (PTSD). This technology uses virtual-reality computer hardware and software to help desensitize users to their fears by providing them with a gradual exposure to the feared object.

[D] If the mind should wander, the practitioner simply notices what she is experiencing and then returns her attention to the breath. For example, if her mind thinks about some shopping she needs to do later, she would simply notice what she is thinking and perhaps say to herself, "planning, planning," and then return her focus to the breath. For people who are highly anxious, using this technique gives them an opportunity to gain some distance from their experience. If they start to worry about some future event, they can simply label what they're experiencing ("worrying, worrying"), and then go back to being aware of their breathing. The breath serves as an anchor for awareness, and pure awareness is ultimately free of anxiety.

[E] Using a platform and a headset, the person is immersed in a computer-generated environment (both audio and visual) designed to reproduce the real-world setting (e.g., an airplane for fear of flying, an elevator for fear of heights, a combat situation for a person with PTSD). Then the individual is gradually exposed to stimuli from the setting until they get used to that level of stimulation, after which the level is increased in a series of steps. Eventually, the user becomes habituated to the stimuli so that they can take a plane flight or maintain their calm in a hectic environment without triggering PTSD symptoms.

[Adapted from Armstrong, T. (2010) *The Power of Neurodiversity*, Cambridge, MA: Da Capo Press.]

7. Which of the following shows the best (most coherent) sentence order for paragraph [A]?
a. 1–5–3–4–2 b. 2–3–4–1–5 c. 3–2–5–1–4 d. 4–3–5–2–1
8. Which of the following shows the best (most coherent) paragraph order for the passage?
a. A–C–D–B–E b. B–C–D–E–A c. C–E–B–D–A d. D–C–E–A–B

Part IV. Read the texts in Sections A and B, and answer the questions.

Section A: Choose the best option from a – d for questions 1 – 5.

In the analysis of any argument, questions and answers to questions (assertions) should never be isolated from each other. In other words, every argument is really a dialogue, and should be evaluated as such. Every argument has two sides. It is the obligation of an answerer in reasonable dialogue to give an informative and relevant direct answer to a reasonable question if he/she can. If an answerer truly does not know whether the proposition queried is true or false, he/she should have the option, in reasonable dialogue, of replying ‘I don’t know’ or ‘no commitment one way or the other.’ In other words, the ignorant answerer should be able to admit his/her ignorance. For, as Socrates reminded us, the beginning of wisdom is to admit your ignorance if you really don’t know the answer to a question. Hence, any structure of dialogue that does not allow an answerer the (A), in replying to questions, would not be tolerant of wisdom.

The idea that an answerer should concede that he/she doesn’t know the answer, if he/she really doesn’t, is reflected in a traditional fallacy called the *ad ignorantiam* fallacy. Consider the following dialogue:

Elliot: How do you know that ghosts don’t exist?

Zelda: Well, nobody has ever proved that ghosts do exist, have they?

Here, Elliot asks Zelda to give justification for her commitment to the proposition that ghosts do not exist. Zelda answers by shifting the burden of proof back onto Elliot to prove that ghosts do exist. This reply is said to commit the fallacy of arguing from ignorance (*argumentum ad ignorantiam*); just because a proposition has never been proved true, that does not mean that it is false. You cannot argue from ignorance.

Fermat’s Last Theorem in mathematics can be a good illustration of this point. The theorem, written in 1637 stating that it is impossible to separate any power higher than the second into two like powers (no three positive integers a , b , and c satisfy the equation $a^n + b^n = c^n$ for any integer value of n greater than 2), had never been proved true until 1994, when Andrew Wiles and Richard Taylor worked out a proof based on methods developed by other mathematicians. Prior to 1994, it was (B) whether it can be proved that Fermat’s Last Theorem is unprovable.

[Adapted from Walton, D. (2008) *Informal Logic: A Pragmatic Approach*, 2nd Ed., Cambridge, UK: Cambridge University Press.]

1. Which of the following best fits in blank A?
 - a. no-commitment option
 - b. negative-answer option
 - c. positive-response option
 - d. response with wisdom
2. Which of the following arguments meets the definition of the *argumentum ad ignorantiam*?
[I] Proposition A is not known to be true; therefore, A is false.
[II] Proposition A is not known to be false; therefore, A is true.
 - a. I only
 - b. II only
 - c. both I and II
 - d. neither I nor II
3. Which of the following is NOT true of the argument below?
[Some philosophers have tried to prove God does not exist, but they have failed. Therefore, God exists.]
 - a. The argument is not consistent with Socrates’ sense of wisdom.
 - b. The conclusion is similar to Zelda’s response to Elliot’s question in the text.
 - c. The replacement of the conclusion with “Therefore, God does not exist” makes the argument sound.
 - d. The argument is a case of *argumentum ad ignorantiam*.
4. Which of the following best fills in the blank labeled B?
 - a. an appropriate proposition
 - b. an open question
 - c. a disclosed problem
 - d. a challenging issue
5. What could we say about Fermat’s Last Theorem before 1994?
 - a. It had not been proved because it could not be proved.
 - b. All that was known was that it might just be very difficult to prove.
 - c. Mathematics does not allow argument from ignorance.
 - d. Whether a proposition has been proved is analogous to whether it can be proved.

Section B: Choose the best option from a – d for questions 6 – 10.

- I. Statements about the natural numbers can often be regarded as sequences of statements P_n for all n ($n=1, 2, 3, \dots$).
- II. The principle of mathematical induction states: Given any statement about the natural numbers P_n , if the following conditions hold:
 1. P_1 is true.
 2. Whenever P_k is true, P_{k+1} is true.
 Then P_n is true for all n .
- III. We can apply the principle of mathematical induction to a sequence of statements P_n as follows:
 1. Write out the statements P_1 , P_k , and P_{k+1}
 2. Show that P_1 is true.
 3. Assume that P_k is true. From this assumption (it is never (A) to prove P_k explicitly), show that the truth of P_{k+1} follows. This proof is often called the *induction step*.
 4. Conclude that P_n holds for all n .
- IV. We now prove the statement P_n : $1 + 2 + 2^2 + \dots + 2^{n-1} = 2^n - 1$ by mathematical induction using the steps outlined in III.

P_1 is the statement $1 = 2^1 - 1$,

P_k is the statement $1 + 2 + 2^2 + \dots + 2^{k-1} = 2^k - 1$,

P_{k+1} is the statement $1 + 2 + 2^2 + \dots + 2^{(k+1)-1} = 2^{k+1} - 1$, which can be rewritten as

$$1 + 2 + 2^2 + \dots + 2^{k-1} + 2^k = 2^{k+1} - 1$$

Now P_1 is true, since $1 = 2^1 - 1 = 2 - 1 = 1$ is true. Assume the truth of P_k and, comparing it to P_{k+1} , note that the left side of P_{k+1} differs from the left side of P_k only by the single additional term (B). Hence, starting with P_k , add 2^k to both sides.

$$1 + 2 + 2^2 + \dots + 2^{k-1} = 2^k - 1$$

$$1 + 2 + 2^2 + \dots + 2^{k-1} + 2^k = 2^k + 2^k - 1$$

Simplifying the right side yields:

$$2^k + 2^k - 1 = 2 \cdot 2^k - 1 = 2^1 \cdot 2^k - 1 = 2^{k+1} - 1, \text{ thus}$$

$$1 + 2 + 2^2 + \dots + 2^{k-1} + 2^k = 2^{k+1} - 1$$

holds. But this is (C) the statement P_{k+1} . Thus the truth of P_{k+1} (D) from the truth of P_k . Thus, by the principle of mathematical induction, P_n holds for all n .

[Adapted from Safier, F. (2013) *Precalculus*, Third Ed., New York City: The McGraw-Hill Companies, Inc.]

6. Which of the following is closest in meaning to “induction” in the text?
 - a. a method of discovering general rules and principles from particular facts and examples
 - b. the process of using information you have in order to find the answer to a problem
 - c. the act of bringing something into use or existence for the first time
 - d. a means of reaching specific facts and examples from general statements and guidelines
7. Which of the following best fits in blank A?

a. possible	b. necessary	c. easy	d. conditional
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8. Which of the following best fits in blank B?

a. 2	b. 2^{k-1}	c. 2^k	d. 2^{k+1}
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9. Which of the following best fits in blank C?

a. eventually	b. precisely	c. accurately	d. properly
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10. Which of the following best fits in blank D?

a. follows	b. induces	c. deduces	d. precedes
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Part V. Answer the questions.

For questions 1 – 15, two definitions are given, each with one sample sentence. Think of a word that matches both definitions and also fits in the blanks in both sentences. Convert each letter of the word into a number 1 to 4 according to the table below: number 1 represents letters a – g, 2 represents h – m, 3 represents n – s, and 4 represents t – z. Then choose the matching sequence of numbers from options a – d. For example, if the word you think of is *wise*, for which the first letter *w* is given, the remaining letters would be changed into 2 for *i*, 3 for *s*, and 1 for *e*. Hence, the correct answer would be *w231*.

Number	Letters
1	a, b, c, d, e, f, g
2	h, i, j, k, l, m
3	n, o, p, q, r, s
4	t, u, v, w, x, y, z

- (i) the desire to know about something: The news about a new type of solar cell aroused a lot of (c) among the Japanese people.

(ii) a person or thing that is interesting because they are unusual: This discovery is a scientific (c) and will be examined by many scientists.

a. c331133 b. c144233 c. c122 d. c43233244
- (i) a piece of writing about a subject in a newspaper or magazine: Have you read this (a) about last week's disaster?

(ii) an item in a law or a legal agreement: We all know that the ninth (a) of the Japanese constitution is about renouncing war as a means of settling international disputes.

a. a3142134 b. a33343112134 c. a14233 d. a342121
- (i) a talk given to a group of people to teach them about a particular subject: All science and engineering students are required to attend a series of (l)s on research ethics.

(ii) a long angry talk to someone who has done something wrong: I know I should stop wasting money. Don't give me a (l) about it.

a. l114431 b. l13333 c. l311 d. l1314111
- (i) a calm and controlled manner in a difficult situation that deserves respect or the ability to behave in such a manner: John accepted all the criticism with quiet (d).

(ii) the fact of being respected or honored by people: Terminally ill patients should be allowed to die with (d).

a. d23112211 b. d11114 c. d213244 d. d1142
- (i) the lowest part of something: Mary was standing at the (b) of the stairs.

(ii) the lowest position in a group or organization: Immigrants tend to be put at the (b) of the social ladder.

a. b112 b. b121311 c. b13213 d. b34432
- (i) an important topic that people are arguing about: She usually writes about environmental (i)s.

(ii) a problem or worry that somebody has: I don't think my private life is the (i) here.

a. i3341 b. i132414 c. i2113421 d. i44132141
- (i) very large or important: There are calls for (m) changes to our old system.

(ii) the main subject or course of a college student: My (m) is chemistry.

a. m1233 b. m3214 c. m2342113 d. m134112
- (i) a particular length of time: This offer is available for a limited (p) only.

(ii) any of the parts that a day is divided into at a school: "What do you have next (p)?" "Physics."

a. p13231 b. p12332 c. p42123 d. p3342

9. (i) a strong belief that influences your actions: I refuse to lie about it. It's against my (*p*)s.
 (ii) a rule or law that something is based on: There are three fundamental (*p*)s of teamwork.
 a. *p3332134* b. *p2114321* c. *p41332* d. *p32312321*
10. (i) a careful study of a subject in order to discover new facts: The team carried out extensive (*r*) into renewable energy sources.
 (ii) to study something carefully and try to discover new facts: We have to (*r*) how the product will actually be used.
 a. *r1311312* b. *r4321332* c. *r322321* d. *r24444*
11. (i) a place or a person that you get something from: Your college library is always a useful (*s*) of information.
 (ii) a person or thing that causes something, especially a problem: The recent name change has been the (*s*) of confusion.
 a. *s412443* b. *s3214* c. *s2342113* d. *s34311*
12. (i) to gain something by your own efforts: You will (*a*) a good knowledge of English by taking our course.
 (ii) to obtain something by buying or being given it: You need to (*a*) a new e-mail address as soon as possible.
 a. *a134231* b. *a12332* c. *a3342* d. *a21344*
13. (i) relating to or happening in one particular country and not involving any other countries: Japan's (*d*) market is contracting due to its decreasing population.
 (ii) relating to family relationships and life at home: They sell a wide range of (*d*) appliances such as washing machines and dishwashers.
 a. *d41332* b. *d1321223* c. *d3213421* d. *d2114321*
14. (i) to decide something after considering all the information you have: We will soon (*c*) from our studies that equality between the sexes is a long way off.
 (ii) to end something by saying or doing one final thing: To (*c*), I'd like to express my thanks to my family.
 a. *c3312411* b. *c432133* c. *c13222* d. *c2444221*
15. (i) to give a piece of writing to someone in authority for them to consider: You must (*s*) your application by the end of this month.
 (ii) to agree to obey someone or to go through a process, especially when you have no choice: The suspect agreed to (*s*) to questioning.
 a. *s13222* b. *s432133* c. *s41224* d. *s244422*

[End of Exam]

