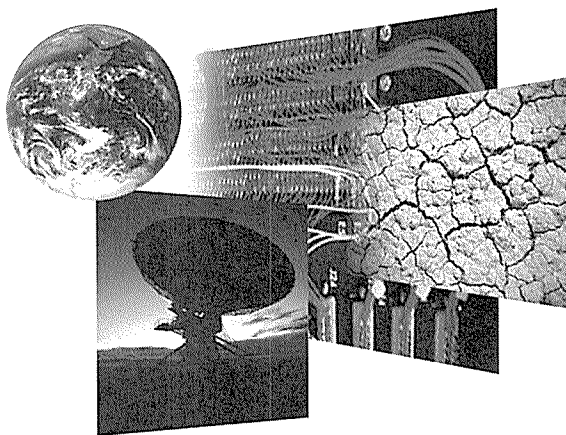


The Wonders of Science and Technology

Akiko Miyama
Stephen M. Ryan
William Figoni
Atsushi Mukuhira
Tomoko Tsujimoto



SANSHUSHA

はじめに

現代はハイテク時代。どのような分野で働こうと、科学技術に無知では通用しません。当然、国際化の今、交渉や売り込みや説明の場で技術関係に使われる英語が必要とされ、人々の耳に頻繁に届いてきます。そのような状況に対応できるように練り上げたのがこの書です。すなわち理工科系、文科系を問わず、現代の学生が充分興味を持てる最も今日的な、最先端の科学技術のトピックを扱った英文素材を精選結集し、「時代が求める実用英語力」を身につけるべく図ったテキストです。

ここで強調したいのは、それらの素材が英字新聞、科学雑誌、科学専門書、論文、ニュース雑誌など多岐のジャンルにわたっており、それぞれのジャンルに適した読解力が身に付くように練習問題が工夫されている点です。この「ジャンル別読解力」の養成こそ、この書の狙いであり、最大の特徴でもあります。

以下に本書の構成と使用上の若干の注意点を述べます。

Prediction I, II

図版、写真、表、グラフ等で、Readingのセクションで扱われるトピックの読解に必要な語彙や背景知識を養います。

ここではできるだけ辞書を引かずに解答して、Readingセクションにとりかかる前のwarm-upを行って下さい。

Reading

Predictionのセクションで、長文を読むための準備運動が出来ているはずですから、未知の単語を全て辞書を引きながら読むのではなく、背景知識を利用して、推理を働かせて読む練習を行って下さい。

Comprehension I

主としてTrue or False, Multiple Choice, Question & Answerの形式で、Readingセクションで取り上げた英文が理解できているかどうかを問います。

Comprehension II

Readingセクションで取り上げたトピックに関連した別の記事や、将来仕事の現場で必要となるような仕様一覧、注文書、アンケート、報告書、論文抄録など特殊な英文素材を取り上げ、応用問題としています。

既出の語注は、後半の章では省かれています。また、前半の章で扱った背景知識を利

用するとより良く理解できる内容のものは、後半の章に廻すなど、知識の蓄積に応じて達成感が得られるように問題の種類や章の配列を工夫していますので、並べられている章の順序に従って学習して下さい。

当テキストを学べば、時代に即した幅広い科学技術の知識が得られると同時に、ジャンル別読解力の基礎固めができるものと確信しております。

1999年 春

著者

CONTENTS

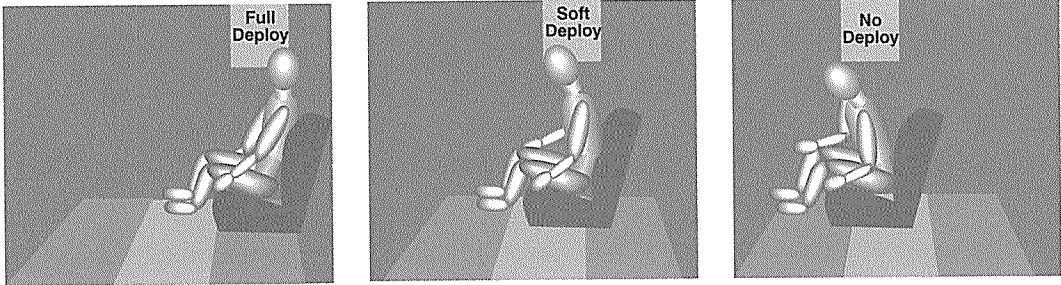
- Unit 1 賢いエアーバッグ /7
- Unit 2 未来への入り口：新京都駅ビル /11
- Unit 3 転ばぬ先の杖 /15
- Unit 4 ダイアナの遺言 /19
- Unit 5 誰もが宇宙へ行ける日 /23
- Unit 6 広告は情報の宝庫 /27
- Unit 7 対ガン戦士「遺伝子」 /31
- Unit 8 インターネット電話時代到来 /35
- Unit 9 あら探しの達人 /39
- Unit 10 スタイルが大切 /43
- Unit 11 コミュニケーションの新しいカタチ /47
- Unit 12 エルニーニョの共犯者 /51
- Unit 13 水が危ない /55
- Unit 14 限りなくクリアーな世界 /59
- Unit 15 臓器工場も夢じゃない /63
- Unit 16 もっと速く! —次世代チップ /67
- Unit 17 地球に優しい生物燃料 /71
- Unit 18 ミクロの激突 /75
- Unit 19 省エネビルディング登場 /79
- Unit 20 論争のすすめ /83



Unit 1 賢いエアバッグ

●● Prediction I

車の衝突事故の際に、座席の下に仕掛けられた圧電性のセンサーはどのようにエアバッグの作動をコントロールするか。下の写真とキャプションを参考に、日本語で答えなさい。



Sensors such as the piezoelectric sheet under the seat deploy an air bag more softly or deactivate it if the passenger is in a potentially dangerous position. (Mechanical Engineering)

●● Prediction II

次の1～4は、エアバッグを作動させるかどうかを決定するために、座っている人の位置を特定するセンサーである。各センサーの説明文をA～Dの中から選び、()に記入しなさい。

1. () ultrasonic sensor 2. () infrared sensor
 3. () weight sensor 4. () capacitive sensor

- A. The sensor perceives an invisible beam as a spot on an occupant. The system operates in real time, so it can adjust if the passenger moves around.
 B. The sensor can tell that something is on the seat but gives no indication as to whether the weight is a person or an object. Furthermore, it cannot determine an occupant's position.
 C. A low-power signal from the car causes the resonator to send a reply signal. If the system receives this signal, it knows not to activate the air bag.
 D. The sensor detects the change of the field capacitance caused by the presence of a human. Therefore, the system will never mistake an object for a passenger.

Notes: ultrasonic [超音波の] infrared [赤外線の] capacitive [(静電)容量性の] resonator [共鳴器]

●● Reading

Sensors Help Make Air Bags Safer

By Greg Paula

First installed in 1986 in some luxury cars, air bags are now standard equipment in virtually every automobile sold in the United States. Essentially a nylon pouch folded up like a parachute, the bag is intended to supplement the seat belt by cushioning the passenger during a crash.

5 Air bags, however, are also highly controversial because they have killed 67 people and injured more with severe trauma to the neck and head. Most victims have been either children or small women riding in the passenger seat. Critics contend that air bags are unnecessary and seat belts are enough to maximize passenger safety. They also claim that the deployment threshold set by some air-bag manufacturers is too low,
10 and air bags inflate too quickly.

Proponents of the device are quick to point out that air bags are credited with saving 1,900 lives so far. The apparent recent increase in the number of deaths, they say, is due more to the higher number of vehicles equipped with air bags than to the bags becoming less safe. Most importantly, almost every person killed by an air bag was not
15 wearing a seat belt.

Although virtually all of the bag's safety problems would be eliminated if passengers wore seat belts, auto manufacturers are redesigning air-bag systems around the fact that not all passengers do. Most safety improvements revolve around sensor-based systems that detect the size and position of the passenger seat's occupant and prevent the air
20 bag from deploying if there is the potential for harm.

Meanwhile, several measures are being taken to address safety concerns. For example, the Ford Motor Co. in Dearborn, Mich., is among the U.S. automakers working on making its bags deploy more softly, which will increase safety for children and small women. This action follows a ruling by the National Highway Traffic Safety
25 Administration (NHTSA) that allows automakers to reduce air-bag power by 20 to 35 percent.

When air bags were first designed, the inflation speed was optimized to provide the highest level of protection for an average-size adult not wearing a safety belt in a 30-mile-per-hour crash. Therefore, although depowered bags provide more protection for
30 smaller passengers, they are less effective for average and large adults. Vehicles of 1998 model year will be the first to have the air bags depowered along NHTSA guidelines.

(Mechanical Engineering)

Notes: pouch 「袋」 fold 「折り畳む」 supplement 「補助する」 trauma 「損傷」 the deployment threshold

「(エアバッグを)膨らますかどうかの限界」 proponent 「支持者」 eliminate 「取り除く」 revolve around ～
「～を中心課題とする」 detect 「検知する」 passenger seat's occupant 「助手席に座っている人」 concerns
「事柄」 be optimized to ～ 「～するのに最適にする」 depower 「威力を減ずる」

●○○ **Comprehension I**

次の1～7の英文が、本文の内容に合っている場合はT(True)を、合っていない場合はF(False)を()に記入しなさい。

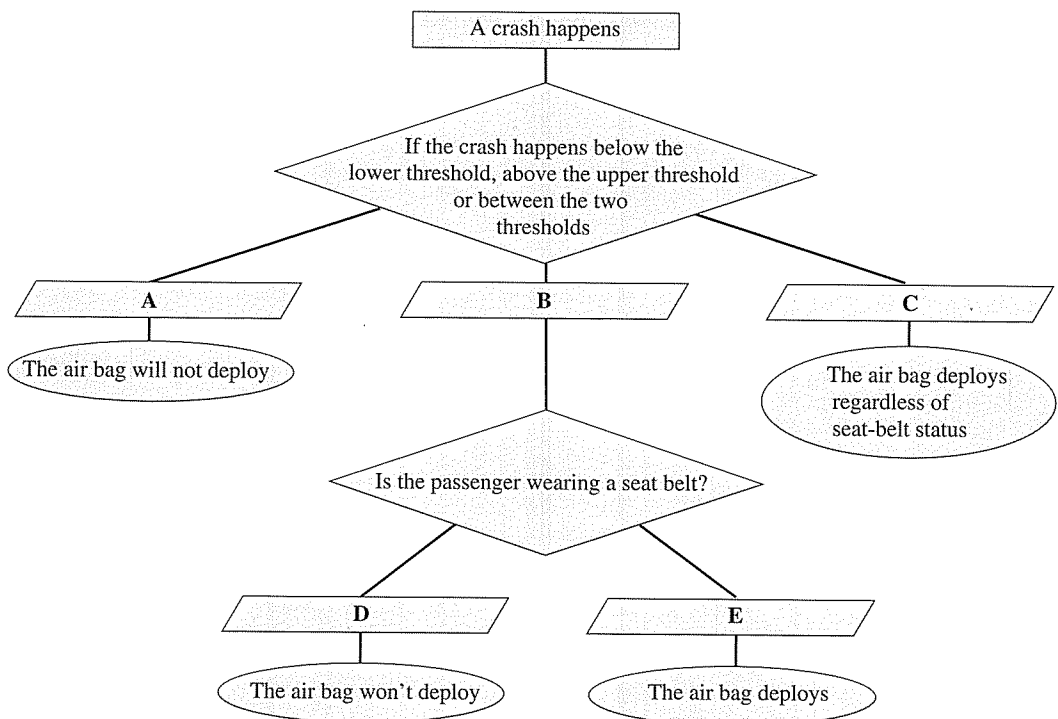
1. () More than 10 years have passed since air bags were installed in every car.
2. () Children or small women are subject to air-bag accidents.
3. () The deployment threshold set by some air-bag manufacturers is low enough to ensure passenger safety.
4. () The number of deaths caused by air-bag accidents is increasing due to the bags becoming less safe.
5. () Sensor-based systems deactivate an air bag in potentially dangerous cases.
6. () In an attempt to address safety concerns, auto manufacturers try to design air-bag deployment systems.
7. () Depowered air bags are designed for average and large adults.

Comprehension II

フローチャートの書き方を説明した英文1を参考にして英文2を読み、チャートのA～Eに適切な語句を記入しなさい。

1. A flow chart indicates different processes by using frames of different shapes. A rectangle shows something happens and a diamond indicates something should be decided. A parallelogram indicates possible decisions. The end of the chart is represented by an oval-shaped frame.
2. Some automakers already have systems in place that make air bags safer. For example, Mercedes Benz in Montvale, N. J., has a dual-threshold system that considers not only how severe the crash is but also whether the passenger is wearing a seat belt. If the crash happens below the lower threshold, the air bag will not deploy. Between the two thresholds, the bag deploys if the passenger isn't wearing a seat belt, but it won't deploy if the passenger is belted. (A simple electrical circuit tells the system that the seat belt is buckled or unbuckled.) The bag deploys regardless of seat-belt status if the crash occurs above the upper threshold.

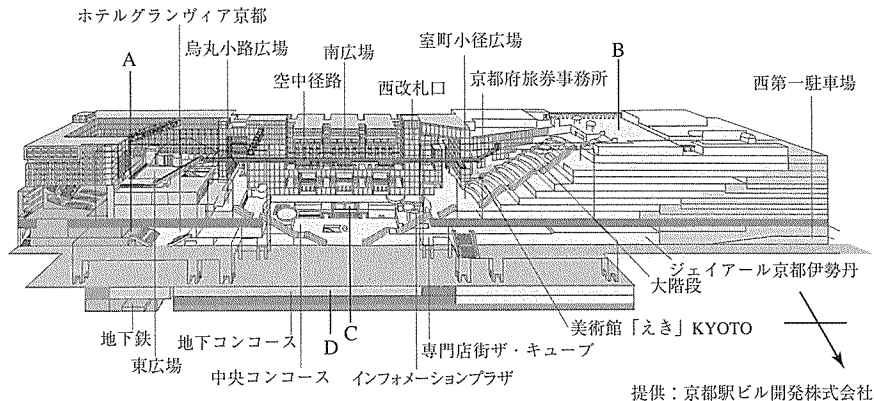
Mercedes Benz's Dual-Threshold System



Unit 2 未来への入り口：新京都駅ビル

●● Prediction I

次の図は新しい京都駅ビルの概観である。下記1～4の下線部の施設は、図中のA～Dのどれにあたるか。それぞれ1つ選び、記号で答えなさい。



1. () Passengers on international flights operated by Japan Airlines and Japan Asia Airways can check in at the Kyoto CAT (City Air Terminal) located on the first floor of the basement of the building, beneath the Central Concourse.
2. () If passengers go up a long staircase with 171 steps at the station's west side, then they can really relax in the Sky Garden with a wonderful view of the city.
3. () Automatic ticket barriers are installed at all of the station's entrances and exits, of course, including the Karasuma central entrance facing the Central Concourse.
4. () The latest technology is used to provide visitors with entertainment in the form of live performances, art exhibitions and films at the Theater 1200, which occupies the lower part of the station's far east side.

Notes: basement 「地下」 ticket barrier 「改札機」 install 「設置する」

●● Prediction II

次の語句や英文を正しく発音しなさい。

1. July 12 2. the 21st century 3. in 1877 4. the 60-meter tall station
5. the 4,000-square-meter Concourse
6. The passage is 240 meters long and 12 meters wide.
7. The height varies between 3.8 meters and 6.4 meters.

The New Kyoto Station

Kyoto—The new Kyoto Station complex, which is being hailed as a gateway to the ancient capital and beyond, partially opened amid great fanfare in the city's Shimogyo Ward on July 12.

The West Japan Railway Co. has equipped the new station with new facilities such as automatic ticket barriers and a check-in counter for passengers taking international flights from Kansai International Airport. Quite apart from its role as a place to board and disembark from trains, JR West is promoting the new station as a model public space for the 21st century that attaches as much importance to the comfort and well-being of passengers as it does to an efficient train service.

The new station building is the fourth addition to the original two-story brick structure completed in 1877. The new building, with 16 stories above ground and three below, was designed by architect Hiroshi Hara with a view to fostering a sense of drama for travelers passing through the station.

The station's exterior is made of glass and metal panels that allow natural light to pass into the vastness of the building's interior.

The central feature of the interior is the 4,000-square-meter Central Concourse. The highest point of the concourse is about 50 meters above ground and is sheltered by an enormous glass roof.

The station's Karasuma entrance in the north is linked with the Hachijouguchi entrance for Shinkansen trains in the south via a pedestrian passage on the second floor. The passage is 240 meters long and 12 meters wide. The height of the ceiling varies between 3.8 meters and 6.4 meters.

Previously, the north and south entrance to the station were linked by a single passage located at the east side of the station. However, the passage was only open while services on the Karasuma subway line were in operation. As a result, commuters arriving early in the morning or late at night while the subway was still closed were forced to make long detours to cross from the south to the north side of the station.

The new pedestrian passage leads directly to a bus terminal situated in front of the station's Karasuma entrance.

The passage is dotted with coffee shops, bakeries, cafes, pharmacies, souvenir shops and other stores. Apart from its practical role linking the station's main exits, JR West officials hope the passage will become a place where travelers and other visitors to the station can relax or do some shopping. A tourist information center can be found near the passage.

(The Daily Yomiuri)

Notes: Kyoto Station complex 「京都駅ビル」 be hailed as ~ 「～としての呼び声が高い」 a gateway to the ancient capital and beyond 「古都と新時代に向かう門」 equip A with B 「AにBを設置する」 facility 「施設」 disembark 「降りる」 foster 「呼び起こす」 shelter 「おおう」 commuter 「通勤客」 make detours 「遠回りをする」 dot 「点在する」 pharmacy 「薬局」

●○○ **Comprehension I**

次の1～7の英文が、本文の内容に合っている場合はT (True) を、合っていない場合はF (False) を()に記入しなさい。

1. () JR West is promoting the new station as a place to board trains leading to the 21st century.
2. () Concrete was used to construct the first Kyoto Station.
3. () What the architect of the new station intended is to provide every traveler with a chance of becoming an actor.
4. () Natural light passes through the enormous glass roof into the Central Concourse.
5. () The bus terminal in front of the Karasuma entrance is connected with the south entrance for the Shinkansen by the new pedestrian passage.
6. () The new station is more convenient than the old one for commuters who want to cross the station building when the subway is closed.
7. () Travelers cannot do any shopping in the shops dotted along the new passage without a travel ticket.

●● Comprehension II

次の1～5の数式を英文に、6～10の英文を数式に直しなさい。

1. $12 + 11 = 23$

2. $8 \times 17 = 136$

3. $X + Y > Z$

4. $3x - 5y \leq z$

5. $20 \div 4 = 5$

6. Forty minus nineteen is twenty-one.

7. Two hundred (and) ten divided by fifteen is fourteen.

8. R minus S is less than T.

9. Two X times seven Y is greater than or equal to Z.

10. W squared minus X cubed equals Y to the power of four, plus Z.



Unit 3 転ばぬ先の杖

●● Prediction I

次の表にタイトルをつけたい。1～4の中から最も適当なものを選びなさい。

Recommendation	Estimated cost	What has happened
Review security systems at airports	\$5.5 million	41 of 450 airports were checked by various government agencies; checks continue.
Install advanced explosives-detection machines in airports	\$161.3 million	54 of the most advanced machines were bought, but only two are in use.
Expand the use of bomb-sniffing dogs	\$8.9 million	114 teams have been funded; training and assignments are under way.
Certify companies that provide security	\$5.3 million	The FAA is developing a process to raise standards of crews that screen carry-on bags.

Source: USA Today research

Notes: FAA=Federal Aviation Administration carry-on bag「機内持ち込み手荷物」

1. Fund-Raising Project for Airport Security
2. Airport Security Project: A Progress Report
3. Airport Security Technology
4. Airport Security Proposals

●● Prediction II

次の英文は、空港における荷物のセキュリティ・チェックについて書かれたものである。1～4の()に当てはまる適当な語をA～Dの中から選び、記入しなさい。

Bag matching ensures that every piece of luggage in the cargo bay belongs to a (1:) on board. Aviation officials know that a (2:) could send a bomb into the belly of a plane by simply checking in a piece of luggage and leaving the airport. Currently, bags are matched on international flights, which allot more time to prepare for departure. But airline officials, who oppose bag matching on (3:) flights, say the nation's air (4:) system does not allow enough time to remove bags of passengers who do not get on planes.

- A. terrorist B. passenger C. travel D. domestic

Airport Security

Make sure there's a passenger for every suitcase loaded into a jet. Consider every passenger a possible threat. Require FBI checks of new airport workers. These proposals and more have been hotly debated since the Aviation Safety and Security Commission started work July 25 to make the skies safer. Now the commission's work
5 is ending. A final report and recommendations could come as early as this week.

The commission has said it wants a \$10 million automated profiling system to find passengers who are security threats. Airline workers already profile passengers by comparing what they know about a customer to several known characteristics of terrorists.

10 For example, a passenger who pays cash for a one-way ticket should trigger a warning at the ticket counter. Passengers who admit they didn't pack their own bags or say they're carrying packages given to them by strangers should trigger warnings at baggage check-in.

With computerized profiling, the ticket agent could get help. More than 100 warning
15 signs would be checked at various points of a passenger's trek through the airport. For example, a warning flag might appear on an agent's computer screen when a passenger pays cash for a one-way ticket. If the passenger also has no previous record with the airline and requests a suspicious destination, a higher alert is given. The computer would assign that passenger a rating that every airline worker could see: from the ticket
20 counter to security office at headquarters to baggage handling.

Each could perform different security checks. Baggage handlers could put luggage through explosives detection devices. Security agents in the terminal could search carry-on bags and ask more questions. Security experts say only 1% of passengers pose enough of a threat to warrant intense scrutiny. Frequent fliers who are known to the air-
25 lines can usually safely be eliminated from higher levels of scrutiny. Northwest Airlines already is using an automated profiling system that may be expanded across the nation.

Concerns about terrorism are so high that the commission also talked about requiring missile defense systems aboard some jets. One way to defend against a missile is
30 through a flare device placed on the jet's wings. If a heat-seeking missile is detected by sight or radar, pilots can send off flares as decoy targets.

(USA Today)

Notes: threat 「危険人物」 profiling 「プロファイリング」人物の特性を描き出す trigger a warning 「警戒信号を發する」 trek 「移動」 alert 「警戒態勢」 assign a rating 「判定する」 detection device 「探知装置」

intense scrutiny 「非常に詳しい検査」 flare 「照明弾」 heat-seeking missile 「熱赤外線追跡ミサイル」 decoy target 「おとり」

●○○ **Comprehension I**

本文を読み、下の1～4に続くものをA～Cの中から選びなさい。

1. An automated profiling system ()
 - A. can detect a passenger's destination.
 - B. can predict a possible threat.
 - C. can detect a heat-seeking missile.

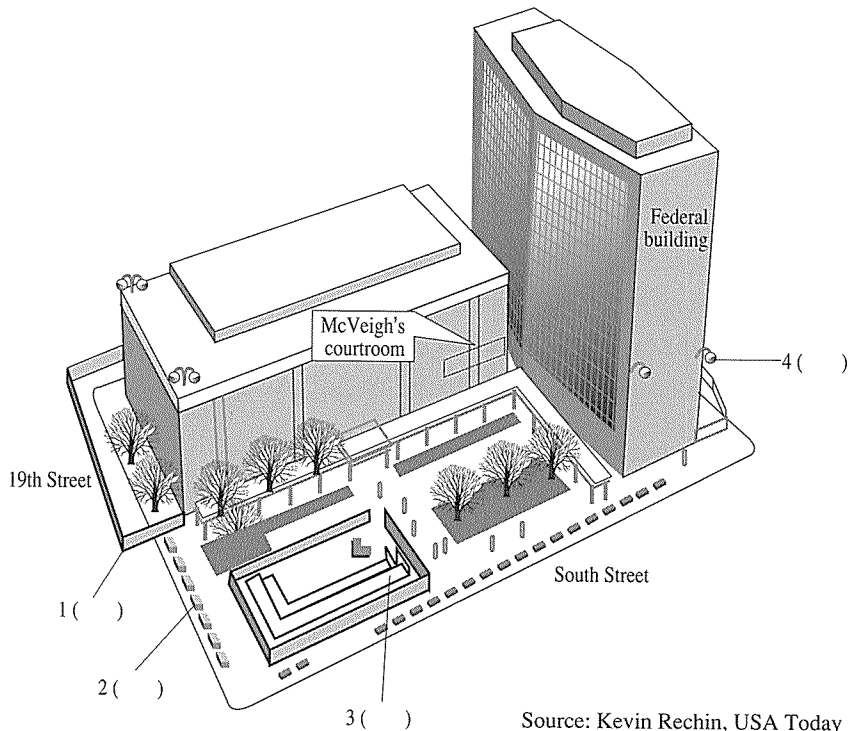
2. It is likely that passengers ()
 - A. who buy one-way tickets with cash are a security threat.
 - B. who packed their own bags are a security threat.
 - C. who have previous records with the airline are a security threat.

3. Warning signs are checked ()
 - A. at ticket counters.
 - B. at the Aviation Safety and Security Commission Office.
 - C. only on the plane.

4. Missile defense systems defend against missiles ()
 - A. by using the automated profiling system.
 - B. through a flare device.
 - C. through explosives detection devices.

●●● Comprehension II

次の図は、アメリカ合衆国連邦ビル爆破事件の犯人の裁判を行う裁判所のセキュリティ・システムを図解したものである。図中の1～4の場所は、どのようなセキュリティの措置がとられているか。適当な説明文をA～Dの中から選び、()に記入しなさい。



Source: Kevin Rechin, USA Today

- A. Bulb-shaped cameras provide a 360-degree view of the area.
(Placement: On corners of the courthouse buildings and the federal building)
- B. Eighty-eight rectangular planters are filled with rocks and dirt and weigh more than 1,000 pounds each.
(Placement: Around the entire front courtyard and at all entrances to prevent vehicles from getting through)
- C. Barriers block off what would have been a parking lane along one side and the back of the courthouse.
- D. The media area, where daily news conferences will be staged, is ringed with portable metal fences and has only one entrance.