LỜI GIỚI THIỆU

Chào các bạn,

Các bạn đang cầm trên tay cuốn “Boost your vocabulary” được biên soạn bởi mình và bạn Dương Nguyễn. Cuốn sách được viết nhằm mục đích giúp các bạn đang muốn cải thiện vốn từ vựng cho phần thi Reading trong IELTS. Sách được viết dựa trên nền tảng bộ Cambridge IELTS của Nhà xuất bản Đại học Cambridge – Anh Quốc.

Từ lúc mình lên ý tưởng cho cuốn sách này đến khi cùng bạn Dương Nguyễn bắt đầu thực hiện, mình đã mất tương đối nhiều thời gian để nghiên cứu cách thức đưa nội dung sao cho khoa học và dễ dùng nhất với các bạn đọc. Tuy vậy, cuốn sách không khỏi có những hạn chế nhất định. Mọi góp ý để cải thiện nội dung cuốn sách mọi người xin gửi về email **thangwrm@gmail.com**

Trân trọng cảm ơn,


dinhthangielts

NHÓM THỰC HIỆN

Đinh Thắng

Hiện tại là giáo viên dạy IELTS tại Hà Nội với các lớp học quy mô nhỏ (dưới 10 người) từ cuối năm 2012. Chứng chỉ ngành ngôn ngữ Anh, đại học Brighton, Anh Quốc, 2016.Từng làm việc tại tổ chức giáo dục quốc tế Language Link Việt Nam (2011-2012)

Facebook.com/dinhthangielts

Dương Nguyễn

Cựu sinh viên K55 Đại học Kinh tế Quốc Dân Hà Nội.

Facebook.com/duong.nguyen.9216778

Tài liệu gốc Cambridge IELTS của NXB Đại học Cambridge-Mua sách gốc tại link
Biên tập cuốn sách Boost your vocabulary này được thực hiện bởi IELTS Family-Các nhóm tự học IELTS

03 LÝ DO TẠI SAO NÊN HỌC TỪ VỰNG THEO CUỐN SÁCH NÀY

1. Không còn mất nhiều thời gian cho việc tra từ

Các từ học thuật (academic words) trong sách đều có kèm giải thích hoặc từ đồng nghĩa. Bạn tiết kiệm được đáng kể thời gian gõ từng từ vào từ điển và tra. Chắc chắn những bạn thuộc dạng "không được chăm chỉ lắm trong việc tra từ vựng" sẽ thích điều này.

2. Tập trung bộ nhớ vào các từ quan trọng

Mặc dù cuốn sách không tra hết các từ giúp bạn nhưng sách đã chọn ra các từ quan trọng và phổ biến nhất giúp bạn. Như vậy, bạn có thể tập trung bộ nhớ vào các từ này, thay vì phải mất công nhớ các từ không quan trọng. Bạn nào đạt Reading từ 7.0 trở lên đều sẽ thấy rất nhiều trong số các từ này thuộc loại hết sức quen thuộc

3. Học một từ nhớ nhiều từ

Rất nhiều từ được trình bày theo synonym (từ đồng nghĩa), giúp các bạn có thể xem lại và học thêm các từ có nghĩa tương đương hoặc giống như từ gốc. Có thể nói, đây là phương pháp học hết sức hiệu quả vì khi học một từ như impact, bạn có thể nhớ lại hoặc học thêm một loạt các từ nghĩa tương đương như significant, vital, imperative, chief, key. Nói theo cách khác thì nếu khả năng ghi nhớ của bạn tốt thì cuốn sách này giúp bạn đấy số lượng từ vựng lên một cách đáng kể.

HƯỚNG DẪN SỬ DỤNG SÁCH

ĐỐI TƯỢNG SỬ DỤNG SÁCH

Nhìn chung các bạn cần có mức độ từ vựng tương đương 5.5 trở lên (theo thang điểm 9 của IELTS), nếu không có thể sẽ gặp nhiều khó khăn trong việc sử dụng sách này.

CÁC BƯỚC SỬ DỤNG

Bước 1: Bạn in cuốn sách này ra. Nên in bìa màu để có thêm động lực học. Cuốn sách được thiết kế cho việc đọc trực tiếp, không phải cho việc đọc online nên bạn nào đọc online sẽ có thể thấy khá bất tiện khi tra cứu, đối chiếu từ vựng

Bước 2: Tìm mua cuốn Cambridge IELTS (6 cuốn mới nhất từ 6-12) của Nhà xuất bản Cambridge để làm. Hãy cẩn thận đừng mua nhầm sách lậu. Sách của nhà xuất bản Cambridge được tái bản tại Việt Nam thường có bìa và giấy dày, chữ rất rõ nét.

Bước 3: Làm một bài test hoặc passage bất kỳ trong bộ sách trên. Ví dụ passage 1, test 1 của Cambridge IELTS 12.

Bước 4: Đối chiếu với cuốn sách này, bạn sẽ lọc ra các từ vựng quan trọng cần học.

Ví dụ passage 1, test 1 của Cambridge IELTS 12, bài về CORK: Bạn sẽ thấy

4.1 Cột bên trái là bản text gốc, trong đó gạch chân các từ vựng học thuật CƠ BẢN trong list 570 academic word mà nhiều bạn chắc đã từng nghe nói đến.

4.2 **Cột bên phải chứa các từ vựng học thuật (academic words) theo kèm định nghĩa (definition) hoặc từ đồng nghĩa (synonym)**

Trong đó các từ đóng vai trò quan trọng trong việc giúp người đọc hiểu nội dung của text (important words) được giải thích. Các từ này có thể nằm trong hoặc không nằm trong list 570 từ phía trên.

Nguyên nhân vì

- Khá nhiều từ trong list 570 từ vựng thuộc loại rất phổ biến (VD: individual, structure, technology, energy, v.v…) nên các từ này tất nhiên không được giải thích ở cột bên phải.

- Khổ giấy có hạn, rất khó để trình bày hết các từ. Giả sử trình bày hết các từ thì trông cũng rất rối. Ở đây cuốn sách đặc biệt phục vụ cho các bạn đang ở tầm 6.5-7.0 về từ vựng.

** Tài liệu này nên được in ra để thuận tiện cho việc học*

*** Lúc học, nên dùng kèm bút highlight/bút đỏ/bút chì để đánh dấu từ, như vậy sẽ đỡ bận mắt lúc đọc và tra cứu.*

**** Tránh mua/bán tài liệu này dưới mọi hình thức.*

Cambridge 10
Test 1
READING PASSAGE 1

Stepwells

A millennium ago, stepwells were fundamental to life in the driest parts of India. Although many have been **neglected**, recent **restoration** has returned them to their **former glory**. Richard Cox travelled to north-western India to document these **spectacular monuments** from a **bygone** era.
During the sixth and seventh centuries, the **inhabitants** of the modern-day states of Gujarat and Rajasthan in North-western India developed a method of gaining access to clean, fresh groundwater during the dry season for drinking, bathing, watering animals and **irrigation**. However, the significance of this invention – the stepwell – goes beyond its **utilitarian** application.

Unique to the region, stepwells are often architecturally complex and vary widely in size and shape. During their **heyday**, they were places of gathering, of leisure, of relaxation and of worship for villagers of all but the lowest **castes**. Most stepwells are found dotted around the desert areas of Gujarat (where they are called vav) and Rajasthan (where they are known as baori), while a few also survive in Delhi. Some were located in or near villages as public spaces for the community; others were **positioned** beside roads as resting places for travellers.

As their name suggests, stepwells **comprise** a series of stone steps **descending** from ground level to the water source (normally an underground aquifer) as it recedes following the rains. When the water level was high, the user needed only to descend a few steps to reach it; when it was low, several levels would have to be **negotiated**.

Some wells are vast, open **craters** with hundreds of

Neglect= ignore, abandon…

Restoration= repair, renewal…

Former= ex, previous, past…

Glory= when something is beautiful and impressive in appearance.

Spectacular= fantastic, stunning, amazing, impressive, fabulous…

Bygone= past, former, previous…

Inhabitant= citizen, resident…

Monument= a building, statue, or other large structure that is built to remind people of an important event or famous person.

Irrigate= to supply land or crops with water.

Utilitarian= useful, practical, effective…

Unique= sole, only one of its kind, distinctive…

Heyday= peak of your success, glory days, prime= the time when someone or something was most popular, successful, or powerful.

Caste= social class in India.

Position= locate, situate, place…

Comprise= include, contain, consist of…

Descend= go down, move down, tumble down…

Negotiate= consult, discuss…

Crater= hole.

steps paving each sloping side, often in **tiers**. Others are more **elaborate**, with long stepped passages leading to the water via several storeys built from stone and supported by **pillars**, they also included **pavilions** that **sheltered** visitors from the **relentless** heat. But perhaps the most impressive features are the **intricate** decorative **sculptures** that **embellish** many stepwells, showing activities from fighting and dancing to everyday acts such as women combing their hair and churning butter.

Down the centuries, thousands of wells were constructed throughout northwestern India, but the majority have now fallen into disuse; many are **derelict** and dry, as groundwater has been **diverted** for industrial use and the wells no longer reach the water table. Their condition hasn't been helped by recent dry spells: southern Rajasthan suffered an eight-year drought between 1996 and 2004.

However, some important sites in Gujarat have recently **undergone** major restoration, and the state government announced in June last year that it plans to restore the stepwells throughout the state.

In Patan, the state's ancient capital, the stepwell of Rani Ki Vav (Queen's Stepwell) is perhaps the **finest** current example. It was built by Queen Udayamati during the late 11th century, but became silted up following a flood during the 13th century. But the Archaeological Survey of India began restoring it in the 1960s, and today it's in **pristine** condition . At 65 metres long, 20 metres wide and 27 metres deep, Rani Ki Vav features 500 distinct sculptures carved into niches throughout the monument, **depicting** gods such as Vishnu and Parvati in various **incarnations**. Incredibly, in January 2001, this ancient structure survived a **devastating earthquake** that measured 7.6 on the Richter scale.

Another example is the Surya Kund in Modhera, northern Gujarat, next to the Sun Temple, built by King Bhima I in 1026 to **honour** the sun god Surya. It's actually a tank (kund means reservoir or pond) rather than a well, but displays the hallmarks of stepwell architecture, including four sides of steps that descend

Tier= one of several levels or layers that rise up one above the other.

Elaborate= intricate, complicated, complex…

Pillar= Tower of strength= a tall upright round post used as a support for a roof or bridge.

Pavilion= exhibition area, spectator area…

Shelter= protect.

Intricate= complex, complicated, elaborate…

Relentless= Endless, persistent…

Sculpture= statue.

Embellish= decorate, beautify, make fancy…

Derelict= neglected, abandoned…

Divert= reroute, turn away…

Undergo= experience.

Finest= best, most excellent…

Pristine= like new, untouched, unspoiled…

Depict= show, represent, describe, illustrate…

Incarnation= the state of living in the form of a particular person or animal. According to some religions, people have several different incarnations.

Devastating= harmful, damaging, ruinous…

Earthquake = a sudden shaking of the Earth's surface that often causes a lot of damage.

Honour= respect, admire…

to the bottom in a stunning geometrical formation. The terraces house 108 small, intricately carved shrines between the sets of steps. Rajasthan also has a wealth of wells. The ancient city of Bundi, 200 kilometres south of Jaipur, is reknowned for its architecture, including its stepwells. One of the larger examples is Raniji Ki Baori, which was built by the queen of the region, Nathavatji, in 1699. At 46 metres deep, 20 metres wide and 40 metres long, the intricately carved monument is one of 21 baoris **commissioned** in the Bundi area by Nathavatji. In the old **ruined** town of Abhaneri, about 95 kilometres east of Jaipur, is Chand Baori, one of India's oldest and deepest wells; aesthetically, it's perhaps one of the most **dramatic**. Built in around 850 AD next to the temple of Harshat Mata, the baori **comprises** hundreds of zigzagging steps that run along three of its sides, steeply descending 11 storeys, resulting in a **striking** geometric pattern when seen from afar. On the fourth side, covered verandas supported by **ornate** pillars overlook the steps. Still in public use is Neemrana Ki Baori, located just off the Jaipur–Dehli highway. Constructed in around 1700, it's nine storeys deep, with the last two levels underwater. At ground level, there are 86 colonnaded openings from where the visitor descends 170 steps to the deepest water source. Today, following years of neglect, many of these monuments to medieval engineering have been saved by the Archaeological Survey of India, which has recognised the importance of **preserving** them as part of the country's rich history. Tourists **flock** to wells in far-flung corners of northwestern India to gaze in wonder at these architectural **marvels** from 1,000 years ago, which serve as a reminder of both the **ingenuity** and artistry of ancient civilisations and of the value of water to human existence.	**Commissioned**= specially made, custom- built… **Ruined**= broke, destroyed… **Dramatic**= spectacular, striking, remarkable, extraordinary… **Comprise**= include, contain, consist of, involve… **Striking**= good-looking, attractive… **Ornate**= covered with a lot of decoration. **Preserve**= protect, save… **Flock**= gather, form a group… **Marvel**= wonder, awesome sight, amazing thing… **Ingenuity**= cleverness, inventiveness, creativity…

READING PASSAGE 2

EUROPEAN TRANSPORT SYSTEMS 1990-2010

What have been the trends and what are the **prospects** for European transport systems?

A It is difficult to **conceive** of **vigorous** economic growth without an **efficient** transport system. Although modern information technologies can reduce the demand for physical transport by **facilitating** teleworking and teleservices, the requirement for transport continues to increase. There are two key factors behind this trend. For passenger transport, the determining factor is the spectacular growth in car use. The number of cars on European Union (EU) roads saw an increase of three million cars each year from 1990 to 2010, and in the next decade the EU will see a further **substantial** increase in its fleet.

B As far as goods transport is concerned, growth is due to a large extent to changes in the European economy and its system of production. In the last 20 years, as internal **frontiers** have been **abolished**, the EU has moved from a ”stock” economy to a ”flow” economy. This phenomenon has been **emphasised** by the relocation of some industries, particularly those which are **labourintensive**, to reduce production costs, even though the production site is hundreds or even thousands of kilometres away from the final **assembly** plant or away from users.

C The strong economic growth expected in countries which are **candidates** for entry to the EU will also increase transport flows, in particular road **haulage** traffic. In 1998, some of these countries already **exported** more than twice their 1990 volumes and **imported** more than five times their 1990 volumes. And although many candidate countries **inherited** a

Prospect= possibility, likelihood, chance, option…

Conceive=imagine, visualize, think of….

Vigorous= strong and healthy…

Efficient= effective, useful, helpful, well-organized…

Facilitate= aid, help, assist…

Substantial= significant, considerable…

Frontier= border, boundary, edge…

Abolish= eliminate, put an end to, stop, close down, get rid of…

Emphasis= stress.

Labour-intensive = an industry or type of work that is labour-intensive needs a lot of workers.

Assembly= gathering, meeting, get-together…

Candidate= applicant.

Haulage =moving, carrying, shipping…

Export= sell abroad, sell overseas, sell to other countries…

Import= bring in, trade in, buy from abroad, buy from overseas, buy from other countries…

Inherit= be left, take over…

transport system which encourages rail, the **distribution** between modes has tipped sharply in favour of road transport since the 1990s. Between 1990 and 1998, road haulage increased by 19.4%, while during the same period rail haulage decreased by 43.5%, although – and this could benefit the enlarged EU – it is still on average at a much higher level than in existing member states.

D However, a new **imperative**-**sustainable** development – offers an opportunity for **adapting** the EU common transport **policy**. This **objective**, agreed by the Gothenburg European Council, has to be achieved by **integrating** environmental considerations into Community policies, and shifting the balance between modes of transport lies at the heart of its **strategy**. The ambitious objective can only be fully achieved by 2020, but **proposed** measures are nonetheless a first essential step towards a sustainable transport system which will **ideally** be in place in 30 years" time, that is by 2040.

E In 1998, energy consumption in the transport sector was to **blame** for 28% of **emissions** of CO2, the leading greenhouse gas. According to the latest estimates, if nothing is done to **reverse** the traffic growth trend, CO2 emissions from transport can be expected to increase by around 50% to 1,113 billion tonnes by 2020, compared with the 739 billion tonnes recorded in 1990. Once again, road transport is the main **culprit** since it alone **accounts for** 84% of the CO2 emissions attributable to transport. Using alternative fuels and improving energy efficiency is thus both an ecological necessity and a technological challenge.

F At the same time greater efforts must be made to achieve a modal shift. Such a change cannot be achieved overnight, all the less so after over half a century of constant **deterioration** in favour of road. This has reached such a pitch that today rail freight services are facing **marginalisation**, with just 8% of market share, and with international goods trains struggling along at an average speed of 18km/h. Three possible options have **emerged**.

Distribution= sharing, spreading, allocation…

Imperative= vital, very important, crucial, essential…

Sustainable= able to continue for a long time.

Adapt= get a feel to, get used to, familiarize yourself…

Policy= rule, guiding principle, strategy, plan…

Objective= aim, purpose, goal, intention…

Integrate= put together, mix, combine…

Strategy= plan.

Propose= suggest, recommend, advise…

Ideally= perfectly, well…

Blame= hold responsible, accused…

Emission= release, discharge…

Reverse = overturn.

Culprit= cause, reason…

Account for= represent, explain, answer for…

Deterioration = worsening, decline, weakening…

Marginalise= to make a person or a group of people unimportant and powerless in an unfair way.

Emerge= appear, come out…

G The first approach would consist of focusing on road transport solely through pricing. This option would not be **accompanied** by **complementary** measures in the other modes of transport. In the short term it might **curb** the growth in road transport through the better loading **ratio** of goods vehicles and **occupancy** rates of passenger vehicles expected as a result of the increase in the price of transport. However, the lack of measures available to revitalise other modes of transport would make it impossible for more sustainable modes of transport to take up the baton. H The second approach also **concentrates on** road transport pricing but is accompanied by measures to increase the efficiency of the other modes (better quality of services, **logistics**, technology). However, this approach does not include investment in new **infrastructure**, nor does it guarantee better regional **cohesion**. It could help to achieve greater **uncoupling** than the first approach, but road transport would keep the lion"s share of the market and continue to concentrate on saturated **arteries**, despite being the most polluting of the modes. It is therefore not enough to guarantee the necessary shift of the balance. I The third approach, which is not new, comprises a series of measures ranging from pricing to **revitalising** alternative modes of transport and targeting investment in the trans-European network. This integrated approach would allow the market shares of the other modes to return to their 1998 levels and thus make a shift of balance. It is far more ambitious than it looks, **bearing in mind** the historical imbalance in favour of roads for the last fifty years, but would achieve a marked break in the link between road transport growth and economic growth, without placing restrictions on the mobility of people and goods.	**Accompany**= go along with, go together with… **Complementary**= balancing. **Ratio**= proportion, percentage… **Curb**= hold back, limit, restrain, reduce, cut back… **Occupancy**= the number of people who stay, work, or live in a room or building at the same time. **Concentrate on=** focus on. **Logistics**= the business of transporting things such as goods to the place where they are needed. **Infrastructure**= the basic systems and structures that a country or organization needs in order to work properly, for example roads, railways, banks etc. **Cohesion**= unity, consistency, organization… **Uncoupling**= disconnection, separation… **Saturated**= soaked, wet… **Artery**= a main road, railway line, river etc. **Revitalizing=** refreshing, renewing… **Bear in mind**=since, given that…

READING PASSAGE 3

The psychology of innovation

Why are so few companies truly innovative?

Innovation is key to business **survival**, and companies put **substantial** resources into **inspiring** employees to develop new ideas. There are, nevertheless, people working in luxurious, state-of-the-art centres designed to **stimulate** innovation who find that their environment doesn't make them feel at all creative. And there are those who don't have a **budget**, or much space, but who innovate successfully.

For Robert B. Cialdini, Professor of Psychology at Arizona State University, one reason that companies don't succeed as often as they should is that innovation starts with **recruitment**. Research shows that the fit between an employee's values and a company's values makes a difference to what contribution they make and whether, two years after they join, they're still at the company. Studies at Harvard Business School show that, although some individuals may be more creative than others, almost every individual can be creative in the right **circumstances**.

One of the most famous photographs in the story of rock'n'roll emphasises Ciaidini's views. The 1956 picture of singers Elvis Presley, Carl Perkins, Johnny Cash and Jerry Lee Lewis jamming at a piano in Sun Studios in Memphis tells a hidden story. Sun's 'million-dollar **quartet**' could have been a **quintet**. Missing from the picture is Roy Orbison' a greater natural singer than Lewis, Perkins or Cash. Sam Phillips, who owned Sun, wanted to **revolutionise** popular music with songs that **fused** black and white music, and country and blues. Presley, Cash, Perkins and Lewis instinctively understood Phillips's **ambition** and believed in it. Orbison wasn't inspired by the goal, and only ever achieved one hit with the Sun label.

Innovation= improvement, advance, modernization…

Survival= continued existence.

Substantial= considerable, significant…

Inspire= motivate, encourage…

Stimulate= inspire, motivate, encourage…

Budget= the money that is available to a person.

Recruitment= employment, staffing…

Circumstance= situation, condition…

Quartet= four singers or musicians who sing or play together.

Quintet= five singers or musicians who perform together.

Revolutionise= transform, develop, modernize, change…

Fuse= combine, blend…

Ambition= aim, goal, objective…

The value fit matters, says Cialdini, because innovation is, in part, a process of change, and under that pressure we, as a species, behave differently, 'When things change, we are **hard-wired** to play it safe.' Managers should therefore **adopt** an approach that appears counterintuitive -they should explain what stands to be lost if the company fails to **seize** a particular opportunity. Studies show that we invariably take more **gambles** when **threatened** with a loss than when offered a reward.

Managing innovation is a **delicate** art. It's easy for a company to be pulled in **conflicting** directions as the marketing, product development, and finance departments each get different feedback from different sets of people. And without a system which **ensures collaborative** exchanges within the company, it's also easy for small 'pockets of innovation" to disappear. Innovation is a contact sport. You can"t **brief** people just by saying, 'We're going in this direction and I'm going to take you with me.'

Cialdini believes that this 'follow-the-leader **syndrome**, is dangerous, not least because it encourages bosses to go it alone. 'It's been scientifically proven that three people will be better than one at solving problems, even if that one person is the smartest person in the field.' To prove his point, Cialdini **cites** an interview with molecular biologist James Watson. Watson, together with Francis Crick, discovered the structure of DNA, the genetic information carrier of all living **organisms**. 'When asked how they had **cracked** the code ahead of an array of highly **accomplished rival** investigators, he said something that stunned me. He said "he and Crick had succeeded because they were aware that they weren't the most intelligent of the scientists **pursuing** the answer. The smartest scientist was called Rosalind Franklin who, Watson said, "was so intelligent she rarely sought advice".'

Teamwork taps into one of the basic drivers of human behaviour. 'The principle of social proof is so **pervasive** that we don't even recognise it,' says Cialdini. 'If your project is being **resisted**, for example, by a group of **veteran** employees, ask another old-

Hard-wired= if an attitude, way of behaving etc is hard-wired, it is a natural part of a person's character that they are born with and cannot change.

Adopt= embrace, take on, accept, approve….

Seize= take advantage of, grab, take…

Gamble= risk.

Threatened= in danger, in jeopardy…

Delicate= needing to be dealt with carefully or sensitively in order to avoid problems or failure.

Conflicting= contradictory, disagreeing, differing…

Ensure= make sure, guarantee…

Collaborative= mutual, shared…

Brief =inform, tell…

Syndrome= a set of qualities, events, or types of behaviour that is typical of a particular kind of problem.

Cite= refer to, mention…

Organism= an animal, plant, human, or any other living thing.

Crack= solve, work out, figure out…

Accomplished= talented, gifted, skilful, expert….

Rival= opponent, competitor…

Pursue= chase, follow, hunt

Pervasive= existing everywhere.

Resist= oppose, refuse to accept, deny…

Veteran= experienced, expert…

timer to speak up for it.' Cialdini is not alone in **advocating** this strategy. Research shows that **peer** power, used horizontally not vertically, is much more powerful than any boss's speech.

Writing, visualising and prototyping can stimulate the flow of new ideas. Cialdini cites scores of research papers and historical events that prove that even something as simple as writing deepens every individual's **engagement** in the project. It is, he says, the reason why all those competitions on breakfast cereal packets encouraged us to write in saying, in no more than 10 words: 'I like Kellogg's Com Flakes because… .' The very act of writing makes us more likely to believe it.

Authority doesn't have to **inhibit** innovation but it often does. The wrong kind of leadership will lead to what Cialdini calls "captainitis, the **regrettable tendency** of team members to **opt** out of team responsibilities that are properly their'. He calls it captainitis because, he says, "crew members of multipilot aircraft exhibit a sometimes deadly passivity when the flight captain makes a clearly wrong-headed decision". This behaviour is not, he says, unique to air travel, but can happen in any workplace where the leader is **overbearing**.

At the other end of the scale is the 1980s Memphis design collective, a group of young designers for whom "the only rule was that there were no rule". This environment encouraged a free **interchange** of ideas, which led to more creativity with form, **function**, colour and materials that revolutionised attitudes to **furniture** design.

Many theorists believe the **ideal** boss should lead from behind, **taking pride in** collective **accomplishment** and giving credit where it is due. Cialdini says:"Leaders should encourage everyone to contribute and **simultaneously assure** all concerned that every recommendation is important to making the right decision and will be given full attention" The **frustrating** thing about innovation is that there are many approaches, but no magic **formula**. However, a manager who wants to create a truly innovative culture

Advocate= support, encourage, promote, be in favor of…

Peer= colleague, friend…

Engagement= meeting, appointment…

Inhibit= stop, prevent…

Regrettable= undesirable, unwelcome, unfortunate…

Tendency= trend.

Opt= choose, decide on, select…

Overbearing= domineering= always trying to control other people without considering their wishes or feelings.

Interchange= exchange, swap…

Function= role, purpose, meaning…

Furniture= large objects such as chairs, tables, beds, and cupboards.

Ideal= perfect, best…

Take pride in= to do something very carefully and well, in a way that gives you a lot of satisfaction.

Accomplishment= achievement, success…

Simultaneously= at the same time, at once…

Assure = ensure, make certain, guarantee…

Frustrating= annoying.

Formula= rule, principle…

can make their job a lot easier by recognising these psychological realities.	

Test 2

READING PASSAGE 1

Tea and the Industrial Revolution

A Cambridge professor says that a change in drinking habits was the reason for the Industrial Revolution in Britain. Anjana Abuja reports

A Alan Macfarlane, professor of **anthropological** science at King's College, Cambridge has, like other historians, spent decades **wrestling with** the **enigma** of the Industrial Revolution. Why did this particular Big Bang – the world-changing birth of industry-happen in Britain? And why did it strike at the end of the 18th century?

B Macfarlane compares the **puzzle** to a combination lock. 'There are about 20 different factors and all of them need to be present before the revolution can happen,' he says. For industry to **take off**, there needs to be the technology and power to **drive** factories, large **urban** populations to provide cheap **labour**, easy transport to move goods around, an affluent middle-class willing to buy mass-produced objects, a market-driven economy and a political system that allows this to happen. While this was the case for England, other nations, such as Japan, the Netherlands and France also met some of these criteria but were not industrialising. All these factors must have been necessary. But not **sufficient** to cause the revolution, says Macfarlane. 'After all, Holland had everything except **coal** while China also had many of these factors. Most historians are **convinced** there are one or two

Anthropological= the scientific study of people, their societies, cultures etc.

Wrestle with something= to try to understand or find a solution to a difficult problem.

Enigma= mystery, puzzle…

Puzzle= mystery, enigma…

Take off= start out, begin…

Drive= run.

Urban= city, town, metropolitan…

Labour= workforce, workers, employees…

Criterion= standard, principle…

Sufficient= adequate, enough…

Coal= a hard black mineral which is dug out of the ground and burnt to produce heat

Convinced= persuaded.

missing factors that you need to open the lock.
’

C The missing factors, he **proposes**, are to be found in almost even kitchen cupboard. Tea and beer, two of the nation’s favourite drinks, fuelled the revolution. The antiseptic properties of tannin, the active **ingredient** in tea, and of hops in beer – plus the fact that both are made with boiled water – allowed urban communities to **flourish** at close quarters without **succumbing** to water-borne diseases such as dysentery. The theory sounds **eccentric** but once he starts to explain the detective work that went into his **deduction**, the **scepticism** gives way to wary admiration. Macfarlane’s case has been **strengthened** by support from **notable** quarters – Roy Porter, the distinguished medical historian, recently wrote a favourable **appraisal** of his research.

D Macfarlane had **wondered** for a long time how the Industrial Revolution came about. Historians had **alighted on** one interesting factor around the mid-18th century that required explanation. Between about 1650 and 1740, the population in Britain was **static**. But then there was a burst in population growth. Macfarlane says: ‘The **infant mortality** rate halved in the space of 20 years, and this happened in both rural areas and cities, and across all classes. People suggested four possible causes. Was there a sudden change in the viruses and bacteria around? Unlikely. Was there a revolution in medical science? But this was a century before Lister’s revolution*. Was there a change in environmental conditions? There were improvements in agriculture that **wiped out** malaria, but these were small gains. **Sanitation** did not become widespread until the 19th century. The only option left is food. But the height and weight **statistics** show a decline. So the food must have got worse. Efforts to explain this sudden reduction in child deaths appeared to draw a blank.’

E This population burst seemed to happen at just the right time to provide labour for the Industrial Revolution. ‘When you start moving towards an industrial revolution, it is economically efficient to have people living close together,’ says Macfarlane. ‘But then you get disease, particularly from human waste.’ Some digging around in historical records revealed that there was a change in

Propose= suggest.

Ingredient= element, part…

Flourish= thrive, grow…

Succumb= give in, surrender…

Eccentric= unusual, weird, strange…

Deduction= reasoning, conclusion, logic…

Scepticism= an attitude of doubting that particular claims or statements are true or that something will happen.

Strengthen= support, reinforce…

Appraisal= assessment, evaluation, judgment, review…

Notable= important, interesting, excellent, or unusual enough to be noticed or mentioned.

Wonder= self=question.

Alight on= to suddenly think of or notice something or someone.

Static= constant, unchanging…

Infant= newborn baby.

Mortality= death.

Wipe out= destroy, eliminate, remove…

Sanitation= the protection of public health by removing and treating waste, dirty water etc.

Statistics= data, information, figures…

the **incidence** of water-borne disease at that time, especially dysentery. Macfarlane **deduced** that whatever the British were drinking must have been important in **regulating** disease. He says, 'We drank beer. For a long time, the English were protected by the strong antibacterial agent in hops, which were added to help **preserve** the beer. But in the late 17th century a tax was introduced on **malt**, the basic ingredient of beer. The poor turned to water and gin and in the 1720s the mortality rate began to rise again. Then it suddenly dropped again. What caused this?' F Macfarlane looked to Japan, which was also developing large cities about the same time, and also had no sanitation. Water-borne diseases had a much looser grip on the Japanese population than those in Britain. Could it be the **prevalence** of tea in their culture? Macfarlane then noted that the history of tea in Britain provided an **extraordinary coincidence** of dates. Tea was relatively expensive until Britain started a direct dipper trade with China in the early 18th century. By the 1740s, about the time that infant mortality was **dipping**, the drink was common. Macfarlane guessed that the fact that water had to be boiled, together with the stomach-**purifying** properties of tea meant that the breast milk provided by mothers was healthier than it had ever been. No other European nation sipped tea like the British, which, by Macfarlanes logic, pushed these other countries **out of contention** for the revolution. G But, if tea is a factor in the combination lock, why didn't Japan **forge ahead** in a tea-soaked industrial revolution of its own? Macfarlane notes that even though 17th-century Japan had large cities, high **literacy** rates, even a futures market, it had turned its back on the essence of any work-based revolution by giving up labour-saving devices such as animals, afraid that they would put people out of work. So, the nation that we now think of as one of the most technologically advanced entered the 19th century having '**abandoned** the wheel'.	**Incidence**= frequency, occurrence, rate… **Deduce**= assume, reason, figure out… **Regulate**= control. **Preserve**= protect. **Malt**= grain, usually barley, that has been kept in water for a time and then dried. It is used for making beer, whisky etc.. **Prevalence**= dominance. **Extraordinary**= strange, unusual, surprising… **Coincidence**= when two things happen at the same time, in the same place, or to the same people in a way that seems surprising or unusual. **Dipping**= plummeting, dropping, reducing… **Purify**= clean, get rid of impurities… **Out of contention**= no longer having a chance of winning something. **Forge ahead**= to make progress, especially quickly. **Literacy**= the state of being able to read and write. **Abandoned**= neglected.

READING PASSAGE 2

Gifted children and learning

A Internationally, 'giftedness' is most frequently **determined** by a score on a general **intelligence** test, known as an IQ test, which is above a chosen **cutoff point**, usually at around the top 2-5%. Children's educational environment **contributes** to the IQ score and the way intelligence is used. For example, a very close positive relationship was found when children's IQ scores were compared with their home educational **provision** (Freeman, 2010). The higher the children's IQ scores, especially over IQ 130, the better the quality of their educational **backup**, measured in terms of reported **verbal interactions** with parents, number of books and activities in their home etc. Because IQ tests are decidedly influenced by what the child has learned, they are to some extent measures of current achievement based on age-norms; that is, how well the children have learned to **manipulate** their knowledge and know-how within the terms of the test. The vocabulary aspect, for example, is dependent on having heard those words. But IQ tests can neither identify the processes of learning and thinking nor **predict** creativity.

B Excellence does not **emerge** without **appropriate** help. To reach an exceptionally high standard in any area very able children need the means to learn, which includes **material** to work with and focused challenging **tuition** -and the **encouragement** to follow their dream. There appears to be a qualitative difference in the way the **intellectually** highly able think, compared with more average-ability or older pupils, for whom **external regulation** by the teacher often **compensates** for lack of **internal** regulation. To be at their most effective in their self-regulation, all children can be helped to identify their own ways of learning – metacognition – which will include strategies of planning, monitoring, evaluation, and choice of what to learn. Emotional awareness is also part of metacognition, so children should be helped to be

Determine= decide.

Intelligence= cleverness.

Cutoff point= maximum value.

Contribute= be a factor.

Provision= the act of providing something that someone needs.

Backup= help, support, encouragement…

Verbal= oral, spoken.

Interaction= communication.

Manipulate= to work skillfully with information, systems etc to achieve the result that you want.

Predict = guess, forecast, foresee…

Emerge= come out, appear…

Appropriate = suitable, proper, right, correct, fitting…

Material= data, information…

Tuition= teaching, guidance, training…

Encouragement= support.

Intellectual= relating to the ability to understand things and think intelligently.

External = outside, outer…

Regulation= control.

Compensate= balance

Internal= inside, inner…

aware of their feelings around the area to be learned, feelings of **curiosity** or confidence, for example.

C High achievers have been found to use self-regulatory learning **strategies** more often and more effectively than lower achievers, and are better able to transfer these strategies to deal with unfamiliar tasks. This happens to such a high degree in some children that they appear to be **demonstrating** talent in particular areas. Overviewing research on the thinking process of highly able children, (Shore and Kanevsky, 1993) put the instructor's problem **succinctly**: 'If they [the **gifted**] **merely** think more quickly, then .we need only teach more quickly. If they merely make fewer errors, then we can shorten the practice'. But of course, this is not entirely the case; **adjustments** have to be made in methods of learning and teaching, to **take account of** the many ways individuals think.

D Yet in order to learn by themselves, the gifted do need some support from their teachers. **Conversely**, teachers who have a **tendency** to 'overdirect' can diminish their gifted pupils' learning **autonomy**. Although 'spoon-feeding' can produce extremely high examination results, these are not always followed by equally impressive life successes. Too much dependence on the teachers risks loss of autonomy and motivation to discover. However, when teachers o pupils to reflect on their own learning and thinking activities, they increase their pupils' self-regulation. For a young child, it may be just the simple question 'What have you learned today?' which helps them to **recognise** what they are doing. Given that a **fundamental** goal of education is to transfer the control of learning from teachers to pupils, improving pupils' learning to learn techniques should be a **major** outcome of the school experience, especially for the highly **competent**. There are quite a number of new methods which can help, such as child- initiated learning, ability-peer tutoring, etc. Such practices have been found to be particularly useful for **bright** children from **deprived** areas.

E But scientific **progress** is not all theoretical, knowledge is a so **vital** to **outstanding** performance: individuals who know a great deal about a specific

Curiosity= the desire to know about something.

Strategy= plan, approach…

Demonstrate= show, display…

Succinctly= in a few words, concisely…

Gifted= talented.

Merely= just, only, simply…

Adjustment= change, modification, correction…

Take account of= comprise, contain, take in…

Conversely= on the other hand, in opposition, on the contrary…

Tendency= trend.

Autonomy= independence.

Recognize= realize.

Fundamental= basic, original, elemental, primary…

Major= main, most important, foremost…

Competent= knowledgeable, experienced…

Bright= brilliant, intelligent, clever, smart…

Deprived= disadvantaged, poor…

Progress= development, growth, improvement, advancement…

Vital= very important, crucial, necessary…

Outstanding= excellent, great, wonderful…

domain will achieve at a higher level than those who do not (Elshout, 1995). Research with creative scientists by Simonton (1988) brought him to the **conclusion** that above a certain high level, **characteristics** such as independence seemed to contribute more to reaching the highest levels of **expertise** than intellectual skills, due to the great demands of effort and time needed for learning and practice. Creativity in all forms can be seen as expertise se mixed with a high level of motivation (Weisberg, 1993). F To sum up, learning is affected by emotions of both the individual and significant others. Positive emotions facilitate the creative aspects of earning and negative emotions inhibit it. Fear, for example, can limit the development of curiosity, which is a strong force in scientific advance, because it motivates problem-solving behaviour. In Boekaerts' (1991) review of emotion the learning of very high IQ and highly achieving children, she found emotional forces in harness. They were not only curious, but often had a strong **desire** to control their environment, improve their learning efficiency and increase their own learning resources.	**Domain** = field, area… **Conclusion**= something you decide after considering all the information you have. **Characteristic**= trait, feature… **Expertise**= know-how, knowledge, proficiency… **Desire**= want, need…

# READING PASSAGE 3 ## Museums of fine art and their public The fact that people go to the Louvre museum in Paris to see the **original** painting Mona Lisa when they can see a **reproduction** anywhere leads us to question some **assumptions** about the role of museums of **fine** art in today's world One of the most famous works of art in the world is	**Original**= real. **Reproduction**= copy, imitation, replica, duplicate… **Assumption**= supposition, guess, hypothesis… **Fine**= very well, excellent, top quality…

Leonardo da Vinci's Mona Lisa. Nearly everyone who goes to see the original will already be familiar with it from reproductions, but they accept that fine art is more rewardingly viewed in its original form. However, if Mona Lisa was a famous **novel**, few people would **bother** to go to a museum to read the writer's actual manuscript rather than a printed reproduction. This might be explained by the fact that the novel has **evolved precisely** because of technological developments that made it possible to print out huge numbers of texts, whereas oil paintings have always been produced as unique objects. In addition, it could be argued that the practice of **interpreting** or 'reading' each medium follows different **conventions**. With novels, the reader attends mainly to the meaning of words rather than the way they are printed on the page, whereas the 'reader' of a painting must attend just as closely to the material form of marks and shapes in the picture as to any ideas they may **signify.** Yet it has always been possible to make very accurate **facsimiles** of pretty well any fine art work. The seven surviving versions of Mona Lisa bear **witness** to the fact that in the 16th century, artists seemed perfectly content to **assign** the reproduction of their creations to their **workshop apprentices** as regular '**bread and butter' work**. And today the task of reproducing pictures is incomparably more simple and reliable, with reprographic techniques that allow the production of high-quality prints made exactly to the original **scale**, with **faithful** colour values, and even with **duplication** of the surface relief of the painting. But despite an implicit recognition that the spread of good reproductions can be culturally valuable, museums continue to promote the special status of original work. Unfortunately, this seems to place severe limitations on the kind of experience offered to visitors. One limitation is related to the way the museum presents its **exhibits**. As repositories of unique historical objects, art museums are often called	**Novel**= work of fiction, story… **Bother**= to make the effort to do something. **Evolve**= develop, grow… **Precisely**= exactly, correctly, accurately… **Interpret**= translate. **Convention**= rule, principle… **Signify=** mean, indicate, show… **Facsimile**= exact copy, duplicate, reproduction… **Witness**= see, observe… **Assign**= allocate, give… **Workshop**= class, seminar… **Apprentice**= trainee, learner… **Bread and butter work**= bread-and-butter work is work that is not very exciting but provides you with most of the money that you need in order to live. **Scale**= size. **Faithful**= true, authentic, exact, close… **Duplication**= replication, copying… **Exhibit**= display, show…

'treasure houses'. We are reminded of this even before we view a collection by the presence of security guards, attendants, ropes and display cases to keep us away from the exhibits. In many cases, the architectural style of the building further **reinforces** that **notion**. In addition, a major collection like that of London's National Gallery is housed in numerous rooms, each with dozens of works, any one of which is likely to be worth more than all the average visitor **possesses**. In a society that judges the personal status of the individual so much by their material worth, it is therefore difficult not to be impressed by one's own relative 'worthlessness' in such an environment. Furthermore, consideration of the 'value' of the original work in its treasure house setting impresses upon the viewer that, since these works were originally produced, they have been assigned a huge **monetary** value by some person or **institution** more powerful than themselves. Evidently, nothing the viewer thinks about the work is going to **alter** that value, and so today's viewer is **deterred** from trying to extend that **spontaneous**, immediate, self-reliant kind of reading which would originally have met the work. The visitor may then be struck by the strangeness of seeing such **diverse** paintings, drawings and sculptures brought together in an environment for which they were not originally created. This 'displacement effect' is further heightened by the sheer volume of exhibits. In the case of a major collection, there are probably more works on display than we could realistically view in weeks or even months. This is particularly **distressing** because time seems to be a **vital** factor in the **appreciation** of all art forms. A fundamental difference between paintings and other art forms is that there is no prescribed time over which a painting is viewed. By contrast, the audience encourage an opera or a play over a specific time, which is the duration of the performance. Similarly novels and poems are read in a prescribed temporal sequence, whereas a picture has no clear place at which to start viewing, or at which to finish. Thus art works themselves encourage us to view them **superficially**, without appreciating the richness of	**Treasure**= wealth. **Reinforce**= strengthen, support… **Notion**=idea, view.. **Possess**= have, own… **Monetary**= financial, economic… **Institution**= organization. **Alter**= change. **Deter**= discourage, prevent.. **Spontaneous**= artless, unstructured, unplanned… **Diverse**= various, varied… **Distressing**= upsetting, painful, sad… **Vital**= very important, fundamental, essential, crucial, central…. **Appreciation**= admiration, approval, enjoyment… **Superficially**= apparently.

detail and labour that is involved. Consequently, the **dominant critical** approach becomes that of the art historian, a specialised academic approach **devoted** to 'discovering the meaning' of art within the cultural context of its time. This is in perfect **harmony** with the museum s function, since the approach is dedicated to seeking out and conserving 'authentic', original, readings of the exhibits. Again, this seems to put paid to that spontaneous, participators **criticism** which can be found in **abundance** in criticism of classic works of literature, but is **absent** from most art history. The displays of art museums serve as a **warning** of what critical practices can emerge when spontaneous criticism is suppressed. The museum public, like any other audience, experience art more rewardingly when given the confidence to express their views. If appropriate works of fine art could be rendered permanently accessible to the public by means of high-fidelity reproductions, as literature and music already are, the public may feel somewhat less in awe of them. Unfortunately, that may be too much to ask from those who seek to maintain and control the art **establishment**.	**Dominant**= leading. **Critical**= significant… **Devote**= apply, dedicate, offer… **Harmony**= agreement. **Criticism**= disapproval. **Abundance**= loads, great quantity, plenty… **Absent**= lacking. **Warning**= caution. **Establishment**= organization.

# Test 3 # READING PASSAGE 1 ## The Context, Meaning and Scope of Tourism A Travel has existed since the beginning of time, when **primitive** man set out, often traversing great distances in search of game, which provided the food and clothing necessary for his **survival**. Throughout the course of history, people have travelled for purposes of	**Primitive**= prehistoric, ancient… **Survival**= continued existence.

trade, religious **conviction**, economic gain, war, migration and other equally **compelling** motivations. In the Roman era, wealthy aristocrats and high government officials also travelled for pleasure. Seaside resorts located at Pompeii and Herculaneum **afforded** citizens the opportunity to escape to their vacation **villas** in order to avoid the summer heat of Rome. Travel, except during the Dark Ages, has continued to grow and, throughout recorded history, has played a vital role in the development of civilisations and their economies. B Tourism in the mass form as we know it today is a distinctly twentieth-century phenomenon. Historians suggest that the **advent** of mass tourism began in England during the industrial revolution with the rise of the middle class and the availability of **relatively** inexpensive transportation. The creation of the commercial airline industry following the Second World War and the subsequent development of the jet aircraft in the 1950s signalled the **rapid** growth and **expansion** of international travel. This growth led to the development of a major new industry: tourism. In turn, international tourism became the concern of a number of world governments since it not only provided new employment opportunities but also produced a means of earning foreign **exchange**. C Tourism today has grown significantly in both economic and social importance. In most industrialised countries over the past few years the fastest growth has been seen in the area of services. One of the largest **segments** of the service industry, although largely unrecognised as an entity in some of these countries, is travel and tourism. According to the World Travel and Tourism Council (1992),Travel and tourism is the largest industry in the world on virtually any economic measure including value-added capital investment, employment and **tax** contributions,. In 1992' the industry's gross output was **estimated** to be $3.5 trillion, over 12 per cent of all consumer spending. The travel and tourism industry is the world's largest employer the almost 130 million jobs, or almost 7 per cent of all employees. This industry is the world's leading industrial contributor, producing over 6 per cent of the world's national product and accounting for	**Conviction**= belief, faith… **Compelling**= persuasive, convincing… **Afford**= give, offer… **Villa**= holiday home… **Advent**= start, beginning… **Relatively**= quite, fairly, rather, comparatively… **Rapid**= fast, quick, speedy… **Expansion**= growth, development, increase, spreading out… **Exchange**= swap, trade, import and export… **Segment**= part, section…. **Tax**= an amount of money that you must pay to the government according to your income, property, goods etc and that is used to pay for public services. **Estimate**= calculate approximately.

capital investment in excess of $422 billion m direct indirect and personal taxes each year. Thus, tourism has a **profound** impact both on the world economy and, because of the educative effect of travel and the effects on employment, on society itself. D However, the major problems of the travel and tourism industry that have hidden, or **obscured**, its economic impact are the **diversity** and **fragmentation** of the industry itself. The travel industry includes: hotels, motels and other types of **accommodation**; restaurants and other food services; transportation services and facilities; **amusements**, attractions and other leisure **facilities**; gift shops and a large number of other **enterprises**. Since many of these businesses also serve local residents, the impact of spending by visitors can easily be **overlooked** or underestimated. In addition, Meis (1992) points out that the tourism industry involves **concepts** that have remained amorphous to both analysts and decision makers. Moreover, in all nations this problem has made it difficult for the industry to develop any type of reliable or **credible** tourism information base in order to estimate the contribution it makes to regional, national and global economies. However, the nature of this very diversity makes travel and tourism ideal vehicles for economic development in a wide variety of countries, regions or communities. E Once the exclusive province of the wealthy, travel and tourism have become an institutionalised way of life for most of the population. In fact, McIntosh and Goeldner (1990) suggest that tourism has become the largest **commodity** in international trade for many nations and, for a significant number of other countries, it ranks second or third. For example, tourism is the major source of income in Bermuda, Greece, Italy, Spain, Switzerland and most Caribbean countries. In addition, Hawkins and Ritchie, quoting from data published by the American Express Company, suggest that the travel and tourism industry is the number one ranked employer in the Bahamas, Brazil, Canada, France, (the former) West Germany, Hong Kong, Italy, Jamaica, Japan, Singapore, the United Kingdom and the United States. However, because of problems of definition, which directly affect	**Capital**= money or property, especially when it is used to start a business or to produce more wealth. **Profound**= deep, great, extreme… **Obscured**= hidden, covered, buried… **Diversity**= variety. **Fragmentation**= breakup, division… **Accommodation**= somewhere to live, somewhere to stay… **Amusement**= entertainment, recreation, pursuit… **Facilities**= services, conveniences… **Enterprise**= venture, project, activity… **Overlook**= fail to notice, ignore, miss, forget, neglect… **Concept**= idea, theory… **Credible**= believable, convincing, plausible, probable… **Commodity**= product, goods…

statistical measurement, it is not possible with any degree of certainty to provide **precise**, valid or reliable data about the extent of world-wide tourism participation or its economic impact. In many cases, similar difficulties **arise** when **attempts** are made to measure domestic tourism.	**Statistical**= numerical. **Precise**= exact, specific, accurate… **Arise**= happen, occur… **Attempt**= effort.

# READING PASSAGE 2 ## Autumn leaves Canadian writer Jay Ingram **investigates** the **mystery** of why leaves turn red in the fall A One of the most **captivating** natural events of the year in many areas throughout North America is the turning of the leaves in the fall. The colours are **magnificent**, but the question of exactly why some trees turn yellow or orange, and others red or purple, is something which has long puzzled scientists. B Summer leaves are green because they are full of chlorophyll, the **molecule** that captures sunlight converts that energy into new building materials for the tree. As fall approaches in the northern **hemisphere**, the amount of solar energy available declines considerably. For many trees – evergreen conifers being an exception – the best strategy is to abandon photosynthesis* until the spring. So rather than maintaining the now **redundant** leaves throughout the winter, the tree saves its **precious** resources and **discards** them. But before letting its leaves go, the tree **dismantles** their chlorophyll molecules and ships their valuable nitrogen back into the **twigs**. As chlorophyll is depleted, other colours that have been dominated by it throughout the summer begin to be revealed. This unmasking explains the autumn colours of yellow and orange, but not the brilliant reds and	**Investigate**= examine, study, explore… **Mystery**= secrecy. **Captivating**= charming, attractive, fascinating… **Magnificent**= wonderful, outstanding, brilliant… **Molecule**= tiny part. **Hemisphere**= a half of the Earth, especially one of the halves above and below the equator. **Redundant**= unneeded, unnecessary… **Precious**= valuable, important, treasured, cherished… **Discard**= get rid of, throw away, remove… **Dismantle**= take to pieces. **Twig**= a small very thin stem of wood that grows from a branch on a tree.

purples of trees such as the maple or sumac. C The source of the red is widely known: it is created by anthocyanins, water-soluble plant pigments reflecting the red to blue range of the visible **spectrum**. They belong to a class of sugar-based chemical compounds also known as flavonoids. What's **puzzling** is that anthocyanins are actually newly minted, made in the leaves at the same time as the tree is preparing to drop them. But it is hard to make sense of the **manufacture** of anthocyanins – why should a tree **bother** making new chemicals in its leaves when it's already **scrambling** to withdraw and **preserve** the ones already there? D Some theories about anthocyanins have argued that they might act as a chemical defence against attacks by insects or **fungi**, or that they might attract fruit-eating birds or increase a leafs tolerance to freezing. However there are problems with each of these theories, including the fact that leaves are red for such a relatively short period that the **expense** of energy needed to manufacture the anthocyanins would **outweigh** any anti-fungal or anti-herbivore activity achieved.* photosynthesis: the production of new material from sunlight, water and carbon dioxide. E It has also been **proposed** that trees may produce vivid red colours to convince herbivorous insects that they are healthy and robust and would be easily able to mount chemical defences against **infestation**. If insects paid attention to such advertisements, they might be **prompted** to lay their eggs on a duller, and presumably less resistant host. The flaw in this theory lies in the lack of **proof** to support it. No one has as yet **ascertained** whether more robust trees sport the brightest leaves, or whether insects make choices according to colour intensity. F Perhaps the most **plausible** suggestion as to why leaves would go to the trouble of making anthocyanins when they're busy packing up for the winter is the theory known as the 'light screen' **hypothesis**. It sounds paradoxical, because the idea behind this hypothesis is that the red pigment is made in autumn leaves to protect chlorophyll, the light-absorbing	**Spectrum**= the set of bands of coloured light into which a beam of light separates when it is passed through a prism. **Puzzling**= confusing. **Manufacture**= produce, create, make… **Bother**= trouble. **Scramble**= move quickly, rush… **Preserve**= protect, save…. **Fungus**= a simple type of plant that has no leaves or flowers and that grows on plants or other surfaces. Mushrooms and mould are both fungi. **Expense**= cost, price. **Outweigh**= more than. **Propose**= recommended, suggested… **Infestation**= if insects, rats etc infest a place, there are a lot of them and they usually cause damage. **Prompted**= encouraged. **Proof**= evidence. **Ascertained**= determined, established, discovered… **Plausible**= believable, reasonable, possible… **Hypothesis**= suggestion, assumption…

chemical, from too much light. Why does chlorophyll need protection when it is the natural world's supreme light absorber? Why protect chlorophyll at a time when the tree is breaking it down to salvage as much of it as possible?

G Chlorophyll, although exquisitely evolved to capture the energy of sunlight, can sometimes be overwhelmed by it, especially in situations of drought, low temperatures, or nutrient deficiency. Moreover, the problem of oversensitivity to light is even more acute in the fall, when the leaf is busy preparing for winter by dismantling its internal machinery. The energy absorbed by the chlorophyll molecules of the unstable autumn leaf is not immediately channelled into useful products and processes, as it would be in an **intact** summer leaf. The weakened fall leaf then becomes **vulnerable** to the highly **destructive** effects of the oxygen created by the excited chlorophyll molecules.

H Even if you had never **suspected** that this is what was going on when leaves turn red, there are **clues** out there. One is **straightforward**: on many trees, the leaves that are the reddest are those on the side of the tree which gets most sun. Not only that, but the red is brighter on the upper side of the leaf. It has also been recognised for decades that the best conditions for intense red colours are dry, sunny days and coo nights, conditions that nicely match those that make leaves susceptible to **excess** light. And finally, trees such as maples usually get much redder the more north you travel in the northern hemisphere. It's colder there, they're more stressed, their chlorophyll is more sensitive and it needs more sunblock.

I What is still not fully understood, however, is why some trees resort to producing red pigments while others don't bother, and simply reveal their orange or yellow hues. Do these trees have other means at their **disposal** to prevent **overexposure** to light in autumn? Their story, though not as **spectacular** to the eye, will surely turn out to be as subtle and as complex.

Intact= unbroken, undamaged, unharmed…

Vulnerable= at risk, in danger, defenseless, weak…

Destructive= damaging, devastating, harmful, detrimental…

Suspect= doubt, disbelieve, distrust…

Clue= evidence, sign…

Straightforward= simple, uncomplicated…

Excess= extra.

Disposal= removal, clearance…

Overexposure= over contact.

Spectacular= stunning, amazing, impressive, fantastic, brilliant…

READING PASSAGE 3

Beyond the blue horizon

Ancient voyagers who settled the far-flung islands of the Pacific Ocean

(1)

An important archaeological discovery on the island of Efate in the Pacific archipelago of Vanuatu has revealed **traces** of an **ancient** seafaring people, the distant ancestors of todays, Polynesians. The site came to light only **by chance**. An agricultural worker, **digging** in the grounds of a derelict plantation, scraped open a grave – the first of dozens in a burial ground some 3,000 years old. It is the oldest **cemetery** ever found in the Pacific islands, and it harbors the remains of an ancient people archaeologists call the Lapita.

(2)

They were daring blue-water adventurers who used basic canoes to **rove** across the ocean. But they were not just explorers. They were also **pioneers** who carried with them everything they would need to build new lives – their **livestock**, taro seedlings and stone tools. Within the span of several centuries, the Lapita stretched the boundaries of their world from the jungle-clad volcanoes of Papua New Guinea to the loneliest coral outliers of Tonga.

(3)

The Lapita left **precious** few clues about themselves, but Efate expands the volume of data available to researchers dramatically. The remains of 62 individuals have been uncovered so far, and archaeologists were also **thrilled** to find six complete Lapita pots. Other items included a Lapita burial urn with modeled birds arranged on the rim as though peering down at the human remains sealed inside. 'It's an important discovery,' says Matthew Spriggs, professor of archaeology at the Australian National University and head of the international team digging up the site, 'for it conclusively **identifies** the remains as Lapita.'

(4)

Trace= a small sign that shows that someone or something was present or existed.

Ancient= very old.

By chance= by accident, accidentally, unintentionally…

Dig= excavate.

Cemetery= a piece of land, usually not belonging to a church, in which dead people are buried.

Rove= travel, journey…

Pioneer= leader.

Livestock= farm animals.

Boundary= border, limitation…

Precious= valuable, important…

Thrilled= excited, delighted…

Identify= detect, discover, find…

DNA teased from these human remains may help answer one of the most **puzzling** questions in Pacific anthropology: did all Pacific islanders spring from one source or many? Was there only one outward migration from a single point in Asia, or several from different points? 'This represents the best opportunity we've had yet,' says Spriggs, 'to find out who the Lapita actually were, where they came from, and who their closest **descendants** are today.' (5) There is one stubborn question for which archaeology has yet to provide any answers: how did the Lapita **accomplish** the ancient **equivalent** of a moon landing, many times over? No-one has found one of their canoes or any rigging, which could reveal how the canoes were sailed. Nor do the **oral** histories and traditions of later Polynesians offer any insights, for they turn into **myths** long before they reach as far back in time as the Lapita. (6) 'All we can say for certain is that the Lapita had canoes that were capable of ocean voyages, and they had the ability to sail them,' says Geoff Irwin, a professor of archaeology at the University of Auckland. Those sailing skills, he says, were developed and passed down over thousands of years by earlier mariners who worked their way through the archipelagoes of the western Pacific, making short crossings to nearby islands. The real adventure didn't begin, however, until their Lapita descendants sailed out of sight of land, with empty horizons on every side. This must have been as difficult for them as landing on the moon is for us today. Certainly it **distinguished** them from their ancestors, but what gave them the **courage** to launch out on such risky voyages? (7) The Lap it as thrust into the Pacific was eastward, against the prevailing trade winds, Irwin notes. Those nagging headwinds, he argues, may have been the key to their success. 'They could sail out for days into the unknown and assess the area, secure in the knowledge that if they didn't find anything, they could turn about and catch a **swift** ride back on the trade winds. This is what would have made the whole thing work.' Once out there, skilled seafarers would have detected abundant leads to follow to land: seabirds,	**Puzzling**= confusing. **Descendant**= offspring, young generation. **Accomplish**= achieve, complete, do, finish, get done… **Equivalent**= something that has the same value, purpose, job etc as something else. **Oral**= spoken, by word of mouth… **Myth**= legend, fairy tale… **Distinguished**= differentiate, tell apart… **Courage**= brave. **Swift**= speedy, fast, quick, rapid…

coconuts and twigs carried out to sea by the **tides**, and the afternoon pile-up of clouds on the horizon which often **indicates** an island in the distance. (8) For returning explorers, successful or not, the geography of their own archipelagoes would have provided a safety net. Without this to go by, **overshooting** their home ports, getting lost and sailing off into **eternity** would have been all too easy. Vanuatu, for example, **stretches** more than 500 miles in a northwest-southeast trend, its scores of inrervisible islands forming a backstop for mariners riding the trade winds home. (9) All this **presupposes** one essential detail, says Atholl Anderson, professor of prehistory at the Australian National University: the Lapita had mastered the advanced art of sailing against the wind. 'And there's no **proof** they could do any such thing,' Anderson says. 'There has been this assumption they did, and people have built canoes to re-create those early voyages based on that assumption. But nobody has any idea what their canoes looked like or how they were **rigged**.' (10) Rather than give all the credit to human skill, Anderson invokes the winds of chance. El Nino, the same climate **disruption** that affects the Pacific today, may have helped **scatter** the Lapita, Anderson suggests. He points out that climate data obtained from slow-growing corals around the Pacific indicate a series of unusually frequent El Ninos around the time of the Lapita **expansion**. By **reversing** the regular east-to-west flow of the trade winds for weeks at a time, these super El Ninos might have taken the Lapita on long unplanned voyages. (11) However they did it, the Lapita spread themselves a third of the way across the Pacific, then called it quits for reasons known only to them. Ahead lay the vast emptiness of the central Pacific and perhaps they were too thinly stretched to venture farther. They probably never numbered more than a few thousand in total, and in their rapid migration eastward they **encountered** hundreds of islands – more than 300 in Fiji alone.	**Tide**= wave. **Indicate**= point out, show, suggest… **Overshoot**= pass, go beyond, go past… **Eternity**= time without end. **Stretch**= widen, enlarge, make longer, broaden… **Presuppose**= assume. **Proof**= evidence. **Rig**= engineer, arrange, prepare… **Disruption**= a situation in which something is prevented from continuing in its usual way. **Scatter**=spread out. **Expansion**= spreading out. **Reverse**= turn around. **Encounter**= come across, meet.

Test 4
READING PASSAGE 1

The megafires of California

Drought, housing expansion, and **oversupply** of **tinder** make for bigger, hotter fires in the western United States

Wildfires are becoming an increasing **menace** in the western United States, with Southern California being the hardest hit area. There's a reason fire **squads** battling more frequent **blazes** in Southern California are having such difficulty containing the flames, despite better preparedness than ever and decades of experience fighting fires fanned by the 'Santa Ana Winds'. The wildfires themselves, experts say, are generally hotter, faster, and spread more **erratically** than in the past.

Megafires, also called 'siege fires', are the increasingly frequent blazes that burn 500,000 acres or more - 10 times the size of the average forest fire of 20 years ago. Some recent wildfires are among the biggest ever in California in terms of acreage burned, according to state figures and news reports.

One explanation for the trend to more superhot fires is that the region, which usually has dry summers, has had significantly below normal precipitation in many recent years. Another reason, experts say, is related to the century- long policy of the US Forest Service to stop wildfires as quickly as possible.
The **unintentional consequence** has been to **halt** the natural **eradication** of **underbrush**, now the primary fuel for megafires.

Drought= a long period of dry weather when there is not enough water for plants and animals to live.

Oversupply= the state of having more of something than you need or can sell.

Tinder= dry material that burns easily and can be used for lighting fires.

Menace= threat, danger…

Squad= team, crew, group…

Blaze= fire.

Erratically= randomly, unpredictably…

Unintentional= unplanned, accidental, not deliberately…

Consequence= result, effect, outcome…

Halt= stop, pause…

Eradication= abolition.

Underbrush= undergrowth, bushes…

Three other factors contribute to the trend, they add. First is climate change, marked by a 1-degree Fahrenheit rise in average yearly temperature across the western states. Second is fire seasons that on average are 78 days longer than they were 20 years ago. Third is increased construction of homes in wooded areas. 'We are increasingly building our homes in fire-prone ecosystems,' says Dominik Kulakowski, adjunct professor of biology at Clark University Graduate School of Geography in Worcester, Massachusetts. 'Doing that in many of the forests of the western US is like building homes on the side of an **active volcano**.' In California, where population growth has averaged more than 600,000 a year for at least a decade, more residential housing is being built. 'What once was open space is now residential homes providing fuel to make fires burn with greater **intensity**,' says Terry McHale of the California Department of Forestry firefighters' union. 'With so much dryness, so many communities to catch fire, so many fronts to fight, it becomes an almost incredible job.' That said, many experts give California high marks for making **progress** on preparedness in recent years, after some of the largest fires in state history **scorched** thousands of acres, burned thousands of homes, and killed numerous people. Stung in the past by **criticism** of **bungling** that allowed fires to spread when they might have been contained, **personnel** are meeting the peculiar challenges of neighborhood - and canyon- hopping fires better than previously, observers say. State promises to provide more up-to-date engines, planes, and helicopters to fight fires have been **fulfilled**. Firefighters' unions that in the past complained of dilapidated equipment, old fire engines, and **insufficient** blueprints for fire safety are now praising the state's commitment, noting that **funding** for firefighting has increased, despite huge cuts in many other programs. 'We are pleased that the current state **administration** has been very **proactive** in its support of us, and [has] come through with budgetary support of the infrastructure needs we have long	**Active**= lively, dynamic… **Volcano**= a mountain with a large hole at the top, through which lava (=very hot liquid rock) is sometimes forced out. **Intensity**= strength, power, amount… **Progress**= development, growth, improvement… **Scorch**= burn. **Criticism**= disapproval. **Bungle**= to fail to do something properly, because you have made stupid mistakes – used especially in news reports. **Personnel**= workers, staff, employees, workforce, human resources… **Fulfilled**= satisfied. **Insufficient**= lacking, not enough… **Funding**= financial support, money… **Administration**= management, government… **Proactive**= positive, upbeat…

sought,' says Mr. McHale of the firefighters' union. Besides providing money to **upgrade** the fire engines that must **traverse** the **mammoth** state and wind along serpentine canyon roads, the state has invested in better **command**-and-control facilities as well as in the **strategies** to run them. 'In the fire sieges of earlier years, we found that other **jurisdictions** and states were willing to offer mutual-aid help, but we were not able to communicate **adequately** with them,' says Kim Zagaris, chief of the state's Office of Emergency Services Fire and Rescue Branch. After a **commission** examined and **revamped** communications procedures, the statewide response 'has become far more professional and **responsive**,' he says. There is a sense among both government officials and residents that the speed, dedication, and **coordination** of firefighters from several states and jurisdictions are resulting in greater efficiency than in past 'siege fire' situations. In recent years, the Southern California region has improved building codes, evacuation procedures, and procurement of new technology. 'I am **extraordinarily impressed** by the improvements we have witnessed,' says Randy Jacobs, a Southern California- based lawyer who has had to **evacuate** both his home and business to escape wildfires. 'Notwithstanding all the damage that will continue to be caused by wildfires, we will no longer suffer the loss of life endured in the past because of the fire **prevention** and firefighting measures that have been put in place,' he says.	**Upgrade**= improve. **Traverse**= cross, pass though… **Mammoth**= enormous, huge, massive… **Command**= the control of a group of people or a situation. **Jurisdiction**= the right to use an official power to make legal decisions, or the area where this right exists. **Commission**= official group, committee, authority… **Revamp**= improve, refurbish, restore, do up… **Strategy**= plan, policy… **Adequately**= sufficiently, satisfactorily… **Responsive**= quick to respond… **Coordinatio**n= the organization of people or things so that they work together well. **Extraordinarily**= extremely, very, particularly… **Impress**= amaze. **Evacuate**= abandon, leave… **Prevention**= avoidance.

READING PASSAGE 2

Second nature

Your **personality** isn't necessarily set in stone. With a little **experimentation**, people can reshape their temperaments and **inject** passion, **optimism**, joy and **courage** into their lives

A Psychologists have long held that a person's character cannot undergo a **transformation** in any meaningful way and that the key **traits** of personality are **determined** at a very young age. However, researchers have begun looking more closely at ways we can change. Positive psychologists have **identified** 24 qualities we **admire**, such as loyalty and kindness, and are studying them to find out why they come so naturally to some people. What they're discovering is that many of these qualities amount to habitual behaviour that determines the way we respond to the world. The good news is that all this can be learned. Some qualities are less challenging to develop than others, optimism being one of them. However, developing qualities requires mastering a range of skills which are diverse and sometimes surprising. For example, to bring more joy and passion into your life, you must be open to experiencing negative emotions. **Cultivating** such qualities will help you realise your full potential.

B 'The evidence is good that most personality traits can be **altered**,' says Christopher Peterson, professor of psychology at the University of Michigan, who cites himself as an example. Inherently **introverted**, he realised early on that as an academic, his **reticence** would prove disastrous in the lecture hall. So he learned to be more outgoing and to entertain his classes. 'Now my extroverted behaviour is **spontaneous**,' he says.

Personality= character, traits, qualities…

Experimentation= testing.

Inject= add, insert, bring in…

Optimism= hopefulness.

Courage= brave.

Transformation= change, alteration, conversion, revolution…

Trait= feature.

Determine= decide, establish…

Identify= recognize, discover, find, detect…

Admire= like, respect, have a high regard for…

Cultivate= develop, nurture, promote, encourage, foster…

Alter= change, modify, adjust…

Introverted= someone who is introverted is quiet and shy and does not enjoy being with other people.

Reticence= shyness, quietness, introversion…

Disastrous= unsuccessful, terrible…

Spontaneous= natural.

C David Fajgenbaum had to make a similar **transition**. He was preparing for university, when he had an accident that put an end to his sports career. On campus, he quickly found that beyond **ordinary counselling**, the university had no services for students who were undergoing physical rehabilitation and suffering from depression like him. He therefore **launched** a support group to help others in similar situations. He took action despite his own pain - a typical response of an optimist. D Suzanne Segerstrom, professor of psychology at the University of Kentucky, believes that the key to increasing optimism is through cultivating optimistic behaviour, rather than positive thinking. She recommends you train yourself to pay attention to good **fortune** by writing down three positive things that come about each day. This will help you convince yourself that favourable outcomes actually happen all the time, making it easier to begin taking action. E You can recognise a person who is **passionate about** a **pursuit** by the way they are so strongly involved in it. Tanya Streeter's passion is freediving - the sport of plunging deep into the water without tanks or other breathing equipment. Beginning in 1998, she set nine world records and can hold her breath for six minutes. The physical **stamina** required for this sport is intense but the psychological demands are even more **overwhelming**. Streeter learned to untangle her **fears** from her judgment of what her body and mind could do. 'In my career as a competitive freediver, there was a limit to what I could do - but it wasn't anywhere near what I thought it was/ she says. F Finding a pursuit that **excites** you can improve anyone's life. The secret about consuming passions, though, according to psychologist Paul Silvia of the University of North Carolina, is that 'they require **discipline**, hard work and ability, which is why they are so rewarding.' Psychologist Todd Kashdan has this advice for those people taking up a new passion: 'As a newcomer, you also have to **tolerate** and laugh at your own ignorance. You must be willing to accept the negative feelings that come your way,' he says.	**Transition**= change, conversion… **Ordinary**= normal, usual, regular… **Counsel**= advise, support, help, guide, assist… **Launch**= open, start… **Fortune**= wealth, riches… **Passionate about**= keen about, mad about, crazy about. **Pursuit**= hobby, chase, hunt, interest… **Stamina**= energy, strength, endurance… **Overwhelm**=overpower. **Fear**= anxiety, worry, fright… **Excite**= stimulate, motivate… **Discipline**= obedience. **Tolerate**= stand, bear, put up with, accept…

G In 2004, physician-scientist Mauro Zappaterra began his PhD research at Harvard Medical School. **Unfortunately**, he was **miserable** as his research wasn't compatible with his **curiosity** about **healing**. He finally took a break and during eight months in Santa Fe, Zappaterra learned about alternative healing techniques not taught at Harvard. When he got back, he **switched** labs to study how cerebrospinal fluid nourishes the developing nervous system. He also **vowed** to look for the joy in everything, including failure, as this could help him learn about his research and himself.
One thing that can hold joy back is a person's concentration on avoiding failure rather than their looking forward to doing something well. 'Focusing on being safe might get in the way of your reaching your goals,' explains Kashdan. For example, are you hoping to get through a business lunch without **embarrassing** yourself, or are you thinking about how fascinating the conversation might be?

H Usually, we think of courage in physical terms but ordinary life **demands** something else. For marketing **executive** Kenneth Pedeleose, it meant speaking out against something he thought was **ethically** wrong. The new manager was **intimidating** staff so Pedeleose carefully recorded each instance of bullying and eventually took the evidence to a senior director, knowing his own job security would be threatened. Eventually the manager was the one to go. According to Cynthia Pury, a psychologist at Clemson University, Pedeleose's story proves the point that courage is not motivated by fearlessness, but by moral **obligation**. Pury also believes that people can acquire courage. Many of her students said that faced with a risky situation, they first tried to calm themselves down, then looked for a way to **mitigate** the danger, just as Pedeleose did by documenting his **allegations.**
Over the long term, picking up a new character trait may help you move toward being the person you want to be. And in the short term, the effort itself could be surprisingly rewarding, a kind of internal adventure.

Unfortunately= unluckily, unhappily, sadly…

Miserable= unhappy, fed-up, sad, depressed, down…

Curiosity= the desire to know about something.

Heal= cure, nurse back to health…

Switch= change.

Vow= promise, swear.

Embarrassing= make shy, humiliate…

Demand= require, ask, want…

Executive= senior manager, director, administrator…

Ethically= morally.

Intimidate= threaten, frighten, scare, bully…

Obligation= compulsion, duty, responsibility, requirement…

Mitigate= lessen, reduce, alleviate…

Allegation= a statement that someone has done something wrong or illegal, but that has not been proved.

READING PASSAGE 3

When evolution runs backwards

Evolution isn't supposed to run **backwards** - yet an increasing number of examples show that it does and that it can sometimes **represent** the future of a species.

The description of any animal as an 'evolutionary throwback' is **controversial**. For the better part of a century, most biologists have been **reluctant** to use those words, mindful of a principle of evolution that says 'evolution cannot run backwards. But as more and more examples come to light and modern **genetics** enters the scene, that principle is having to be rewritten. Not only are evolutionary throwbacks possible, they sometimes play an important role in the forward march of evolution. The technical term for an evolutionary throwback is an 'atavism', from the Latin atavus, meaning forefather. The word has ugly **connotations** thanks largely to Cesare Lombroso, a 19th-century Italian **medic** who argued that criminals were born not made and could be identified by certain physical features that were throwbacks to a **primitive**, sub-human state.

While Lombroso was **measuring** criminals, a Belgian palaeontologist called Louis Dollo was studying fossil records and coming to the opposite **conclusion**. In 1890 he **proposed** that evolution was **irreversible**: that 'an **organism** is unable to return, even partially, to a previous stage already realised in the ranks of its ancestors. Early 20th-century biologists came to a similar conclusion, though they qualified it in terms of **probability**, stating that there is no reason why

Backwards= toward the back.

Represent= stand for.

Controversial= causing a lot of disagreement, because many people have strong opinions about the subject being discussed.

Reluctant= unwilling, unenthusiastic…

Genetics= the study of how the qualities of living things are passed on in their genes.

Connotation= a quality or an idea that a word makes you think of that is more than its basic meaning.

Medic= a medical doctor.

Primitive= prehistoric, ancient…

Measure= assess, evaluate…

Conclusion= end, deduction…

Propose= suggest.

Irreversible= irreversible damage, change etc is so serious or so great that you cannot change something back to how it was before.

Organism= an animal, plant, human, or any other living thing.

Probability= likelihood, chance…

evolution cannot run backwards -it is just very unlikely. And so the idea of irreversibility in evolution stuck and came to be known as 'Dollo's law.

If Dollo's law is right, atavisms should occur only very rarely, if at all. Yet almost since the idea took root, **exceptions** have been cropping up. In 1919, for example, a humpback whale with a pair of leglike appendages over a metre long, complete with a full set of limb bones, was caught off Vancouver Island in Canada. Explorer Roy Chapman Andrews argued at the time that the whale must be a throwback to a land-living ancestor. 'I can see no other explanation, he wrote in 1921.

Since then, so many other examples have been discovered that it no longer makes sense to say that evolution is as good as irreversible. And this poses a puzzle: how can **characteristics** that **disappeared** millions of years ago suddenly **reappear**? In 1994, Rudolf Raff and colleagues at Indiana University in the USA decided to use genetics to put a number on the **probability** of evolution going into reverse. They reasoned that while some evolutionary changes involve the loss of genes and are therefore irreversible, others may be the result of genes being switched off. If these silent genes are somehow switched back on, they argued, longlost traits could reappear.

Raff's team went on to calculate the **likelihood** of it happening. Silent genes accumulate random mutations, they reasoned, eventually rendering them useless. So how long can a gene survive in a species if it is no longer used? The team calculated that there is a good chance of silent genes surviving for **up to** 6 million years in at least a few individuals in a population, and that some might survive as long as 10 million years. In other words, throwbacks are possible, but only to the **relatively** recent evolutionary past.
As a possible example, the team pointed to the mole salamanders of Mexico and California. Like most amphibians these begin life in a **juvenile** 'tadpole' state, then metamorphose into the adult form – except for one species, the axolotl, which famously lives its entire life as a juvenile. The simplest explanation for this is that the axolotl **lineage** alone lost the ability to

Exception= something or someone that is not included in a general statement or does not follow a rule or pattern.

Characteristic= trait, feature…

Disappear= vanish, fade away, go…

Reappear= comeback.

Probability= likelihood, chance, possibility…

Calculate= work out, analyze…

Likelihood= probability, possibility, chance…

Up to= equal to.

Relatively= comparatively, quite, fairly…

Juvenile= young, childish, immature…

Lineage= the way in which members of a family are descended from other members.

metamorphose, while others **retained** it. From a detailed analysis of the salamanders' family tree, however, it is clear that the other lineages evolved from an ancestor that itself had lost the ability to metamorphose. In other words, metamorphosis in mole salamanders is an atavism. The salamander example fits with Raff's 10million-year time frame. More recently, however, examples have been reported that break the time limit, suggesting that silent genes may not be the whole story. In a paper published last year, biologist Gunter Wagner of Yale University reported some work on the evolutionary history of a group of South American lizards called Bachia. Many of these have **minuscule limbs**; some look more like snakes than lizards and a few have completely lost the toes on their **hind** limbs. Other species, however, sport up to four toes on their hind legs. The simplest explanation is that the toed lineages never lost their toes, but Wagner begs to differ. According to his analysis of the Bachia family tree, the toed species re-evolved toes from toeless ancestors and, what is more, digit loss and gain has occurred on more than one **occasion** over tens of millions of years. So what's going on? One possibility is that these **traits** are lost and then simply reappear, in much the same way that similar structures can independently arise in unrelated species, such as the dorsal fins of sharks and killer whales. Another more intriguing possibility is that the genetic information needed to make toes somehow survived for tens or perhaps hundreds of millions of years in the lizards and was reactivated. These atavistic traits provided an advantage and spread through the population, effectively **reversing** evolution. But if silent genes degrade within 6 to million years, how can long-lost traits be reactivated over longer timescales? The answer may lie in the womb. Early embryos of many species develop ancestral features. Snake embryos, for example, sprout hind limb buds. Later in development these features disappear thanks to developmental programs that say 'lose the leg'. If for any reason this does not happen, the ancestral feature may not disappear, leading to an atavism.	**Retain**= keep, hold, maintain… **Minuscule**= tiny, very small… **Limb=** an arm or leg. **Hind**= back. **Occasion**= time, chance… **Trait**= characteristic, feature… **Reverse=** turn around.