# IELTSFever Academic Reading Test 84

## Reading Passage 1

### Organic farming and chemical fertilisers

**{A}** The world's population continues to climb. And despite the rise of high-tech agriculture, 800 million people don't get enough to eat. Clearly it's time to rethink the food we eat and where it comes from. Feeding 9 billion people will take more than the same old farming practices, especially if we want to do it without feeling rainforests and planting every last scrap of prairie. Finding food for all those people will tax farmers'--and researchers'--ingenuity to the limit. Yet Already, precious aquifers that provide irrigation water for some of the world's most productive farmlands are drying up or filling with seawater, and arable land in China is eroding to create vast dust storms that redden sunsets as far away as North America. "Agriculture must become the solution to environmental problems in 50 years. If we don't have systems that make the environment better--not just hold the fort-then we're in trouble," says Kenneth Cassman, an agronomist at the University of Nebraska at Lincoln. That view was echoed in January by the Curry report, a government panel that surveyed the future of farming and food in Britain.

**{B}** It's easy to say agriculture has to do better, but what should this friendly farming of the future look like? Concerned consumers come up short at this point, facing what appears to be an ever-widening ideological divide. In one corner are the techno-optimists who put their faith in genetically modified crops, improved agrochemicals and computer-enhanced machinery; in the other are advocates of organic farming, who reject artificial chemicals and embrace back-to-nature techniques such as composting. Both sides cite plausible science to back their claims to the moral high ground, and both bring enough passion to the debate for many people to come away thinking we're faced with a stark choice between two mutually incompatible options.

**{C}** Not so. If you take off the ideological blinkers and simply ask how the world can produce the food it needs with the least environmental cost, a new middle way opens. The key is sustainability: whatever we do must not destroy the capital of soil and water we need to keep on producing. Like today's organic farming, the intelligent farming of the future should pay much more attention to the health of its soil and the ecosystem it's part of. But intelligent farming should also make shrewd and locally appropriate use of chemical fertilisers and pesticides. The most crucial ingredient in this new style of agriculture is not chemicals but information about what's happening in each field and how to respond. Yet ironically, this key element may be the most neglected today.

**{D}** Clearly, organic farming has all the warm, fuzzy sentiment on its side. An approach that eschews synthetic chemicals surely runs no risk of poisoning land and water. And its emphasis on building up natural ecosystems seems to be good for everyone. Perhaps these easy assumptions explain why sales of organic food across Europe are increasing by at least 50 per cent per year.

**{E}** Going organic sounds idyllic--but it's naive, too. Organic agriculture has its own suite of environmental costs, which can be worse than those of conventional farming, especially if it were to become the world norm. But more fundamentally, the organic versus-chemical debate focuses on the wrong question. The issue isn't what you put into a farm, but what you get out of it, both in terms of crop yields and pollutants, and what condition the farm is in when you're done.

**{F}** Take chemical fertilisers, which deliver nitrogen, an essential plant nutrient, to crops along with some phosphorus , and potassium . It is a mantra of organic farming that these fertilisers are unwholesome, and plant nutrients must come from natural sources. But in fact the main environmental damage done by chemical fertilisers as opposed to any other kind is through greenhouse gases-carbon dioxide from the fossil fuels used in their synthesis and nitrogen oxides released by their degradation. Excess nitrogen from chemical fertilisers can pollute groundwater, but so can excess nitrogen from organic manures.

**{G}** On the other hand, relying solely on chemical fertilisers to provide soil nutrients without doing other things to build healthy soil is damaging. Organic farmers don't use chemical fertilisers, so they are very good at building soil fertility by working crop residues and manure into the soil, rotating grain with legumes that fix atmospheric nitrogen, and other techniques.

**{H}** This generates vital soil nutrients and also creates a soil that is richer in organic matter, so it retains nutrients better and is hospitable to the crop's roots and creatures such as earthworms that help maintain soil fertility. Such soil also holds water better and therefore makes more efficient use of both rainfall and irrigation water. And organic matter ties up CO2 in the soil, helping to offset emissions from burning fossil fuels and reduce global warming.

**{I}** Advocates of organic farming like to point out that fields managed in this way can produce yields just as high as fields juiced up with synthetic fertilisers. For example, Bill Liebhardt, research manager at the Rodale Institute in Kutztown, Pennsylvania, recently compiled the results of such comparisons for corn, wheat, soybeans and tomatoes in the US and found that the organic fields averaged between 94 and 100 per cent of the yields of nearby conventional crops.

**{J}** But this optimistic picture tells only half the story. Farmers can't grow such crops every year if they want to maintain or build soil nutrients without synthetic fertilisers. They need to alternate with soil-building crops such as pasture grasses and legumes such as alfalfa. So in the long term, the yield of staple grains such as wheat, rice and corn must go down. This is the biggest cost of organic farming. Vaclav Smil of the University of Manitoba in Winnipeg, Canada, estimates that if farmers worldwide gave up the 80 million tonnes of synthetic fertilizers they now use each year, total grain production would fall by at least half. Either farmers would have to double the amount of land they cultivate- at catastrophic cost to natural habitats--or billions of people would starve.

**{K}** That doesn't mean farmers couldn't get by with less fertiliser. Technologically advanced farmers in wealthy countries, for instance, can now monitor their yields hectare by hectare, or even more finely, throughout a huge field. They can then target their fertiliser to the parts of the field where it will do the most good, instead of responding to average conditions. This increases yield and decreases fertiliser use. Eventually, farmers may incorporate long-term weather forecasts into their planning as well, so that they can cut back on fertiliser use when the weather is likely to make harvests poor anyway, says Ron Olson, an agronomist with Cargill Fertilizer in Tampa, Florida.

**{L}** Organic techniques certainly have their benefits, especially for poor farmers. But strict `organic agriculture", which prohibits certain technologies and allows others, isn't always better for the environment. Take herbicides, for example. These can leach into waterways and poison both wildlife and people. Just last month, researchers led by Tyrone Hayes at the University of

California at Berkeley found that even low concentrations of atrazine, the most commonly used weed killer in the US, can prevent frog tadpoles from developing properly.

## Questions 1-4

*Use the information in the passage to match the people (listed A-D) with opinions or deeds below. Write the appropriate letters A-D in boxes 1-4 on your answer sheet.*

**(A)** Vaclav Smil

**(B)** Bill Liebhardt

**(C)** Kenneth Cassman

**(D)** Ron Olson

**(1)** Use of chemical fertilizer can be optimised by combining weather information.

**(2)** Organic farming yield is nearly equal to traditional ones.

**(3)** Better agricultural setting is a significant key to solving environmental tough nut.

**(4)** Substantial production loss would happen in case all farmers shifted from using synthetic fertiliser

## Questions 5-9

*Do the following statements agree with the information given in Reading Passage 1 In boxes 5-9 on your answer sheet, write*

| | |
|---|---|
| TRUE | if the statement is True |
| FALSE | if the statement is false |
| NOT GIVEN | If the information is not given in the passage |

**(5)** Increasing population, draining irrigation, eroding farmland push agricultural industry to extremity.

**(6)** There are only two options for farmers; they use chemical fertiliser or a natural approach.

**(7)** Chemical fertilizers currently are more expensive than natural fertilisers.

**(8)** In order to keep nutrients in the soil, organic farmers need to rotate planting methods.

**(9 )**"Organic agriculture" is the way that environment-damaging technologies are all strictly forbidden.

## Questions 10-13

Summary Complete the following summary of the paragraphs of Reading Passage, using no more than two words from the Reading Passage for each answer. Write your answers in boxes 10-13 on your answer sheet.

| |
|---|
| Several .........**10.**....approaches need to be applied in order that the global population wouldn't go starving. A team called.......**11.**... repeated the viewpoint of a scholar by a survey in British farming. More and more European farmers believe in .......**12**.... Farming these years. The argument of organic against .........**13**....seems in an inaccurate direction. |



## Reading Passage 2

# Twin Study: Two of a kind

**{A}** THE scientific study of twins goes back to the late 19th century, when Francis Galton, an early geneticist, realised that they came in two varieties: identical twins born from one egg and non-identical twins that had come from two. That insight turned out to be key, although it was not until 1924 that it was used to formulate what is known as the twin rule of pathology, and twin studies really got going.

**{B}** The twin rule of pathology states that any heritable disease will be more concordant (that is, more likely to be jointly present or absent) in identical twins than in non-identical twins-and, in turn, will be more concordant in non-identical twins than in non-siblings. Early work, for example, showed that the statistical correlation of skin-mole counts between identical twins was 0.4, while non-identical twins had a correlation of only 0.2. (A score of 1.0 implies perfect correlation, while a score of zero implies no correlation.) This result suggests that moles are heritable, but it also implies that there is an environmental component to the development of moles, otherwise the correlation in identical twins would be close to 1.0.

**{C}** Twin research has shown that whether or not someone takes up smoking is determined mainly by environmental factors, but once he does so, how much he smokes is largely down to his genes. And while a person's religion is clearly a cultural attribute, there is a strong genetic component to religious fundamentalism. Twin studies are also unraveling the heritability of various aspects of human personality. Traits from neuroticism and anxiety to thrill- and novelty-seeking all have large genetic components. Parenting matters, but it does not determine personality in the way that some had thought.

**{D}** More importantly, perhaps, twin studies are helping the understanding of diseases such as cancer, asthma, osteoporosis, arthritis and immune disorders. And twins can be used, within ethical limits, for medical experiments. A study that administered vitamin C to one twin and a placebo to the other found that it had no effect on the common cold. The lesson from all today's twin studies is that most human traits are at least partially influenced by genes. However, for the most part, the age-old dichotomy between nature and nurture is not very useful. Many genetic programs are open to input from the environment, and genes are frequently switched on or off by environmental signals. It is also possible that genes themselves influence their environment. Some humans have an innate preference for participation in sports. Others are drawn to novelty. Might people also be drawn to certain kinds of friends and types of experience? In this way, a person's genes might shape the environment they act in as much as the environment shapes the actions of the genes.

**{E}** In the past, such research has been controversial. Josef Mengele, a Nazi doctor working at the Auschwitz extermination camp during the second world war, was fascinated by twins. He sought them out among arrivals at the camp and preserved them from the gas-chambers for a series of brutal experiments. After the war, Cyril Burt, a British psychologist who worked on the heredity of intelligence, tainted twin research with results that appear, in retrospect, to have been rather too good. Some of his data on identical twins who had been reared apart were probably faked. In any case, the prevailing ideology in the social sciences after the war was Marxist, and disliked suggestions that differences in human potential might have underlying genetic causes. Twin studies were thus viewed with suspicion.

**{F}** The ideological pendulum has swung back; however, as the human genome project and its aftermath have turned genes from abstract concepts to real pieces of DNA. The role of genes in sensitive areas such as intelligence is acknowledged by all but a few die-hards. The interesting questions now concern how nature and nurture interact to produce particular bits of biology, rather than which of the two is more important. Twin studies, which are a good way to ask these questions, are back in fashion, and many twins are enthusiastic participants in this research.

**{G}** Research at the Twinsburg festival began in a small way, with a single stand in 1979. Gradually, news spread, and more scientists began turning up. This year, half a dozen groups of researchers were lodged in a specially pitched research tent. In one corner of this tent, Paul Breslin, who works at the Monell Institute in Philadelphia, watched over several tables where twins sat sipping clear liquids from cups and making notes. It was the team's third year at Twinsburg. Dr Breslin and his colleagues want to find out how genes influence human perception, particularly the senses of smell and taste and those (warmth, cold, pain, tingle, itch and so on) that result from stimulation of the skin. Perception is an example of something that is probably influenced by both genes and experience. Even before birth, people are exposed to flavours such as chocolate, garlic, mint and vanilla that pass intact into the bloodstream, and thus to the fetus. Though it is not yet clear whether such prenatal exposure shapes taste-perception, there is evidence that it shapes preferences for foods encountered later in life.

**{H}** However, there are clearly genetic influences at work, as well—for example in the ability to taste quinine. Some people experience this as intensely bitter, even when it is present at very low levels. Others, whose genetic endowment is different, are less bothered by it. Twin studies make this extremely clear. Within a pair of identical twins, either both, or neither, will find quinine hard to swallow. Non-identical twins will agree less frequently.

**{I}** On the other side of the tent Dennis Drayna, from the National Institute on Deafness and Other Communication Disorders, in Maryland, was studying hearing. He wants to know what happens to sounds after they reach the ear. It is not clear, he says, whether sound is processed into sensation mostly in the ear or in the brain. Dr Drayna has already been involved in a twin study which revealed that the perception of musical pitch is highly heritable. At Twinsburg, he is playing different words, or parts of words, into the left and right ears of his twinned volunteers. The composite of the two sounds that an individual reports hearing depends on how he processes this diverse information and that, Dr Drayna believes, may well be influenced by genetics.

**{J}** Elsewhere in the marquee, Peter Miraldi, of Kent State University in Ohio, was trying to find out whether genes affect an individual's motivation to communicate with others. A number of twin studies have shown that personality and sociability are heritable, so he thinks this is fertile ground. And next to Mr. Miraldi was a team of dermatologists from Case Western Reserve University in Cleveland. They are looking at the development of skin diseases and male-pattern baldness. The goal of the latter piece of research is to find the genes responsible for making men's hair fall out.

**{K}** The busiest part of the tent, however, was the queue for forensic-science research into fingerprints. The origins of this study are shrouded in mystery. For many months, the festival's organisers have been convinced that the Secret Service, the American government agency responsible for, among other things, the safety of the president—is behind it. When The Economist contacted the Secret Service for more information, we were referred to Steve Nash, who is chairman of the International Association for Identification (IAI), and is also a detective in the scientific investigations section of the Marin County Sheriff's Office in California. The IAI, based in Minnesota, is an organisation of forensic scientists from around the world. Among other things, it publishes the Journal of Forensic Identification.

## Questions 14-18

*The reading Passage has seven paragraphs A-K.*

*Which paragraph contains the following information?*

*Write the correct letter A-K, in boxes 14-18 on your answer sheet.*

**NB** ***You may use any letter more than once***.

**(14)** Mentioned research conducted in Ohio

**(15)**Medical contribution to the research for twins.

**(16)** Research situation under life threatening conditions

**(17)** Data of similarities of identical twins

**(18)** Reasons that make one study unconvincing

## Questions 19-20

Summary

*Complete the following summary of the paragraphs of Reading Passage, using* ***no more than two words*** *from the Reading Passage for each answer. Write your answers in boxes 19-20on your answer sheet.*

| |
|---|
| The first one that conducted research on twins is called ......**...19.**......... He separated twins into two categories: non identical and identical twins. The twin research was used in medical application in as early as the year of .........**20.**......... |



## Questions 21-23

*Choose the correct letters in the following options: Write your answers in boxes 21-23 on your answer sheet.*

*Please choose* ***THREE*** *research fields that had been carried out in Ohio, Maryland and Twinsburgh?*

| |
|---|
| **(A)** Sense |
| **(B)** Cancer |
| **(C)** Be allergic to Vitamin D |
| **(D)** Mole heredity |
| **(E)** Sound |
| **(F)** Boldness of men |

## Questions 24-26

*Choose the correct letters in following options:*

*Write your answers in boxes 24-26 on your answer sheet.*

*Please choose* ***THREE*** *results that had been verified in this passage*.

**(A)** Non identical twins come from different eggs.

**(B )**Genetic relation between identical twins is closer than non-identical ones.

**(C)** Vitamin C has an evident effect on a cold.

**(D)** Genetic influence to smoking is superior to environment's

**(E)** If a pregnant woman eats too many sweets it would lead to skin disease.

**(F)** Hair loss has been found to be connected with skin problems.

## Reading Passage 3

# Thomas Harriot :The Discovery of Refraction

**{A}** When light travels from one medium to another, it generally bends, or refracts. The law of refraction gives us a way of predicting the amount of bending. Refraction has many applications in optics and technology. A lens uses refraction to form an image of an object for many different purposes, such as magnification. A prism uses refraction to form a spectrum of colors from an incident beam of light. Refraction also plays an important role in the formation of a mirage and other optical illusions. The law of refraction is also known as Snell's Law, named after Willobrord Snell, who discovered the law in 1621. Although Snell's sine law of refraction is now taught routinely in undergraduate courses, the quest for it spanned many centuries and involved many celebrated scientists. Perhaps the most interesting thing is that the first discovery of the sine law, made by the sixteenth-century English scientist Thomas Harriot (1560-1621), has been almost completely overlooked by physicists, despite much published material describing his contribution.

**{B}** A contemporary of Shakespeare, Elizabeth I, Johannes Kepler and Galilei Galileo, Thomas Harriot (1560-1621) was an English scientist and mathematician. His principal biographer, J. W. Shirley, was quoted saying that in his time he was “England's most profound mathematician, most imaginative and methodical experimental scientist”. As a mathematician, he contributed to the development of algebra, and introduced the symbols of “>, , and “<” for “more than” and “less than.” He also studied navigation and astronomy. On September 17, 1607, Harriot observed a comet, later Identified as Hailey-s. With his painstaking observations, later workers were able to compute the comet's orbit. Harriot was also the first to use a telescope to observe the heavens in England. He made sketches of the moon in 1609, and then developed lenses of increasing magnification. By April 1611, he had developed a lens with a magnification of 32. Between October 17, 1610 and February 26, 1612, he observed the moons of Jupiter, which had already been discovered by Galileo. While observing Jupiter's moons, he made a discovery of his own: sunspots, which he viewed 199 times between December 8, 1610 and January 18, 1613. These observations allowed him to figure out the sun's period of rotation.

**{C}** He was also an early English explorer of North America. He was a friend of the English courtier and explorer Sir Walter Raleigh, and travelled to Virginia as a scientific observer on a colonising expedition in 1585. On June 30, 1585, his ship anchored at Roanoke Island, off Virginia. On shore, Harriot observed the topography, flora and fauna, made many drawings and maps, and met the native people who spoke a language the English called Algonquian. Harriot worked out a phonetic transcription of the native people's speech sounds and began to learn the language, which enabled him to converse to some extent with other natives the English encountered. Harriot wrote his report for Raleigh and published it as A Briefe and True Report of the New Found Land of Virginia in 1588. Raleigh gave Harriot his own estate in Ireland, and Harriot began a survey of Raleigh's Irish holdings. He also undertook a study of ballistics and ship design for Raleigh in advance of the Spanish Armada's arrival.

**{D}** Harriot kept regular correspondence with other scientists and mathematicians, especially in England but also in mainland Europe, notably with Johannes Kepler. About twenty years before Snell's discovery, Johannes Kepler (1571-1630) had also looked for the law of refraction, but used the early data of Ptolemy. Unfortunately, Ptolemy's data was in error, so Kepler could obtain only an approximation which he published in 1604. Kepler later tried to obtain additional experimental results on refraction, and corresponded with Thomas Harriot from 1606 to 1609 since Kepler had heard Harriot had carried out some detailed experiments. In 1606, Harriot sent Kepler some tables of refraction data for different materials at a constant incident angle, but didn't provide enough detail for the data to be very useful. Kepler requested further information, but Harriot was not forthcoming, and it appears that Kepler eventually gave up the correspondence, frustrated with Harriot's reluctance.

**{E}** Apart from the correspondence with Kepler, there is no evidence that Harriot ever published his detailed results on refraction. His personal notes, however, reveal extensive studies significantly predating those of Kepler, Snell and Descartes. Harriot carried out many experiments on refraction in the 1590s, and from his notes it is clear that he had discovered the sine law at least as early as 1602. Around 1606, he had studied dispersion in prisms (predating Newton by around 60 years), measured the refractive indices of different liquids placed in a hollow glass prism, studied refraction in crystal spheres, and correctly understood refraction in the rainbow before Descartes.

**{F}** As his studies of refraction, Harriot's discoveries in other fields were largely unpublished during his lifetime, and until this century, Harriot was known only for an account of his travels in Virginia published in 1588, and for a treatise on algebra published posthumously in 1631. The reason why Harriot kept his results unpublished is unclear. Harriot wrote to Kepler that poor health prevented him from providing more information, but it is also possible that he was afraid of the seventeenth century's English religious establishment which was suspicious of the work carried out by mathematicians and scientists.

**{G}** After the discovery of sunspots, Harriot' s scientific work dwindled. The cause of his diminished productivity might have been a cancer discovered on his nose. Harriot died on July 2, 1621, in London, but his story did not end with his death. Recent research has revealed his wide range of interests and his genuinely original discoveries. What some writers describe as his "thousands upon thousands of sheets of mathematics and of scientific observations" appeared to be lost until 1784, when they were found in Henry Percy's country estate by one of Percy's descendants. She gave them to Franz Xaver Zach, her husband's son's tutor. Zach eventually put some of the papers in the hands of the Oxford University Press, but much work was required to prepare them for publication, and it has never been done. Scholars have begun to study them, and an appreciation of Harriot's contribution started to grow in the second half of the twentieth century. Harriot's study of refraction is but one example where his work overlapped with independent studies carried out by others in Europe, but in any historical treatment of optics his contribution rightfully deserves to be acknowledged.

## Questions 27-31

*Reading Passage 3 has 7 paragraphs A-G.*
***Choose the correct heading for paragraphs B-E and G from the list of headings below.***
*Write the correct number, i-x, in boxes 28-32 on your answer sheet.*

**List of Headings**

**(i)** A misunderstanding in the history of science

**(ii)** Thomas Harriot's biography

**(iii)** Unknown reasons for his unpublished works

**(iv)** Harriot's 1588 publication on North America studies

**(V)** Expedition to the New World

**(vi)** Reluctant cooperation with Kepler

**(vii)** Belated appreciation of Harriot's contribution

**(viii)** Religious pressures keeping him from publishing

**(ix)** Correspondence with Kepler

**(x)** Interests and researches into multiple fields of study

*Example* *Answer*

**Paragraph A** **i**

**(27)** Paragraph B

**(28)** Paragraph C

**(29)** Paragraph D

**(30)** Paragraph E

**(31)** Paragraph G

## Questions 32-37

*Answer the questions below using* ***NO MORE THAN THREE WORDS*** *from the passage for each answer.*

*Write your answers in boxes 32-36 on your answer sheet.*

Various modern applications based on an image produced by lens use refraction , such as **32.**.................. And a spectrum of colors from a beam of light can be produced with **33.**... ……

Harriot travelled to Virginia and mainly did research which focused on two subjects of American **34**.................. After, he also entered upon a study of flight dynamics and **35**.................. for one of his friends much ahead of major European competitors. He undertook extensive other studies which were only noted down personally yet predated than many other great scientists. One result, for example, corrected the misconception about the idea of **36**...........



## Questions 37-40

*Look at the following researchers (listed A-D) and findings*

*Match each researcher with the correct finding.*

*Write your answers in boxes 36-40 on your answer sheet.*

***NB You may use any researcher more than once.***

**(A)** Willobrord Snell

**(B)** Johannes Kepler

**(C)** Ptolemy

**(D)** Galileo

**(E)** Harriot

**(37)** discovered the moons of Jupiter

**(38)** distracted experimental calculation on refraction

**(39)** the discovery of sunspots

**(40)** the person whose name the sin law was attributed to