



## Đề thi thật 1: ROMAN CONCRETE

Ancient Roman concrete has withstood attacks from elements for over 2000 years. Can we learn from the Romans in some way to improve our concrete? How is it that Roman walls built with their concrete last longer than modern walls? Or is this just a perception? When we build a wall with concrete today, a plywood framework is constructed, concrete is poured into it, and when the concrete is cured, it is removed, leaving the concrete wall. In ancient Rome, two freestanding, parallel walls were built of brick bound with mortar, the combination of which is much, much stronger than plywood. A cavity a couple feet wide was left between the brick walls, and then concrete was poured in, along with some small rocks to bolster stability. This method makes a very sturdy wall. Today, we build buildings to last ten years; the Romans built buildings to last for millennia. A most unusual Roman structure depicting their technical advancement is the Pantheon. This is a brick faced building constructed to praise the Roman gods and has withstood the ravages of weathering in near perfect condition, sitting magnificently in the business district of Rome. Above all, this building humbles the modern engineer not only in its artistic splendour, but also because there are no steel rods to counter the high tensile forces, such as we need to hold our modern concrete together. Examining this large circular building tells much of the intelligence of its builders; it was designed to contain a fictional ball, and is some 143 feet in diameter with a wall in the form of skirts dropping from its circumference. In the centre of the dome is a 19-foot opening held in place by a bronze ring backed by a brick ring integrated into the concrete dome. This ingenious opening admitted sunlight to brighten the interior and the slightly curved marble floor provided drainage.

Dusty ancient history books teach us that Roman concrete consisted of just three parts: hydrate lime, pozzolan ash from a nearby volcano and a few pieces of fist-sized rock. If these parts were mixed together today in the manner of modern concrete and placed in a structure, the result would certainly not pass the test of the ages. So, how was it that the Romans so many years ago built such elaborate and ageless structures in concrete as seen on the skyline of Rome? Solving the riddle of ancient concrete is about understanding the chemistry. To understand its chemical composition, we must go back further in time. Three millennia ago, people of the Middle East made walls for their fortifications and homes by pounding moist clay between forms, often called pise work. To protect the surfaces of the clay from erosion, the ancients discovered that a coating of thin, white, burnt limestone would chemically combine with the gases in the air to give a hard protecting and moisture proof shield. We can only guess that the event of discovering this pseudo concrete occurred when a lime coating was applied to a wall made of volcanic, pozzolanic ash near the town of Pozzuoli in Italy. A chemical reaction took place between the chemicals in the wall of volcanic ash (silica and small amounts of alumina and iron oxide) and the layer of lime (calcium hydroxide) applied to the wall. Later, it was found that mixing a little volcanic ash in a fine powder with the moist lime not only made a thicker coat for the ancient concrete, but also produced a durable product that could be submerged in water, something that the plaster product of wet lime and plain sand could not match

### Questions 28–30

Write **NO MORE THAN THREE WORDS** for each.

#### ROMAN WALLS AND MODERN WALLS

1. What is used as a framework when building modern concrete walls?
2. What material was used to bind bricks in ancient Roman walls?
3. What was left between the brick walls before pouring concrete in Roman construction?

### Questions 31–33

Do the following statements agree with the information given in the text?

In boxes 31–33 on your answer sheet, write:

- **TRUE** – if the statement agrees with the information
- **FALSE** – if the statement contradicts the information
- **NOT GIVEN** – if there is no information on this

1. The Pantheon was constructed for business purposes.
2. When it was first built, light could not penetrate the Pantheon.
3. Pozzolan ash from volcanoes was difficult to mine for the ancients.

A new concrete product called roller compacted concrete was developed in the last century and this concrete mimics some of ancient concrete's characteristics. Roller compacted concrete consists of a mixture of 40 per cent Portland cement and 60 percent fly ash, a byproduct of electric power plants. By coincidence, the fly ash contains the same amorphous silica compounds as the ash from explosive volcanoes, and, when mixed, the hydrated Portland cement releases the same calcium component recognised in the lime mixing part of the ancient concrete formula. When hydroelectric dam a bonding gel was formed to tie inert rock these two parts were first mixed for roller compacted concrete - for the building of a pieces together. The calcium hydroxide molecules created in the concrete made with Portland cement and fly ash with amorphous silica can be compared to the composition of the ancient concrete made with wet lime, and volcanic pozzolan with its amorphous silica. Thus, there is a reasonable relationship regarding the concrete components that make the gel for both modern roller compacted concrete and ancient concrete.

The similarity of the ingredients of modern roller compacted concrete and ancient concrete has been explained, but there is more. The ancients hand mixed their components (wet lime and volcanic ash) in a mortar box with very little water to give a nearly dry composition, carried it to the into the rock layer. Is this job site in baskets, placing it over a previously prepared layer of rock pieces, and then proceeded to pound the mortar important? Yes! Close packing of the molecular structure by tamping reduces the need for excess water, which is a source of voids and weakness. concrete practices, which is little water used and tightly compacting the materials in their placement. When we review, we can see that the techniques of making ancient concrete have a modern counterpart. The materials (and their ratios) are very similar in both ancient and modern roller compacted concrete and the technique of tamping stiff mortar into the voids of a rock layer to avoid empty spaces are also common to both.

## Questions 34-36

**Do the following statements agree with the information given in the text?**

**In boxes 34-36 on your answer sheet, write:**

- **TRUE** – if the statement agrees with the information
- **FALSE** – if the statement contradicts the information
- **NOT GIVEN** – if there is no information on this

1. The limestone coating on ancient concrete created a water-resistant layer.
2. Using a little volcanic ash in the composition of ancient concrete allowed its use under water.
3. Electricity generation was inadvertently very useful in helping make the ingredients for roller compacted concrete.

## Questions 37-40

**Choose FOUR letters, A-G.**

*According to the text, which of the following are true for both Roman concrete and roller compacted concrete?*

- A. The compositions of both concretes were discovered by accident.
- B. Both concretes contain amorphous silica compounds.
- C. Sulphuric acid derivatives are required in the composition of both concretes.
- D. Both concretes release a calcium component during their composition.
- E. Both concretes require little water in their composition.
- F. Both concretes dry quickly, even in wet conditions.
- G. Packing techniques used for making both concretes reduce the threat of vulnerable gaps in the finished product.





## Đề thi thật 2: The Oldest Leather Shoe

Archeologists discovered in 2010 what is said to be the world's oldest known leather shoe. The 5,500-year-old shoe, some 1,000 years older than the Egyptian pyramids, was found by scientists excavating a huge cave, designated Areni-1, in Armenia near the border of Turkey and Iran. The shoe was part of a treasure trove of artifacts that experts say provide unprecedented information about an important and sparsely documented era: the Chalcolithic period or Copper Age, when humans are believed to have invented the wheel, as well as domesticating horses and producing other important innovations.

Along with the shoe, the cave yielded horns and bones of wild goats and red deer, as well as broken pottery and evidence of what may be the oldest known intentionally dried fruits: apricots, grapes, and plums. The cave, first discovered in 1997, appears to have been used primarily by powerful people of high status for keeping the Chalcolithic community's ritual objects, as well as their harvest during the winter months each year. But other people, probably acting as guards, seem to have lived in the front portion of the cave.

One of the lead scientists excavating Areni-1, Dr. Gregory Areshian of the University of California, Los Angeles, in the USA, said that the cave was also used by later civilizations, most recently by 14th-century Mongols, so he had assumed the shoe would be 600 to 700 years old. When separate laboratories at the University of Oxford in the UK and the University of California at Irvine in the USA carbon-dated the leather to 3653 to 3627 BC, he said, "We couldn't believe that a shoe could be so ancient."

The cow-hide shoe itself dates back to -3,500 BC (the Chalcolithic period) and is in perfect condition. Made from a single piece of leather and shaped to fit the wearer's foot, it contained grass—its purpose uncertain, whether to keep the foot warmer or to maintain the shape of the shoe, perhaps a precursor to the modern shoe-tree. "It is not known whether the shoe belonged to a man or woman," said lead author of the research, Dr. Ron Pinhas, University College Cork, Cork, Ireland. "As while small (European size 37; US size 7 women), the shoe could well have fitted a man from that era."

### Questions 1-8

Do the following statements agree with the information in the IELTS reading text?

In boxes 1-8 on your answer sheet, write

- TRUE if the statement agrees with the information
- FALSE if the statement contradicts the information
- NOT GIVEN if there is no information on this

1. The shoe discovered in Armenia is older than the Egyptian pyramids.
2. The cave where the shoe was found has been extensively documented since its discovery in 1997.
3. The artifacts found in the cave suggest it was primarily used for storing agricultural products.
4. Dr. Gregory Areshian initially estimated the shoe's age to be much younger than its actual age.
5. The shoe was made from multiple pieces of leather sewn together
6. The stable conditions in the cave contributed to the preservation of wheat and barley found there.
7. Diana Zardaryan, an Armenian PhD student, found the shoe alongside a complete pot.
8. The shoe was found with its original shoelaces intact.



The cave is situated in the Vayots Dzor province of Armenia, on the Armenian, Iranian, Nakhichevan, and Turkish borders, and was known to regional archaeologists due to its visibility from the highway below. The stable, cool, and dry conditions in the cave resulted in exceptional preservation of the various objects that were found, which included large containers holding well-preserved wheat and barley, apricots, and other edible plants. The floor of the cave was covered by thick layers of sheep dung, acting as a solid seal over the objects and preserving them beautifully over the millennia.

"We initially thought that the shoe and other objects were about 600–700 years old due to their remarkable condition," explained Dr. Pinhasi. "It was only through carbon dating by laboratories in Oxford, UK, and California, US, that we discovered the shoe's true age—several hundred years older than Ötzi, the famous Alpine iceman."

Three samples were taken to determine the absolute age of the shoe, and all tests yielded the same results. Two small strips of leather were cut from the shoe and sent for analysis to the Oxford Radiocarbon Accelerator Unit and the University of California - Irvine Accelerator Mass Spectrometry Facility. Additionally, a piece of grass from within the shoe was dated at Oxford, confirming that both the shoe and the grass were of the same ancient age

The shoe's discovery was credited to Armenian PhD student Diana Zardaryan of the Institute of Archaeology, Armenia, who found it in a pit alongside a broken pot and wild goat horns. Reflecting on the find, Ms. Zardaryan remarked, "I was amazed to find that even the shoe-laces were preserved." Dr. Gregory Areshian, co-director of the excavation at UCLA's Cotsen Institute of Archaeology, USA, expressed his astonishment at the state of preservation, noting, "The crusts sealed the artifacts and archaeological deposits as if they were freshly dried, just like they were put in a can."

### Questions 9–13

**Complete the summary below.**

**Write NO MORE THAN TWO WORDS from the passage for each answer.**

**Write your answers in boxes 9–13 on your answer sheet.**

The shoe discovered in Armenia dates back \_\_\_\_\_ approximately 9. \_\_\_\_\_ years, making it older than the Egyptian pyramids. The cave at Areni-1 was utilized by different civilizations over time, including 10. \_\_\_\_\_ in the 14th century. The shoe, made from a single piece of leather, was found alongside artifacts indicating the cave was used for storing 11. \_\_\_\_\_. Dr. Gregory Areshian initially underestimated the shoe's age, believing it to be 12. \_\_\_\_\_ years old. The preservation of artifacts in the cave was aided by a thick layer of 13. \_\_\_\_\_ covering the floor.





## Đề thi thật 3: Jellyfish: A Remarkable Marine Life Form

When viewed in the wild, jellyfish are perhaps the most graceful and vividly coloured of all sea creatures. But few people have seen a jellyfish living in its natural habitat. Instead, they might see a dead and shapeless specimen lying on the beach, or perhaps receive a painful sting while swimming, so it is inevitable that jellyfish are often considered ugly and possibly dangerous. This misunderstanding can be partly traced back to the 20th century when the use of massive nets and mechanical winches often damaged the delicate jellyfish that scientists managed to recover.

As a result, disappointingly little research was carried out into jellyfish, as marine biologists took the easy option and focused on physically stronger species such as fish, crabs, and shrimp. Fortunately, however, new techniques are now being developed

For example, scientists have discovered that sound bounces harmlessly off jellyfish, so in the Arctic and Norway researchers are using sonar to monitor jellyfish beneath the ocean's surface. This, together with aeroplane surveys, satellite imagery, and underwater cameras, has provided a wealth of new information in recent years.

Scientists now believe that in shallow water alone there are at least 38 million tonnes of jellyfish and these creatures inhabit every type of marine habitat, including deep water. Furthermore, jellyfish were once regarded as relatively solitary, but this is another area where science has evolved.

Dr. Karen Hansen was the first to suggest that jellyfish are the centre of entire ecosystems, like shrimp, lobster, and fish shelter and feed among their tentacles. This proposition has subsequently been conclusively proven by independent studies.

DNA sequencing and isotope analysis have provided further insights, including the identification of numerous additional species of jellyfish unknown to science only a few years ago.

This brings us to the issue of climate change. Research studies around the world have recorded a massive growth in jellyfish populations in recent years and some scientists have linked this to climate change.

However, while this may be credible, it cannot be established with certainty as other factors might be involved. Related to this was the longstanding academic belief that jellyfish had no predators and therefore there was no natural process to limit their numbers.

However, observations made by Paul Dewar and his team showed that this was incorrect. As a result, the scientific community now recognizes that species including sharks, tuna, swordfish, and some salmon all prey on jellyfish.

It is still widely assumed that jellyfish are among the simplest life forms, as they have no brain or central nervous system. While this is true, we now know they possess senses that allow them to see, feel and interact with their environment in subtle ways.

What is more, analysis of so-called 'upside-down jellyfish' shows that they shut down their bodies and rest in much the same way that humans do at night, something once widely believed to be impossible for jellyfish?

Furthermore, far from 'floating' in the water as they are still sometimes thought to do, analysis has shown jellyfish to be the most economical swimmers in the animal kingdom. In short, scientific progress in recent years has shown that many of our established beliefs about jellyfish were inaccurate. Jellyfish, though, are not harmless.

### Question Number 1

*Following are a few statements given from the passage above. You have to check the answers from the passage and write them correctly.*

*#1. \_\_\_\_\_ are perhaps the most graceful and vividly coloured of all sea creatures.*

*#2. \_\_\_\_\_ and isotope analysis have provided further insights.*

*#3. \_\_\_\_\_ was the first to suggest that jellyfish are the centre of entire ecosystems, like shrimp, lobster, and fish shelter and feed among their tentacles*

*#4. The \_\_\_\_\_ now recognizes that species including sharks, tuna, swordfish, and some salmon all prey on jellyfish.*

*#5. Jellyfish have existed more or less unchanged for at least \_\_\_\_\_ years.*



Their sting can cause a serious allergic reaction in some people and large outbreaks of them – known as ‘blooms’ – can damage tourist businesses, break fishing nets, overwhelm fish farms and block industrial cooling pipes.

On the other hand, jellyfish are a source of medical collagen used in surgery and wound dressings. In addition, a particular protein taken from jellyfish has been used in over 30,000 scientific studies of serious diseases such as Alzheimer’s. Thus, our relationship with jellyfish is complex as there are a range of conflicting factors to consider.

Jellyfish have existed more or less unchanged for at least 500 million years. Scientists recognize that over the planet’s history there have been three major extinction events connected with changing environmental conditions.

Together, this destroyed 99 % of all life, but jellyfish lived through all three. Research in the Mediterranean Sea has now shown, remarkably, that in old age and on the point of death, certain jellyfish can revert to an earlier physical state, leading to the assertion that they are immortal.

While this may not technically be true, it is certainly an extraordinary discovery. What is more, the oceans today contain 30% more poisonous acid than they did 100 years ago, causing problems for numerous species, but not jellyfish, which may even thrive in more acidic waters. Jellyfish throughout their long history have shown themselves to be remarkably resilient.

Studies of jellyfish in the class known as Scyphozoa have shown a life cycle of three distinct phases. First, thousands of babies known as planulae are released. Then, after a few days, the planulae develop into polyps – stationary lifeforms that feed off floating particles.

Finally, these are transformed into something that looks like a stack of pancakes, each of which is a tiny jellyfish. It is now understood that all species of jellyfish go through similarly distinct stages of life. This is further evidence of just how sophisticated and unusual these life forms are.

*Look at the statements below and after reading them, write TRUE or FALSE in front of them.*

*TRUE – If the statement agrees with the information that is given above in the passage.*

*FALSE – If the statement disagrees with the information that is given above in the passage.*

*#6. Little research was carried out into jellyfish, as marine biologists took the easy option and focused on physically stronger species such as fish, crabs, and shrimp.*

*#7. Research in the Antarctic Sea has now shown, remarkably, that in old age and on the point of death, certain jellyfish can revert to an earlier physical state*

*#8. Thousands of babies known as planulae are released.*

*#9. A particular protein taken from jellyfish has been used in over 30,000 scientific studies of serious diseases such as Alzheimer’s.*

*#10. Far from ‘floating’ in the water as they are still sometimes thought to do, analysis has shown jellyfish to be the most economical swimmers in the animal kingdom.*

