**TEXTO 1**

## Decoding the Antikythera Mechanism, the First Computer

After 2,000 years under the sea, three flat, misshapen pieces of bronze at the National Archaeological Museum in Athens are all shades of green, from emerald to forest. From a distance, they look like rocks with patches of mold. Get closer, though, and the sight is stunning. Crammed inside, obscured by corrosion, are traces of technology that appear utterly modern: gears with neat triangular teeth and a ring divided into degrees. Nothing else like this has ever been discovered from antiquity. Nothing as sophisticated, or even close, appears again for more than a thousand years.

For decades after divers retrieved these scraps from the Antikythera wreck from 1900 to 1901, scholars were unable to make sense of them. X-ray imaging in the 1970s and 1990s revealed that the device must have replicated the motions of the heavens. Holding it in your hands, you could track the paths of the Sun, Moon and planets with impressive accuracy. One investigator dubbed it “an ancient Greek computer.” But the X-ray images were difficult to interpret. It wasn’t until 2006 that the Antikythera mechanism captured broader attention. That year, Mike Edmunds of Cardiff University in Wales and his team published CT scans of the fragments, revealing more details of the inner workings, as well as hidden inscriptions—and triggering a burst of scholarly research.

The Antikythera mechanism was similar in size to a mantel clock, and bits of wood found on the fragments suggest it was housed in a wooden case. Like a clock, the case would have had a large circular face with rotating hands. There was a knob or handle on the side, for winding the mechanism forward or backward. And as the knob turned, trains of interlocking gearwheels drove at least seven hands at various speeds. Instead of hours and minutes, the hands displayed celestial time: one hand for the Sun, one for the Moon and one for each of the five planets visible to the naked eye—Mercury, Venus, Mars, Jupiter and Saturn. A rotating black and silver ball showed the phase of the Moon. Inscriptions explained which stars rose and set on any particular date.

Experts have been working to decipher inscriptions hidden inside the mechanism, in particular to understand the mechanism’s missing pieces, some destroyed, some probably still at the bottom of the sea. Though the pointers on the front face don’t survive, Alexander Jones, from the Institute for the Study of the Ancient World in New York, says an inscription reveals that they carried colored balls: fiery red for Mars, gold for the Sun.

Also missing are the parts that drove the planetary pointers, leading to debate about exactly how they moved. Because planets orbit the Sun, when viewed from Earth they appear to wander back and forth in the sky. The Greeks explained this motion with “epicycles”: small circles superimposed on a larger orbit. According to Michael Wright, a former curator at London’s Science Museum who has studied the mechanism longer than anyone, it modeled epicycles with trains of small gears riding around larger ones.

The tradition of making such mechanisms could be much older. Cicero wrote of a bronze device made by Archimedes in the third century B.C. and James Evans, from the University of Puget Sound in Tacoma, Washington, thinks that the eclipse cycle represented is Babylonian in origin and begins in 205 B.C. Maybe it

was Hipparchus, an astronomer in Rhodes around that time, who worked out the math behind the device. He is known for having blended the arithmetic-based predictions of Babylonians with geometric theories favored by the Greeks.

Regardless, the Antikythera mechanism proves that the ancient Greeks used complex arrangements of precisely cut wheels to represent the latest in scientific understanding. It's also a window into how the Greeks saw their universe. They came to believe that nature worked according to predefined rules, like a machine—an approach that forms the basis of our modern scientific views. Edmunds argues that this "mechanical philosophy" must have developed as a two-way process. The ancient mechanics who captured the cosmos in bronze weren't just modeling astronomical theories but were also inspiring them.

**FONTE:** Adaptado de: J. Marchant. **Decoding the Antikythera Mechanism, the First Computer.** Disponível em: https://www.smithsonianmag.com/history/decoding-antikythera-mechanism-first-computer-180953979/. Acesso em 03 nov 2024.

## TEXTO 2

### The Business of Voluntourism

Voluntourism has become a booming industry, attracting millions of people from wealthy nations eager to combine travel with charitable work. University students, church groups, and corporate teams participate in short-term missions, often seeking personal growth and a meaningful connection with those less fortunate. Orphanages, in particular, draw significant interest, as volunteers hope to brighten the lives of vulnerable children. However, experts argue that voluntourism often does more harm than good, sustaining exploitative systems rather than addressing the root causes of poverty and child welfare concerns.

Research has long demonstrated that children develop best in family settings. Yet, despite widespread recognition that institutionalizing children leads to neglect and abuse, orphanages persist—especially in poorer nations. Wealthy countries, having moved away from institutional care in favor of foster and adoption systems, still fund orphanages abroad, keeping them financially viable. Astonishingly, studies show that most children in these institutions are not orphans. In Sri Lanka and Liberia, over 90% of institutionalized children have at least one living parent. Many are placed in orphanages due to financial hardship or promises of better education.

Tragically, some orphanages actively recruit children to meet the demand created by foreign donors and volunteers. Investigations in Haiti, Kenya, Uganda, and Cambodia have exposed child-finders who persuade struggling families to relinquish their children. Some institutions, such as a notorious orphanage in Haiti, have been accused of trafficking and profiting from child exploitation. The surge in orphanages in Cambodia, for example, is not due to an increase in orphans but rather the growing number of Australian tourists willing to pay for a voluntourism experience.

Voluntourism evolved from the ecotourism movement, catering to travelers seeking authentic and socially impactful experiences. Many organizations now market packaged volunteer trips, allowing participants to engage in projects such as building schools or digging wells. While this model generates revenue, it often displaces local labor. Poor communities desperately need jobs, and hiring locals would create lasting

economic benefits. However, since volunteers pay for the experience, organizations prioritize fundraising over meaningful change. Studies reveal that international volunteer-built houses in Honduras cost 15 times more than those constructed by local Christian groups. If volunteers had simply donated money instead of labor, significantly more homes could have been built.

Short-term volunteer work also fails to make a lasting impact. One study of Americans who helped rebuild homes in Honduras after Hurricane Mitch found that, years later, their experience had not influenced their long-term giving or volunteering habits. This suggests that while voluntourism might feel personally rewarding, its broader social effects are questionable. Experts argue that financial contributions to local initiatives would be far more effective than the temporary efforts of unskilled foreign workers.

In Guatemala, Hope of Life is a prime example of an institution designed to attract foreign volunteers and donors. With a $15.7 million annual budget, the organization funds various programs, including orphan care, school construction, and medical missions. Volunteers, who pay between $750 and $1,500 for the experience, bring in at least $9 million per year. While Hope of Life offers crucial services, critics argue that it prioritizes donor satisfaction over sustainable solutions. Instead of rescuing malnourished children when they are near death, more lives could be saved by directly supporting families with small financial contributions.

Governments in developing nations often rely on foreign-funded institutions to care for vulnerable children, as they lack the resources or political will to invest in comprehensive social welfare programs. In Haiti, orphanages receive $100 million annually in foreign donations—five times the budget of the country's social affairs ministry. This disproportionate allocation of funds exacerbates the problem, diverting resources from initiatives that could help families keep their children.

The dangers of orphanage care are exemplified by the 2017 tragedy at Hogar Seguro in Guatemala, where 41 teenage girls died in a fire while locked inside their overcrowded institution. One of the girls set a mattress on fire to get the police to open the door. It remained closed. Abuse, neglect, and trafficking had been reported for years, but systemic failures allowed the mistreatment to continue. Although the incident led to the closure of Guatemala's large public institutions, many children were simply transferred to private orphanages, such as Hope of Life, where conditions remain questionable. Investigations by advocacy groups found children restrained in Catholic-run homes, while others were kept in cages.

Despite these grim realities, there is growing momentum to reform child welfare practices. Australia is taking legislative steps to classify orphanage tourism as child trafficking, and the UK has committed to supporting family-based care. Some major voluntourism organizations, such as Projects Abroad and International Volunteer HQ, have stopped sending volunteers to orphanages. Even religious groups, historically among the largest supporters of orphanages, are shifting their focus toward strengthening family care systems.

While voluntourism is driven by good intentions, its effectiveness is often undermined by economic and structural realities. Experts advocate for a shift toward "transformational tourism," where visitors focus on understanding local communities rather than engaging in short-term projects. Supporting local caregivers,

funding community initiatives, and advocating for policy changes are far more impactful than brief, feel-good experiences.

Ultimately, voluntourism must evolve beyond its emotionally gratifying but often counterproductive model. The challenge is to redirect the enthusiasm of well-meaning travelers toward sustainable, community-driven solutions that empower those in need rather than perpetuate cycles of dependency and exploitation.

**Fonte:** Adaptado de: Rosenberg, Tina. The business of voluntourism: do western do-gooders actually do harm? Disponível em: https://www.theguardian.com/news/2018/sep/13/the-business-of-voluntourism-do-western-do-gooders-actually-do-harm. **Acesso em:** 18 dez 2024.

## QUESTÕES

**As questões de 1 a 5 referem-se ao TEXTO 1:**

**1. Os exames de raio-X e as tomografias realizados no mecanismo de Antikythera revelaram que ele**

**(A)** era um relógio de sol sofisticado usado pelos gregos antigos.

**(B)** previa os ciclos de eclipses de maneira acurada.

**(C)** replicava os movimentos celestes com alta precisão.

**(D)** tinha partes de madeira que permitiam melhor preservação.

**2. Em relação ao conhecimento astronômico dos gregos antigos, o texto sugere que eles**

**(A)** dependiam de mitos para compreender e explicar os princípios da astronomia.

**(B)** desenvolveram uma visão científica do universo como um sistema com regras fixas.

**(C)** eram influenciados por crenças religiosas em suas descobertas astronômicas.

**(D)** se basearam primordialmente nos conhecimentos matemáticos dos babilônios.

**3. Analise as afirmativas abaixo acerca do mecanismo de Antikythera:**

**I.** As inscrições descobertas no interior do mecanismo colaboraram para a compreensão de seu funcionamento.

**II.** Uma nova expedição está sendo planejada a fim de recuperar partes faltantes do mecanismo.

**III.** Os "epiciclos" controlavam a velocidade das engrenagens do mecanismo.

**IV.** Há indícios de que já existiram outros mecanismos semelhantes bem antes da existência do mecanismo de Antikyhthera.

**É CORRETO o que se afirma em:**

**(A)** I e III, apenas.

**(B)** II e IV, apenas

**(C)** II e III, apenas.

**(D)** I e IV, apenas.

**4. Explique por que o mecanismo de Antikythera pode ser considerado o "primeiro computador" e como ele exemplifica o avanço científico dos gregos antigos.**

**5. Explique as hipóteses apresentadas no texto sobre a origem e os criadores do mecanismo de Antikythera.**

**As questões de 6 a 10 referem-se ao TEXTO 2:**

**6) Os orfanatos continuam a operar em países em desenvolvimento devido à combinação dos seguintes fatores:**

**(A)** A falta de estruturas legais que regulamentem os orfanatos e a crença persistente de que o cuidado institucional é superior.

**(B)** O apoio financeiro contínuo de doadores estrangeiros e volunturistas, incentivando a institucionalização das crianças.

**(C)** O aumento do número de crianças que perderam ambos os pais devido a guerras e desastres naturais.

**(D)** Esforços governamentais para a transição para sistemas de adoção e acolhimento familiar, que paradoxalmente resultam em mais crianças entrando em orfanatos.

**7) Quais são as preocupações éticas associadas ao volunturismo, especialmente em orfanatos?**

**8) Analise as seguintes afirmativas sobre os projetos de construção baseados no volunturismo:**

**I.** A presença de voluntários estrangeiros aumenta os custos dos materiais e atrasa os prazos de construção.

**II.** A chegada de voluntários estrangeiros desvaloriza o mercado de trabalho local, impedindo que trabalhadores qualificados ganhem seu sustento.

**III.** As casas construídas por voluntários sem treinamento são frequentemente abandonadas devido à baixa qualidade da construção.

**IV.** A participação de voluntários muitas vezes é obrigatória para que ONGs recebam financiamento internacional, desviando o foco das reais necessidades da comunidade.

**São VERDADEIRAS:**

**(A)** I e II, apenas.

**(B)** II, apenas.

**(C)** I, III e IV, apenas.

**(D)** III e IV, apenas.

**9) É falha que contribuiu para a tragédia de 2017 no Hogar Seguro:**

**(A)** A falta de fiscalização governamental permitiu que condições de abuso e negligência persistissem, levando a revoltas entre as crianças.

**(B)** Um sistema falho de adoção internacional resultou em superlotação, pois crianças foram abandonadas após tentativas fracassadas de adoção.

**(C)** A instituição havia sido designada como uma instalação de alta segurança, e o incêndio foi causado por uma falha elétrica.

**(D)** Voluntários que trabalhavam na instituição ignoraram repetidos avisos sobre os riscos de segurança antes do incidente.

**10) Quais soluções os especialistas propõem para tornar o volunturismo mais eficaz e sustentável?**

## RASCUNHO