UPSC Daily Current Affairs| Prelim Bits 17-04-2025

India–Middle East–Europe Economic Corridor

Prelims – *Current events of International Importance.*

Mains (GS I) – *International Relations | Bilateral, regional and global groupings and agreements involving India and/or affecting India's interests.*

Why in News?

India and Italy have decided to expand cooperation jointly in implementing the ambitious India-Middle-East-Europe-Economic Corridor (IMEEC).

- It is an initiative to ***enhance India's maritime security*** and facilitate quicker transportation of goods between Europe and Asia.

- **Launched on -** G20 Summit in Delhi in September 2023.

- **Aim -** To integrate India, Europe, and the Middle-East through UAE, Saudi Arabia, Jordan, Israel and the European Union.

- **Memorandum of Understanding (MoU) signed countries -** India, United States, United Arab Emirates, Saudi Arabia, France, Germany, Italy and the European Union.

- **Corridors**

- **East corridor** - Connects India to the Gulf and
- **Northern corridor -** Connects the Gulf to Europe.

- **Ports to be Linked**

India	Mundra (Gujarat), Kandla (Gujarat), and Jawaharlal Nehru Port Trust (Navi Mumbai).
Middle East	Fujairah, Jebel Ali, and Abu Dhabi in the UAE, along with Dammam and Ras Al Khair ports in Saudi Arabia.
A railway line will connect Fujairah port (UAE) to Haifa port (Israel) through Saudi Arabia (Ghuwaifat and Haradh) and Jordan.	
Israel	Haifa port.
Europe	Piraeus port in Greece, Messina in Southern Italy, and Marseille in France.

- The main elements of the Framework include development and management of a logistics platform, including a digital ecosystem, and provision of supply chain services to handle all types of general cargo, bulk, containers and liquid bulk in order to enable IMEEC.

- **Advantages -** The corridor intends to enhance connectivity, increase efficiency, reduce costs, secure regional supply chains, increase trade accessibility, generate jobs and lower greenhouse gas emissions.

Significance for India

- *Strengthening Maritime Security* and also acts as a strategic countermeasure to China's Belt and Road Initiative.

- IMEEC will contribute to *regional stability* and peace by aligning with the European Nations' Global Gateway program.

- A *stabilized trade corridor* under the IMEEC framework will streamline logistics and ensure the continuous, dependable flow of products, renewable energy, and information.

- The corridor will also drive a significant increase in trade demand and supply across the region*, reducing transaction costs* and creating new job opportunities.

- IMEEC offers a vital platform for *cultural and political exchange*.

- It extends into the energy and technology sectors, incorporating initiatives such as integrated electricity grids, *clean hydrogen pipelines*, and secure high-speed data connectivity.

Reference

The Indian Express | IMEEC initiative

Jallianwala Bagh Massacre & Sir Sankaran Nair

Prelims – *History of India and Current events of national importance.*

Mains (GS I) – *Indian Heritage and Culture.*

Why in News?

Prime Minister Recently recalled Sir Chettur Sankaran Nair, who fought a battle against a senior official of the Raj who had sued Sir Sankaran for holding him responsible for the Jallianwala Bagh massacre.

- He is a nationalist and jurist and a firm opponent of British colonialism.

- **Born in** - 1857 in an aristocratic family in Malabar's Palakkad district.

- **Graduated from** - Presidency College in Madras and got a degree in law.

- **Hired by -** Sir Horatio Shepherd who later became Chief Justice of Madras High Court.

- **Contributions -** Led the Indian National Congress Session in Amraoti in 1897.

- Sankaran Nair was designated as the public prosecutor in 1899 and later ascended to the position of judge at the Madras High Court in 1908.

- In 1912, he was honored with a knighthood by the British Crown.

- By 1915, he became a member of the Viceroy's Executive Council, focusing on educational reforms.

- In 1919, he played an important role in the expansion of provisions in the Montagu-Chelmsford reforms.

Montagu-Chelmsford reforms introduced a system of dyarchy in the provinces and increased participation of Indians in the administration.

- However, in 1919, he chose to resign in protest against the Jallianwala Bagh massacre.
- Nair believed in India's right to self-government.
- Acted as the chairman of the All-India Committee, which engaged with the Simon Commission in 1928–29, albeit with limited success.
- Held the position of councillor to the ***Secretary of State for India*** from 1920 to 1921.
- In 1922, Nair published Gandhi and Anarchy, a book in which he spelt out his critique of Gandhi's methods of non-violence, civil disobedience, and non-cooperation.
- He also accused Michael O'Dwyer, who was Lieutenant Governor of Punjab at the time of the massacre, of following policies that led to the deaths.
- Nair passed away in 1934 at the age of 77.

Jallianwallah Bagh Massacre
• **Incident happened on** - April 13, 1919. • It coincided with Baisakhi, a widely celebrated harvest festival in Punjab and northern India. • Reason – To protest against the detention of two prominent leaders, ***Satya Pal and Saifuddin Kitchlew***, as well as the enforcement of the Rowlatt Act. • The gathering convened at Jallianwala Bagh; a park surrounded by walls with only a few small entrances. • During the meeting, Brigadier-General Reginald Edward Harry Dyer, who had approached the scene with the intent to reprimand the assembled crowd, commanded the soldiers accompanying him to open fire on the attendees.
Rowlatt Act

- **Passed on** - March 10, 1919.
- It authorizes the government to imprison or confine, without a trial, any person associated with seditious activities.

Reference

The Indian Express | Sir Sankaran Nair

real-time LAMP (rt-LAMP) Assay

Prelims – *General Science.*

Mains (GS II & III) - *Issues relating to development and management of Social Sector/Services relating to Health, Education, Human Resources| Science and Technology Developments.*

Why in News?

Researchers at the Thiruvananthapuram-based Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST) have developed and tested cost-effective, rt-LAMP assay for early diagnosis of TB.

- It is a novel ***molecular test*** with high sensitivity and specificity for ***early diagnosis of Tuberculosis (TB).***
- It was able to detect TB DNA even when only 10 copy numbers were present per microlitre in a sample.
- Researchers used fluorescent dye Syto 16 (commonly used in laboratories for analyzing cells and various biological samples), which does not hinder the reaction, effectively addressing the persistent problem of false negatives observed in previous LAMP tests.
- Unlike RT-PCRs that require 3 different temperature settings to complete a test, the rt-LAMP test works at a single temperature.
- 6 primers used for amplification compared with two in the case RT-PCRs, the rate of amplification is high.
- Results of positive samples can be obtained in 10-20 minutes.

- **Approval Status -** It has been licensed to the industry for production.
- It has received approval from the Central Drugs Standard Control Organisation (CDSCO).
- It is currently being validated by the Indian Council of Medical Research (ICMR).
- The WHO Health Technology Access Pool program is currently evaluating the technology.

Reference

The Hindu | real-time LAMP (rt-LAMP) assay

China Suspends Rare Earth Exports

Prelims – *Current events of national and international importance.*

Mains (GS I) – *Distribution of key natural resources across the world.*

Why in news?

Recently, China has suspended the export of key rare earth metals and magnets as a part of China's retaliation for US tariff increase.

- **Rare Earth Elements (REEs)** – They are a set of ***17 silvery-white soft heavy metals***.
- It is also called **rare earth oxides**.
- The 17 rare earth elements are,

Atomic Number	Element	Symbol
21	Scandium**	Sc
39	Yttrium	Y
57	Lanthanum	La
58	Cerium	Ce
59	Praseodymium	Pr
60	Neodymium	Nd
61	Promethium*	Pm
62	Samarium	Sm
63	Europium	Eu
64	Gadolinium	Gd
65	Terbium	Tb
66	Dysprosium	Dy
67	Holmium	Ho
68	Erbium	Er
69	Thulium	Tm
70	Ytterbium	Yb
71	Lutetium	Lu

- Scandium and yttrium are not part of the lanthanide family, but they are included because they *occur in the same mineral deposits* as the lanthanides and *have similar chemical properties*.

- All Rare earth elements are ***considered metals***.

- **Properties** – Malleable with *high melting and boiling points*.

- They exhibit both *strong magnetic and luminescent properties* due to their unique electronic structure.

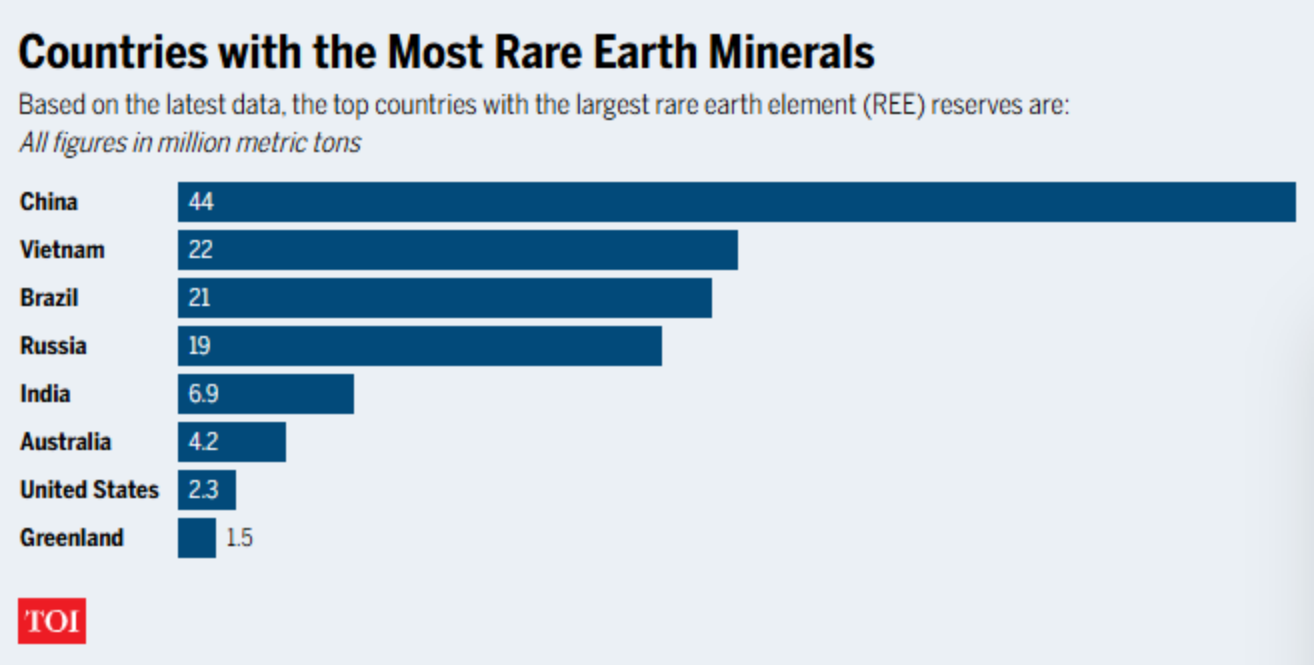
- **Significance** – Rare earth metals are vital in advanced electronics, defence and medical equipment's and renewable energy.

- They are critical in green technologies, *to support net zero carbon emissions goals.*

- **Resource distribution** – China has the largest reserves and production, followed by countries like Brazil, Vietnam, and Russia.

- China *account for 90% of global production* and it also controls refining technologies

related to rare earth elements.



- **Suspension on export** – The Chinese government ordered restrictions on the export of key rare earth metals, *which are refined entirely in China*, as well as rare earth magnets.

- Key heavy rare earth metals which that are covered under restriction are samarium, gadolinium, terbium, dysprosium, lutetium, scandium and yttrium.

- **Retaliation on US** – This suspension was in response to reciprocal tariffs imposed by US which led to trade war between the world's two largest economies.

- It is primarily aimed to prevent supplies from reaching certain companies, including American military contractors.

- **New regulatory system** – The metals, and special magnets made with them, can now be shipped out of China only with special export licenses.

- The licensing regime for other countries is yet to set up by China which, effectively halts shipments.

- **Impact of Rare earth element export suspension** –It is likely to *trigger a global supply crunch* especially affecting major REE-consuming countries like the US, Japan, Vietnam, and Germany.

- It could affect the production of Electric vehicles, defence equipment and advanced electronics.

- India has limited impact due to relatively low domestic consumption but it still relies heavily on China for Rare Earth metals with 65% of imports are from China.

References

1. The New York Times| China Halts Metal Exports

2. Rare Elements Resources| Rare Earth Elements

Mugger crocodile

Prelims – *Current events of national and international importance| General issues on Environmental ecology, Bio-diversity and Climate Change.*

Mains (GS III) – *Conservation*

Why in news?

Recently, Tamil Nadu Forest Department has conducted survey to map the population of mugger crocodiles in the state.

- The mugger crocodile (Crocodylus palustris) is a medium-sized broad-snouted crocodile, also known *marsh crocodile*.

- **Scientific name** – Crocodylus palustris

- **Distribution** – India (15 states), Sri Lanka, Pakistan, Nepal, Bangladesh and Iran.

- **Habitat** – They are primarily found in *freshwater habitats* like rivers, lakes and marshes.

- **Appearance** – The Mugger crocodile has the broadest snout among living crocodiles and it has a powerful tail and webbed feet.

- **Key populations** – Middle Ganga, Chambal River, Gujarat, Tamil Nadu's Cauvery

delta

- **Diet** – Muggers primarily eats fish, crabs, insects, small fish.
- Adults consume amphibians, reptiles (snakes, turtles), birds, monkeys, deer, buffalo.
- **Characteristics** – Crocodiles eat minimally during winters, it is only during their breeding season in summers they become opportunistic predators and use all available resources as food.
- **Threats** – Habitat destruction, fishing equipment entanglement, illegal poaching for skin and meat and the use of body parts in medicine and human conflict.
- **Conservation**
    - **IUCN** – Vulnerable
    - **Wildlife Protection Act, 1972** – Schedule I
    - **CITES** – Appendix I.
- Tamil Nadu to set up ***Crocodile Conservation Centre*** at Anaikarai near Kollidam River.

Survey by Tamil Nadu Government

- The Tamil Nadu Forest Department is conducting a study on mugger crocodiles in the Cauvery delta.
- To identify critical crocodile habitats in Tamil Nadu.
- To understand the crocodile-human conflict and propose long-term strategies for habitat conservation.
- Preliminary study has revealed that Tamil Nadu is home to a significant population of mugger crocodiles along Kollidam River.

References

1. The Hindu| Tamil Nadu Surveys Mugger Crocodile

2. World Wildlife Institute of India| Marsh Crocodile

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Geography

Increased Activity at Mount Spurr

A recent surge of Mount Spurr over 50 earthquakes in a single week, monitored by the Alaska Volcano Observatory (AVO), signals magma movement beneath the surface.

• Mount Spurr, near Anchorage, Alaska, is experiencing heightened volcanic activity, causing concern among scientists and local populations.

• **Seismic Swarm Indicates Potential Eruption** – This significant increase in seismic events strongly suggests a potential volcanic eruption is possible. The observed magma movement is a key indicator of rising volcanic unrest and the potential for ash clouds and other hazardous events.

• **Anchorage Prepares for Volcanic Hazards** – In response to the escalating volcanic activity, the city of Anchorage is actively preparing for potential impacts. These preparations likely include strategies to mitigate the effects of ash fall and other hazards associated with a volcanic eruption.

• **Key Geographical Information** – Mount Spurr is the tallest volcano within the Aleutian Arc. It is situated approximately 130 kilometers west of Anchorage, Alaska, in proximity to Chakachamna Lake.

• **Volcano Type and Structure** – Classified as a stratovolcano (or stratocone), Mount Spurr features a prominent horseshoe-shaped caldera. This large caldera spans about 5 kilometers in width and opens towards the south.

Economy

RBI Maintains Accommodative Stance

Recently, the Reserve Bank of India (RBI) has decided to continue its accommodative stance in the latest Monetary Policy Committee (MPC) meeting. This aims to bolster economic recovery amidst easing inflation and weak growth indicators.

• **Defining Accommodative Monetary Policy** – An accommodative stance is a monetary policy approach where the central bank aims to stimulate economic activity. This typically involves maintaining low interest rates and ensuring sufficient liquidity within the financial system.

• **Conditions for Adoption** – This policy is generally implemented when economic growth is slow, inflation is under control, and there is a need to encourage consumption, investment, and job creation. It can also be used to counter financial shocks.

• **Key Objectives of the Stance** – The primary goals of an accommodative stance are to facilitate credit flow, encourage private investment, reduce borrowing costs to boost spending, revive overall demand in the economy, and provide liquidity support to struggling sectors.

• **RBI's Current Rationale** – The RBI's decision reflects its ongoing commitment to supporting economic recovery in the face of moderating inflation and signals of sluggish growth within the current economic landscape.

Agriculture

Punjab Bans Hybrid Paddy Seeds

Recently, Punjab government has prohibited the sale of hybrid paddy seeds in anticipation of the 2025 Kharif season. This decision comes after rice millers expressed their unwillingness to process hybrid rice due to concerns over milling efficiency and grain quality.

• **Understanding Hybrid Paddy** – Its varieties are crossbred rice developed from distinct parent lines. The aim is to enhance yield, improve water efficiency, and promote earlier maturity. These non-Basmati varieties are primarily cultivated for large-scale commercial farming.

• **Key Characteristics** – Hybrid paddy offers several advantages, including higher yields (35-40 quintals per acre, exceeding regular varieties), a shorter growth cycle (125-130 days, saving water), and reduced stubble production, which can help mitigate stubble burning issues.

• **Reasons for Government Ban** – The primary reasons behind the ban are the low milling efficiency (Out Turn Ratio of 60-63% compared to the FCI's 67% minimum) reported by millers and the high percentage of broken grains during processing. This leads to financial losses for millers.

• **Impact on Farmers and Millers** – The lower milling efficiency and increased broken grains result in lower procurement prices for farmers due to quality discrepancies. The ban aims to address these concerns and protect the interests of both farmers and rice millers in the state.

Environment

Lichens Thrive Under Stimulated Martian Conditions

Recent groundbreaking research has demonstrated the remarkable resilience of certain lichen species to harsh Martian environments, challenging prior assumptions about the possibility of life on Mars.

• **Unique Symbiotic Nature of Lichens** – They are composite organisms, a symbiotic partnership between a fungus and either algae or cyanobacteria. This unique biological arrangement enables them to survive and flourish in extreme terrestrial habitats like deserts and polar region.

• **Experimental Setup: Simulating Mars** – Scientists conducted rigorous experiments utilizing a Mars simulation chamber. Two distinct lichen species, Diploschistes muscorum and Cetraria aculeata, were subjected to Martian atmospheric conditions, pressure, temperature fluctuations, and radiation levels for a five-hour duration.

• **Metabolic Activity Confirmed** – The study's key finding revealed that the tested lichens not only survived the simulated Martian conditions but also remained metabolically active throughout the exposure period, indicating a capacity for biological processes under such extreme stress.

Rare Golden Tiger Sighted in Kaziranga

Recently, a rare golden tiger, also known as a golden tabby tiger, has been recently observed and photographed in Kaziranga National Park, located in Assam. This remarkable sighting highlights the unique biodiversity of the region.

• **Understanding the Golden Tiger** – It is not a distinct subspecies but rather an uncommon color variation of the Bengal tiger. It's striking golden hue and tabby stripes make it a visually exceptional animal.

• **Exclusive Wild Habitat** – Notably, all known wild golden tigers reside exclusively in Kaziranga National Park in Assam. This limited geographic distribution underscores their rarity and the importance of this habitat for their survival.

• **Genetic Basis of the Golden Color** – The distinctive golden coloration is attributed to a genetic mutation in the wideband gene. This mutation leads to an increased production of pheomelanin, the reddish-yellow pigment responsible for their unique appearance.

• **Inheritance of the Trait** – For a golden tiger to be born, both parent tigers must carry the recessive mutated gene. This specific genetic requirement contributes to the rarity of this color variant in the wild.

Bat Echolocation Monitoring (BatEchoMon)

Recently, India's first automated bat monitoring system, BatEchoMon, utilizes real-time acoustic analysis for bat species detection and classification.

• **Introducing BatEchoMon** – It is an autonomous, AI-powered system for real-time detection, analysis, and classification of bat echolocation calls.

• **Developed by** – Indian Institute for Human Settlements (IIHS), Bengaluru.

• **Aim** – To simplify and accelerate bat data processing for enhanced ecological and biodiversity research with minimal manual effort_

• **Real-time Acoustic Analysis** – The device activates at sunset, employing a Raspberry Pi microprocessor to isolate and analyze bat calls in real time.

• **AI-Powered Species Identification** – BatEchoMon uses convolutional neural networks (CNN) to compare detected call structures with known bat species for accurate identification.

• **Visual and Statistical Output** – The system generates spectrograms and statistical data on bat activity across different species and time intervals.

Security

GPS Spoofing Targets IAF Aid Mission

Recently, Indian Air Force (IAF) aircraft involved in delivering aid to earthquake-stricken Myanmar under Operation Brahma reportedly encountered GPS spoofing attacks, highlighting significant airspace cybersecurity vulnerabilities.

• **Understanding GPS Spoofing** – It is a cyberattack that transmits counterfeit GPS signals to deceive receivers about their actual geographical position. This manipulation involves broadcasting stronger, fake signals that overpower genuine satellite signals, leading to inaccurate location readings.

• **How Spoofing Works** – GPS receivers determine location by processing signals from orbiting satellites. Spoofers exploit this by transmitting fabricated GPS signals. When these fake signals are stronger, the receiver locks onto them, generating false location data for the affected device.

• **Serious Implications of Spoofing** – GPS spoofing carries substantial risks. In aviation, it can misdirect aircraft, endangering flight safety. It can also disrupt logistics, compromise defense and surveillance operations, and negatively impact consumer applications relying on location services.

Science

Recognition by International Diabetes Federation (IDF)

Recently, IDF has officially acknowledged Type 5 diabetes as a distinct condition at the World Diabetes Congress in Bangkok.

• **Type 5 diabetes** – It is a form of malnutrition-related diabetes. It primarily affects lean, undernourished teenagers and young adults, particularly in low- and middle-income regions.

• **Global Prevalence** – An estimated 20 to 25 million people worldwide suffer from this condition. It is most prevalent in Asia and Africa, where malnutrition is more common.

• **Key Characteristics** – Unlike Type 1 and Type 2 diabetes, Type 5 diabetes is not caused by insulin resistance but by a severe defect in insulin secretion due to chronic undernutrition.

• **Historical Background** – First identified in Jamaica in 1955 as J-type diabetes, it was later reported across South Asia and Africa. WHO briefly recognized it in 1985 but withdrew support in 1999 due to limited research.

Maharashtra Partners with ROSATOM for Thorium SMR

Recently, Maharashtra has entered into a Memorandum of Understanding (MoU) with Russia's ROSATOM to collaboratively develop a thorium-based Small Modular Reactor (SMR). This marks a pioneering step for an Indian state in the nuclear energy sector.

• **Understanding Small Modular Reactors (SMRs)** – It is a compact and adaptable nuclear reactor engineered for secure, efficient, and versatile power generation. Thorium-based SMRs utilize Thorium-232, a fertile material that is transmuted into Uranium-233 to serve as nuclear fuel.

• **Key Players in the Initiative** – The primary institutions involved in this groundbreaking collaboration are MAHAGENCO (Maharashtra State Power Generation Company Ltd) from India and ROSATOM (Russia's State Atomic Energy Corporation), leveraging their respective expertise in energy generation and nuclear technology.

• **Advantages of Thorium SMR Technology** – Thorium-based SMRs offer several key benefits. They utilize thorium as fuel, which is converted to Uranium-233 for clean energy production. Their modular design allows for phased and economical deployment. Their compact size makes them suitable for remote areas, and they incorporate passive safety systems for automatic shutdown in emergencies.

• **Regulatory Framework and Safety** – The development and operation of this thorium-based SMR will adhere to stringent Indian nuclear safety regulations as mandated by the Atomic Energy Regulatory Board (AERB) and relevant central government guidelines, ensuring safe and responsible energy production.

Mirror Science Explained by IIT Physicist

Recently, an IIT Kanpur physicist elucidated the science behind mirrors using electron behavior and quantum mechanics, aligning with the International Year of Quantum Science and Technology 2025.

• A mirror is a smooth surface designed to reflect the majority of incident light, producing clear images through specular reflection, where light bounces off at an equal angle.

• **Material Composition of Mirrors** – Mirrors are typically constructed with a transparent glass front and a thin metallic backing, often made of silver or aluminum. The glass protects the reflective metal layer.

• **The Mechanism of Reflection** – Mirrors function based on the law of reflection. Free electrons within the metal layer uniformly interact with incoming light, causing specular reflection and forming a virtual image that appears behind the mirror.

• **Understanding Image Formation** – Mirrors generate a virtual image, a perception created by the way reflected light reaches our eyes. Contrary to common belief, mirrors reverse front and back, not left and right

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