



Asteroid 2024 YR4

[Source: IE](#)

Why in News?

[National Aeronautics and Space Administration \(NASA\)](#) has identified a near-Earth **Asteroid 2024 YR4**, which has a slightly over 1% chance of impacting Earth in 2032.

What are the Key Facts About Asteroid 2024 YR4?

- **About:** The asteroid, detected in **December 2024**, passed **800,000 km from Earth** (twice the Moon's distance) and remained observable until **April 2025**, set to reappear in **2028**.
- **Potential Risk:** NASA has classified it as **Level 3 on the Torino Scale**, indicating a potential for **localized destruction** if it impacts Earth.
 - The **Torino Scale**, adopted by the [IAU \(International Astronomical Union\)](#) in 1999, categorizes asteroid impact risks on a **0 to 10** scale based on likelihood and severity.
 - It can release **8-10 megatons in case of impact**, higher than the **2013 Chelyabinsk, Russia meteor (released 500 kilotons of energy—** about 30 times more than the Hiroshima atomic bomb).

What are Asteroids?

- **About:** Asteroids are **rocky, airless remnants** from the **solar system's formation (4.6 billion years ago)**.
 - They primarily orbit the Sun in the **Asteroid Belt**, though some follow **Earth-crossing paths**.
 - Their sizes vary from **a few meters to hundreds of kilometers**.
- **Categorisation:**
 - **Main Asteroid Belt:** Located **between Mars and Jupiter**, this region contains the **majority of known asteroids**.
 - **Trojans:** These asteroids **share an orbit with a larger planet** and remain near [Lagrangian points \(L4 and L5\)](#), where gravitational forces of the Sun and the planet balance, preventing collisions.
 - **Near-Earth Asteroids (NEAs):** These asteroids have **orbits that bring them close to Earth**. Those that **intersect Earth's orbit** are specifically termed **Earth-crossers**.
- **Asteroid Collision Frequency:** Small asteroids **frequently burn up in the atmosphere**.
 - Larger asteroids occasionally reach the surface but **rarely cause significant damage**. Global-scale impacts, like the [Chicxulub event in Mexico](#) that led to the **extinction of dinosaurs and 75% of Earth's species**, occur approximately **once every 260 million years**.
- **Planetary Defense Against Asteroids:** **NASA** and other space agencies are developing **planetary defense mechanisms to prevent asteroid collisions**.
 - NASA's [DART mission \(2022\)](#) successfully altered the trajectory of asteroid Dimorphous, showcasing the potential for **deflection strategies** to mitigate future threats.

Initiatives Related to Monitoring of Near-Earth Objects:

- [Double Asteroid Redirection Test \(DART\) Mission](#)
- [ESA's Hera Mission](#)
- [NETRA Project & Space Junk](#)

What is a....?

Comet

A comet is a mass of ice, rock, and dust, and often has a tail that is made up of dust and other materials.



Asteroid

An asteroid is made up of metallic or non-metallic rocks, and orbits the sun. They can range in size from a few centimeters wide to almost a thousand kilometers across!



Meteoroid

Meteoroids are usually fragments of asteroids or comets, often smaller than 1 meter wide, that fly through space.



Meteorite

If a meteor doesn't completely burn up in the Earth's atmosphere, the fragment found on Earth is called a meteorite.



Meteor

A meteor is a meteoroid that enters Earth's atmosphere. It burns up as it travels through the atmosphere, producing a streak of light behind it.



UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. What is the difference between asteroids and comets? (2011)

1. Asteroids are small rocky planetoids, while comets are formed of frozen gases held together by rocky and metallic material.

2. Asteroids are found mostly between the orbits of Jupiter and Mars, while comets are found mostly between Venus and Mercury.
3. Comets show a perceptible glowing tail, while asteroids do not.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 1 and 3 only
- (c) 3 only
- (d) 1, 2 and 3

Ans: (b)

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