

# 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?

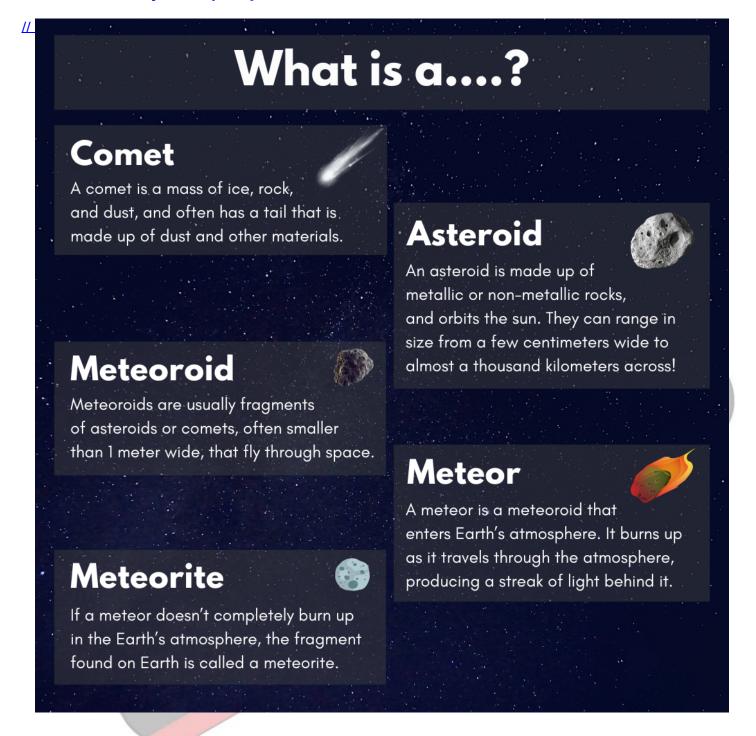
- About: The asteroid, detected in December 2024, passed 800,000 km from Earth (twice the Moon's distance) and remained observable until April 2025, set to reappear in 2028.
- Potential Risk: NASA has classified it as Level 3 on the Torino Scale, indicating a potential for localized destruction if it impacts Earth.
  - The Torino Scale, adopted by the <u>IAU (International Astronomical Union)</u> 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 <u>Lagrangian points</u> (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 <u>Chicxulub event in Mexico</u> 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 <u>DART mission</u> (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



## **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)

