



SATISH CHANDRA MEMORIAL SCHOOL
ACADEMIC SESSION: 2025-26
CASE STUDY & ASSERTION-REASON QUESTION BANK
SEGMENT: NUMBER SYSTEM
CHAPTER 10: EXPONENTS AND POWERS

CASE STUDY

1. A young boy named Aditya visited a wildlife sanctuary on a school field trip. Aditya was excited to see a variety of animals up close. Outside each animal's enclosure, he noticed that the weight of the animals was written on small boards:

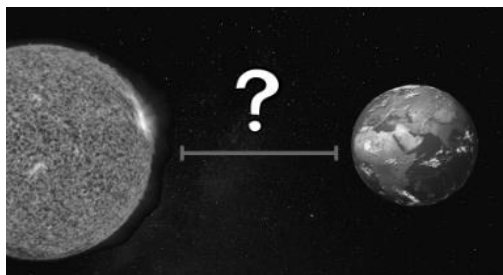
- a) an Elephant 6350 kg, b) a Giraffe 2646 kg, c) a Tiger 289 kg, d) a Parrot 22.7 g, e) a Sparrow 16 g.



On the basis of above information, answer the following questions.

- i) Find the weight of an Elephant in standard form.
- ii) Find the total weight of a Parrot and a Sparrow.
- iii) If the weight of a Parrot is $(a \times 10^{-2})\text{kg}$, then find the value of a .

2. The distance between Earth and Sun is approximately 149,600,000 km. Astronomers often use standard form to express such large numbers in a simpler way.

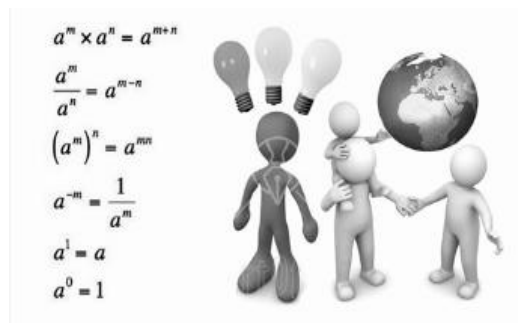


Based on the above information, answer the following questions

- i) Write the distance between Earth and Sun in standard form.
- ii) The diameter of the Sun is about 1,392,000 km. Write this in standard form.
- iii) Convert 0.000056 into standard form.

3. A mathematician is studying the properties of exponents and powers. She writes down the following equation involving a variable x . The equation is $2^{x+3} = 16$

She wants to solve for x and analyze how changing the equation affects the value of x .



Based on the above information, answer the following questions

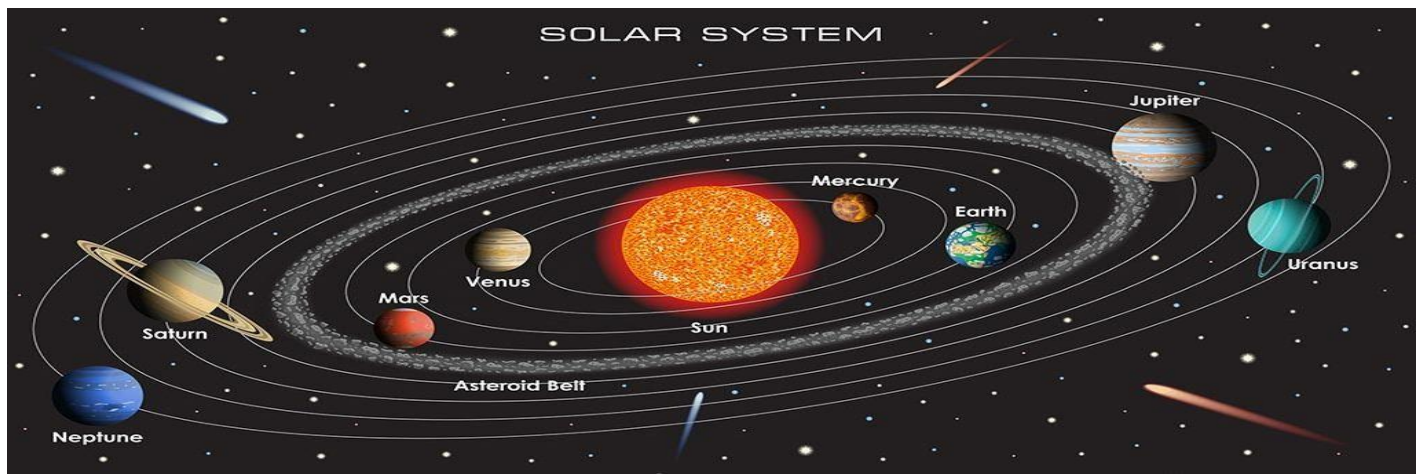
i) Solve the equation $2^{x+3} = 16$

ii) If the equation is changed to $2^{x+3} = 64$, what is the new value of x ?

iii) If the equation $3^{x-2} = 27$, solve for x .

3. Our solar system consists of our star, the Sun, and everything bound to it by gravity – the planets Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune; dwarf planets such as Pluto; dozens of moons; and millions of asteroids, comets, and meteoroids. Beyond our own solar system, we have discovered thousands of planetary systems orbiting other stars in the Milky Way. The distance of all the planets from the Sun in kilometers (km) is given in below table:

Planet	Distance from Sun (km)
Mercury	57,900,000
Venus	108,200,000
Earth	149,600,000
Mars	227,900,000
Jupiter	778,600,000
Saturn	1,433,500,000
Uranus	2,872,500,000
Neptune	4,495,100,000



Based on the above situation, answer the following questions:

- (i) Write the distance of Mercury from the Sun in standard form.
- (ii) Write the sum of the distances of Mercury and Venus from the Sun in standard form.
- (iii) Write the difference of the distances of Earth and Venus from the Sun in standard form.
- (iv) Find the mean distance of Earth and Venus from the Sun in standard form.

ASSERTION-REASONING

1. Assertion (A): Multiplying two numbers with the same base adds their exponents.

Reason (R): According to exponent laws, $a^m \times a^n = a^{m+n}$.

2. Assertion (A): Any number raised to a negative exponent results in its reciprocal

Reason (R): $a^{-n} = \frac{1}{a^n}$, where $a \neq 0$.

3. Assertion (A): Any non-zero number raised to the power of zero is equal to one.

Reason (R): Exponent law states that $a^0 = 1$ for any non-zero number a .

4. Assertion (A): Scientific notation helps in representing very large or very small numbers

Reason (R): Scientific notation expresses numbers as a power of 10 for easier calculation.