# NCERT Solutions For Class 8 Maths

# Chapter 2 - Power Play

## 1) Express the following in exponential form

(i) $6 \times 6 \times 6 \times 6$

**Answer:** $6^4$

(ii) $y \times y$

**Answer:** $y^2$

(iii) $b \times b \times b \times b$

**Answer:** $b^4$

(iv) $5 \times 5 \times 7 \times 7 \times 7$

**Answer:** $5^2 \times 7^3$

(v) $2 \times 2 \times a \times a$

**Answer:** $2^2 \times a^2$

(vi) $a \times a \times a \times c \times c \times c \times c \times d$

**Answer:** $a^3 \times c^4 \times d$

## Extra: Values with Base 0

What is $0^2$ and $0^5$?

**Answer:** $0^2 = 0$ and $0^5 = 0$.

What is $0^n$ (for positive integer *n*)?

**Answer:** $0^n = 0$ for all positive integers *n*. (Note: $0^0$ is undefined/not defined.)

How do you read $5^4$?

**Answer:** "5 raised to the power 4" / "5 to the power 4" / "5 power 4" / "4th power of 5".

**2) Express each number as a product of powers of prime factors (exponential form)**

**(i) 648**

**Answer:** $648 = 2^3 \times 3^4$

**(ii) 405**

**Answer:** $405 = 3^4 \times 5$"

**(iii) 540**

**Answer:** $540 = 2^2 \times 3^3 \times 5$

**(iv) 3600**

**Answer:** $3600 = 2^4 \times 3^2 \times 5^2$

**3) Write the numerical value**

*Note*: Interpreting the given expressions in standard exponent form.

**(i) $2 \times 10^3$**

**Answer:** $2 \times 1000 = 2000$

**(ii) $7^2 \times 2^3$**

**Answer:** 49 × 8 = 392

**(iii) $3 \times 4^4$**

**Answer:** 3 × 256 = 768

**(iv) $(-3)^2 \times (-5)^2$**

**Answer:** 9 × 25 = 225

**(v) $3^2 \times 10^4$**

**Answer:** 9 × 10000 = 90000

**(vi) $(-2)^5 \times (-10)^6$**

**Answer:** (−32) × 1,000,000 = −32,000,000

**Class 8 – Powers & Exponents**

**1. Find out the units digit in the value of $2^{224} \div 4^{32}$? [Hint: $4 = 2^2$]**

**Answer:** $4^{32} = (2^2)^{32} = 2^{64}$. Hence $2^{224} \div 4^{32} = 2^{224-64} = 2^{160}$. Units digit of powers of 2 cycles 2,4,8,6 every 4. Since 160 ≡ 0 (mod 4), the units digit is **6**.

**2. There are 5 bottles in a container. Every day, a new container is brought in. How many bottles would be there after 40 days?**

**Answer:** Each day adds 5 bottles. In 40 days: 40 × 5 = **200 bottles**.

**3. Write the given number as the product of two or more powers in three different ways. The powers can be any integers. (i) $64^3$ (ii) $19^{28}$ (iii) $32^{-5}$**

**Answer:**

**(i) $64^3$**

$(2^6)^3 = 2^{18} = 2^{10} \times 2^8$

$4^9 = 4^4 \times 4^4 \times 4$

$8^6 = 8^3 \times 8^3$

**(ii) $19^{28}$**

$19^{14} \times 19^{14}$

$19^{20} \times 19^8$

$19^{10} \times 19^{10} \times 19^8$

**(iii) $32^{-5}$**

$(2^5)^{-5} = 2^{-25} = 2^{-10} \times 2^{-10} \times 2^{-5}$

$8^{-5} \times 4^{-5}$

$16^{-5} \times 2^{-5}$

**4. Examine each statement below and find out if it is 'Always True', 'Only Sometimes True', or 'Never True'. Explain your reasoning. (i) Cube numbers are also square numbers. (ii) Fourth powers are also square numbers. (iii) The fifth power of a number is divisible by the cube of that number. (iv) The product of two cube numbers is a cube number. (v) $q^{46}$ is both a 4th power and a 6th power (q is a prime number).**

**Answer:**

(i) **Only Sometimes True** (e.g., 64 is both; but 8 is not a square).

(ii) **Always True** since $n^4 = (n^2)^2$.

(iii) **Always True** ($n^5 \div n^3 = n^2$).

(iv) **Always True** ($a^3 \times b^3 = (ab)^3$).

(v) **Never True** because 46 is not a multiple of 4 or 6 (LCM = 12).

**5. Simplify and write these in the exponential form.**

**(i) $10^{-2} \times 10^{-5}$ (ii) $5^7 \div 5^4$ (iii) $9^{-7} \div 9^4$ (iv) $(13^{-2})^{-3}$ (v) $m^5/n^{12}\,(mn)^9$**

**Answer:**

(i) $10^{-7}$

(ii) $5^3$

(iii) $9^{-11}$

(iv) $13^6$

(v) $m^{14}\, n^{-3}$

**6. If $12^2 = 144$ what is (i) $(1.2)^2$ (ii) $(0.12)^2$ (iii) $(0.012)^2$ (iv) $120^2$**

**Answer:**

(i) 1.44

(ii) 0.0144

(iii) 0.000144

(iv) 14,400

**7. Circle the numbers that are the same— $2^4 \times 3^6$ $6^4 \times 3^2$ $6^{10}$ $18^2 \times 6^2$ $6^{24}$**

**Answer:** The equal ones are $2^4 \times 3^6$, $6^4 \times 3^2$, and $18^2 \times 6^2$ (all simplify to $2^4 3^6$). The others differ.

**8. Identify the greater number in each of the following—**
**(i) $4^3$ or $3^4$ (ii) $2^8$ or $8^2$ (iii) $100^2$ or $2^{100}$**

**Answer:**

(i) $3^4$ (81 > 64)

(ii) $2^8$ (256 > 64)

(iii) $2^{100}$ (much larger than 10,000)

**9. A dairy plans to produce 8.5 billion packets of milk in a year. They want a unique ID (identifier) code for each packet. If they choose to use the digits 0–9, how many digits should the code consist of?**

**Answer:** With digits only, codes of length *d* give $10^d$ possibilities. Need $10^d \geq 8.5 \times 10^9$ ⇒ smallest d is **10**.

**10. 64 is a square number ($8^2$) and a cube number ($4^3$). Are there other numbers that are both squares and cubes? Is there a way to describe such numbers in general?**

**Answer:** Yes. Numbers that are both squares and cubes are exactly the **sixth powers**, i.e., $n^6$ (e.g., 1, 64, 729, 4096, …).

**11. A digital locker has an alphanumeric (it can have both digits and letters) passcode of length 5. Some example codes are G89P0, 38098, BRJKW, and 003AZ. How many such codes are possible?**

**Answer:** 10 digits + 26 letters ⇒ 36 choices per place. Total codes = $36^5$ = **60,466,176**.

**12. The worldwide population of sheep (2024) is about $10^9$, and that of goats is also about the same. What is the total population of sheep and goats? (i) $20^9$ (ii) $10^{11}$ (iii) $10^{10}$ (iv) $10^{18}$ (v) $2 \times 10^9$ (vi) $10^9 + 10^9$**

**Answer:** $10^9 + 10^9 = 2 \times 10^9$. Correct option: **(v) $2 \times 10^9$**.

**13. Calculate and write the answer in scientific notation: (i) If each person in the world had 30 pieces of clothing, find the total number of pieces of clothing. (ii) There are about 100 million bee colonies in the world. Find the number of honeybees if each colony has about 50,000 bees. (iii) The human body has about 38 trillion bacterial cells. Find the bacterial population residing in all humans in the world. (iv) Total time spent eating in a lifetime in seconds.**

**Answer:** (Taking world population ≈ $8 \times 10^9$)

(i) $30 \times 8 \times 10^9$ = **$2.4 \times 10^{11}$**

(ii) $10^8 \times 5 \times 10^4$ = **$5 \times 10^{12}$**

(iii) $3.8 \times 10^{13} \times 8 \times 10^9$ = **$3.04 \times 10^{23}$** ≈ $3.0 \times 10^{23}$

(iv) ≈ 1.5 hours/day × 75 years ⇒ **≈ $1.5 \times 10^8$** seconds

**14. What was the date 1 arab/1 billion seconds ago?**

**Answer:** 1 billion seconds ≈ 31.7 years. From 27 October 2025 (IST), the date was approximately **17 February 1994**.