

Important Questions Class 8 Maths Chapter 10

Exponents and Power

Question 1: The human body has about 100 billion cells. This number can be written in exponential form as

10-11

10¹¹

10⁹

10-9

Answer 1: Option (b) is the correct answer.

Explanation 1: 100 billion = 100,000,000,000 = 10¹¹.

Question 2: The distance between earth and sun is 150 million kilometres which can be written in exponential form as _____.

Answer 2: 1.5×10^8 km

Explanation 2: 1 million km = 1,000,000

Therefore, 150 million km = 150,000,000 km = 1.5×10^8 km.

Question 3: Express $\frac{27}{64}$ and $-\frac{27}{64}$ as powers of a rational number.

Answer 3: $27 = 3 \times 3 \times 3 = 3^3$

$-27 = -3 \times -3 \times -3 = (-3)^3$

$64 = 4 \times 4 \times 4 = 4^3$

Now using the identity $(\frac{a}{b})^m = \frac{a^m}{b^m}$

We get

$\frac{27}{64} = \frac{3^3}{4^3} = (\frac{3}{4})^3$

$\Rightarrow -\frac{27}{64} = \frac{(-3)^3}{4^3} = (-\frac{3}{4})^3$

Question 4: $(49 \times z - 3) / (7 - 3 \times 10 \times z - 5)$ ($z \neq 0$)

Answer 4: Using the identity $a^m \div a^n = a^{m-n}$

$$\begin{aligned} & (49 \times z^{-3}) / (7^{-3} \times 10 \times z^{-5}) \\ &= (7^2 \times z^{-3}) / (7^{-3} \times 10 \times z^{-5}) \\ &= (7^{2+3} \times z^{-3+5}) / 10 \\ &= (7^5 \times z^2) / 10 \\ &= (75z^2) / 10 \end{aligned}$$

Question 5: Find the value of x so that

$$(5/3)^{-2} \times (5/3)^{-14} = (5/3)^{8x}$$

Answer 5: Using the identity $a^m \times a^n = a^{m+n}$

We get

$$(5/3)^{-2} \times (5/3)^{-14} = (5/3)^{8x}$$

$$\Rightarrow (5/3)^{-2-14} = (5/3)^{8x}$$

Comparing the power of both sides,

$$\Rightarrow -16 = 8x$$

$$\Rightarrow x = -2$$

Question 6: Divide 293 by 10,00,000 and express the result in standard form.

Answer 6: Using the identity $a^{-m} = 1/a^m$

$$1000000 = 10^6$$

$$\Rightarrow 293/10^6$$

$$= 293 \times 10^{-6}$$

$$= 2.93 \times 10^{-6} \times 10^2$$

$$= 2.93 \times 10^{-4}$$

Question 7: If $53x^{-1} \div 25 = 125$, find the value of x.

$$\text{Answer 7: } 53x^{-1} \div 5^2 = 5^3$$

$$53x^{-1-2} = 5^3 \text{ [As } a^m \div a^n = a^{m-n}]$$

$$53x^{-3} = 5^3$$

Comparing the power of both sides,

$$3x - 3 = 3$$

$$\Rightarrow x - 1 = 1$$

$$\Rightarrow x = 2$$

Question 8: Simplify

$$(3 \cdot 5 \times 10 \cdot 5 \times 125) / (5 \cdot 7 \times 6 \cdot 5)$$

$$\text{Answer 8: } (3 \cdot 5 \times 10 \cdot 5 \times 125) / (5 \cdot 7 \times 6 \cdot 5)$$

$$= (3 \cdot 5 \times 10 \cdot 5 \times 5^3) / (5 \cdot 7 \times (2 \times 3) \cdot 5)$$

$$= (3 \cdot 5 \times 2 \cdot 5 \times 5 \cdot 5 \times 5^3) / (5 \cdot 7 \times 2 \cdot 5 \times 3 \cdot 5)$$

$$\text{[Since, } (ab)^m = a^m b^m \text{]}$$

$$= (3 \cdot 5 \times 2 \cdot 5 \times 5 \cdot 5 \cdot 5^3) / (5 \cdot 7 \times 2 \cdot 5 \times 3 \cdot 5)$$

$$= (3 \cdot 5 \times 2 \cdot 5 \times 5 \cdot 5^2) / (5 \cdot 7 \times 2 \cdot 5 \times 3 \cdot 5)$$

$$\text{[Since, } a^m \times a^n = a^{m+n}]$$

$$3 \cdot 5^{1+5} \times 2 \cdot 5^{1+5} \times 5^{-2+7}$$

$$= 1 \times 1 \times 3125$$

$$= 3125$$

Question 9: Express the number appearing in the following statements in standard form.

(i) Size of bacteria is 0.0000005m.

(ii) Size of a plant cell is 0.00001275m.

Answer 9: (i) Size of bacteria = 0.0000005

$$= 5 / 10000000$$

$$= 5 / 10^7$$

$$= 5 \times 10^{-7} \text{ m}$$

(ii) Size of a plant cell = 0.00001275m

$$= 1.275 / 100000$$

$$= 1.275 / 10^5$$

$$= 1.275 \times 10^{-5} \text{ m}$$

Question 10: In a stack, there are 5 books each of thickness 20 mm and 5 paper sheets each of thickness 0.016 mm. What is the total thickness of the stack?

Answer 10: If thickness of one book = 20mm

Then thickness of 5 books = $20 \times 5 = 100 \text{ mm}$

If thickness of one paper = 0.016 mm

Then thickness of 5 papers = $0.016 \times 5 = 0.08 \text{ mm}$

Therefore, total thickness of a stack = $100 + 0.08 = 100.08 \text{ mm}$

$$= 1.0008 \times 10^2 \text{ mm}$$

Question 11: Find the value of:

(i) $(2^{-1} \times 4^{-1}) \div 2^{-2}$

(ii) $(3^{-1} + 4^{-1} + 5^{-1})^0$

Answer 11:(i) $(2^{-1} \times 4^{-1}) \div 2^{-2}$

$$= [(1/2) \times (1/4)] \div (1/4)$$

Using the identity $a^{-m} = 1/a^m$

$$= (1/2 \times 1/2^2) \div 1/4$$

$$= 1/2^3 \div 1/4$$

$$= (1/8) \times 4$$

$$= 1/2$$

$$(ii) (3^{-1} + 4^{-1} + 5^{-1})^0$$

Using the identity $a^0 = 1$

$$= 1$$

Question 12: Sanchay put a 1cm stick of gum through a (1×3^{-2}) machine. How long was the stick when it came out?

Answer 12: Size of the machine = $1 \times 3^{-2} = 1/3^2 = 1/9$

Length of the stick put through the machine = 1cm.

Now we can see a negative (-) sign in the power means that the machine is a shrinking machine.

Therefore, $1 \times 1/9 = 1/9$ cm.

Thus, the length when it comes out of the machine becomes 1/9cm.