

# CHAPTER 2

## EXPONENTS AND POWERS

### More Questions for Practice

1. Simplify:

$$(i) \left( \frac{x^{-1}y^2}{z^{-3}} \right)^3$$

$$(ii) \frac{x^0 - y^0}{x^0 + y^0}$$

$$(iii) (x^2y^3z^{-2})^0$$

$$(iv) \frac{x^{-2}}{x^2}$$

2. Simplify:  $\frac{4^{-2} \times 2^2 \times 2}{8 \times 8^{-2}}$

3. Simplify:

$$(i) (2^{-1})^4 \times 3^4 \div (3^4 \times 8 \div 9)^2$$

$$(ii) \left( \frac{64}{125} \right)^{-1} \div \frac{1}{\left( \frac{625}{256} \right)^{-1}} + \left( \frac{25}{64} \right)^0$$

4. Show that:

$$(i) \left( \frac{x^a}{x^b} \right)^{a+b} \times \left( \frac{x^b}{x^c} \right)^{b+c} \times \left( \frac{x^c}{x^a} \right)^{c+a} = 1$$

$$(ii) \frac{(x^{m+n})(x^{n+l})(x^{l+m})}{(x^m \cdot x^n \cdot x^l)^2} = 1$$

5. Prove that:

$$(i) \frac{1}{2}(2^3)^2 \div [2 \div (2 \div 2^3)^2] = 1$$

$$(ii) (x^{-1} + y^{-1})^{-1} = \frac{xy}{x+y}$$

6. Simplify:

$$(i) \frac{2^{-n} \cdot 8^{2n+1} \cdot 16^{2n}}{4^{3n}}$$

$$(ii) \frac{a^{7+2n} \cdot (a^2)^{3n+2}}{(a^4)^{2n+3}}$$

$$(iii) \frac{p^{2n+3} \cdot p^{(2n+1)(n+2)}}{(p^3)^{2n+1} \cdot p^{n(2n+1)}}$$

7. Solve for  $p$ :  $3^{5p} = 3^{3p} \div (81)^{-1}$

8. Find the value of  $n$  if

$$6^{-1} \times 3^2 \times 2^2 \div (7^2 \div 7^3) - \frac{10^3}{10^2} = 2^n$$

9. Solve for  $x$ :  $3^{x-1} = (9)^{x+3}$

10.  $\left( \frac{-5}{6} \right)^3$  when divided by  $\left( \frac{-5}{6} \right)^7$  becomes  $\left( \frac{-5}{6} \right)^{3+x}$ . Find the value of  $x$ .

11. Solve:  $\left( \frac{3}{7} \right)^{2x+5} = \frac{16807}{243}$ .

12. Simplify:  $\frac{3^{n+1} \times 3^{(n-1)(n+1)}}{3^{n(n-1)} \times 9^{n+1}}$ .

13. If  $(a^{-3})^2(b^4)^{-1}(c^2)^3 = a^x b^y c^{-z}$  find  $x$ ,  $y$  and  $z$ .
14. Simplify:  $(x^3 \cdot y^{-3})^2 \div (xy^{-2})$
15. If  $[a^4 \div (a^2 \times a^{-4})]^2 = a^k$ , then find  $k$ .
16. Evaluate the following by *prime factorisation*:
- (i)  $\sqrt{\frac{441}{196}}$       (ii)  $\sqrt{\frac{3844}{196}}$       (iii)  $\sqrt{38\frac{11}{25}}$
17. Find the square roots of the following numbers by the *division method*:
- (i) 531441      (ii) 390625      (iii) 62504836
18. (i) Find the smallest 3-digit number, which is a perfect square.  
(ii) Find the least number of 5-digits, which is a perfect square.
19. (i) Find the greatest 3-digit number, which is a perfect square.  
(ii) Find the greatest number of 6-digits, which is a perfect square.
20. Find the square roots of the following decimals (correct up to three places of decimal):
- (i) 0.675      (ii) 473.56
21. Find the smallest number by which 557568 must be divided so that it becomes a perfect square. Also, find the number whose square is the resulting number.
22. Find the smallest number of four digits which is a perfect square.
23. Find the greatest number of four digits which is a perfect square.
24. Find the square root of each of the following numbers in decimal form:
- (i) 0.00053361      (ii) 176.252176
25. What is the fraction, which multiplied by itself gives 251953.8025?
26. Evaluate  $\sqrt{813604}$  and hence find the value of
- (i)  $\sqrt{8136.04} - \sqrt{81.3604}$       (ii)  $\sqrt{81.3604} + \sqrt{0.813604}$
27. Evaluate:
- (i)  $\frac{\sqrt{0.2304} + \sqrt{0.1764}}{\sqrt{0.2304} - \sqrt{0.1764}}$       (ii)  $\frac{\sqrt{0.4761} + \sqrt{0.3969}}{\sqrt{0.4761} - \sqrt{0.3969}}$
28. A society collected ₹ 92.16. Each member contributed as many paise as there were members. How many members were there and how much did each contribute?
29. A General wishing to arrange his men, who were 335250 in number in the form of a square, found that there were 9 men left over. How many were there in each row?
30. Find the length of the diagonal of a square whose perimeter is equal to the perimeter of an equilateral triangle of side 4 cm, correct to two places of decimal.

31. The area of a square field is 5184 sq m. A rectangular field, with its length twice its breadth, has its perimeter equal to the perimeter of the square field. Find the area of the rectangular field.
32. The area of a square field is 1476225 sq m. A motorist travels along its boundary at 36 km/h. In how much time, will he return to the starting point?
33. Find the perimeter of a square, with its area equal to the area of a rectangle of dimensions 270 m by 85 m, correct up to two places of the decimal.
34. Find the *cube* of each of the following numbers:
- (i)  $\frac{-8}{11}$                       (ii)  $3\frac{1}{4}$                       (iii) 3.1
35. Find the *cube root* of the following numbers, using *prime factorisation method*:
- (i) 42875                      (ii) 74088
36. Find the *cube root* of:
- (i) 1157625                      (ii) 3723875
37. Find the square root of 20, correct to 2 places of decimal.
38. Using prime factorisation method, find the cube root of 1728.
39. What is the smallest number by which 16384 must be divided so that the quotient is a perfect cube? Also, find the cube root of the quotient so obtained.
40. What is the smallest number which when multiplied with 2500 will make the product a perfect cube? Find the cube root of the product.

## ANSWERS

1. (i)  $x^{-3}y^6z^9$                       (ii) 0                      (iii) 1                      (iv)  $\frac{1}{x^4}$
2. 4                      3. (i)  $\frac{1}{1024}$                       (ii)  $1\frac{4}{5}$
6. (i)  $2^{7n+3}$                       (ii)  $\frac{1}{a}$                       (iii)  $p^2$
7. 2                      8. 5                      9. -7                      10. -7
11. -5                      12.  $\frac{1}{9}$                       13.  $x = -6, y = -4$  and  $z = -6$
14.  $\frac{x^5}{y^4}$                       15.  $k = 12$ .
16. (i)  $\frac{3}{2}$                       (ii)  $\frac{31}{7}$                       (iii)  $6\frac{1}{5}$
17. (i) 729                      (ii) 625                      (iii) 7906
18. (i) 100                      (ii) 10000                      19. (i) 961                      (ii) 998001
20. (i) 0.822                      (ii) 21.761                      21. 2; 528                      22. 1024
23. 9801                      24. (i) 0.0231                      (ii) 13.276

25.  $501\frac{19}{20}$

26. 902

(i) 81.18

(ii) 9.922

27. (i) 15

(ii) 22.

28. 96, ₹ 96

29. 579

30. 4.24 cm

31. 4608 sq m

32. 8 min 6 sec

33. 605.97 m

34. (i)  $\frac{-512}{1331}$

(ii)  $\frac{2197}{64}$

(iii) 29.791

35. (i) 35

(ii) 42

36. (i) 105

(ii) 155

37. 4.47

38. 12

39. 4; 16

40. 50; 50

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