



MATHS

BOOKS - S CHAND IIT JEE FOUNDATION

EXPONENTS

Solved Examples

1. Simplify: $(0.04)^{-1.5}$



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2. When simplified, the expression

$(100)^{\frac{1}{2}} \times (0.001)^{\frac{1}{3}} - (0.0016)^{\frac{1}{4}} \times 3^0 + \left(\frac{5}{4}\right)^{-1}$ is equal to :

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3. Evaluate: $\frac{6^{\frac{2}{3}} \times \sqrt[3]{(6)^7}}{\sqrt[3]{6^6}}$

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4. Given that $10^{0.48} = x$ and $10^{0.70} = y$ and $x^z = y^2$, then find the approximate value of z ?

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5. If $(\sqrt{3})^5 \times 9^2 = 3^n \times 3\sqrt{3}$, then what is the value of n ?

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6. If $3^{x-y} = 27$ and $3^{x+y} = 243$, then what is the value of x ?

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7. Simplify: $\left(\frac{x^a}{x^b}\right)^{a+b} \cdot \left(\frac{x^b}{x^c}\right)^{b+c} \cdot \left(\frac{x^c}{x^a}\right)^{c+a}$

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8. If $2 = 10^m$ and $3 = 10^n$, then find the value of 0.15

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9. What is the value of the expression

$$\frac{x-1}{x^{3/4} + x^{1/2}} \times \frac{x^{1/2} + x^{1/4}}{x^{1/2} + 1} \times x^{1/4}, \text{ when } x = 16?$$

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10. What is the simplified value of $\left[\frac{4^{m+\frac{1}{4}} \times \sqrt{2 \times 2^m}}{2\sqrt{2^{-m}}} \right]^{\frac{1}{m}}$?

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11. Given, $a = 2^x$, $b = 4^y$, $c = 8^z$ and $ac = b^2$. Find the relation x,y and z.

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Question Bank

1. If $\frac{\left(\frac{1}{216}\right)^{-\frac{2}{3}}}{\left(\frac{1}{27}\right)^{-\frac{4}{3}}} = x$. The value of x is:

A. $\frac{3}{4}$

B. $\frac{4}{9}$

C. $\frac{2}{3}$

D. $\frac{1}{8}$

Answer: B



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2. If $\sqrt{3^n} = 81$. Then, n is equal to:

A. 2

B. 4

C. 6

D. 8

Answer: D



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3. $(64)^{-\frac{2}{3}} \times \left(\frac{1}{4}\right)^{-3}$ equals:

A. $\frac{1}{4}$

B. 1

C. 4

D. 16

Answer: C



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4. $\frac{1}{(216)^{-\frac{2}{3}}} + \frac{1}{(256)^{-\frac{3}{4}}} + \frac{1}{(243)^{-\frac{1}{5}}}$ is equal to:

A. 103

B. 105

C. 107

D. 101

Answer: A



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5. $(4)^{0.5} \times (0.5)^4$ is equal to:

A. 1

B. 4

C. $\frac{1}{8}$

D. $\frac{1}{32}$

Answer: C



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6. $\left(\frac{1}{64}\right)^0 + (64)^{-\frac{1}{2}} + (32)^{\frac{4}{5}} - (32)^{-\frac{4}{5}} = ?$

A. $16\left(\frac{1}{8}\right)$

B. $17\left(\frac{1}{8}\right)$

C. $17\left(\frac{1}{16}\right)$

D. $-17\left(\frac{1}{16}\right)$

Answer: C



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7.

Simplify:

$$\left[\left(2\frac{10}{27} \right)^{-\frac{2}{3}} \div \left(11\frac{1}{9} \right)^{-0.5} \right] + \left[(6.25)^{0.5} \div (-4)^{-1} \right]$$

A. $-8\left(\frac{1}{8}\right)$

B. $8\left(\frac{1}{8}\right)$

C. $1\left(\frac{7}{8}\right)$

D. $-1\left(\frac{7}{8}\right)$

Answer: A



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8. Simplify:
$$\frac{(6.25)^{\frac{1}{2}} \times (0.0144)^{\frac{1}{2}} + 1}{(0.027)^{\frac{1}{3}} \times (81)^{\frac{1}{4}}}$$

A. 0.14

B. 1.4

C. 1

D. $1.\bar{4}$

Answer: D



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9. $4^{3.5} : 2^5$ is the same as:

A. 4 : 1

B. 2 : 1

C. 7 : 5

D. 7 : 10

Answer: A



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10. Simplify: $\left[\sqrt[3]{\sqrt[6]{5^9}} \right]^8 \left[\sqrt[6]{\sqrt[3]{5^9}} \right]^8$

A. 5^2

B. 5^4

C. 5^8

D. 5^{12}

Answer: c



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11. The value of $\frac{(243)^{\frac{n}{5}} \cdot 3^{2n+1}}{9^n \cdot 3^{n-1}}$ is:

A. 1

B. 9

C. 3

D. 3^n

Answer: B



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12. If $x^{x\sqrt{x}} = (x\sqrt{x})^x$, then x is equal to:

A. $\frac{3}{2}$

B. $\frac{2}{9}$

C. $\frac{9}{4}$

D. $\frac{4}{9}$

Answer: C



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13. $\left[1 - \left[1 - (1 - a^4)^{-1}\right]^{-1}\right]^{-\frac{1}{4}}$ is equal to:

A. a^4

B. a^2

C. a

D. $\frac{1}{a}$

Answer: C



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14. If $64^a = \frac{1}{(256)^b}$, then $3a + 4b$ equals

A. 2

B. 4

C. 8

D. 0

Answer: D



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15. If $a = b^{\frac{2}{3}}$ and $b = c^2$, what is the value of a in terms of c ?

A. $\frac{4}{c^3}$

B. $\sqrt[3]{c^4}$

C. $\frac{1}{\sqrt[3]{c^4}}$

D. $\sqrt[4]{c^3}$

Answer: C



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16. The value of $\frac{5 \cdot (25)^{n+1} + 25 \cdot (5)^{2n-1}}{25 \cdot (5)^{2n} - 105(25)^{n-1}}$ is :

A. 0

B. 1

C. $6\left(\frac{1}{4}\right)$

D. $5\left(\frac{1}{4}\right)$

Answer: C



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17. If $5\sqrt{5} \times \frac{5^3}{5^{-\frac{3}{2}}} = 5^{a+2}$ then the value of a is

A. 4

B. 5

C. 6

D. 8

Answer: A



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18. What is the expression

$(x + y)^{-1}(x^{-1} + y^{-1})(xy^{-1} + x^{-1}y)^{-1}$ equal to:

A. $x + y$

B. $(x^2 + y^2)^{-1}$

C. xy

D. $x^2 + y^2$

Answer: B



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19. If $2^x - 2^{x-1} = 4$, then what is the value of $2^x + 2^{x-1}$?

A. 8

B. 12

C. 10

D. 16

Answer: B



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20. If $x = y^z$, $y = z^x$ and $z = x^y$, then

A. $\frac{xy}{z} = 1$

B. $xyz = 1$

C. $x + y + z = 1$

D. $xz = y$

Answer: B



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21. Prove that:

$$\frac{1}{1 + x^{b-a} + x^{c-a}} + \frac{1}{1 + x^{a-b} + x^{c-b}} + \frac{1}{1 + x^{b-c} + x^{a-c}} = 1$$

A. $\frac{1}{2}$

B. 2

C. 1

D. 0

Answer: C



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22. Find the value of x if $[3^{2x-2} + 10] / 13 = 7$

A. 1

B. 3

C. 4

D. 2

Answer: B



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23. Prove that:
$$\frac{2^{\frac{1}{2}} x 3^{\frac{1}{3}} x 4^{\frac{1}{4}}}{10^{-\frac{1}{5}} x 5^{\frac{3}{5}}} \div \frac{3^{\frac{4}{3}} x 5^{-\frac{7}{5}}}{4^{-\frac{3}{5}} x 6} = 10$$

A. 1

B. a

C. b

D. c

Answer: C



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24. $x^{\frac{a+b-c}{(a-c)(b-c)}} \cdot x^{\frac{b+c-a}{(b-a)(c-a)}} \cdot x^{\frac{c+a-b}{(c-b)(a-b)}} =$

A. 1

B. a

C. b

D. c

Answer: A



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25. The value of $\left(\frac{x^q}{x^r}\right)^{\frac{1}{qr}} \times \left(\frac{x^r}{x^p}\right)^{\frac{1}{rp}} \times \left(\frac{x^p}{x^q}\right)^{\frac{1}{pq}}$ is equal to:

A. $x^{\frac{1}{p} + \frac{1}{q} + \frac{1}{r}}$

B. 0

C. $x^{pq+qr+rp}$

D. 1

Answer: D



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26. The largest number among the following is:

A. $3^{2^{2^2}}$

B. $\left\{ (3^2)^2 \right\}^2$

C. $3^2 \times 3^2 \times 3^2$

D. 3222

Answer: A



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27. If $6^x - 36 = 7740$, then $x^x =$

A. 7796

B. 243

C. 3125

D. 46656

Answer: C



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28. The value of:

$$\frac{(9^x(9^x-1))^x}{9^{x+1} \cdot 3^{2x-2}} \left\{ \frac{729^{\frac{x}{3}}}{81} \right\}^{-x} + \frac{3^a - 2^3 \cdot 3^{a-2}}{3^a - 3^{a-1}} \text{ is:}$$

A. 9

B. 6

C. 12

D. 16

Answer: B



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29. Find the value of

$$\left(2^{1/4} - 1\right)\left(2^{3/4} + 2^{1/2} + 2^{1/4} + 1\right)$$

A. 2

B. 3

C. 5

D. 1

Answer: D

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30. Simplify: $\frac{a^{\frac{1}{2}} + a^{-\frac{1}{2}}}{1 - a} + \frac{1 - a^{-\frac{1}{2}}}{1 - \sqrt{a}}$

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31. If $3^{x+y} = 81$ and $81^{x-y} = 3$, then the value of x and y are:

A. $\frac{17}{8}, \frac{9}{8}$

B. $\frac{17}{8}, \frac{15}{8}$

C. $\frac{17}{8}, \frac{11}{8}$

D. $\frac{15}{8}, \frac{11}{8}$

Answer: B



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32. Find x , if $8^{x-2} \times \left(\frac{1}{2}\right)^{4-3x} = (0.0625)^x$

A. 0

B. 4

C. 2

D. 1

Answer: D



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33. Find the value of the expression

$$\frac{(x^{a+b})^2 \times (x^{b+c})^2 \times (x^{c+a})^2}{(x^a x^b x^c)^4}, \text{ if } x = 2, a = 1, b = 2, c = 3$$

A. 16

B. 32

C. 24

D. 1

Answer: D

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34. If $(2.4)^x = (0.24)^y = 10^z$, then show that $\frac{1}{x} - \frac{1}{z} = \frac{1}{y}$

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35. If $2^x = 4^y = 8^z$ and $xyz = 288$, the value of

$$\frac{1}{2x} + \frac{1}{4y} + \frac{1}{8z} \text{ is}$$

A. $\frac{11}{8}$

B. $\frac{11}{24}$

C. $\frac{11}{48}$

D. $\frac{11}{96}$

Answer: D



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Self Assessment Sheet

1. Find the value of $(27)^{-2/3} + \left(\left(2^{-2/3} \right)^{-5/3} \right)^{-9/10}$

A. $\frac{1}{9}$

B. $\frac{2}{9}$

C. $\frac{11}{18}$

D. 1

Answer: C



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2. Given that $10^{0.48} = x$, $x^{0.70} = y$ and $x^2 = y^2$, then the value of z is close to 1. 45 b. 1. 88 c. 3. 7 d. 2. 9

A. $2\left(\frac{11}{12}\right)$

B. $\frac{4}{9}$

C. $1\left(\frac{1}{48}\right)$

D. $\frac{48}{49}$

Answer: A



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3. The expression $(x^{2p}y^{3q})^6 / (x^{-3}y^{-1})^{-4p}$ after simplification becomes:

- A. independent of x but not of y.
- B. independent of y but not of x
- C. independent of both x and y
- D. dependent of both x and y but independent of p and q.

Answer: A



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4. If $2^{x-1} + 2^{x+1} = 320$, then find the value of x .

A. 4

B. 5

C. 6

D. 7

Answer: D



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5. The value

$\left(\frac{x^a}{x^b}\right)^{(a^2+ab+b^2)} \left(\frac{x^b}{x^c}\right)^{(b^2+bc+c^2)} \left(\frac{x^c}{x^a}\right)^{(c^2+ca+a^2)}$ is :

A. $a^3 + b^3 + c^3$

B. 1

C. $(a + b + c)^3$

D. 0

Answer: B



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6. Simplify: $\frac{16 \times 2^{n+1} - 4 \times 2^n}{16 \times 2^{n+1} - 2 \times 2^{n+2}}$.

A. $\frac{1}{4}$

B. $-\frac{1}{2}$

C. $-\frac{1}{4}$

D. $\frac{1}{2}$

Answer: D



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7. If $3^{x+8} = 27^{2x+1}$, then the value of:

$$\left[\left(\frac{\sqrt{289}}{\sqrt[3]{216}} \right)^x / \left(\frac{17}{\sqrt[4]{1296}} \right)^x \right]^{1/2} \text{ is:}$$

A. 1

B. 0

C. $\frac{17}{6}$

D. $\frac{6}{17}$

Answer: A



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8. Solve the followings :

The value of the expression

$$\frac{(0.3)^{1/3} \cdot \left(\frac{1}{27}\right)^{1/4} \cdot (9)^{1/6} \cdot (0.81)^{2/3}}{(0.9)^{2/3} \cdot (3)^{-1/2} \cdot \left(\frac{1}{3}\right)^{-2} \cdot (243)^{-1/4}} \text{ is :}$$

A. 0.9

B. 2.7

C. 0.27

D. 0.09

Answer: B



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9. $\frac{[(625)^{1/2} \times (1024)^{1/5}]^{1/2}}{[(\sqrt[4]{256})^{1/2}] \times (125)^{1/3}}$ equals

A. $\frac{1}{5}$

B. $\frac{1}{125}$

C. 1

D. $\frac{1}{10}$

Answer: C



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10. If $a = (\sqrt{5} + \sqrt{4})^{-3}$ and $b = (\sqrt{5} - \sqrt{4})^{-3}$, then the value of: $(a + 1)^{-1} + (b + 1)^{-1}$ is:

A. $20\sqrt{5}$

B. 4

C. 1

D. $16\sqrt{5}$

Answer: C



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