MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

EXPONENTS OF REAL NUMBER

Others

1. Prove that : $\frac{a^{-1}}{a^{-1}+b^{-1}}+\frac{a^{-1}}{a^{-1}-b^{-1}}=\frac{2b^2}{b^2-a^2}$

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2. Find the value of x, if $5^{x-3}.3^{2x-8}=225$

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3. Show that : (i) $\frac{x^{a(b-c)}}{x^{b(a-c)}} / \left(\frac{x^b}{x^a}\right)^c = 1$, (ii) $\frac{\left(x^{a+b}\right)^2\left(x^{b+c}\right)^2\left(x^{c+a}\right)^2}{\left(x^a x^b x^c\right)^4} = 1$

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4. If $\frac{9^n \cdot 3^2 \cdot \left(3^{-\frac{n}{2}}\right)^{-2} - (27)^n}{3^{3m} \cdot 2^3} = \frac{1}{27}$, Prove that $m - n = 1$.

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5. If $27^x = \frac{9}{3^x}$, find x.

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6. Find the values of x in each of the following : (i) $2^{5x} \div 2^{x} = 2^{20}$ (ii) $\left(2^{3}\right)^{4} = \left(2^{2}\right)^{x}$,

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7. Evaluate each of the following: (i) $5^{2} \cdot 5^{4}$ (ii) $5^{8} + 5^{3}$ (iii) $\left(3^{2}\right)^{3}$ $\left(\frac{11}{12}\right)^{3}$ (iv) $\left(\frac{3}{4}\right)^{-3}$

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8. Evaluate each of the following: (i) $\left(\frac{2}{11}\right)^{4} \cdot \left(\frac{11}{3}\right)^{2} \cdot \left(\frac{3}{2}\right)^{3}$ (ii) $\left(\frac{1}{2}\right)^{5} \cdot \left(\frac{-2}{3}\right)^{4} \cdot \left(\frac{3}{5}\right)^{-1}$

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9. If $a = 2$ and $b = 3$, then find the values of each of the following: (i) $a^a + b^b$ (ii) $a^b + b^a$ (iii) $a^b \left(\frac{a}{b}\right)^a$ (iv) $\left(\frac{1}{a} + \frac{1}{b}\right)^a$

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10. Assuming that x, y are positive real numbers, simplify each of the following: (i) $\sqrt{x^{-2}y^3}$ (ii) $\left(x^{-2}y^{-\frac{1}{2}}\right)^2$ (iii) $\left(\sqrt{x^{-3}}\right)^5$

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11. Simplify : $\frac{(25)^{\frac{3}{2}} \cdot (243)^{\frac{3}{5}}}{(16)^{\frac{5}{4}} \cdot (8)^{\frac{4}{3}}}$

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12. Simplify: $\left(\frac{81}{16}\right)^{-\frac{3}{4}} \cdot \left[\left(\frac{25}{9}\right)^{-\frac{3}{2}} \div \left(\frac{5}{2}\right)^{-3}\right]$

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13. If x, y, z are positive real numbers show that: $\sqrt{x^{-1}y}\sqrt{y^{-1}z}\sqrt{z^{-1}x} = 1$

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14. Evaluate each of the following

(i) 5^2 x 5^4 (ii) $5^8 \div 5^3$ (iii) $\left(3^2\right)^3$ (iv) $\left(\frac{11}{12}\right)^3$ (v) $\left(\frac{3}{4}\right)^{-3}$

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15. Evaluate each of the following

(i) $\left(\frac{2}{11}\right)^4 \times \left(\frac{11}{3}\right)^2 \times \left(\frac{3}{2}\right)^3$ (ii) $\left(\frac{1}{2}\right)^5 \times \left(-\frac{2}{3}\right)^4 \times \left(\frac{3}{5}\right)^{-1}$

(iii) $2^{55} \times 2^{60} - 2^{97} \times 2^{18}$ (iv) $\left(\frac{2}{3}\right)^2 \times \left(\frac{2}{5}\right)^{-3} \times \left(\frac{3}{5}\right)^2$

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16. If a=2 and b=3 then find the values of each of the following

(i) $a^a + b^b$ (ii) $a^b + b^a$ (iii) a^b (iv) $\left(\frac{a}{b}\right)^a$ (v) $\left(\frac{1}{a} + \frac{1}{b}\right)^a$ (vi) $(ab)^b$

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17. Evaluate each of the following removing radical sign and negative indices wherever they occur

(i) $(64)^{\frac{1}{3}}$ (ii) $(125)^{-\frac{1}{3}}$ (iii) $(27)^{-\frac{2}{3}}$ (iv) $\left(\frac{64}{25}\right)^{-\frac{3}{2}}$ (v) $\left(-\frac{1}{2}\right)^{-5}$

(vi) $\left(\frac{1}{4}\right)^{-1}$ (vii) 5^{-2}

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18. Evaluate each of the following

(i) $5^2 \times 5^4$

(ii) $\left(3^2\right)^3$

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19. Evaluate each of the following

(i) $\left(\frac{11}{12}\right)^3$

(ii) $\left(\frac{3}{4}\right)^{-3}$

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20. Evaluate each of the following:

$(i)\left(\frac{2}{11}\right)^{4} \times \left(\frac{11}{3}\right)^{2} \times \left(\frac{3}{2}\right)^{3}$

$(ii)\left(\frac{1}{2}\right)^{5} \times \left(\frac{-2}{3}\right)^{4} \times \left(\frac{3}{5}\right)^{-1}$

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21. Evaluate each of the following: $(i)\ 2^{55} \times 2^{60} - 2^{97} \times 2^{18}$

$(ii)\left(\frac{2}{3}\right)^{2} \times \left(\frac{2}{5}\right)^{-3} \times \left(\frac{3}{5}\right)^{2}$

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22. If $a = 2$ and $b = 3$, then find the values of each of the following:

(a)$a^{a} + b^{b}$

(b) $a^b + b^a$

(c) a^b

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23. If $a = 2$ and $b = 3$, then find the values of each of the following:

(a) $\left(\frac{a}{b}\right)^a$

(b) $\left(\frac{1}{a} + \frac{1}{b}\right)^a$

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24. Simplify the following

(i) $\left(3a^4b^3\right)\left(18a^3b^5\right)$

(ii) $\frac{3a^7b^6}{18a^6b^8}\left(\frac{-2a^2}{b^3}\right)^3$

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25. Simplify each of the following: $(a)\ \dfrac{7^n - 3 \times 7^{n+1}}{20 \times 7^n - 2 \times 7^n}$ $(b)\ \dfrac{5^n - 6 \times 5^{n+1}}{9 \times 5^n - 2^2 \times 5^n}$ $(c)\ \dfrac{16 \times 2^{n+1} - 4 \times 2^n}{16 \times 2^{n+2} - 2 \times 2^{n+2}}$

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26. If $\dfrac{9^n \times 3^2 \times \left(3^{-\frac{n}{2}}\right)^{-2} - 27^n}{3^{3m} \times 2^3} = \dfrac{1}{27}$, prove that $m - n = 1$

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27. Assuming that x is a positive real number and $a,\ b,\ c$ are rational numbers, show that: $\left(\dfrac{x^b}{x^c}\right)^a \left(\dfrac{x^c}{x^a}\right)^b \left(\dfrac{x^a}{x^b}\right)^c = 1$

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28. Assuming that x is a positive real number and a, b, c are rational numbers, show that: $\left(\frac{x^a}{x^b}\right)^{\frac{1}{ab}} \left(\frac{x^b}{x^c}\right)^{\frac{1}{bc}} \left(\frac{x^c}{x^a}\right)^{\frac{1}{ac}} = 1$

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29. Assuming that x is a positive real number and a, b, c are rational numbers, show that: $\left(\frac{x^a}{x^b}\right)^{a^2+ab+b^2} \left(\frac{x^b}{x^c}\right)^{b^2+bc+c^2} \left(\frac{x^c}{x^a}\right)^{c^2+ca+a^2} = 1$

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30. Assuming that x is a positive real number and a, b, c are rational numbers, show that: $\left(\frac{x^a}{x^b}\right)^{a+b} \left(\frac{x^b}{x^c}\right)^{b+c} \left(\frac{x^c}{x^a}\right)^{c+a} = 1$

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31. If x is a positive real number and the exponents are rational numbers, show that:

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

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32. If x is a positive real number and the exponents are rational numbers, Find: $\left(\frac{x^a}{x^b}\right)^{a^2+b^2-ab}\cdot\left(\frac{x^b}{x^c}\right)^{b^2+c^2-bc}\cdot\left(\frac{x^c}{x^a}\right)^{c^2+a^2-ca}$

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33. Show that: $(i)\frac{x^{a(b-c)}}{x^{b(a-c)}}\div\left(\frac{x^b}{x^a}\right)^c=1,$

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34. Show that:

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

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35. If $abc=1$, show that

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

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36. Prove that: $\frac{a^{-1}}{a^{-1}+b^{-1}}+\frac{a^{-1}}{a^{-1}-b^{-1}}=\frac{2b^2}{b^2-a^2}$

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37. If $a,\ b,\ c$ are distinct positive prime integers such that $a^2b^3c^4 = 49392$, find the value of $a,\ b$ and c

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38. Find the value of x, if $5^{x-3}\ 3^{2x-8} = 225$

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39. Solve the following equations:

(i) $2^{x-5} = 256$

(ii) $2^{x+3} = 4^{x-1}$

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40. If $9^{x+2} = 720 + 9^x$, find the value of $(4x)^{\frac{1}{x}}$

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41. Solve the equation for x: $2^{2x+1} = 17.\ 2^x - 2^3$

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42. Solve the equation for x: $5^{2x+1} = 6.\ 5^x - 1$

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43. Simplify the following:

$3\left(a^4b^3\right)^{10} \times 5\left(a^2b^2\right)^3$

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44. Simplify that: $\left(2x^{-2}y^{3}\right)^{3}$

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45. Simplify that: $\frac{\left(4 \times 10^{7}\right)\left(6 \times 10^{-5}\right)}{8 \times 10^{4}}$

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46. Simplify that: $\frac{4ab^{2}\left(-5ab^{3}\right)}{10a^{2}b^{2}}$

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47. Simplify that : $\left(\frac{x^{2}y^{2}}{a^{2}b^{3}}\right)^{n}$

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48. Simplify that: $\frac{\left(a^{2n-9}\right)^6}{a^{2n-4}}$

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49. If $a = 3$ and $b = -2$, find the values of: $(i)\ a^a + b^b$

$(ii)\ a^b + b^a$ $(iii)\ (a+b)^{ab}$

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50. Prove that: $\left(\frac{x^a}{x^b}\right)^{a^2+ab+b^2} \times \left(\frac{x^b}{x^c}\right)^{b^2+bc+c^2} \times \left(\frac{x^c}{x^a}\right)^{c^2+ca+a^2}$

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51. Prove that:

$$\left(\frac{x^a}{x^b}\right)^{a^2+ab+b^2} \times \left(\frac{x^b}{x^c}\right)^{b^2+bc+c^2} \times \left(\frac{x^c}{x^a}\right)^{c^2+ca+a^2} = 1$$

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52. Prove that: $\left(\frac{x^a}{x^b}\right)^{c} \times \left(\frac{x^b}{x^c}\right)^{a} \times \left(\frac{x^c}{x^a}\right)^{b} = 1$

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53. Prove that: $\frac{1}{1+x^{a-b}} + \frac{1}{1+x^{b-a}} = 1$

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54. Prove that:

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

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55. Prove that: $\frac{a+b+c}{a^{-1}b^{-1}+b^{-1}c^{-1}+c^{-1}a^{-1}}=abc$

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56. Prove that: $\left(a^{-1}+b^{-1}\right)^{-1}=\frac{ab}{a+b}$

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57. If $abc=1$, show that

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

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58. Simplify the following: $(i)\ \dfrac{3^n \times 9^{n+1}}{3^{n-1} \times 9^{n-1}}$,

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59. Simplify the following: $(i)\ \dfrac{5^{n+3} - 6 \times 5^{n+1}}{9 \times 5^n - 2^2 \times 5^n}$

$(ii)\ \dfrac{6(8)^{n+1} + 16(2)^{3n-2}}{10(2)^{3n+1} - 7(8)^n}$

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60. Solve the following equations for x : $(i)\ 7^{2x+3} = 1$

$(ii)\ 2^{x+1} = 4^{x-3}\ (iii)\ 2^{5x+3} = 8^{x+3}$

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61. Solve the following equations for x : $(i)\ 4^{2x} = \frac{1}{32}$

$(ii)\ 4^{x-1} \times (0.5)^{3-2x} = \left(\frac{1}{8}\right)^{x}$ $(iii)\ 2^{3x-7} = 256$

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62. Solve the following equations for x :

$(i)\ 2^{2x} - 2^{x+3} + 2^4 = 0$ $(ii)\ 3^{2x+4} + 1 = 2.3^{x+2}$

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63. If $49392 = a^4b^2c^3$, find the value of a, b and c , where a, b and c are different positive primes.

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64. If $1176 = 2^a \times 3^b \times 7^c$, and $a, b \, and \, c$ are natural numbers. find a,b,c.

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65. Given $4725 = 3^a 5^b 7^c$, find the integral values of a, $b \, and \, c$ the value of $2^{-a} 3^b 7^c$

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66. If $a = xy^{p-1}$, $b = xy^{q-1}$ and $c = xy^{r-1}$, prove that $a^{q-r} b^{r-p} \, c^{p-q} = 1$

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67. Find the value of: $\left(\frac{8}{27}\right)^{\frac{1}{3}}$

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68. Find the value of : $\left(\frac{32}{243}\right)^{\frac{1}{5}}$

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69. Find the value of: $\left(\frac{1}{64}\right)^{\frac{1}{6}}$

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70. Evaluate each of the following by removing radical signs and negative indices wherever they occur: $(i)\ (64)^{\frac{1}{3}}$ (ii) $(125)^{-\frac{1}{3}}$

$(iii)\ (27)^{-\frac{2}{3}}$ (iv) $\left(\frac{64}{25}\right)^{-\frac{3}{2}}$

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71. Evaluate each of the following by removing radical signs and negative indices wherever they occur:

(i)$(27)^{-\frac{2}{3}}$

(ii) $\left(\frac{64}{25}\right)^{-\frac{3}{2}}$

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72. Simplify each of the following:

$(i)\ (625)^{-\frac{1}{4}}$

$(ii)\ \left(\frac{256}{81}\right)^{\frac{5}{4}}$

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73. Simplify each of the following: $(i)\left(\frac{243}{32}\right)^{-\frac{4}{5}}$ $(ii)\ (32)^{-\frac{3}{5}}$

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74. $\left[\left\{(625)^{-\frac{1}{4}}\right\}^{-\frac{1}{2}}\right]^{2}$

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75. Simplify: $(256)^{-\left(4^{\left(\frac{-3}{2}\right)}\right)}$

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

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77. Simplify: $\sqrt{\frac{1}{4}} + (0.01)^{-\frac{1}{2}} - (27)^{\frac{2}{3}}$

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78. Simplify : $\frac{(25)^{\frac{3}{2}} \cdot (243)^{\frac{3}{5}}}{(16)^{\frac{5}{4}} \cdot (8)^{\frac{4}{3}}}$

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79. Simplify: $\left(\frac{81}{16}\right)^{-\frac{3}{4}} \cdot \left[\left(\frac{25}{9}\right)^{-\frac{3}{2}} \div \left(\frac{5}{2}\right)^{-3}\right]$

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80. Simplify each of the following by removing radical signs and negative indices wherever they occur: $(i)\ \left(\sqrt{4}\right)^{-\frac{3}{4}}$ $(ii)\ \left(\sqrt{5}\right)^{-3} \times \left(\sqrt{2}\right)^{-3}$ $(iii)\ \frac{1}{\left(4^{-5}\right)3}$

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81. Simplify each of the following by removing radical signs and negative indices wherever they occur: $(i)\ \left(\sqrt{4}\right)^{-7} \times \left(\sqrt{2}\right)^{-5}$

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82. Assuming that x, y, z are positive real numbers, simplify each of the following: (i) $\left(x^{-\frac{2}{3}} y^{-\frac{1}{2}}\right)^2$

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83. Assuming that x, y, z are positive real numbers, simplify each of the following: (i) $\left(\sqrt{x}\right)^{-\frac{2}{3}}\sqrt{y^4} - \sqrt{xy^{-\frac{1}{2}}}$

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84. Assuming that x, y, z are positive real numbers, simplify each of the following: $(i)\sqrt[3]{xy^2} \div x^2y\ (ii)\ \sqrt[4]{\sqrt[3]{x^2}}$

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85. If x, y, z are positive real numbers show that: $\sqrt{x^{-1}y}\sqrt{y^{-1}z}\sqrt{z^{-1}x} = 1$

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86. If $\left(\frac{x^{-1}y^2}{x^3y^{-2}}\right)^1 . \left(\frac{x^6\, y^{-3}}{x^2\, y^3}\right)^{\frac{1}{2}} = x^a y^b,$ prove that $a + b = -1$, where x *and* y are different positive primes.

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87. If $x = 28^{\frac{1}{3}}$ *and* $y = 27^{\frac{1}{3}}$ find the value of $x - y - \frac{1}{x^2 + xy + y^2}$

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88. If $x = 3$, find the value of $\left(x^{\frac{1}{3}} + x^{-\frac{1}{3}}\right)\left(x^{\frac{2}{3}} + x^{-\frac{2}{3}} - 1\right)$

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89. If $25^{n-1} + 100 = 5^{2n-1}$, find the value of n :

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90. Solve the equation for x: $(i)\ 4^{2x} = \frac{1}{32}$

$(ii)\ \sqrt{\left(\frac{3}{5}\right)^{1-2x}} = 4\frac{17}{27}$

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91. Solve the equation for x: $\left(5^0 + \frac{2}{3}\right)^2 = (0.6)^{3-2x}$

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92. Solve the equation for x: $2^3\left(5^0 + 3^{2x}\right) = 8\frac{8}{27}$

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93. Solve the equation: $3(2^x + 1) - 2^{x+2} + 5 = 0$

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94. Solve the equations for $x \text{ and } y$:

$3^x = 9 \times 3^y,\ 8 \times 2^y = 4^x$

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95. Solve the equation for $x \text{ and } y$

$(32)^x \div 2^{y+1} = 1,\ 16^{4-\frac{x}{2}} - 8^y = 0$

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96. If $a^x = b,\ b^y = c \text{ and } c^z = a,$ prove that $xyz = 1$

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97. If $a^x = b^y = c^z \; and \; b^2 = ac,$ prove that $y = \dfrac{2xz}{x+z}$

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98. Assuming that $x,\ y,\ z$ are positive real numbers, simplify each of the following: $(i)\left(\sqrt{x^{-3}}\right)^5$ (ii) $\sqrt{x^{-2}y^3}$ (iii) $\left(x^{-\frac{2}{3}}\, y^{-\frac{1}{2}}\right)^2$

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99. Assuming that $x,\ y,\ z$ are positive real numbers, simplify each of the following: $\left(\sqrt{x}\right)^{-\frac{2}{3}}\sqrt{y^4} \div \sqrt{xy^{-\frac{1}{2}}}$ (ii) $\sqrt[5]{243\, x^{10}y^5z^{10}}$

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100. Assuming that x, y, z are positive real numbers, simplify each of the following: $(i)\left(\frac{x^{-4}}{y^{-10}}\right)^{\frac{5}{4}}$ $(ii)\left(\frac{\sqrt{2}}{\sqrt{3}}\right)^{5}\left(\frac{6}{7}\right)^{2}$

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101. Simplify: (i)$(32)^{-\frac{3}{5}}$ (ii) $(343)^{-\frac{2}{3}}$

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102. Simplify: $(i)\ \frac{(25)^{\frac{3}{2}} \times (243)^{\frac{3}{5}}}{(16)^{\frac{5}{4}} \times (8)^{\frac{4}{3}}}$

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103. Simplify: $(i)\left(\frac{\sqrt{2}}{5}\right)^{8} \div \left(\frac{\sqrt{2}}{5}\right)^{13}$

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104. Prove that:

$$\left(\sqrt{3 \times 5^{-3}} \div \sqrt[3]{3^{-1}}\sqrt{5}\right) \times \left(3 \times 5^{6}\right)^{\frac{1}{6}} = \frac{3}{5}$$

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105. Prove that: $9^{\frac{3}{2}} - 3 \times 5^{0} - \left(\frac{1}{81}\right)^{-\frac{1}{2}} = 15$

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106. Prove that: $\left(\frac{1}{4}\right)^{-2} - 3 \times 8^{\frac{2}{3}} \times 4^{0} + \left(\frac{9}{16}\right)^{-\frac{1}{2}} = \frac{16}{3}$

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

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108. Prove that: $(i)\ \sqrt{\frac{1}{4} + (0.01)^{-\frac{1}{2}} - (27)^{\frac{2}{3}}} = \frac{3}{2}$

$(ii)\ \frac{2^n + 2^{n-1}}{2^{n+1} - 2^n} = \frac{3}{2}$

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109. Prove that: $\left(\frac{64}{125}\right)^{-\frac{2}{3}} + \frac{1}{\left(\frac{256}{625}\right)^{\frac{1}{4}}} + \left(\frac{\sqrt{25}}{\sqrt[3]{64}}\right) = \frac{65}{16}$

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110. Prove that: $\frac{3^{-3} \times 6^2 \times \sqrt{98}}{5^2 \times \sqrt[3]{\frac{1}{25}} \times (15)^{-\frac{4}{3}} \times 3^{\frac{1}{3}}} = 28\sqrt{2}$

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111. Prove that: $\frac{(0.6)^0 - (0.1)^{-1}}{\left(\frac{3}{8}\right)^{-1}\left(\frac{3}{2}\right)^3 + \left(-\frac{1}{3}\right)^{-1}} = -\frac{3}{2}$

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112. Solve: $\frac{1}{1+x^{a-b}} + \frac{1}{1+x^{b-a}} = ?$

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113. Show that : $\frac{x^{a(b-c)}}{x^{b(a-c)}} \div \left(\frac{x^b}{x^a}\right)^c = 1$

$\frac{\left(x^{a+b}\right)^2\left(x^{b+c}\right)^2\left(x^{c+a}\right)^2}{\left(x^a x^b x^c\right)^4} = 1$

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114. Solve the following equation - $(i) 2^{x+1} = 8$

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115. Show that: $(i)\ \left(x^{a-b}\right)^{a+b}\left(x^{b-c}\right)^{b+c}\left(x^{c-a}\right)^{c+a} = 1$

$(ii)\ \left\{\left(x^{a-a^{-1}}\right)^{\frac{1}{a-1}}\right\}^{\frac{a}{a+1}} = x$

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116. Show that: $\left(\frac{a^{x+1}}{a^{y+1}}\right)^{x+y}\left(\frac{a^{y+2}}{a^{z+2}}\right)^{y+z}\left(\frac{a^{z+3}}{a^{x+3}}\right)^{z+x}=1$

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117. Show that: $\left(\frac{3^a}{3^b}\right)^{a+b}\left(\frac{3^b}{3^c}\right)^{b+c}\left(\frac{3^c}{3^a}\right)^{c+a}=1$

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118. If $2^x=3^y=12^z$ show that $\frac{1}{z}=\frac{1}{y}+\frac{2}{x}$

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119. If $2^x=3^y=6^{-z}$ prove that $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=0$

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120. If $a^x = b^y = c^z$ and $b^2 = ac$, then show that $y = \frac{2zx}{z+x}$

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121. If $3^x = 5^y = (75)^z$ show that $z = \frac{xy}{2x+y}$

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122. If $27^x = \frac{9}{3^x}$, find x.

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123. Find the values of x in each of the following : (i) $2^{5x} \div 2^x = 2^{\frac{20}{5}}$ (ii) $\left(2^3\right)^4 = \left(2^2\right)^x$,

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124. Find the value of x in each of the following:

$(i)\left(\frac{3}{5}\right)^{x}\left(\frac{5}{3}\right)^{2x}=\frac{125}{27}$ $(ii)\ 5^{x-2}\times 3^{2x-3}=135$

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125. Find the value of x in each of the following:

$2^{x-7}\times 5^{x-4}=1250$ (ii) $(4)^{2x+\frac{1}{2}}=\frac{1}{32}$

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126. Find the value of x in each of the following: $(i)\ 5^{2x+3}=1$

$(ii)\ (13)^{\sqrt{x}}=4^4-3^4-6$ $(iii)\left(\sqrt{\frac{3}{5}}\right)^{x+1}=\frac{125}{27}$

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127. If $x = 2^{\frac{1}{3}} + 2^{\frac{2}{3}}$ show that $x^3 - 6x = 6$

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128. Determine $(8x)^x$, if $9^{x+2} = 240 + 9^x$

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129. If $3^{x+1} = 9^{x-2}$, find the value of 2^{1+x}

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130. If $3^{4x} = (81)^{-1}$ and $10^{\frac{1}{y}} = 0.0001$, find the value of 2^{-x+4y}

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131. If $5^{3x} = 125$ and $10^{y} = 0.001$ find x and y

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132. Solve the following equations: $(i)\ 3^{x+1} = 27 \times 3^{4}$ and (ii) $\left(\frac{1}{2}\right)^{3+x} = \left(\frac{1}{4}\right)^{3y}$

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133. If a and b are distinct positive primes such that $\sqrt[3]{a^{6}b^{-4}} = a^{x}b^{2y}$, find x and y.

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134. If a and b are different positive primes such that

$(i)\left(\frac{a^{-1}b^2}{a^2b^{-4}}\right)^7 \div \left(\frac{a^3b^{-5}}{a^{-2}b^3}\right) = a^x b^y$, find x and y

$(ii)\ (a+b)^{-1}\left(a^{-1}+b^{-1}\right) = a^x b^y$, find $x+y+2$

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135. If $2^x\ 3^y\ 5^z = 2160$, find x, y and z. Hence, compute the value of $3^x\ 2^{-y}\ 5^{-2}$.

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136. If $1176 = 2^a \times 3^b \times 7^c$, find the values of a, b and c. Hence, compute the value of $2^a \times 3^b \times 7^{-c}$ as a fraction.

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137. Simplify: $(i)\left(\frac{x^{a+b}}{x^c}\right)^{a-b}\left(\frac{x^{b+c}}{x^a}\right)^{b-c}\left(\frac{x^{c+a}}{x^b}\right)^{c-a}$

$(ii)\left(\frac{x^l}{x^m}\right)^{\frac{1}{lm}} \times \left(\frac{x^m}{x^n}\right)^{\frac{1}{mn}} \times \left(\frac{x^n}{x^l}\right)^{\frac{1}{\ln}}$

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138. Show that: $\frac{\left(a+\frac{1}{b}\right)^m \times \left(a-\frac{1}{b}\right)^n}{\left(b+\frac{1}{a}\right)^m \times \left(b-\frac{1}{a}\right)^n} = \left(\frac{a}{b}\right)^{m+n}$

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139. If $a = x^{m+n}\, y^l,\ b = x^{n+l}\, y^m$ and $c = x^{l+m} y^n,$ prove that

$a^{m-n}\, b^{n-l}\, c^{l-m} = 1$

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140. If $x = a^{m+n}$, $y = a^{n+l}$ and $z = a^{l+m}$, prove that $x^m y^n z^l = x^n y^l z^m$

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141. Write $(625)^{-\frac{1}{4}}$ in decimal form

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142. State the product law of exponents.

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143. State the power law of exponents

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144. For any positive real number x, find the value of $\left(\frac{x^a}{x^b}\right)^{a+b} \times \left(\frac{x^b}{x^c}\right)^{b+c} \times \left(\frac{x^c}{x^a}\right)^{c+a}$

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145. Write the value of $\left\{5(8^{-\frac{1}{2}})^{-\frac{1}{4}}\right\}^2$

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146. For any positive real number x;write the value of $\left\{(x^a)^b\right\}^{\frac{1}{ab}}\left\{(x^b)^c\right\}^{\frac{1}{bc}}\left\{(x^c)^a\right\}^{\frac{1}{ca}}$

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147. If $(x-1)^3 = 8$, what is the value of $(x+1)^2$?

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148. If $2^4 \times 4^2 = 16^x$, then find the value of x ?

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149. If $3^{x-1} = 9$ and $4^{y+2} = 64$, what is the value of $\frac{x}{y}$?

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150. Write the value of $\sqrt[3]{7} \times \sqrt[3]{49}$

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151. Write $\left(\frac{1}{9}\right)^{-\frac{1}{2}} \times (64)^{-\frac{1}{3}}$ as a rational number.

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152. Write the value of $\sqrt[3]{125} \times \sqrt[3]{27}$

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153. The value of $\left\{2-3(2-3)^3\right\}^3$ is

(a)5

(b) 125

(c) $\frac{1}{5}$

(d) -125

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154. Which one is the correct option $(256)^{0.16} \times (256)^{0.09} = ?$

a. 4

b. 16

c. 64

d. 256.25

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155. If $10^{2y} = 25$, then 10^{-y} equals

(a) $-\frac{1}{5}$

(b) $\frac{1}{50}$

(c) $\frac{1}{625}$

(d) $\frac{1}{5}$

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156. The value of $x - y^{x-y}$ when $x = 2$ and $y = -2$ is

(a)18

(b) -18

(c) 14

(d) -14

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157. The product of the square root of x with the cube root of x is (a) cube root of the square root of x (b) sixth root of the fifth power of x (c) fifth root of the sixth power of x (d) sixth root of x

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158. if $9^{x+2} = 240 + 9^{x}$, then $x =$

(a)0.5

(b) 0.2

(c) 0.4

(d) 0.1

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159. The seventh root of x divided by the eighth root of x is

(a)x

(b) $\sqrt{x}$

(c) x^{56}

(d) $x^{\frac{1}{56}}$

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160. The square root of 64 divided by the cube root of 64 is

(a) 64

(b) 2

(c) $\frac{1}{2}$

(d) $64^{\frac{2}{3}}$

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161. Which of the following is (are) not equal to $\left\{\left(\frac{5}{6}\right)^{\frac{1}{5}}\right\}^{-\frac{1}{6}}$?

$(a)\ \left(\frac{5}{6}\right)^{\frac{1}{5}-\frac{1}{6}}$

$(b)\ \frac{1}{\left\{(5)^{\frac{1}{5}}\right\}^{\frac{1}{6}}}$

$(c)\ \left(\frac{6}{5}\right)^{\frac{1}{30}}$

$(d)\ \left(\frac{5}{6}\right)^{-\frac{1}{30}}$

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162. When simplified $\left(x^{-1}+y^{-1}\right)^{-1}$ is equal to

$(a)\ xy$

(b) $x+y$

(c) $\dfrac{xy}{x+y}$

(d) $\dfrac{x+y}{xy}$

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163. If $8^{x+1}=64,$ what is the value of 3^{2x+1} ?

(a)1

(b) 3

(c) 9

(d) 27

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164. If $0 < y < x,$ which statement must be true?

(a) $\sqrt{x} - \sqrt{y} = \sqrt{x - y}$

(b) $\sqrt{x} + \sqrt{x} = \sqrt{2x}$

(c) $x\sqrt{y} = y\sqrt{x}$

(d) $\sqrt{xy} = \sqrt{x}\sqrt{y}$

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165. If x is a positive real number and $x^2 = 2,$ then $x^3 =$

(a) $\sqrt{2}$

(b) $2\sqrt{2}$

(c) $3\sqrt{2}$

(d) 4

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166. If $\left(2^3\right)^2 = 4^x,$ then $3^x =$

(a)3

(b) 6

(c) 9

(d) 27

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167. If $10^x = 64,$ what is the value of $10^{\frac{x}{2}+1}$?

(a) 18

(b) 42

(c) 80

(d) 81

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168. If $\frac{x}{x^{1.5}} = 8x^{-1}$ and $x > 0$, then $x =$

(a) $\frac{\sqrt{2}}{4}$

(b) $2\sqrt{2}$

(c) 4

(d) 64

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169. If $g = t^{\frac{2}{3}} + 4t^{-\frac{1}{2}}$, what is the value of g when $t = 64$?

(a) $\frac{31}{2}$

(b) $\frac{33}{2}$

(c) 16

(d) $\frac{257}{16}$

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170. If $x^{-2} = 64$, then $x^{\frac{1}{3}} + x^0 =$

(a) 2

(b) 3

(c) $\frac{3}{2}$

(d) $\frac{2}{3}$

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171. If $4^x - 4^{x-1} = 24$, then $(2x)^x$ equals

(a) $5\sqrt{5}$

(b) $\sqrt{5}$

(c) $25\sqrt{5}$

(d) 125

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172. When simplified $\left(-\frac{1}{27}\right)^{-\frac{2}{3}}$ is

(a) 9

(b) -9

(c) $\frac{1}{9}$

(d) $-\frac{1}{9}$

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173. Which one of the following is not equal to $\left(\sqrt[3]{8}\right)^{-\frac{1}{2}}$?

(a) $\left(\sqrt[3]{2}\right)^{-\frac{1}{2}}$

(b) $8^{-\frac{1}{6}}$

(c) $\frac{1}{\left(\sqrt[3]{8}\right)^{\frac{1}{8}}}$

(d) $\frac{1}{\sqrt{2}}$

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174. Which one of the following is not equal to $\left(\frac{100}{9}\right)^{-\frac{3}{2}}$?

$(a)\ \left(\frac{9}{100}\right)^{\frac{3}{2}}$ (b) $\frac{1}{\left(\frac{100}{9}\right)^{\frac{3}{2}}}$ $(c)\ \frac{3}{10} \times \frac{3}{10} \times \frac{3}{10}$ (d) $\sqrt{\frac{100}{9} x \frac{100}{9} x \frac{100}{9}}$

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175. When simplified $(256)^{-\left(4^{(-3/2)}\right)}$ is

(a) 8

(b) $\frac{1}{8}$

(c) 2

(d) $\frac{1}{2}$

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176. 5 n+2 −6 xx 5 n+1/13 xx 5 n − 2 *5 n+1 is equal to

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177. If a, b, c are positive real numbers, then $\sqrt{a^{-1}b} \times \sqrt{b^{-1}c} \times \sqrt{c^{-1}a}$ is equal to:

$(a)\ 1$

(b) abc

(c) $\sqrt{abc}$

(d) $\frac{1}{abc}$

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178. If $\frac{3^{2x-8}}{225} = \frac{5^3}{5^x}$, then $x =$

(a) 2

(b) 3

(c) 5

(d) 4

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179. If $\left(\frac{2}{3}\right)^{x}\left(\frac{3}{2}\right)^{2x}=\frac{81}{16},$. then $x=$

(a) 2

(b) 3

(c) 4

(d) 1

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180. If $a,\ b,\ c$ are positive real numbers, then $\sqrt[5]{3125\,a^{10}b^{5}c^{10}}$ is equal to

(a) $5a^2bc^2$

(b) $25ab^2c$

(c) $5a^3bc^3$

(d) $125\ a^2bc^2$

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181. The value of $64^{-\frac{1}{3}}\left(64^{\frac{1}{3}}-64^{\frac{2}{3}}\right)$, is

(a) 1

(b) $\frac{1}{3}$

(c) -3

(d) -2

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182. If $\sqrt{5^n} = 125$, then $5^{\sqrt[n]{64}} =$

(a) 25

(b) $\frac{1}{125}$

(c) 625

(d) $\frac{1}{5}$

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183. If $(16)^{2x+3} = (64)^{x+3}$, then $4^{2x-2} =$

(a) 64

(b) 256

(c) 32

(d) 512

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184. If $a,\ m,\ n$ are positive integers, then $\left\{\sqrt[m]{\sqrt[n]{a}}\right\}^{mn}$ is equal to

(a) a^{mn}

(b) a

(c) $a^{\frac{m}{n}}$

(d) 1

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185. If $2^{-m} \times \frac{1}{2^m} = \frac{1}{4}$, then $\frac{1}{14}\left\{(4^m)^{1/2} + \left(\frac{1}{5^m}\right)^{-1}\right\}$ is equal to

(a) $\frac{1}{2}$

(b) 2

(c) 4

(d) $-\frac{1}{4}$

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186. If $x = 2$ and $y = 4$, then $\left(\frac{x}{y}\right)^{x-y} + \left(\frac{y}{x}\right)^{y-x} =$

(a) 4

(b) 8

(c) 12

(d) 2

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187. The value of m for which $\left[\left\{\left(\frac{1}{7^2}\right)^{-2}\right\}^{\frac{1}{3}}\right]^{\frac{1}{4}} = 7^m$, is

(a) $\frac{1}{3}$

(b) $\frac{1}{4}$

(c) -3

(d) 2

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188. If $\frac{2^{m+n}}{2^{m-n}} = 16$ and $a = 2^{\frac{1}{10}}$ then $\frac{\left(a^{2m+n-p}\right)^2}{\left(a^{m-2n+2p}\right)^{-1}} =$

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189. The value of $\left\{\left(23+2^2\right)^{\frac{2}{3}} + (140-19)^{\frac{1}{2}}\right\}^2$, is

(a) 196

(b) 289

(c) 324

(d) 400

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190. $If\ \sqrt{2^n} = 1024,\ \text{then}\ 3^{2\left(\frac{n}{4}-4\right)} =$

(a)3

(b) 9

(c) 27

(d) 81

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191. If $\frac{3^{5x} \times 81^2 \times 6561}{3^{2x}} = 3^7,\ \text{then}\ x =$

$(a)\ 3$

(b) -3

(c) $\frac{1}{3}$

(d) $-\frac{1}{3}$

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192. State the quotient law of exponents

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193. The value of $\{8^{-\frac{4}{3}} \div 2^{-2})^{\frac{1}{2}}$ is

(a) $\frac{1}{2}$

(b) 2

(c) $\frac{1}{4}$

(d) 4

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