MATHS

BOOKS - PEARSON IIT JEE FOUNDATION

NUMBER SYSTEMS

Example

1. Which of the following are surds ?

(a) $\sqrt{9}$ $(b)\sqrt[3]{13}$ $(c)\sqrt[4]{25}$ $(d)\sqrt[6]{32}$

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2. Identify the following types of surds :

$(a)\sqrt{6}+5\sqrt{3}$ $(b)\sqrt{15}+\sqrt{8}-\sqrt{11}$ $(c)\sqrt{5}$ $(d)5+\sqrt{7}$

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3. Which of the following surds are similar ?

$(a) 2\sqrt{5} \quad (b) 3\sqrt[3]{5} \quad (c) 4\sqrt{5} \quad 5\sqrt[4]{5}$

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4. Express the following surds in their simplest form as multiples of smaller surds :

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5. Arrange the following in ascending or descending order of magnitude:

$\sqrt[6]{6}\sqrt[3]{7}, \sqrt{5}$

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6. Simplify the following by combining similar surds :

$(a) 2\sqrt{5} + 5\sqrt{5} \quad (b) 3\sqrt{6} + \sqrt{216}$

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7. (a) $\sqrt{15} \times \sqrt{35}$.

(b) $2\sqrt{3} \div 3\sqrt{27}$.

(c) Muliple $\sqrt[3]{3}$ by $\sqrt[4]{2}$.

(d) Divide $\sqrt[6]{5}$ by $\sqrt[3]{10}$.

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8. Find the simplest RF of :

(a) $\sqrt[4]{216}$ and $(b) \sqrt[5]{16}$

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9. Express the following surds with rational denominators

$(a)\frac{2}{\sqrt{14}}(b)\frac{2.3^{\frac{1}{3}}}{25^{\frac{1}{3}}}$

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10. Given that $\sqrt{2}=1.414$ then find the value of $\frac{3}{\sqrt{2}}$ upto three decimal places.

A. 2.121

B. 2.122

C. 2.123

D. 2.124

Answer: A

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11. Rationalize the denominator of $\frac{2+\sqrt{5}}{2-\sqrt{5}}$

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12. Given $\sqrt{2}=1.414, \sqrt{3}=1.732, \sqrt{5}=2.236, \sqrt{6}=2.449$ and $\sqrt{10}=3.162$ Then find the value of $\frac{\sqrt{2}-1}{\sqrt{3}-\sqrt{5}}$ upto three decimal places

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13. Write the conjugate of :

(a) $\sqrt{3}+\sqrt{5}$

(b) $5+\sqrt[3]{7}$

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14. (a) Find the RF of $2^{\frac{1}{3}} + 2^{-\frac{1}{3}}$ (b) Find the RF of $5^{\frac{1}{3}} - 5^{-\frac{1}{3}}$

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15. Among $\sqrt{7} - \sqrt{3}$ and $\sqrt{11} - \sqrt{7}$ which is greater?

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16. Compare the surds $A = \sqrt{8} + \sqrt{7}$ and $B = \sqrt{10} + \sqrt{5}$

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17. Rationalize the numerator of $\frac{2 - \sqrt{3 + x}}{x - 1}$

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18. Express $E = \dfrac{1}{\sqrt{5}+\sqrt{3}-\sqrt{8}}$ with rational denominator

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19. If both a and b are rational numbers then find the value of a and b in each of the following (a) $\dfrac{3+\sqrt{5}}{3-\sqrt{5}} = a + b\sqrt{5}$ (b) $\dfrac{3+2\sqrt{3}}{5-2\sqrt{3}} = a + b\sqrt{3}$

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20. Find the square root of $7 + 4\sqrt{3}$.

(b) Find the square root of $10 + \sqrt{24} + \sqrt{60} + \sqrt{40}$

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21. If $x = 2 + 2^{\frac{2}{3}} + 2^{\frac{1}{3}}$, then the value of $x^3 - 6x^2 + 6x$ is:

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Very Short Answer Type Questions

1. $\sqrt{5} \times \sqrt{125}$=_____

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2. $\frac{\sqrt{20}}{\sqrt{320}} =$ _____

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3. $\sqrt[3]{6} \times \sqrt[3]{6} \times \sqrt[3]{6}$ =_____

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4. $\sqrt{3} \div 4\sqrt{12} =$ _____

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5. The sum/difference of a rational and an irrational number is _____ .

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6. $\frac{\sqrt{7}}{3\sqrt{3}}$, in rational denominator is _____ .

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7. Two mixed quadratic surds, $a + \sqrt{b}$ and $a - \sqrt{b}$, whose sum and product are rational , are called _____ surds.

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8. $10\sqrt{3}$ and $11\sqrt{3}$ are _____ surds (similar/dissimilar)

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9. $x + \sqrt{y}$ is a pure surd, if x=_____ (zero/one)

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10. Conjugate surd of $\sqrt{5} - 3$ is. .

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11. If $x + \sqrt{5} = 4 + \sqrt{y}$, then $x + y$=____(where x and y are rational)

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12. If the product of two surds is a rational number,then each of the two is a _____ of the other

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13. If $\sqrt{6}-\sqrt{7}$ the conjugate of $\sqrt{6}+\sqrt{7}$

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14. Express the surd $\frac{3}{\sqrt{11}}$ with rational denominator .

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15. Find the smallest rationalizing factor is $\sqrt{28}$.

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16. Multiply : $\sqrt[3]{5}$ by $\sqrt[4]{2}$.

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17. Which is greater , $\sqrt{2}$ or $\sqrt[3]{3}$?

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18. Express the surd $2\sqrt{3}$ as a pure surd.

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19. Multiply : $\sqrt{14}$ by $\sqrt{8}$

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20. $\left(\sqrt[3]{3}\right)^4$ =_____ .

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21. Rationalizing factor of $5^{1/3} + 5^{-1/3}$ is _____.

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22. Express the following in the simplest form: $\frac{\sqrt[3]{81}}{\sqrt[3]{3}}$

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23. Express the following in the simplest form: $\sqrt[3]{625}$

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24. Express the following as a pure surd :

$\frac{2}{3}\sqrt[3]{16}$

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25. $\sqrt[3]{3+\sqrt{2}}$ is a surd . (True/False)

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26. Express the surd $\frac{\sqrt[3]{5}}{\sqrt[3]{6}}$ with rational denominator.

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27. If $p=2+\sqrt{3}$ and pq is a rational number, then q is a unique surd. (True/false)

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28. Divide : $\sqrt[6]{144}$ by $\sqrt[6]{4}$.

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29. Express the following in the simplest form :

$\sqrt[3]{\sqrt{15625}}$

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30. Which is smaller , $\sqrt{2}-1$ or $\sqrt{3}-\sqrt{2}$?

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Short Answer Type Questions

1. find $\sqrt{7+\sqrt{48}}$=_____

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2. Find the positive square root of $6-\sqrt{20}$.

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3. Express the following in the simplest form :

$\sqrt[4]{\sqrt[5]{1048576}}$

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4. Simplify : $2\sqrt{2}-3\sqrt{32}+2\sqrt{48}$

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5. If $x = c\sqrt{d} + 4$, find $x + \frac{1}{x}$.

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6. Arrange the following surds in an ascending order of magnitude:

$\sqrt[3]{9}, \sqrt[9]{5}, \sqrt[3]{7}$

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7. If $x = \frac{2-\sqrt{3}}{2+\sqrt{3}}$, find the value of $x + \frac{1}{x}$.

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8. Which of the two expressions , $\sqrt{11} - \sqrt{10}$ and $\sqrt{12} - \sqrt{11}$ is greater?

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9. Simplify the following : $\frac{5\sqrt{5}}{\sqrt{11}+\sqrt{6}}-\frac{3\sqrt{3}}{\sqrt{6}+\sqrt{3}}-\frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$

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10. Arrange the following surds in an ascending order of magnitude

:

$\sqrt[3]{4}, \sqrt[4]{5}, \sqrt{8}$

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11. Find the positive square root of the following :

$10+2\sqrt{6}+\sqrt{60}+2\sqrt{10}$

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12. If $x = \frac{11}{4 - \sqrt{5}}$, find the value of $x^2 - 8x + 11$.

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13. If both a and b are rational numbers, find the val-ues of a and b in the following equation: $\frac{2 + 3\sqrt{5}}{4 + 5\sqrt{5}} = a + b\sqrt{5}$

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14. Given $\sqrt{2} = 1.414, \sqrt{3} = 1.732, \sqrt{5} = 2.236$, find the value, correct to three decimals of the following

$$\frac{1 - \sqrt{3}}{\sqrt{5} - \sqrt{2}}$$

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15. If $x = 3\sqrt{3} + \sqrt{26}$, find the value $\frac{1}{2}\left(x + \frac{1}{2}\right)$.

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Essay Type Questions

1. If $x = \frac{1}{7 + 4\sqrt{3}}, y = \frac{1}{7 - 4\sqrt{3}}$, find the value of $5x^2 - 7xy - 5y^2$

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2. Rationalize the denominator of the following: $\frac{1}{3 + \sqrt{2} - 3\sqrt{3}}$

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3. Rationalize the denominator of the following :

$$\frac{\sqrt{2}-3\sqrt{5}}{3\sqrt{7}+5\sqrt{3}}$$

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4. Given $\sqrt{3}=1.7321$, find the value of the following surd, correct to three decimal places.

$$\frac{\sqrt{3}+1}{\sqrt{3}-1}+\frac{\sqrt{3}-1}{\sqrt{3}+1}+\frac{4+\sqrt{3}}{4-\sqrt{3}}$$

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Concept Application Level 1

1. Which of the following fractions lie between $\frac{1}{5}$ and $\frac{1}{4}$

$A\frac{7}{33}, B\frac{4}{11}, C\frac{13}{57}, D\frac{7}{17}$

A. A and B

B. A and C

C. B,C and D

D. A,B and D

Answer: B

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2. Express $0.\overline{34} + 0.3\bar{4}$ as a single decimal.

A. $0.67\overline{88}$

B. $0.6\overline{89}$

C. $0.68\overline{78}$

D. $0.6\overline{87}$

Answer: D

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

A. 25

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

C. 625

D. $\frac{1}{25}$

Answer: A

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4. if $x^4 + 1 = 1297$ and $y^4 - 1 = 2400$,then $y^2 - x^2 =$

A. 10

B. 25

C. 13

D. 43

Answer: C

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5. What is the value of 4^{2x-2}, if $(16)^{2x+3} = (64)^{x+3}$?

A. 64

B. 256

C. 32

D. 512

Answer: B

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6. Which of the following pairs is having two equal values ? (where $x \in R$) _____.

A. $9^{x/2}, 27^{x/3}$

B. $(256)^{4/x}, \left(4^3\right)^{4/x}$

C. $(343)^{x/3}, \left(7^4\right)^{x/12}$

D. $\left(36^2\right)^{2/7}, \left(6^3\right)^{2/7}$

Answer: A

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7. The expression $\left(\sqrt{5}-\sqrt{3}\right)\left(\sqrt{7}-\sqrt{2}\right)$ when simplified becomes a

A. simple surd

B. mixed surd

C. compound surd

D. binomial surd

Answer: C

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8. If m and n are positive integers, then for a positive number a, $\left\{\sqrt[m]{\left(\sqrt[n]{a}\right)}\right\}^{mn}$ =_____

A. a^{mn}

B. a

C. $a^{m/n}$

D. 1

Answer: B

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9. If $2^{-m} \times \frac{1}{2^m} = \frac{1}{4}$ then $\frac{1}{14}\left[(4^m)^{1/2} + \left(\frac{1}{5^m}\right)^{-1}\right]$=_____

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

B. 2

C. 4

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

Answer: A

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10. The surds $\sqrt{2}$, $(3)^{\frac{1}{3}}$ and $(5)^{\frac{1}{5}}$, in their descending order are

A. $\sqrt[3]{3}, \sqrt[5]{5}, \sqrt{2}$

B. $\sqrt{3}, \sqrt[3]{3}, \sqrt[5]{5}$

C. $\sqrt{2}, \sqrt[5]{5}, \sqrt[3]{3}$

D. $\sqrt[3]{3}, \sqrt{2}, \sqrt[5]{5}$

Answer: D

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11. $2\left[(16-15)^{-1}+25(13-8)^{-2}\right]^{-1}+(1024)^{0}=$ _____.

A. 2

B. 3

C. 1

D. 5

Answer: A

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12. 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

Answer: B

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13. In which of the following pairs of surds are the given two surds similar /

A. $\sqrt{5}, 7\sqrt{5}$

B. $\sqrt[3]{7}, \sqrt[2]{7}$

C. $\sqrt{7}, \sqrt{28}$

D. Both (a) and (c)

Answer: D

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14. Which of the following is the greatest ?

A. 7^2

B. $(49)^{3/2}$

C. $\left(\frac{1}{343}\right)^{-1/3}$

D. $(2401)^{-1/4}$

Answer: B

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15. $\left(\sqrt[6]{5}\right)\left(\sqrt[3]{2}\right)\left(\sqrt{3}\right)\left(\sqrt[12]{6}\right)$=

A. $\sqrt[12]{1749600}$

B. $\sqrt[3]{2} \times \sqrt[12]{109350}$

C. $\sqrt[12]{177960}$

D. Both (a) and (b)

Answer: D

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16. If $p = 3$ and $q = 2$, then $(3p - 4q)^{q-p} \div (4p - 3q)^{2q-p}$ =_____

A. 1

B. 6

C. $\frac{1}{6}$

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

Answer: C

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17. $\left[\frac{(32)^{0.2}+(81)^{0.25}}{(256)^{0.5}-(121)^{0.5}}\right] =$ _____

A. 2

B. 5

C. 1

D. 11

Answer: C

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18. Which of the following surd is the smallest ?

$\sqrt{10}-\sqrt{5}, \sqrt{19}-\sqrt{14}, \sqrt{22}-\sqrt{17}$ and $\sqrt{8}-\sqrt{3}$

A. $\sqrt{10}-\sqrt{5}$

B. $\sqrt{19}-\sqrt{14}$

C. $\sqrt{22}-\sqrt{17}$

D. $\sqrt{8}-\sqrt{3}$

Answer: C

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19. If $\sqrt{m}-\sqrt{a}+\sqrt{c}$ and $\sqrt{m}, \sqrt{a},$ and $\sqrt{c}$ are three surds, their

A. $\sqrt{m}$ is dissimilar to $\sqrt{a}+\sqrt{c}$

B. $\sqrt{a}$ and $\sqrt{C}$ are similar to $\sqrt{m}$

C. only $\sqrt{a}$ is similar to $\sqrt{m}$

D. None of these

Answer: C

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20. The surd obtained after rationalizing the numberator of $\frac{4-\sqrt{25-a}}{a-9}$ is equal to

A. $\frac{a-9}{4-\sqrt{25-a}}$

B. $\frac{1}{4-\sqrt{25-a}}$

C. $\frac{1}{(a-9)\left(4+\sqrt{25-a}\right)}$

D. $\frac{1}{4+\sqrt{25-a}}$

Answer: B

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21. If $\sqrt{13 - x\sqrt{10}} = \sqrt{8} + \sqrt{5}$, then what is the value of x ?

A. -5

B. -6

C. -4

D. -2

Answer: C

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22. If the surds $\sqrt[4]{4}, \sqrt[6]{5}, \sqrt[8]{6}$ and $\sqrt[12]{8}$ are arranged in ascending order from left to right, then the third surd from the left is

A. $\sqrt[12]{8}$

B. $\sqrt[4]{4}$

C. $\sqrt[8]{6}$

D. $\sqrt[6]{5}$

Answer: D

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23. $\sqrt{11\sqrt{11\sqrt{11\ldots\ldots\ldots .4terms}}}$

A. $\sqrt[16]{11^5}$

B. $\sqrt[16]{11}$

C. $\sqrt[16]{11^{14}}$

D. $\sqrt[16]{11^{15}}$

Answer: D

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24. If $\frac{5-\sqrt{3}}{2+\sqrt{3}} = x + y\sqrt{3}$, then (x,y) is

A. $(13, -7)$

B. $(-13, 7)$

C. $(-13, -7)$

D. $(13, 7)$

Answer: A

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25. The simplified form of $\sqrt{125} + \sqrt{125} - \sqrt{845}$ is

A. $\sqrt{15}$

B. $2\sqrt{5}$

C. $-\sqrt{5}$

D. $-2\sqrt{5}$

Answer: C

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26. Which of the following statements is true ?

(I).If x is a conjugate surd of y, then x can be a RF of y.

(II).If x is RF of y, then x need not be the conjugate of y.

A. Only I

B. Only II

C. Both I and II

D. Neither I nor II

Answer: C

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27. If $\frac{3-2\sqrt{5}}{6-\sqrt{5}} = a + b\sqrt{c}$ where a and b are rational numbers, then what are the values of a and b ?

A. $\frac{8}{35}, \frac{-9}{35}$

B. $\frac{8}{31}, \frac{-9}{31}$

C. $\frac{-8}{31}, \frac{9}{31}$

D. $\frac{-8}{35}, \frac{9}{35}$

Answer: B

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28. If $\frac{3^{5x} \times (81)^2 \times 6561}{3^{2x}} = 3^7$, then x =_____

A. 3

B. -3

C. $\frac{1}{3}$

D. $\frac{-1}{3}$

Answer: B

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

A. 3

B. -3

C. 27

D. 81

Answer: B

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30. If $\left[\left\{\left(\frac{1}{7^2}\right)^{-2}\right\}^{-1/3}\right]^{1/4} = 7^m$, then m= _____.

A. $\frac{-1}{3}$

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

C. -3

D. 2

Answer: A

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Level 2

1. $\left[\left\{\left(\frac{1}{x^{a^2-b^2}}\right)^{\frac{1}{a-b}}\right\}^{a+b}\right]^{\frac{1}{(a+b)^2}} =$ _ _ _ _ _

A. x^2

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

C. 7^3

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

Answer: B

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

A. 2

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

C. 9

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

Answer: A

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3. Simplify

$$\left[\left(p^{-1}+q^{-1}\right)\left(p^{-1}-q^{-1}\right)\div\left(\frac{1}{p^{-1}}-\frac{1}{q^{-1}}\right)\left(\frac{1}{p^{-1}}+\frac{1}{q^{-1}}\right)\right](pq)^2$$

A. $(pq)^2$

B. -1

C. $-(pq)^{-2}$

D. 1

Answer: B

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4. If $x - \frac{2}{\sqrt{10} - \sqrt{8}}, y - \frac{2}{\sqrt{10} + 2\sqrt{2}}$, then $(x - y)^2$=

A. $4\sqrt{2}$

B. 32

C. $8\sqrt{2}$

D. 64

Answer: B

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5. If $a = \sqrt{6} - \sqrt{3}, b = \sqrt{3} - \sqrt{2}$ and $c = \sqrt{2} - \sqrt{6}$, then find the value of $a^3 + b^3 + c^3 - 2abc$.

A. $3\sqrt{2} - 5\sqrt{3} - \sqrt{6}$

B. $3\sqrt{2} - 5\sqrt{3} - \sqrt{6}$

C. $3\sqrt{2}-4\sqrt{3}+\sqrt{6}$

D. $3\sqrt{2}+4\sqrt{3}+\sqrt{6}$

Answer: C

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6. $\sqrt{\frac{81}{64}\sqrt{\frac{81}{64}\sqrt{\frac{81}{61}\sqrt{\frac{81}{64}}}}\ldots\infty}=$

A. $\frac{81}{64}$

B. $\frac{9}{8}$

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

D. $\frac{3}{2\sqrt{2}}$

Answer: A

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7. If $a^p = b^q = c^r = abc$, then pqr=_____.

A. $p^2q + q^2r$

B. $pq + qr + pr$

C. $(pq + qr + rp)^2$

D. $pq(qr + rp)$

Answer: B

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8. 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

Answer: D

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9. If $x = \sqrt{6} + \sqrt{5}$ then $x^2 + \frac{1}{x^2} - 2 =$

A. $2\sqrt{6}$

B. $2\sqrt{5}$

C. 24

D. 20

Answer: D

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10. $\sqrt{6+\sqrt{6+\sqrt{6+\ldots\infty}}}$ is equal to _____.

A. -3

B. 3

C. 6

D. 2

Answer: B

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11. Simplify

$$\frac{1}{\sqrt{19}-\sqrt{360}}-\frac{1}{\sqrt{20}+\sqrt{396}}=$$ _____

A. 1

B. 2

C. 0

D. None of these

Answer: C

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12. If $a = \sqrt{17} - \sqrt{16}$ and $b = \sqrt{16} - \sqrt{15}$ then

A. $a < b$

B. $a > b$

C. $a = b$

D. None of these

Answer: A

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13. $\left(\sqrt[6]{15-2\sqrt{56}}\right)\cdot\left(\sqrt[3]{\sqrt{7}+2\sqrt{2}}\right)$=_____.

A. 0

B. 1

C. -1

D. 2

Answer: B

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14. $\sqrt{\sqrt{63}+\sqrt{56}}=$

A. $\sqrt[4]{7}\left(\sqrt{3}+\sqrt{5}\right)$

B. $\sqrt[4]{7}\left(\sqrt{3}+1\right)$

C. $\sqrt[4]{7}\left(\sqrt{3}+\sqrt{5}\right)$

D. $\sqrt[4]{7}(\sqrt{2}+1)$

Answer: D

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15. If $\frac{\sqrt{7}+2\sqrt{3}}{2\sqrt{7}-\sqrt{5}} = \frac{c+\sqrt{p}+\sqrt{q}+\sqrt{r}}{23}(p<q<r)$, where p,q,are rational numbers, then $q+r-p$=

A. 361

B. 302

C. 418

D. 426

Answer: A

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16. The following are the steps involved in finding the value of x-y from $\frac{\sqrt{8}-\sqrt{5}}{\sqrt{8}+\sqrt{5}} = x - y\sqrt{40}$. Arrange them in sequential order. (A) $\frac{13-2\sqrt{40}}{8-5} = x - y\sqrt{40}$

(B) $\frac{\left(\sqrt{8}\right)^2 + \left(\sqrt{5}\right)^2 - 2\left(\sqrt{8}\right)\left(\sqrt{5}\right)}{\left(\sqrt{8}\right)^2 - \left(\sqrt{5}\right)^2} = x - y\sqrt{40}$

(C) $x - y = \frac{11}{3}$

(D) $x = \frac{13}{3}$ and $y = \frac{2}{3}$

(E) $\frac{\left(\sqrt{8}-\sqrt{5}\right)\left(\sqrt{8}-\sqrt{5}\right)}{\left(\sqrt{8}+\sqrt{5}\right)\left(\sqrt{8}-\sqrt{5}\right)} = x - y\sqrt{40}$

A. EABDC

B. EBADC

C. ABDEC

D. DEBAC

Answer: B

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17. The following are the steps involved in finding the least amont $\sqrt{3}, \sqrt[3]{4}$ and $\sqrt[6]{15}$. Arrange them in sequential order.

(A) $\therefore \sqrt[6]{15}$ is the smallest

(B) $\therefore 3^{1/2} = 3^{3/6}, 4^{1/3} = 4^{2/6}, 15^{1/6} = 15^{1/6}$

(C)The LCM fo the denominators of the exponents is 6

(D) $\sqrt{3} = 3^{1/2}, \sqrt[3]{4} = 4^{1/3}, \sqrt[6]{15} = 15^{1/6}$

(E) $\therefore \sqrt{3} = \sqrt[6]{27}, \sqrt[3]{4} = \sqrt[6]{16}\sqrt[6]{15} = \sqrt[6]{15}$

A. DCABE

B. DABEB

C. DCBEA

D. DBCAE

Answer: C

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18. If $y = 3 - \sqrt{8}$, then $\left(y - \frac{1}{y}\right)^2$ =_____.

A. 9

B. 81

C. 4

D. 32

Answer: D

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19. The following are the steps involved in finding the value of $a + b$ from $\frac{2+\sqrt{3}}{2-\sqrt{3}} = a + b\sqrt{3}$. Arrange them in sequential order.

(A) $\frac{2^2 + \left(\sqrt{3}\right)^2 + 2 \times 2 \times \sqrt{3}}{2^2 - \left(\sqrt{3}\right)^2} = a + b\sqrt{3}$

(B) $a + b = 7 + 4 = 11$

(C) $\frac{\left(2+\sqrt{3}\right)\left(2+\sqrt{3}\right)}{\left(2-\sqrt{3}\right)\left(2+\sqrt{3}\right)} = a + b\sqrt{3}$

(D) $\frac{7+4\sqrt{3}}{4-3} = a + b\sqrt{3}$

(E) $a = 7$ and $b = 4$

A. CDAEB

B. CAEBD

C. CADEB

D. CEDAB

Answer: C

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20. The following are the steps involved in finding the greatest among $\sqrt[3]{2}$, $\sqrt[6]{3}$ and $\sqrt{6}$. Arrange them in sequential order.

(A) The LCM of the denominators of the exponents is 6.

(B) $\therefore \sqrt[6]{216}$ i.e., $\sqrt{6}$ is greatest.

(C) $\sqrt[3]{2} = 2^{1/3}, \sqrt[6]{3} = 3^{1/6}, \sqrt{6} = 6^{1/2}$

(D) $2^{1/3} = 2^{2/6}, 3^{1/6}, 6^{1/2} = 6^{3/6}$

(E) $\sqrt[3]{2} = \sqrt[6]{4}, \sqrt[6]{3} = \sqrt[6]{3}, \sqrt{6} = \sqrt[6]{216}$

A. CADEB

B. CDABE

C. DCAEB

D. DACBE

Answer: A

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21. If $x = \frac{1}{\sqrt{3}+2}$, then $\left(x + \frac{1}{x}\right)^2$ =_____

A. 16

B. 3

C. 12

D. 6

Answer: A

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22. If $\sqrt[x]{3} \times \sqrt[y]{5} = 10125$, then $12xy$ =_____.

A. 1

B. $\frac{1}{3}$

C. 2

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

Answer: A

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23. If $x = \frac{1}{5 + 2\sqrt{6}}$, then $x^2 - 10x + 1 =$ _____.

A. 1

B. -1

C. 1

D. 10

Answer: C

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24. If $x = \frac{2}{\sqrt{3} - \sqrt{5}}$ and $y = \frac{2}{\sqrt{3} + \sqrt{5}}$, then $x + y =$ _____ .

A. 3

B. $4\sqrt{3}$

C. $-2\sqrt{3}$

D. 6

Answer: C

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25. $\frac{3}{7}$ lies between the fractions _____.

A. $\frac{4}{9}, \frac{5}{9}$

B. $\frac{43}{99}, \frac{4}{9}$

C. $\frac{42}{99}, \frac{4}{9}$

D. $\frac{41}{99}, \frac{42}{99}$

Answer: C

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Level 3

1. If $\sum_{k=4}^{143} \frac{1}{\sqrt{k}+\sqrt{k+1}} = a - \sqrt{b}$ then a and b respectively are

A. 10 and 0

B. -10 and 4

C. 10 and 4

D. -10 and 0

Answer: A

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2. The surd $\frac{12}{3+\sqrt{5}+2\sqrt{2}}$, after rationalizing th denominator becomes

A. $\sqrt{5}-\sqrt{2}+\sqrt{10}+1$

B. $\sqrt{5}+\sqrt{10}+\sqrt{2}+1$

C. $\sqrt{10}+\sqrt{2}+\sqrt{5}+1$

D. $\sqrt{5}-\sqrt{10}-\sqrt{2}-1$

Answer: B

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3. $A^{\frac{1}{A}}=B^{\frac{1}{B}}=C^{\frac{1}{C}}, A^{BC}+B^{AC}+C^{AB}=729$ Which of the following equals $A^{\frac{1}{A}}$.

A. $\sqrt[ABC]{81}$

B. $\sqrt{2}$

C. $\sqrt[ABC]{27}$

D. $\sqrt[ABC]{9}$

Answer: B

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4. If $x = \frac{1}{2 - \sqrt{3}}$, the value of $x^3 - 2x^2 - 7x + 10$ is equal to

A. $2 + \sqrt{3}$

B. 10

C. $7 + 2\sqrt{3}$

D. 8

Answer: D

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5. If $x = 1 + 5^{\frac{1}{3}} + 5^{\frac{2}{3}}$ then find the value of $x^3 - 3x^2 - 12x + 6$.

A. 22

B. 20

C. 16

D. 14

Answer: A

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6. $\frac{4}{\sqrt{10-2\sqrt{21}}}$=_____.

A. $\frac{1}{4}\left(\sqrt{7}+\sqrt{3}\right)$

B. $\frac{1}{4}\left(\sqrt{7}-\sqrt{3}\right)$

C. $\sqrt{7}+\sqrt{3}$

D. $\sqrt{7}+\sqrt{3}$

Answer: C

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7. If $y = 3^{\frac{1}{3}} + 3$,then $y^3 - 9y^2 + 27y =$ ____

A. 27

B. -27

C. -30

D. 30

Answer: D

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8. $\frac{1}{\sqrt{8+2+\sqrt{15}}} =$ _____.

A. $\frac{1}{2}(\sqrt{5}+\sqrt{3})$

B. $\frac{1}{2}(\sqrt{5}-\sqrt{3})$

C. $\frac{1}{2}(\sqrt{5}+1)$

D. $\frac{1}{2}(\sqrt{5}-1)$

Answer: B

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9. If $x = 2^{1/3} - 2$, then $x^3 + 6x^2 + 12x$=_____

A. 6

B. -6

C. 8

D. -8

Answer: B

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10. $\frac{3}{\sqrt{19-2\sqrt{88}}}-\frac{8}{\sqrt{14+2\sqrt{33}}}=$ _____.

A. $\sqrt{19+2\sqrt{33}}$

B. $\sqrt{14-2\sqrt{88}}$

C. $\sqrt{11+2\sqrt{24}}$

D. $\sqrt{11-2\sqrt{55}}$

Answer: C

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11. $\sqrt{\sqrt[x]{2^x}\sqrt[x^2]{3^{x^3}}\sqrt[x^2]{6^{x^6}}\sqrt[x^4]{9^{x^{10}}}}=$

A. 18

B. 54

C. 24

D. 36

Answer: A

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12. $\sqrt{7+2\sqrt{6}}+\sqrt{7-2\sqrt{6}}$=_____.

A. 14

B. $\sqrt{6}$

C. $2\sqrt{6}$

D. 7

Answer: C

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13. $\sqrt{3^2\sqrt{9^2\sqrt{(81)^2\sqrt{16}^{16}}}}$=_____.

A. 6×2^4

B. $3^3 \times 2$

C. $6^3 \times 2^3$

D. $6^3 \times 2$

Answer: D

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14. $\left(\sqrt[6]{15-2\sqrt{56}}\right) \cdot \left(\sqrt[3]{\sqrt{7}+2\sqrt{2}}\right)$=_____.

A. 0

B. $\sqrt{2}$

C. 1

D. $\sqrt[6]{2}$

Answer: C

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15. If p=$7-4\sqrt{3}$, then $\frac{p^2+1}{7p}$=_____.

A. 2

B. 1

C. 7

D. $\sqrt{3}$

Answer: A

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