MATHS

BOOKS - S CHAND IIT JEE FOUNDATION

SURDS

Solved Examples

1. Which among the following numbers is the greatest?

A. $\sqrt[6]{16}$

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

C. $\sqrt[4]{5}$

D. $\sqrt{2}$

Answer: $\sqrt[3]{4}$

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2. If $x = \dfrac{\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}}$ and $y = \dfrac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}}$ then $(x + y)$ equals

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3. By how much does $\sqrt{12} + \sqrt{18}$ exceed $\sqrt{3} + \sqrt{2}$?

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4. $\dfrac{\sqrt{5}}{\sqrt{3} + \sqrt{2}} - \dfrac{3\sqrt{3}}{\sqrt{5} + \sqrt{2}} + \dfrac{2\sqrt{2}}{\sqrt{5} + \sqrt{3}}$ is equal to :

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5. If $A = 5 + 2\sqrt{6},$ find the value of $\sqrt{A} + \dfrac{1}{\sqrt{A}}$

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6. Find the value of $\sqrt{6 + \sqrt{6 + \sqrt{6 + \ldots}}}$

7. $\sqrt{-\sqrt{3} + \sqrt{3 + 8\sqrt{7 + 4\sqrt{3}}}} =$

8. Choose the correct answer. The number of $\sqrt{14 + 6\sqrt{5}} + \sqrt{14 - 6\sqrt{5}}$

A. is not a rational number

B. is a rational number ≥ 14

C. simplifies to 5

D. simplifies to 6. (Take positive root only)

Answer:

9. The simplest form of $\dfrac{\sqrt{8 + \sqrt{28}} - \sqrt{8 - \sqrt{28}}}{\sqrt{8 + \sqrt{28}} + \sqrt{8 - \sqrt{28}}}$

10. Prove that:

$$\frac{1}{3 - \sqrt{8}} - \frac{1}{\sqrt{8} - \sqrt{7}} + \frac{1}{\sqrt{7} - \sqrt{6}} - \frac{1}{\sqrt{6} - \sqrt{5}} + \frac{1}{\sqrt{5} - 2} = 5$$

Question Bank 6

1. The greatest number among

$\sqrt[3]{2},\ \sqrt{3},\ \sqrt[3]{5}\ $ and $\ 1.5$ is :

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

   B. $\sqrt{3}$

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

D. 1.5

Answer: B

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2. Arrange $\sqrt[4]{3}$, $\sqrt[6]{10}$, $\sqrt[12]{25}$ in descending order.

A. $\sqrt[4]{3}$, $\sqrt[6]{10}$, $\sqrt[12]{25}$

B. $\sqrt[6]{10}$, $\sqrt[4]{3}$, $\sqrt[12]{25}$

C. $\sqrt[6]{10}$, $\sqrt[12]{25}$, $\sqrt[4]{3}$

D. $\sqrt[4]{3}$, $\sqrt[12]{25}$, $\sqrt[6]{10}$

Answer: B

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3. $\dfrac{\sqrt{2}\left(2+\sqrt{3}\right)}{\sqrt{3}\left(\sqrt{3}+1\right)} - \dfrac{\sqrt{2}\left(2-\sqrt{3}\right)}{\sqrt{3}\left(\sqrt{3}-1\right)}$

A. $\dfrac{1}{3}$

B. $\dfrac{2}{3}$

C. $\dfrac{\sqrt{2}}{3}$

D. $3\sqrt{2}$

Answer: A

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4. $1 - \left[\dfrac{1+\sqrt{3}}{2} - \dfrac{1}{\sqrt{3}-1}\right]$ is

A. $\sqrt{3}$

B. 1

C. $2\sqrt{3}$

D. 0

Answer: D

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5. The simplified form of $\dfrac{2}{\sqrt{7}+\sqrt{5}} + \dfrac{7}{\sqrt{12}-\sqrt{5}} - \dfrac{5}{\sqrt{12}-\sqrt{7}}$ is

A. 5

B. 2

C. 1

D. 0

Answer: D

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6. Given that: $\sqrt{3} = 1.732$, $\dfrac{\sqrt{6}+\sqrt{2}}{\sqrt{6}-\sqrt{2}}$ is equal to:

A. 3.713

B. 3.721

C. 3.732

D. 3.752

Answer: C

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7. If $x = 8 + 2\sqrt{15}$, then the value of $\sqrt{x} + \dfrac{1}{\sqrt{x}}$ is:

A. $2\sqrt{3}$

B. $2\sqrt{5}$

C. $\dfrac{3}{2}\sqrt{5} + \dfrac{\sqrt{3}}{2}$

D. $\dfrac{\sqrt{5}}{2} + \dfrac{3}{2}\sqrt{3}$

Answer: C

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8. $1 + \dfrac{4\sqrt{3}}{2 - \sqrt{2}} - \dfrac{30}{4\sqrt{3} - \sqrt{18}} - \dfrac{\sqrt{18}}{3 + 2\sqrt{3}}$ is simplified to:

A. 0

B. 1

C. $\sqrt{2}$

D. $\sqrt{3}$

Answer: B

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9. Given that: $\sqrt{3} = 1.732$, then $\left(\sqrt{147} - \dfrac{1}{4}\sqrt{48} - \sqrt{75} \right)$ is equal to:

A. 5.196

B. 3.464

C. 1.732

D. 0.866

Answer: C

10. If $\sqrt{6} = 2.55$, then the value of $\sqrt{\dfrac{2}{3}} + \sqrt{\dfrac{3}{2}}$ is:

A. 4.48

B. 4.49

C. 4.5

D. 2.06

Answer: D

11. The value of $\sqrt{5\sqrt{5\sqrt{5\ldots}}}$ is

A. 1

B. 2.5

C. 5

D. 25

Answer: C

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12. The value of

$$\frac{1}{\sqrt{3.25} + \sqrt{2.25}} + \frac{1}{\sqrt{4.25} + \sqrt{3.25}} + \frac{1}{\sqrt{5.25} + \sqrt{4.25}} + \frac{1}{\sqrt{6.25} + \sqrt{5.25}}$$

is:

A. 1

B. 1.25

C. 1.5

D. 2.25

Answer: A

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13. If $\sqrt{2} = 1.414$, the square root of $\dfrac{\sqrt{2}-1}{\sqrt{2}+1}$ is nearest to (a) 0.172 (b) 0.414 (c) 0.586 (d) 1.414

A. 0.172

B. 0.414

C. 0.586

D. 1.414

Answer: B

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14. The value of $\dfrac{1}{\sqrt{12-\sqrt{140}}} - \dfrac{1}{\sqrt{8-\sqrt{60}}} - \dfrac{2}{\sqrt{10+\sqrt{84}}}$ is 0 b. 1 c. 2 d. 3

A. 0

B. 1

C. 2

D. 3

Answer: A

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15. $\sqrt{2 + \sqrt{2 + \sqrt{2 + .}}}$ is equal to (a) 1 (b) 1.5 (c) 2 (d) 2.5

A. 1

B. 2

C. 1.5

D. 2.5

Answer: B

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16. The value of $\sqrt{32} - \sqrt{128} + \sqrt{50}$ correct to 3 places of decimals is :

A. 1.732

B. 1.141

C. 1.414

D. 1.441

Answer: C

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17. The value of

$$\sqrt{(\sqrt{12} - \sqrt{8}) \frac{\sqrt{3} + \sqrt{2}}{5 + \sqrt{24}}}$$ is

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

B. $\sqrt{6} + \sqrt{2}$

C. $\sqrt{6} - 2$

D. $2 - \sqrt{6}$

Answer: C

18. What is the sum of the square of the following numbers?

$$\frac{\sqrt{3}}{\sqrt{2}+1}, \frac{\sqrt{3}}{\sqrt{2}-1}, \frac{\sqrt{2}}{\sqrt{3}}$$

A. 16

B. $16\left(\dfrac{2}{3}\right)$

C. 18

D. $18\left(\dfrac{2}{3}\right)$

Answer: D

19. Which is the odd one out of the following?

A. $\sqrt{3}$

B. $\dfrac{\sqrt{3}-1}{\sqrt{3}+1}$

C. $\left(\dfrac{1}{2}\right)^{-2}$

D. $\dfrac{\sqrt{17}}{8}$

Answer: C

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20. If $a = \left(\sqrt{3}+\sqrt{2}\right)^{-3}$ and $b = \left(5-2\sqrt{6}\right)^{-\frac{3}{2}}$ then the value of $(a+1)^{-1} + (b+1)^{-1}$ is

A. $50\sqrt{3}$

B. $48\sqrt{2}$

C. 1

D. 5

Answer: C

21. By how much does $5\sqrt{7} - 2\sqrt{5}$ exceed $3\sqrt{7} - 4\sqrt{5}$?

A. $5\left(\sqrt{7} + \sqrt{5}\right)$

B. $\sqrt{7} + \sqrt{5}$

C. $2\left(\sqrt{7} + \sqrt{5}\right)$

D. $7\left(\sqrt{2} + \sqrt{5}\right)$

Answer: C

22. If $a = \dfrac{\sqrt{5} + 1}{\sqrt{5} - 1}$ and $b = \dfrac{\sqrt{5} - 1}{\sqrt{5} + 1}$, the value of $\left(\dfrac{a^2 + ab + b^2}{a^2 - ab + b^2}\right)$ is $\dfrac{3}{4}$

(b) $\dfrac{4}{3}$ (c) $\dfrac{3}{5}$ (d) $\dfrac{5}{3}$

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

B. $\dfrac{4}{5}$

C. $\dfrac{3}{5}$

D. $\dfrac{5}{3}$

Answer: B

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23. Given that $\sqrt{3} = 1.732$, the value of $\dfrac{3 + \sqrt{6}}{5\sqrt{3} - 2\sqrt{12} - \sqrt{32} + \sqrt{50}}$ is

A. $3\sqrt{2}$

B. 3

C. 6

D. $\sqrt{3}$

Answer: D

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24. The sum of $\dfrac{1}{\sqrt{2}+1} + \dfrac{1}{\sqrt{3}+\sqrt{2}} + \dfrac{1}{\sqrt{4}+\sqrt{3}} + ... \dfrac{.1}{\sqrt{100}+\sqrt{99}}$

is equal to:

A. 9

B. 10

C. 11

D. 0

Answer: A

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25. If $4 = \sqrt{x + \sqrt{x + \sqrt{x + ..}}}$, then the value of x will be:

A. 20

B. 16

C. 12

D. 8

Answer: C

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Self Assessment Sheet 6

1. Which one of the following sets of surds is in correct sequence of ascending order of their values?

A. $\sqrt[4]{100}$, $\sqrt[3]{6}$, $\sqrt{3}$

B. $\sqrt{3}$, $\sqrt[4]{10}$, $\sqrt[3]{6}$

C. $\sqrt{3}$, $\sqrt[3]{6}$, $\sqrt[4]{10}$

D. $\sqrt[4]{10}$, $\sqrt{3}$, $\sqrt[3]{6}$

Answer: B

2. $\dfrac{\sqrt{31} - \sqrt{29}}{\sqrt{31} + \sqrt{29}}$ equals:

A. $60 - 2\sqrt{899}$

B. $30 - \sqrt{899}$

C. $30 + \sqrt{899}$

D. $\dfrac{1}{30 - \sqrt{899}}$

Answer: B

3. The expression $\dfrac{\left(5\sqrt{3} + \sqrt{50}\right)\left(5 - \sqrt{24}\right)}{\sqrt{75} - 5\sqrt{2}}$ simplifies to

A. 1

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

C. $\sqrt{6} - \sqrt{5}$

D. $\sqrt{2}$

Answer: A

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

A. $6^{\frac{2}{3}}$

B. 6

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

D. 3

Answer: D

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5. If $x = 3 + 2\sqrt{2}$, then the value of $\left(\sqrt{x} - \dfrac{1}{\sqrt{x}} \right)$ is

A. 1

B. $2\sqrt{2}$

C. 2

D. $3\sqrt{3}$

Answer: C

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6. If $\dfrac{\dfrac{1}{\sqrt{9}} - \dfrac{1}{\sqrt{11}}}{\dfrac{1}{\sqrt{9}} + \dfrac{1}{\sqrt{11}}} \times \dfrac{10 + \sqrt{99}}{x} = \dfrac{1}{2}$, then x equal

A. 2

B. 3

C. 10

D. $1/10$

Answer: A

7. If $\sqrt{\dfrac{19 + 8\sqrt{3}}{7 - 4\sqrt{3}}} = a + b\sqrt{3}$**, then a equals**

A. 6

B. 4

C. 11

D. 7

Answer: C

8. The value of $\sqrt{2\sqrt{2\sqrt{2...\infty}}}$ **is**

A. 0

B. 1

C. $2\sqrt{2}$

D. 2

Answer: D

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9. Simplify :

$$\frac{4\sqrt{3}}{2 - \sqrt{2}} - \frac{30}{4\sqrt{3} - \sqrt{18}} - \frac{\sqrt{18}}{3 - 2\sqrt{3}}$$

A. 1

B. -1

C. -2

D. $4\sqrt{6}$

Answer: D

10. $\dfrac{\dfrac{\sqrt{2}-1}{\sqrt{2}+1} + \dfrac{\sqrt{2}+1}{\sqrt{2}-1}}{\dfrac{\sqrt{3}-1}{\sqrt{3}+1} + \dfrac{\sqrt{3}+1}{\sqrt{3}-1}}$ equals:

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

B. 4

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

D. 6

Answer: C

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Unit Test 1

1. In a problem involving division, the divisor is eight times the quotient and four times the remainder. If the remainder is 12, then the dividend is :

A. 300

B. 288

C. 512

D. 524

Answer: A

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2. If x is any natural number, then $x^5 - x$ is divisible by:

A. 6 but not by 10

B. 10 but not by 6

C. Both 6 and 10

D. Neither 6 nor 10

Answer: C

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3. The unit digit in the product $7^{35} \times 3^{71} \times 11^{55}$ is:

A. 1

B. 3

C. 7

D. 9

Answer: A

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4. The number of prime factors of $6^{10} \times 7^{17} \times 55^{27}$ is:

A. 54

B. 64

C. 81

D. 91

Answer: D

5. xy is a number that is divided by ab where $xy < ab$ and gives a result

$0.\ xyxyxy...$ then ab equals:

A. 11

B. 33

C. 99

D. 66

Answer: C

6. The square root of:

$$\frac{2\left(\frac{1}{3}\right) - 1\left(\frac{1}{6}\right)}{2\left(\frac{1}{3}\right) + 1\left(\frac{1}{6}\right)}$$ is:

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

B. $\dfrac{1}{\sqrt{3}}$

C. $\dfrac{1}{3\sqrt{3}}$

D. 3

Answer: B

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7. Simplify: $\dfrac{0.\bar{3} \times 1.\overline{06}}{0.\bar{5} \times 0.\bar{4}}$

A. $\dfrac{31}{4}$

B. $\dfrac{63}{44}$

C. $\dfrac{32}{63}$

D. $\dfrac{44}{111}$

Answer: B

8. Simplify: $\dfrac{\left[\left(8^{-3/4}\right)^{5/2}\right]^{8/15} \times 16^{3/4}}{64^{-1/3}}$

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

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

C. 4

D. 1

Answer: C

9. $\left(28 - 10\sqrt{3}\right)^{1/2} - \left(7 + 4\sqrt{3}\right)^{-1/2}$ is equal to

A. 3

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

C. 1

D. 0

Answer: A

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10. The value of $\sqrt{\sqrt[3]{0.046656}}$ is:

A. 6

B. 0.6

C. 0.06

D. 0.006

Answer: B

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11. Prove that $\sqrt{20 + \sqrt{20 + \sqrt{20 + \ldots}}} = 5$

A. 4

B. 5

C. 6

D. Greater than 6

Answer: B

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12. The value of $\sqrt{a\sqrt{b\sqrt{c\sqrt{d}}}}$ is:

A. $a^{1/2}b^{1/2}c^{1/2}d^{1/2}$

B. $a^{1/2}b^{\frac{1}{2}}c^{1/8}d^{1/16}$

C. $(abcd)^{1/12}$

D. $(abcd)^{1/8}$

Answer: B

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13. Simplified value of: $\left\{ \dfrac{4^{m+\frac{1}{4}} \times \sqrt{2.2^m}}{2\sqrt{2^{-m}}} \right\}^{1/m}$ is:

A. 8

B. 4

C. 16

D. 2

Answer: A

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14. The sum of two numbers is 684 and their HCF is 57. The number of possible pairs of such numbers is:

A. 2

B. 3

C. 4

D. None of these

Answer: A

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15. Find the greatest number of six digits which on being divided by 6,7,8,9 and 10 leaves 4,5,6,7 and 8 in remainder respectively.

A. 997920

B. 997918

C. 997922

D. 997930

Answer: B

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