MATHS

BOOKS - MTG IIT JEE FOUNDATION

EXPONENTS AND POWERS

Illustrations

1. Find the value of $\left(\frac{2}{3}\right)^{-4/5}$.

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2. Find the multiplicative inverse of the following :

3^{-4}

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3. Find the multiplicative inverse of the following :

2^{-5}

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4. Find the multiplicative inverse of the following :

10^{-100}.

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5. Simplify : $(-5)^4 \times (-5)^3$

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6. Simplify : $\frac{(-5)^4}{(-5)^2}$

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7. Simplify : $\left(3^2\right)^3$.

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8. Simplify : $(3 \times 2)^4$

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

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10. Simplify :

$(32)^1$

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11. Simplify :

$(219)^0$

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12. Simplify :

$(1000)^1$.

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13. Express each of the following as a rational number of the form $\frac{p}{q}$: 5^{-3} (ii) $(-2)^{-5}$ (iii) $\left(\frac{4}{3}\right)^{-3}\left(\frac{-2}{5}\right)^{-4}$ (v) $\frac{1}{2^{-3}}$

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14. Express each of the following as a rational number of the form $\frac{p}{q}$: 5^{-3} (ii) $(-2)^{-5}$ (iii) $\left(\frac{4}{3}\right)^{-3}\left(\frac{-2}{5}\right)^{-4}$ (v) $\frac{1}{2^{-3}}$

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15. Simplify (i)

 {\left({ - 4} \right)^5} \times {\left({ - 4} \right)^{ - 10}}

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16. Simplify :

$2^5 . 2^6$

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17. Express 4^{-3} as a power with the base 2

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18. Express the following numbers in standard form :

0.000053

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19. Express the following numbers in standard form :

4500000

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20. Express the following numbers in usual form :

3.52×10^{5}

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21. Express the following numbers in usual form :

7.54×10^{-4}

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22. Express the following numbers in usual form :

3×10^{-5}

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Solved Examples

1. Evaluate $\left(\frac{3}{8}\right)^{-2} \times \left(\frac{4}{5}\right)^{-3}$.

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2. Express each of the following as a rational number of the form $\frac{p}{q}$.

$\left(\frac{-2}{7}\right)^{-4} \times \left(\frac{-7}{5}\right)^{3}$

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3. Find the absolute value of

$$\left(\frac{2}{-3}\right)^4$$

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4. Find the absolute value of

$$\left(\frac{-2}{7}\right)^3$$

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5. Find the reciprocal of

$$3^4$$

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6. Find the reciprocal of

$$\left(\frac{2}{3}\right)^6$$

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7. Evaluate $\left\{\left(\frac{-3}{2}\right)^2\right\}^{-3}$.

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8. Express each of the following as a rational number of the form $\frac{p}{q}$: (i) $\left(2^{-1}+3^{-1}\right)^2$ (ii) $\left(2^{-1}-4^{-1}\right)^2$] (iii) $\left\{\left(\frac{3}{4}\right)^{-1}-\left(\frac{1}{4}\right)^{-1}\right\}^{-1}$

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9. Express each of the following as a rational number of the form $\frac{p}{q}$: (i) $\left(2^{-1}+3^{-1}\right)^2$ (ii) $\left(2^{-1}-4^{-1}\right)^2$] (iii) $\left\{\left(\frac{3}{4}\right)^{-1}-\left(\frac{1}{4}\right)^{-1}\right\}^{-1}$

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10. Evaluate $\left\{\left(\frac{4}{3}\right)^{-1}-\left(\frac{1}{4}\right)^{-1}\right\}^{-1}$

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11. Simplify:

$(i)\left(2^{-1}\times 5^{-1}\right)^{-1}\div 4^{-1}$

$(ii)\left(4^{-1}+8^{-1}\right)\div\left(\frac{2}{3}\right)^{-1}$

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12. Simplify:

$(i)\left(2^{-1}\times 5^{-1}\right)^{-1}\div 4^{-1}$

$(ii)\left(4^{-1}+8^{-1}\right)\div\left(\frac{2}{3}\right)^{-1}$

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13. 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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14. If $a^{1/x}=b^{1/y}=c^{1/z}$, $b^2=ac$, then find the value of $\frac{x+z}{2y}$

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15. If $\frac{2^x}{1+2^x} = \frac{1}{4}$, then find the value of $\frac{8^x}{1+8^x}$.

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16. Arrange in descending order of magnitude $\sqrt[3]{2}, \sqrt[6]{3}, \sqrt[9]{4}$.

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17. Which is greater of the two : 2^{300} or 3^{200} ?

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18. Solve for y if $\frac{\left(\frac{1}{9}\right)^{2y-1}(0.0081)^{1/2}}{\sqrt{243}} = \left(\frac{1}{3}\right)^{2y-5}\sqrt[3]{\frac{27^{y-1}}{1000000}}$.

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19. By what number should $\left(\frac{1}{2}\right)^{-1}$ be multiplied so that the product is $\left(\frac{-5}{4}\right)^{-1}$?

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20. Find the value of m for $5^{2m} \div 5^{-1} = 5^5$.

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21. Simplify (i)

 \left\{ {{{\left({\frac{1}{3}} \right)}^{ - 2}} - {{\left({\frac{1}{2}} \right)}^{ - 3}}} \right\} \div {\left({\frac{1}{4}} \right)^{ - 2}}

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22. Simplify :

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

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23. Simplify :

$$\left(\frac{3}{4}\right)^{-4} \div \left(\frac{3}{2}\right)^{-3}$$

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24. Simplify :

$$\left(\frac{3}{7}\right)^{-2} \times \left(\frac{7}{6}\right)^{-3}$$

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25. Write the following numbers in standard form.

0.4579

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26. Write the following numbers in standard form.

0.000007

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27. Write the following numbers in standard form.

0.0000021

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28. Write the following numbers in standard form: 0.4579 (ii) 0.000007 0.000000564 (iv) 0.0000021 216000000 (vi) $0.0000529 \, x \, 10^4$ $9573 \, x \, 10^{-4}$

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29. Write the following numbers in standard form: 0.4579 (ii) 0.000007 0.000000564 (iv) 0.0000021 216000000 (vi) $0.0000529 \, x \, 10^4$ $9573 \, x \, 10^{-4}$

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30. Write the following numbers in standard form: 0.4579 (ii) 0.000007 0.000000564 (iv) 0.0000021 216000000 (vi) $0.0000529 \, x \, 10^4$ $9573 \, x \, 10^{-4}$

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31. Write the following numbers in usual form.

1.785×10^7

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32. Write the following numbers in usual form.

5.1×10^{-7}

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33. Solve $12^x = 144$ and find the value of x.

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34. Evaluate :

$\left(13^2 - 5^2\right)^{\frac{3}{2}}$

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

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36. Solve each of the following exponential equations.

$6^x = 216$

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37. Solve each of the following exponential equations.

$6^{x-4} = 1$

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Ncert Section Exercise 12 1

1. Evaluate :

3^{-2}

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2. Evaluate :

$(-4)^{-2}$

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3. Evaluate :

$\left(\frac{1}{2}\right)^{-5}$.

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4. Simplify and express the result in power notation with positive exponent.

$(4)^5 \div (-4)^8$

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5. Simplify and express the result in power notation with positive exponent.

$\left(\frac{1}{2^3}\right)^2$

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6. Simplify and express the result in power notation with positive exponent.

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

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7. Simplify and express the result in power notation with positive exponent.

$\left(3^{-7} \div 3^{-10}\right) \times 3^{-5}$

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8. Simplify and express the result in power notation with positive exponent.

$2^{-3} \times (-7)^{-3}$

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9. Find the value of

$\left(3^{0} + 4^{-1}\right) \times 2^{2}$

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10. Find the value of

$\left(2^{-1} \times 4^{-1}\right) \div 2^{-2}$

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11. Find the value of

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

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12. Find the value of

$$\left(3^{-1}+4^{-1}+5^{-1}\right)^{0}$$

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13. Find the value of

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

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14. Evaluate :

$$\frac{8^{-1} \times 5^{3}}{2^{-4}}$$

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15. Evaluate :

$$\left(5^{-1} \times 2^{-1}\right) \times 6^{-1}$$

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16. Find the value of m for which  {5^m} \div {5^{--3}} = {\rm{ }}{5^5}.

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17. $\left\{\left(\frac{1}{3}\right)^{-1}-\left(\frac{1}{4}\right)^{-1}\right\}^{-1}$ is equal to.

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18. Evaluate:

$$\left(\frac{5}{8}\right)^{-7}\times\left(\frac{8}{5}\right)^{-4}$$

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19. Simplify. (i)

 \frac{{25 \times {t^{ - 4}}}}{{{5^{ - 3}} \times 10 \times {t^{ - 8}}}}\left({t \ne 0} \right)

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20. Simplify: $\frac{3^{-5} \times 10^{-5} \times 125}{5^{-7} \times 6^{-5}}$

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Ncert Section Exercise 12 2

1. Express the following numbers in standard form.

0.0000000000085

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2. Express the following numbers in standard form.

0.00000000000942

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3. Express the following numbers in standard form.

6020000000000000

Watch Video Solution

4. Express the following numbers in standard form.

0.00000000837

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5. Express the following numbers in standard form.

31860000000

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6. Express the following numbers in usual form. (i) 

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7. Express the following numbers in usual form.

4.5×10^4

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8. Express the following numbers in usual form.

3×10^{-8}

Watch Video Solution

9. Express the following numbers in usual form. (i) 

Watch Video Solution

10. Express the following numbers in usual form.

5.8×10^{12}

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11. Express the following numbers in usual form.

3.61492×10^{6}

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12. Express the number appearing in the following statements in standard form. (i) 1 micron is equal to  \frac{1}{{1000000}}

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13. Express the number appearing in the following statements in standard form.

Charge of an electron is $0.000,000,000,000,000,16$ coulomb.

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14. Express the number in standard form: 0.0000005

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15. Express the number in standard form: 0.00001275

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16. Express the number in standard form: 0.07

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17. In a stack there are 5 books each of thickness 20mm and 5 paper sheets each of thickness 0.016 mm. What is the total thickness of the stack.

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Exercise Multiple Choice Questions Level 1

1. The value of $\frac{2^{20001}+2^{19999}}{2^{20000}-2^{19998}}$ is

A. 2

B. $10/3$

C. $2^{1000}+1$

D. 10

Answer: B

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2. When simplified $\left(x^{-1}+y^{-1}\right)^{1-}$ is equal to xy (b) $x+y$ (c) $\frac{xy}{x+y}$ (d) $\frac{x+y}{xy}$

A. $x+y$

B. $\frac{xy}{x+y}$

C. xy

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

Answer: B

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3. The value of $[x + x(x^x)]$ when $x = 2$ is

A. 10

B. 16

C. 18

D. 36

Answer: A

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4. The value of $\left(\frac{289}{81}\right)^{-\frac{1}{2}}$ is

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5. The solution of $3^{3x-5} = \frac{1}{9^x}$ is

A. $\frac{5}{2}$

B. 5

C. 1

D. $\frac{7}{3}$

Answer: C

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6. Multiplicative inverse of 10^{-100} is

A. $(10)^{-100}$

B. $\frac{1}{(10)^{-100}}$

C. $(10)^{-10}$

D. $\left(10^{-50}\right)^{3}$

Answer: B

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7. $\left(\frac{16}{81}\right)^{\frac{-3}{4}}$ is equal to

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

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

C. $\frac{8}{27}$

D. $\frac{27}{8}$

Answer: D

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8. The value of $(1024)^{-\frac{4}{8}}$ is

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

B. $\frac{1}{128}$

C. $\frac{1}{256}$

D. $\frac{1}{512}$

Answer: C

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9. $(512)^{\frac{-2}{3}} \times \left(\frac{1}{4}\right)^{-3}$ is equal to

A. 4

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

C. 1

D. 16

Answer: C

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10. The value of $\left(3^2\right)^3 + \left(\frac{2}{3}\right)^0 + 3^5$ is

A. 930

B. 973

C. 932

D. 950

Answer: B

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11. simplify: $16^{\frac{5}{2}} \div 16^{\frac{1}{2}} =$

A. 250

B. 256

C. 255

D. 200

Answer: B

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12. $(32)^{\frac{-2}{5}} \div (125)^{\frac{-2}{3}} =$

A. $\frac{4}{25}$

B. $\frac{25}{4}$

C. $\frac{2}{5}$

D. $\frac{5}{2}$

Answer: B

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13. The value of $(512)^{-2/9}$ is

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

B. 2

C. 4

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

Answer: D

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14. Given that $2^h \times 2^3 = 2^9$, find the value of h.

A. 3

B. 6

C. 8

D. 12

Answer: B

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15. $4^{-3/2} + 8^{2/3}$ is equal to

A. $2\frac{1}{4}$

B. $4\frac{1}{8}$

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

D. $8\frac{1}{4}$

Answer: B

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16. If $\frac{10}{3} \times 3^x - 3^{x-1} = 81$, then the value of x is

A. 2

B. 1

C. 3

D. 0

Answer: C

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17. Which of the following values are equal ?

I 1^4 II 4^0 III 0^4 IV 4^1

A. I and II

B. II and III

C. I and III

D. I and IV

Answer: A

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18. The standard form of 15240000 is

A. 1.524×10^7

B. 1.524×10^6

C. 15.24×10^2

D. 1.524×10^8

Answer: A

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19. Simplify : $\frac{4r}{(r^2m)^2}$

A. $1/2$ m

B. $4/r^3$m

C. $4r/r^5$ m

D. $4/r^3m^2$

Answer: D

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20. $\left(\frac{16}{81}\right)^{3/4} =$

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

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

C. $\frac{8}{27}$

D. $\frac{27}{8}$

Answer: C

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21. The value of expression $\left(8^0 - 3^0\right) \times \left(8^0 + 3^0\right)$ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: A

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22. $8^{4/3} \times 2^{-1} =$

A. 4

B. 8

C. 16

D. 32

Answer: B

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23. Which of the following is not equal to y^6?

A. $\left(y^{2/3}\right)^9$

B. $\left(\sqrt{y^6}\right)^2$

C. $\sqrt[3]{y^{18}}$

D. $\left(y^{1/3}\right)^{12}$

Answer: D

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24. The value of expression $\left(\frac{1}{3}\right)^3 \times \left(\frac{-2}{5}\right)^2 \times \left(\frac{-3}{2}\right)^3$ is

A. $\frac{1}{50}$

B. $\frac{-1}{50}$

C. 1

D. 0

Answer: B

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25. $9x^6y^2 \div 3x^3y =$

A. $3x^2y^2$

B. $3x^3y$

C. $3x^3y^2$

D. $6x^3y$

Answer: B

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26. The largest number among the following is

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

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

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

D. 3222

Answer: A

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27. For a non-zero rational number a, $a^7 \div a^{-12}$ is equal to

A. a^5

B. a^{-19}

C. a^{-5}

D. a^{19}

Answer: D

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28. Usual form of 7.54×10^{-6} is

A. 0.000000754

B. 0.000754

C. 0.0000754

D. 0.00000754

Answer: D

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29. 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 :

A. 0.16

B. 16

C. 1.6

D. 0.016

Answer: C

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30. Find the value of n from the given equation. $5^{12} \div \sqrt[4]{625} = 5^{3n-1}$

A. 4^{-1}

B. 4^{2}

C. 4^{-2}

D. 4

Answer: D

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31. If $\left(9^{x-1} + 19\right) \div 4 = 7$, then x is equal to

A. -2

B. 0

C. 1

D. 2

Answer: C

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32. Find the value of $\frac{27 \times t^{-4}}{3^{-2} \times 18 \times t^{-8}} (t \neq 0).$

A. $\frac{9}{2}t^4$

B. $\frac{27}{2}t^{-4}$

C. $\frac{27}{2}t^4$

D. $\frac{9}{2}t^{-4}$

Answer: C

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

A. 10^{n-m+1}

B. 10^{n+m+1}

C. 10^{n-m-1}

D. $10^{-(n-m-1)}$

Answer: C

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34. Find the value of p so that $\left(\frac{4}{5}\right)^3 \div \left(\frac{4}{5}\right)^{-3} = \left(\frac{4}{5}\right)^{3p}$

A. 3

B. 0

C. 2

D. 1

Answer: C

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

A. 0

B. 4

C. 2

D. 1

Answer: D

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Exercise Multiple Choice Questions Level 2

1. The value of $3\sqrt[3]{2} \times 7\sqrt[3]{6} \times 5\sqrt[3]{18}$ is

A. 545

B. 500

C. 630

D. 400

Answer: C

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2. If $x^y = y^x$, then $\left(\frac{x}{y}\right)^{\frac{x}{y}}$ is equal to $x^{\frac{y}{x}}$ b. $x^{\frac{y}{x}-1}$ c. 1 d. $x^{\frac{x}{y}}$

A. $x^{\frac{x}{y}}$

B. $x^{\frac{x}{y}-1}$

C. $x^{\frac{y}{x}}$

D. $x^{\frac{y}{x}-1}$

Answer: B

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3. The value of $\frac{(5)^{0.25} \times (125)^{0.25}}{(256)^{0.10} \times (256)^{0.15}}$ is

A. $\frac{\sqrt{5}}{2}$

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

C. $\frac{25}{2}$

D. $\frac{25}{16}$

Answer: B

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4. The value of $\frac{\sqrt[3]{81}+\sqrt[3]{-192}+\sqrt[3]{375}}{\sqrt[3]{24}}$ is

A. 0

B. 1

C. 2

D. 3

Answer: C

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5. The value of $\left\{(8)^{\frac{-2}{3}}\right\}^2$ is

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

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

C. 16

D. $\frac{1}{16}$

Answer: B

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6. By what number should $\left(\frac{-3}{2}\right)^{-3}$ be divided so that the quotient may be $\left(\frac{4}{27}\right)^{-2}$?

A. $4 \times \left(\frac{2}{9}\right)^3$

B. $2 \times \left(\frac{4}{27}\right)^3$

C. $-4 \times \left(\frac{2}{3}\right)^3$

D. $-2 \times \left(\frac{4}{27}\right)^3$

Answer: D

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7. Standard form of 0.000000564 is

A. 56.4×10^{-7}

B. 5.64×10^{7}

C. 5.64×10^{-7}

D. 564×10^{7}

Answer: C

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8. Find the value of $\left\{\left(\frac{1}{3}\right)^{-2}-\left(\frac{1}{2}\right)^{-3}\right\} \div\left(\frac{1}{4}\right)^{-2}$

A. $16/3$

B. 4^{-2}

C. 4^{2}

D. 4^{4}

Answer: B

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9. If $64^a = \frac{1}{256^b}$ then $3a + 4b =$

A. 2

B. 4

C. 8

D. 0

Answer: D

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10. Find the value of m for which $(25)^m \div 5^{-3} = 5^5$.

A. 2

B. 1

C. 0

D. -1.

Answer: B

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11. The value of $\frac{9^x\left(9^{x-1}\right)^x}{9^{x+1}.3^{2x-2}}\left\{\frac{729^{\frac{x}{3}}}{81}\right\}^{-x} \div \frac{3^a-2^3.3^{a-2}}{3^a-3^{a-1}}$ is

A. 9

B. 6

C. 12

D. 16

Answer: B

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12. The value of $\left(\frac{x^{a^2}}{x^{b^2}}\right)^{\frac{1}{a+b}} \cdot \left(\frac{x^{b^2}}{x^{c^2}}\right)^{\frac{1}{b+c}} \cdot \left(\frac{x^{c^2}}{x^{a^2}}\right)^{\frac{1}{c+a}}$ is

A. 0

B. 1

C. 2

D. 3

Answer: B

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13. Find the value of $3 \times \sqrt[3]{125} - 5 \times \sqrt[6]{64} + 2 \times \left(\frac{8}{27}\right)^{-1/3}$.

A. -12

B. $(12)^{-1}$

C. $(12)^{2}$

D. 12

Answer: D

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14. If $x = \left(\frac{3}{2}\right)^{2} x \left(\frac{2}{3}\right)^{-4}$, find the value of x^{-2}.

A. $\left(\frac{1}{12}\right)^{2}$

B. $\left(\frac{1}{12}\right)^{-2}$

C. $\left(\frac{2}{3}\right)^{-12}$

D. $\left(\frac{2}{3}\right)^{12}$

Answer: D

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15. If $x = 16$, then find the value of the expression $\frac{x-1}{x^{3/4}+x^{1/2}} \cdot \frac{x^{1/2}+x^{1/4}}{x^{1/2}+1} \cdot x^{1/4}$.

A. 9

B. 3

C. 27

D. 3^0

Answer: B

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Exercise Match The Following

1. In this section each question has two matching lists. Choices for the correct combination of elements from List-I and List-II are given as options (a), (b), (c) and (d) out of which one is correct.

Simplify and match the following :

List-I	List-II
(P) $(3^2 + 2^2) \times \left(\frac{1}{2}\right)^3$	(1) $\frac{19}{64}$
(Q) $(3^2 + 2^2) \times \left(\frac{2}{3}\right)^{-3}$	(2) $-\frac{4}{3}$
(R) $\left[\left(\frac{1}{3}\right)^{-3} - \left(\frac{1}{2}\right)^{-3}\right] + \left[\frac{1}{4}\right]^{-3}$	(3) $\frac{13}{8}$
(S) $(2^2 + 3^2 - 4^2) + \left(\frac{3}{2}\right)^2$	(4) $\frac{351}{8}$

A. P-1, Q- 2, R-3, S-4

B. P-4, Q-1, R-2, S-3

C. P-3, Q-4, R-1, S-2

D. P-4, Q-2, R-3, S-1

Answer: C

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2. In this section each question has two matching lists. Choices for the correct combination of elements from List-I and List-II are given as options (a), (b), (c) and (d) out of which one is correct.

Solve the following word problems.

List-I	List-II
(P) By what number should 5^{-1} be multiplied so that the product may be equal to $(-7)^{-1}$?	(1) $\frac{1}{3}$
(Q) By what number should $(-15)^{-1}$ be divided so that the quotient may be equal to $(-5)^{-1}$?	(2) $\frac{-2}{3}$
(R) By what number should $(-6)^{-1}$ be multiplied so that product becomes 9^{-1} ?	(3) $\frac{-2}{27}$
(S) By what number should $\left(\frac{-2}{3}\right)^{-3}$ be divided so that the quotient may be equal to $\left(\frac{4}{27}\right)^{-2}$?	(4) $\frac{-5}{7}$

A. P-1, Q-3, R-2, S-4

B. P-3, Q-2, R-4, S-1

C. P-3, Q-2, R-1, S-4

D. P-4, Q-1, R-2, S-3

Answer: D

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3. Match the following for rational numbers x, y, a and b.

List-I	List-II
(P) $a^x \times a^y$	(1) a^{x-y}
(Q) $a^x + a^y$	(2) a^{xy}
(R) $(a^x)^y$	(3) a^{x+y}
(S) $(ab)^x$	(4) $a^x \times b^x$

A. P-1, Q-2, R-4, S- 3

B. P-3, Q-1, R-2, S- 4

C. P-4, Q-3, R-2, S-1

D. P-3, Q-2, R-1, S-4

Answer: B

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Exercise Assertion Reason Type

1. Assertion : $\left(\frac{5}{7}\right)^0 = 1$

Reason : For any non-zero rational number x, $x^0 = 1$

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: A

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2. Assertion : $(2)^{-3} \div (2)^{-3} = (2)^{0}$

Reason : $x^{-m} \div x^{-n} = x^{-mn}$

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: C

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3. Assertion : $\left\{\left(\frac{1}{2}\right)^6\right\}$ is the reciprocal of 2^{36}.

Reason : $\{(a^m)^n\} = a^{m \times n}$, for any value of a.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

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4. Assertion : $\sqrt[3]{\frac{27}{216}}$ can be written as $\left(\frac{216}{27}\right)^{1/3}$.

Reason : $a^{1/n} = \sqrt[n]{a}$, where both represents n^{th} root of a.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

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5. Assertion :

$$\left(-\frac{3}{5}\right)^{2} \times \left(-\frac{3}{5}\right)^{-7} = \left(-\frac{3}{5}\right)^{2-7} = \left(-\frac{3}{5}\right)^{-5}$$

Reason : $x^{n} \times y^{-n} = (xy)^{-n}$

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: C

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Exercise Comprehension Type

1. Evaluate : $\frac{9^{-1} \times 5^3}{3^{-3}}$

A. 370

B. 315

C. 375

D. 400

Answer: C

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2. Simplify : $\frac{25 \times a^9}{5^{-3} \times 10 \times a^{-18}}$

A. $\frac{625a^{27}}{12}$

B. $\frac{625a^5}{20}$

C. $625a$

D. $\frac{625a^{27}}{2}$

Answer: D

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3. Find the value of m so that $(-3)^m \hat{} (+1) \times (-3)^5 = (-3)^7$

A. 1

B. -1

C. 0

D. 4

Answer: A

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4. The value of $6^2 \times 6^{-4} \times 6^8$ is

A. 6^6

B. 6^{-6}

C. 6^{12}

D. 6^{-10}

Answer: A

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5. Evaluate :

$$\left(\frac{1}{2}\right)^{-4} \times \left(\frac{1}{2}\right)^{-8} \times \left(\frac{1}{2}\right)^{2} + \left(\frac{1}{4}\right)^{2} \times \left(\frac{1}{4}\right)^{-6} \times \left(\frac{1}{4}\right)^{2}$$

A. $\left(\frac{1}{2}\right)^{-10}$

B. $\left(\frac{1}{2}\right)^{12} \times \left(\frac{1}{4}\right)^{-1}$

C. $\left(\frac{1}{2}\right)^{-14} + \left(\frac{1}{4}\right)^{0}$

D. $\left(\frac{1}{2}\right)^{12}$

Answer: A

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6. Find the value of x if $4^{2x-3} = 4^2 \times 2^3 \times 4$.

A. 0

B. 4

C. $\frac{15}{4}$

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

Answer: C

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Exercise Subjective Problems Very Short Answer Type

1. Express the following as a rational number.

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

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2. Express the following as a rational number.

$$\left(\frac{21}{89}\right)^2$$

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3. Express the following in power notation.

$$\frac{-125}{343}$$

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4. Express the following in power notation.

$$\frac{1}{2401}$$

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5. Find the product of square of $\frac{-1}{2}$ and the cube of $\frac{-2}{3}$.

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6. EXAMPLE 11. Simplify: $\left\{6^{-1}+\left(\frac{3}{2}\right)^{-1}\right\}^{1}$

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7. Simplify : $\left(x^{2^{n-1}}+y^{2^{n-1}}\right)\left(x^{2^{n-1}}-y^{2^{n-1}}\right)$

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8. If $x^{\sqrt{x}}=\left(x^{3/2}\right)^{x}$, then find x.

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9. Find the value of $(-4)^2 \div (2)^5$.

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10. Using the laws exponents, simplify each of the following and express in exponential form : $3^7 x\ 3^{-2}$ (ii) $2^{-7} \div 2^{-3}$ (iii) $\left(5^2\right)^{-3}$ $2^{-3} x\ (-7)^{-3}$ (v) $\frac{3^{-5}}{4^{-5}}$

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11. Using the laws exponents, simplify each of the following and express in exponential form : $3^7 x\ 3^{-2}$ (ii) $2^{-7} \div 2^{-3}$ (iii) $\left(5^2\right)^{-3}$ $2^{-3} x\ (-7)^{-3}$ (v) $\frac{3^{-5}}{4^{-5}}$

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12. Using the laws exponents, simplify each of the following and express in exponential form : $3^7 x\ 3^{-2}$ (ii) $2^{-7} \div 2^{-3}$ (iii) $\left(5^2\right)^{-3}$ $2^{-3} x\ (-7)^{-3}$ (v) $\frac{3^{-5}}{4^{-5}}$

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13. Using the laws exponents, simplify each of the following and express in exponential form : $3^7 x\ 3^{-2}$ (ii) $2^{-7} \div 2^{-3}$ (iii) $\left(5^2\right)^{-3}$ $2^{-3} x\ (-7)^{-3}$ (v) $\frac{3^{-5}}{4^{-5}}$

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14. Using the laws exponents, simplify each of the following and express in exponential form : $3^7 x\ 3^{-2}$ (ii) $2^{-7} \div 2^{-3}$ (iii) $\left(5^2\right)^{-3}$ $2^{-3} x\ (-7)^{-3}$ (v) $\frac{3^{-5}}{4^{-5}}$

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15. Simplify : $\left(\frac{x^a}{x^b}\right)^{a+b} \div \left(\frac{x^a}{x^{a-b}}\right)^{a^2/b}$

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16. Evaluate : $\left(3^2 - 2^2\right) \times \left(\frac{2}{3}\right)^{-2}$

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Exercise Subjective Problems Short Answer Type

1. Evaluate $\left(\frac{-2}{7}\right)^{-4} \times \left(\frac{-5}{7}\right)^{2}$.

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2. If $3^{x+y} = 81$ and $81^{x-y} = 3$, then find the values of x and y.

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

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4. If $2^{x-2} = 5^{2-x}$, then find the value of x.

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5. By what number should $(-24)^{-1}$ be divided so that the quotient may be 3^{-1}?

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6. Simplify : $\frac{(xyz)^4}{(x^{-2}y^3)^{-3}\left(\frac{1}{z^2}\right)^6}(x \neq 0, y \neq 0, z \neq 0).$

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7. By what number should $(-4)^2$ be multiplied so that the product may be equal to 10^{-2}?

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8. Find the value of m so that $\left(\frac{2}{9}\right)^3 \times \left(\frac{2}{9}\right)^{-6} = \left(\frac{2}{9}\right)^{2m-1}$.

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9. Write the following numbers using scientific notation:

Two crore fifty three lakh

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10. Write the following numbers using scientific notation:

98000000000

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11. Write the following numbers using scientific notation:

0.00000000015

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12. The size of a red blood cell is $0.000007\, m$ and the size of a plant cell is $0.00001275\, m$. Compare these two

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Exercise Subjective Problems Long Answer Type

1. Find the largest among $\sqrt[4]{8}, \sqrt{2}, \sqrt[3]{6}$.

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2. Express each of the following as power of a rational number with positive exponent : $\left(\frac{1}{4}\right)^{-3}$ (ii) $5^{-3} x\, 5^{-6}$ (c) $\left(\frac{-1}{4}\right)^{-5} x \left(\frac{-1}{4}\right)^{-7}$

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3. Express each of the following as power of a rational number with positive exponent : $\left(\frac{1}{4}\right)^{-3}$ (ii) $5^{-3} x\, 5^{-6}$ (c) $\left(\frac{-1}{4}\right)^{-5} x \left(\frac{-1}{4}\right)^{-7}$

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4. $\left\{\left(\frac{3}{4}\right)^{-1} - \left(\frac{1}{4}\right)^{-1}\right\}^{-1}$

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5. Given that $\sqrt[3]{3^x} = 5^{1/4}$ and $\sqrt[4]{5^y} = \sqrt{3}$, then find the value of $2xy$.

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6. EXAMPLE 12. Simplify: $\left(2^{-1} \div 5^{-1}\right)^{2} \times \left(\frac{-5}{8}\right)^{-1}$

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7. Evaluate : $\left(6^{-1} - 8^{-1}\right)^{-1} + \left(2^{-1} - 3^{-1}\right)^{-1}$

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8. Simplify : $\left(5^{-1} x\ 3^{-1}\right)^{-1} \div 6^{-1}$

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9. If $\frac{10}{3} \times 3^{x} - 3^{x-1} = 81$. then the value of x.

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Exercise Integer Numerical Value Type

1. The value of $\left(3^0 - 4^0\right) \times 5^2$ is

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2. The value of x in exponential equation $2^{x-14} = 1$ is equal to

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3. If $\left\{\left(\frac{1}{3}\right)^{-1} - \left(\frac{1}{4}\right)^{-1}\right\}^m = 1$, then least positive integral value of m is

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

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5. $(64)^{-2/3} \times (1/4)^{-3}$ equals

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6. $\left(5\left(8^{1/3} + 27^{1/3}\right)\right)^{1/2} =$

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7. If $\left(\frac{a}{b}\right)^{x-10} = \left(\frac{b}{a}\right)^{x-16}$, then x is equal to

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8. The value of $\left(\frac{x^a}{x^b}\right)^{a+b} \times \left(\frac{x^b}{x^c}\right)^{b+c} \times \left(\frac{x^c}{x^a}\right)^{c+a}$ is equal to

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9. $\frac{1}{1+a^{n-m}} + \frac{1}{1+a^{m-n}}$

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10. Given that $4^{n-9} = 256$, find the value of n.

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