MATHS

BOOKS - NCERT EXEMPLAR

EXPONENTS AND POWERS

Solved Examples

1. Which of the following numbers is not equal to $\frac{-8}{27}$?

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

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

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

D. None of the above

Answer: B

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2. $(-7)^5 \times (-7)^3$ is equal to

A. $(-7)^8$

B. $-(7)^8$

C. $(-7)^{15}$

D. $(-7)^2$

Answer: A

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3. For any two non zero integers x and y $x^3 \div y^3$ is equal to

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4. Evaluate: $\left(5^7 \div 5^6\right)^2 =$ _____

A. 5^1

B. 5^4

C. 5^3

D. 5^2

Answer: D

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5. Evaluate: $\frac{a^7 b^3}{a^5 b} =$ _____

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6. State True or False: In the number 7^5 , 5 is the base and 7 is the exponent.

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7. State True or False: $\frac{a^4}{b^3} = \frac{a+a+a+a}{b+b+b}$

A. True

B. False

C. not sure

D. none of the above

Answer: B

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8. State True or False: $a^b > b^a$ is true. If a=3 and b=4, but false if a=2 and b=3.

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9. By what number should we multiply 3^3 so that the product may be equal to 3^7?

A. 81

B. 61

C. 243

D. 31

Answer: A

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10. Find x so that $\left(\frac{5}{3}\right)^5 \times \left(\frac{5}{3}\right)^{11} = \left(\frac{5}{3}\right)^{8x}$

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11. Express 648 in exponential notation.

A. $2^3 \times 3^3$

B. $2^3 \times 3^4$

C. $2^2 \times 3^4$

D. $2^4 \times 3^3$

Answer: B

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12. Express 2,36,00,000 in standard form.

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13. Which of the two is larger : 3^{12} or 6^6?

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14. Find x such that $\frac{1}{5^5} \times \frac{1}{5^{19}} = \frac{1}{5^{8x}}$

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Think And Discuss

1. $\left(\frac{1}{5}\right)^5 \times \left(\frac{1}{5}\right)^{19} = \left(\frac{1}{5}\right)^{8x}$

Try to find the value of x given in the question by changing $\frac{1}{5}$ to $\frac{3}{2}$. What difference do you find the value of x? What do you infer from your answer?

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2. Can you find the value of x if the equation is changed to $(5)^x \div (5)^2 = (5)^3$?

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3. Explain why the exponents cannot be added in the product $14^3 \times 18^3$.

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4. List two ways to express 4^5 as a product of powers.

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5. Explain the difference between $(-5)^2$ and $-(5 \times 5)$

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6. Compare 3×2, 3^2 and 2^3

A. $3^2 < 2^3 < 3 \times 2$

B. $3^2 < 2^3 > 3 \times 2$

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

D. None of the above

Answer: C

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7. Show that $(4 - 11)^2$ is not equal to $4^2 - 11^2$

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Exercise

1. $\left[(-3)^2\right]^3$ is equal to

A. $(-3)^8$

B. $(-3)^6$

C. $(-3)^5$

D. $(-3)^{23}$

Answer:

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2. For a non zero rational number x, $x^8 \div x^2$ is equal to

A. x^4

B. x^6

C. x^{10}

D. x^{16}

Answer:

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3. x is non a zero rational number. Product of the square of x with the cube of x is equal to the

A. second power of x

B. third power of x

C. fifth power of x

D. sixth power of x

Answer: C

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4. For any two non zero rational numbers x and y, $x^5 \div y^5$ is equal to

A. $(x \div y)^1$

B. $(x \div y)^0$

C. $(x \div y)^5$

D. $(x \div y)^{10}$

Answer:

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5. $a^m \times a^n$ is equal to

A. $\left(a^2\right)^{mn}$

B. a^{m-n}

C. a^{m+n}

D. a^{mn}

Answer: C

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6. $(1^\circ + 2^\circ + 3^\circ)$ is equal to

A. 0

B. 1

C. 3

D. 6

Answer: C

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7. Value of $\frac{10^{22} + 10^{20}}{10^{20}}$ is

A. 10

B. 10^{42}

C. 101

D. 10^{22}

Answer: C

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8. The standard form of the number 12345 is

A. 1234.5×10^{1}

B. 123.45×10^{2}

C. 12.345×10^{3}

D. 1.2345×10^{4}

Answer:

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9. $2^{1998} - 2^{1997} - 2^{1996} + 2^{1995} = \quad K.2^{1995}$

A. 1

B. 2

C. 3

D. 4

Answer:

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10. Which of the following is equal to 1?

A. $2^\circ + 3^\circ + 4^\circ$

B. $2^\circ \times 3^\circ \times 4^\circ$

C. $(3^\circ - 2^\circ) \times 4^\circ$

D. $(3^\circ - 2^\circ) \times (3^\circ + 2^\circ)$

Answer: B

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11. In standard form, the number 72105.4 is written as 7.21054×10^n where n is equal to

A. 2

B. 3

C. 4

D. 5

Answer: C

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12. Square of $\left(\frac{-2}{3}\right)$ is

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

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

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

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

Answer:

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13. Cube of $\left(\frac{-1}{4}\right)$ is

A. $\frac{-1}{12}$

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

C. $\frac{-1}{64}$

D. $\frac{1}{64}$

Answer: C

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14. Which of the following is not equal to $\left(\frac{-5}{4}\right)^4$?

A. $\frac{(-5)^4}{4^4}$

B. $\frac{5^4}{(-4)^4}$

C. $-\frac{5^4}{4^4}$

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

Answer: C

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15. Which of the following is not equal to 1?

A. $\frac{2^3 \times 3^2}{4 \times 18}$

B. $\left[(-2)^3 \times (-2)^4\right] \div (-2)^7$

C. $\frac{3^\circ \times 5^3}{5 \times 25}$

D. $\frac{2^4}{(7^\circ + 3^\circ)^3}$

Answer:

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16. $\left(\frac{2}{3}\right)^3 \times \left(\frac{5}{7}\right)^3$ is equal to

A. $\left(\frac{2}{3} \times \frac{5}{7}\right)^9$

B. $\left(\frac{2}{3} \times \frac{5}{7}\right)^6$

C. $\left(\frac{2}{3} \times \frac{5}{7}\right)^3$

D. $\left(\frac{2}{3} \times \frac{5}{7}\right)^\circ$

Answer: C

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17. In standard form, the number 829030000 is written as $K \times 10^8$ where K is equal to

A. 82903

B. 829.03

C. 82.903

D. 8.2903

Answer:

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18. Which of the following has the largest value?

A. 0.001

B. $\frac{1}{10000}$

C. $\frac{1}{10^6}$

D. $\frac{1}{10^6} \div 0.1$

Answer: A

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19. In standard form 72 crore is written as

A. 72×10^7

B. 72×10^8

C. 7.2×10^8

D. 7.2×10^7

Answer:

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20. For non zero numbers a and b $\left(\frac{a}{b}\right)^m \div \left(\frac{a}{b}\right)^n$, where $m > n$, is equal to

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

B. $\left(\frac{a}{b}\right)^{m+n}$

C. $\left(\frac{a}{b}\right)^{m-n}$

D. $\left(\left(\frac{a}{b}\right)^m\right)^n$

Answer: C

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21. Which of the following is not true?

A. $3^2 > 2^3$

B. $4^3 = 2^6$

C. $3^3 = 9$

D. $2^5 > 5^2$

Answer:

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22. Which power of 8 is equal to 2^6?

A. 3

B. 2

C. 1

D. 4

Answer: B

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23. Evaluate: $(-2)^{31} \times (-2)^{13} =$

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24. $(-3)^{8} \div (-3)^{5} = (-3)$_____

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25. Fill in the blanks: $\left(\frac{11}{15}\right)^{4} \times (\_\_\_\_\_)^{5} = \left(\frac{11}{15}\right)^{9}$

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26. Fill in the blanks: $\left(\frac{-1}{4}\right)^{3} \times \left(\frac{-1}{4}\right)$_____ $= \left(\frac{-1}{4}\right)^{11}$

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27. Simplify: $\left[\left(\frac{7}{11}\right)^{3}\right]^{4} =$

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28. Evaluate: $\left(\frac{6}{13}\right)^{10} \div \left[\left(\frac{6}{13}\right)^{5}\right]^{2} =$

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29. Evaluate: $\left[\left(\frac{-1}{4}\right)^{16}\right]^{2} =$

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30. Evaluate : $\left(\frac{13}{14}\right)^{5} \div (----------)^{2} = \left(\frac{13}{14}\right)^{3}$

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31. Evaluate : $a^6 \cdot a^6 \cdot a^0 =$

A. a^{12}

B. a^{36}

C. a^0

D. a^6

Answer: A

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32. 1 lakh $= 10$_____

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33. 1 million $= 10$_____

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34. Fill in the blanks: $729 = 3\_\_\_\_\_$

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35. Fill in the blanks : $432 = 2^4 \times 3\_\_$

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36. $53700000 = \_ \ \_ \ \_ \ \_ \ \_ \times 10^7$

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37. $88880000000 = \_ \ \_ \ \_ \ \_ \times 10^{10}$

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38. $27500000 = 2.75$times10^(_____)`

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39. Find x : $340900000 = 3.409 \times 10^{x}$

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40. Fil in the blanks with $<$, $>$ or = sign

3^2 _ _ 15

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41. Fil in the blanks with $<$, $>$ or = sign

2^3 _ _ _ _ _ 3^2

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Watch Video Solution

42. Fil in the blanks with $<$, $>$ or = sign

7^4 _ _ _ _ 5^4

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43. Fil in the blanks with $<$, $>$ or = sign

$10,000$ — — — — — — — — — 10^5

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44. Fil in the blanks with $<$, $>$ or = sign

6^3 _ _ _ _ 4^4

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45. State True or False : One million $= 10^7$

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46. State True or False : One hour $= 60^2$ seconds

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47. State True or False : $1^\circ \times 0^1 = 1$

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48. State True or False : $(-3)^4 = -12$

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49. State True or False : $3^4 > 4^3$

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50. State True or False : $\frac{-3}{5^{100}} = \frac{-3^{100}}{-5^{100}}$

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51. State True or False : $(10+10)^{10} = 10^{10} + 10^{10}$

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52. State True or False : $x^\circ \times x^\circ = x^\circ \div x^\circ$ is true for all non zero values of x.

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53. standard form a number is said to be in the standard form if it is expressed as the product of a number between 1 and 10 (including 1 but excluding 10

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54. State True or False : 4^2 is greater than 2^4.

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55. State True or False : $x^m + x^m = x^{2m}$, where x is a non zero rational number and m is a positive integer.

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56. State True or False : $x^m \times y^m = (x \times y)^{2m}$, where x and y are non zero rational numbers and m is a positive integer.

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57. $x^m \div y^m = (x \div y)^m$, where x and y are non zero rational numbers and m is a positive integer.

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58. $x^m \times x^n = x^{m+n}$, where x is a non zero rational number and m,n are positive integers.

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59. State True or False : 4^9 is greater than 16^3

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60. State True or False : $\left(\frac{2}{5}\right)^3 \div \left(\frac{5}{2}\right)^3 = 1$

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61. State True or False : $\left(\frac{4}{3}\right)^5 \times \left(\frac{5}{7}\right)^5 = \left(\frac{4}{3} + \frac{5}{7}\right)^5$

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62. State True or False : $\left(\frac{5}{8}\right)^9 \div \left(\frac{5}{8}\right)^4 = \left(\frac{5}{8}\right)^4$

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63. State True or False : $\left(\frac{7}{3}\right)^2 \times \left(\frac{7}{3}\right)^5 = \left(\frac{7}{3}\right)^{10}$

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64. State True or False : $5^\circ \times 25^\circ \times 125^\circ = (5^\circ)^6$

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65. State True or False :

$876543 = 8 \times 10^5 + 7 \times 10^4 + 6 \times 10^3 + 5 \times 10^2 + 4 \times 10^1 + 3 \times 10^\circ$

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66. State True or False : $600060 = 6 \times 10^5 + 6 \times 10^2$

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67. State True or False :

$4 \times 10^5 + 3 \times 10^4 + 2 \times 10^3 + 1 \times 10^\circ = 432010$

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68. State True or False :

$8 \times 10^6 + 2 \times 10^4 + 5 \times 10^2 + 9 \times 10^\circ = 8020509$

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69. State True or False : $4^\circ + 5^\circ + 6^\circ = (4 + 5 + 6)^\circ$

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70. Arrange in ascending order:

$2^5, 3^3, 2^3 \times 2, \left(3^3\right)^2, 3^5, 4^\circ, 2^3 8^1$

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71. Arrange in descending order:

$2^{2+3}, \left(2^2\right)^3, 2 \times 2^2, \frac{3^5}{3^2}, 3^2 \times 3^\circ, 2^3 \times 5^2$

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72. By what number should $(-4)^5$ be divided so that the quotient may be equal to $(-4)^3$?

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73. Find 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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74. If $\frac{p}{q} = \left(\frac{3}{2}\right)^2 \div \left(\frac{9}{4}\right)^\circ$, find the value of $\left(\frac{p}{q}\right)^3$

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75. Find the reciprocal of the rational number $\left(\frac{1}{2}\right)^2 \div \left(\frac{2}{3}\right)^3$

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76. Find the value of :

7°

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77. Find the value of :

$7^7 \div 7^7$

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78. Find the value of :

$(-7)^{2\times7-6-8}$

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79. Find the value of :

$(2^\circ+3^\circ+4^\circ)(4^\circ-3^\circ-2^\circ)$

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80. Find the value of :

$2\times3\times4\div2^\circ\times3^\circ\times4^\circ$

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81. Find the value of :

$(8^\circ - 2^\circ) \times (8^\circ + 2^\circ)$

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82. Find the value of n, where n is an integer and $2^{n-5} \times 6^{2n-4} = \frac{1}{12^4 \times 2}$

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83. Express the following in usual form:

8.01×10^7

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84. Express the following in usual form:

1.75×10^{-3}

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85. Find the value of

2^5

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86. Find the value of

(-3^5)

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87. Find the value of

$(-4)^4$

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88. Express the following in exponential form:

$3 \times 3 \times 3 \times a \times a \times a \times a$

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89. Express the following in exponential form:

$a \times a \times b \times b \times b \times c \times c \times c \times c$

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90. Express the following in exponential form:

$s \times s \times t \times t \times s \times s \times t$

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91. How many times of 30 must be added together to get a sum equal to 30^7?

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92. Express each of the following numbers using exponential notations:

1024

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93. Express each of the following numbers using exponential notations:

1029

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94. Express each of the following numbers using exponential notations:

$\frac{144}{875}$

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95. Identify the greater number in each of the following

2^6 or 6^2

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96. Identify the greater number in each of the following

2^9 or 9^2

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97. Identify the greater number in each of the following

7.9×10^4 or 5.28×10^5

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98. Express each of the following as a product of powers of their prime factors:

9000

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99. Express each of the following as a product of powers of their prime factors:

2025

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100. Express each of the following as a product of powers of their prime factors:

800

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101. Express each of the following in single exponential form:

$2^3 \times 3^3$

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102. Express each of the following in single exponential form:

$2^4 \times 4^2$

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103. Express each of the following in single exponential form:

$5^2 \times 7^2$

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104. Express each of the following in single exponential form:

$(-5)^5 \times (-5)$

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105. Express each of the following in single exponential form:

$(-3)^3 \times (-10)^3$

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106. Express each of the following in single exponential form:

$(-11)^2 \times (-2)^2$

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107. Express the following numbers in standard form:

76,47,000

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108. Express the following numbers in standard form:

8,19,00,000

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109. Express the following numbers in standard form:

5,83,00,00,00,000

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110. Express the following numbers in standard form:

24 billion

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111. The speed of light in vacum is 3×10^8m/s. Sunlight takes about 8 minutes to reach the earth. Express distance of Sun from Earth in standard form.

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112. Simplify and express each of the following in exponential form:

$$\left[\left(\frac{3}{7}\right)^4 \times \left(\frac{3}{7}\right)^5\right] \div \left(\frac{3}{7}\right)^7$$

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113. Simplify and express each of the following in exponential form:

$$\left[\left(\frac{7}{11}\right)^5 \div \left(\frac{7}{11}\right)^2\right] \times \left(\frac{7}{11}\right)^2$$

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114. Simplify and express each of the following in exponential form:

$$\left(3^7 \div 3^5\right)^4$$

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115. Simplify and express each of the following in exponential form:

$$\left(\frac{a^6}{a^4}\right) \times a^5 \times a^\circ$$

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116. Simplify and express each of the following in exponential form:

$$\left[\left(\frac{3}{5}\right)^3 \times \left(\frac{3}{5}\right)^8\right] \div \left[\left(\frac{3}{5}\right)^2 \times \left(\frac{3}{5}\right)^4\right]$$

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117. Simplify and express each of the following in exponential form:

$$\left(5^{15} \div 5^{10}\right) \times 5^5$$

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118. Evaluate:

$$\frac{7^8 \times a^{10} b^7 c^{12}}{7^6 \times a^8 b^4 c^{12}}$$

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119. Evaluate:

$$\frac{5^4 \times 7^4 \times 2^7}{8 \times 49 \times 5^3}$$

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120. Evaluate:

$$\frac{125 \times 5^2 \times a^7}{10^3 \times a^4}$$

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121. Evaluate:

$$\frac{3^4 \times 12^3 \times 36}{2^5 \times 6^3}$$

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122. Evaluate:

$$\left(\frac{6 \times 10}{2^2 \times 5^3}\right)^2 \times \frac{25}{27}$$

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123. Evaluate:

$$\frac{15^4 \times 18^3}{3^3 \times 5^2 \times 12^2}$$

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124. Evaluate:

$$\frac{6^4 \times 9^2 \times 25^3}{3^2 \times 4^2 \times 15^6}$$

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125. Express the given information in Scientific notation (standard form) and then arrange them is ascending order of their size.

Sl.No.	Deserts of the World	Area (Sq. Kilometres)
1.	Kalahari, South Africa	932,400
2.	Thar, India	199,430
3.	Gibson, Australia	155,400
4.	Great Victoria, Australia	647,500
5.	Sahara, North Africa	8,598,800

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126. Express the given information in Scientific notation and then arrange them in descending order of their size.

Sl.No.	Name of the Planet	Mass (in kg)
1.	Mercury	330000000000000000000000
2.	Venus	4870000000000000000000000
3.	Earth	5980000000000000000000000
4.	Mars	642000000000000000000000
5.	Jupiter	1900000000000000000000000000
6.	Saturn	569000000000000000000000000
7.	Uranus	869000000000000000000000000
8.	Neptune	1020000000000000000000000000
9.	Pluto	13100000000000000000

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127. Write the number of seconds in scientific notaiton.

Sl. No.	Unit	Value in Seconds
1.	1 Minute	60
2.	1 Hour	3,600
3.	1 Day	86,400
4.	1 Month	2,600,000
5.	1 Year	32,000,000
6.	10 Years	3,20,000,000

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128. In our own planet Earth 361,419,000 square kilometre of area is covered with waer and 148,647,000 square kilometre of area is covered by land, find the approximate ratio of area covered with water to area covered by land by converting these numbers into scientific notation.

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129. If $2^{n+2} - 2^{n+2} - 2^{n+1} + 2^n = c \times 2^n$ find the value of c.

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130. A light year is the distance that light can travel in one year.

1 light year =9,460,000,000,000 km.

a. Express one light year in scientific notation.

b. The average distance between Earth and Sun is 1.496×10^8 km. Is the distance between Earth and the Sun greater than, less than or

equal to one light year?

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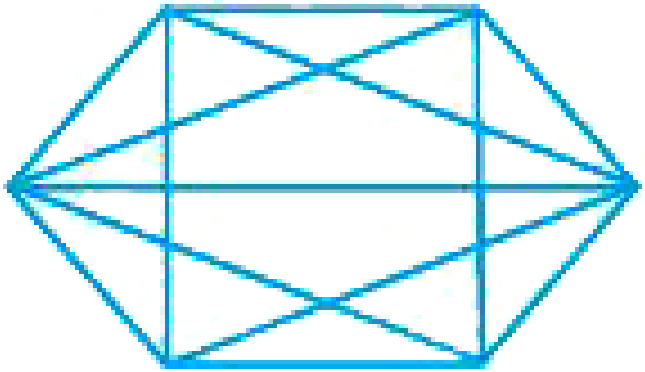
131. Geometry Application: The number of diagonals of n sided figure is $\frac{1}{2}(n^2 - 3n)$. Use the formula to find the number of diagonals for a 6 sided figure (hexagon).



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132. Life Science: Bacteria can divide in ever 20 minutes. So 1 bacterium can multiply to 2 in 20 minutes. 4 in 40 minutes, and so on. How many bacterial will there be in 6 hours? Write your answer using exponents, and then evaluate.

Most bacteria reproduce by a type of simple cell division known as binary fission. Each species reproduce best at a specific temperature and moisture level.

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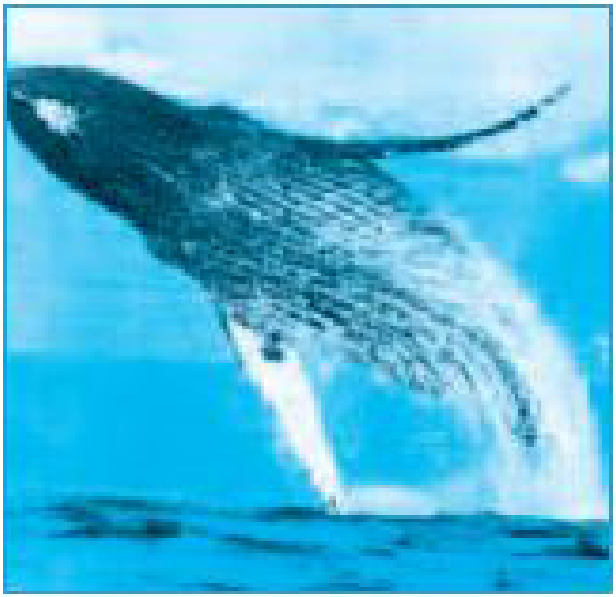
133. Blubber makes up 27 per cent of a blue whale's body weight. Deepak found the average weight of blue whales and used it to calculate the average weight of their blubber. He wrote the amount as $2^2 \times 3^2 \times 5 \times 17$kg. Evaluate this amount.



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134. Life Science Application: The major components of human blood are red blood cells, white blood cells, platelets and plasma. A typical

red blood cell has a diamter of approximately 7×10^{-6} metres. A typical platelet has a diameter of approximately 2.33×10^{-6} metre. Which has a greater diameter a red cell or a platelet?

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135. A googol is the number 1 followed by 100 zeros.

a. How is a googol written as a power?

b. How is a googol times a googol written as a power?

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136. What's the error?

A student said that $\frac{3^5}{9^5}$ is the same as $\frac{1}{3}$. What mistake has the student made?

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