



## MATHS

### BOOKS - MTG IIT JEE FOUNDATION

#### EXPONENTS AND POWERS

##### Illustrations

1. Find the value of  $11^2 + 12^2 + 13^2 + \dots + 20^2$ .

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2. Find the value of :

$5^5$

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3. Express the following in exponential form.

$$5 \times 5 \times 7 \times 7 \times 7$$



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4. Express the following in exponential form.

$$6 \times 6 \times 6 \times 6 \times 6 \times 6 \times 6$$



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5. Express the following in exponential form.

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



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6. Express the following in exponential form.

$$512$$



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7. Express the following in exponential form.

729



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8. Express the following in exponential form.

1296



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9. Which number is greater  $10^2$  or  $2^{10}$  ?



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10. Simplify:  $7^2 \times 2^2$



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11. Simplify:  $(-3)^2 \times 10^4$

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12. Simplify:  $(-4) \times (-2)^4$

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13. Simplify:  $(-5)^2 \times (-3)^3$

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14. Simplify and write the answer in exponential

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

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15. Simplify and write the answer in exponential

$$\left[ (2^3)^5 \times 5^7 \right] \times 3^5$$

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16. Simplify and write the answer in exponential  $(3^2 \times 3^4) \div 3^3$

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17. Simplify and write the answer in exponential

$$\frac{4^5 \times a^8 b^5}{4^4 \times a^5 b^2}$$

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18. Simplify and write the answer in exponential

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

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19. Simplify:  $(3^0 + 2^0)5^0$

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20. Simplify:  $(6^0 \div 7^0) \times (8^0 - 7^0)$

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21. Express 2345789 in standard form.

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22. Express each of the following numbers in standard form.

3908.78

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**23.** Express each of the following numbers in standard form.

5000000



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**24.** Express each of the following numbers in standard form.

31865000000



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**25.** Express each of the following numbers in standard form.

3908178



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**Solved Examples**

1. Express each of the following numbers as a product of powers of their prime factors. 432 (ii) 648 540



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2. Express each of the following as product of powers of their prime factors: (i) 648 (ii) 405 (iii) 540 (iv) 3,600



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3. Express each of the following as product of powers of their prime factors: (i) 648 (ii) 405 (iii) 540 (iv) 3,600



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4. Express the following as the power of a rational number.

$$\frac{16}{81}$$







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5. Express the following as the power of a rational number.

$$\frac{-32}{3125}$$



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6. Find the product of cube of  $\left(\frac{-3}{5}\right)$  and fourth power of  $\frac{2}{-3}$ .



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7. Find the value of 'a' if  $\left[(-3)^3\right]^5 = (-3)^{3a}$ .



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8. Find the value of p, if  $5^{2p+1} \div 25 = 125$ .



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9. Find the value of p in the following:

$$\left(\frac{15}{9}\right)^3 \div \left(\frac{5}{9}\right)^3 = 3^p$$



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10. Find the value of p in the following:

$$\left(\frac{4}{3}\right)^3 \div \left(\frac{-4}{3}\right)^3 = (-1)^{3p}$$



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11. Simplify :

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



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12. Simplify :

$$\left[ \frac{125}{27} \times \left( \frac{9}{25} \right)^3 \right] \div \left( \frac{3}{5} \right)^2$$



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13. Express  $6.022 \times 10^3$  as a whole number.



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14. Following are the distances between:

sun and saturn -  $1433500000000m$

saturn and uranus -  $1439000000000 m$

sun and earth -  $149600000000 m$

which of the three distances is the least ?



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15. A teacher asked the students to write  $3^5 \times 6^2$ , but they wrote 3562.

what is the numerical difference between the two ?

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16. If  $a = 2$  and  $b = 3$ , then find the value of

$$\left[ \frac{1}{a^b} + \frac{1}{b^a} \right].$$

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17. If  $9^3 \times 27^2 \times 81^2$  is equal to  $3^{2k}$ , then find  $k$ .

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18. If  $\frac{52}{x} = \frac{169}{144}$ , find the value of  $x$ .

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19. Evaluate :

$$\frac{625}{11} \times \frac{14}{25} \times \frac{11}{196}$$



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## Ncert Section Exercise 12.1

1. Find the value of :  $2^6$



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2. Find the value of :  $9^3$



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3. Find the value of: (i) 

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4. Find the value of  $5^4$

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5. Express the following in exponential form: (i)

  $6 \times 6 \times 6 \times 6 \times 6$  

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6. Express the following in exponential form :

$$t \times t$$

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7. Express the following in exponential form: (i)

  $6 \times 6 \times 6 \times 6 \times 6$  

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8. Express the following in exponential form :

$$5 \times 5 \times 7 \times 7 \times 7$$

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9. Express the following in exponential form: (i)

  $6 \times 6 \times 6 \times 6 \times 6 \times 6$  

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10. Express the following in exponential form :

$$a \times a \times a \times c \times c \times c \times c \times d$$

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11. Express the following numbers using exponential notation :

512

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**12.** Express each of the following numbers using exponential notation: (i)

512 (ii) 343 (iii) 729 (iv) 3125

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**13.** Express each of the following numbers using exponential notation: (i)

512 (ii) 343 (iii) 729 (iv) 3125

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**14.** Express each of the following numbers using exponential notation: (i)

512 (ii) 343 (iii) 729 (iv) 3125

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15. Identify the greater number, wherever possible, in each of the following ?

(i)  $4^3$  or  $3^4$

(ii)  $5^3$  or  $3^5$

(iii)  $2^8$  or  $8^2$

(iv)  $100^2$  or  $2^{100}$

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16. Identify the greater number, wherever possible, in each of the following?

(i)

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17. Identify the greater number in each of the following:  $5^3$  or  $3^5$  (ii)

$2^8$  or  $8^2$

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18. Identify the greater number, wherever possible, in each of the following?

(i)

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19. Identify the greater number in each of the following:  $2^{10}$  or  $10^2$  (ii)

$2^{100}$  or  $100^2$

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20. Express each of the following as product of powers of their prime factors: (i) 648 (ii) 405 (iii) 540 (iv) 3,600

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21. Express each of the following as product of powers of their prime factors: (i) 648 (ii) 405 (iii) 540 (iv) 3,600

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22. Express each of the following as product of powers of their prime factors: (i) 648 (ii) 405 (iii) 540 (iv) 3,600

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23. Express each of the following as product of powers of their prime factors: (i) 648 (ii) 405 (iii) 540 (iv) 3,600

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24. Simplify:  $2 \times 10^3$  (ii)  $7^2 \times 2^2$

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25. Simplify :  $7^2 \times 2^2$

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26. Simplify:  $2^3 \times 5$  (ii)  $0 \times 10^2$

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27. Simplify :  $3 \times 4^4$

 [Watch Video Solution](#)

28. Simplify :  $0 \times 10^2$

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29. Simplify:  $5^2 \times 3^3$  (ii)  $2^4 \times 3^2$

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30. Simplify :  $2^4 \times 3^2$

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31. Simplify:  $3^2 \times 10^4$  (ii)  $5^3 \times 2^4$

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32. Simplify :  $(-4)^3$

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33. Simplify:  $(-3) \times (-2)^3$  (ii)  $(-3)^2 \times (-5)^2$

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34. Simplify :  $(-3)^2 \times (-5)^2$



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35. Simplify :  $(-2)^3 \times (-10)^3$



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36. Compare the following numbers:

$2.7 \times 10^{10}$ ,  $1.5 \times 10^8$



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37. Compare the following numbers: (i)



$2.7 \times 10^{12}$ ;  $1.5 \times 10^8$



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1. Using laws of exponents, simplify and write the answer in exponential form: (i)   $3^2 \times 3^4 \times 3^8$  

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2. Using laws of exponents, simplify and write the answer in exponential form:  $6^{15} \div 6^{10}$  (ii)  $(5^3)^2$

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3. Using laws of exponents, simplify and write the answer in exponential form:

$$a^3 \times a^2$$

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4. Simplify and write the answer in exponential form:  $7^x \times 7^2$

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5. Using laws of exponents, simplify and write the answer in exponential form:

$$(5^2)^3 \div 5^3$$

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6. Using laws of exponents, simplify and write the answer in exponential form:

$$2^5 \times 5^5$$

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7. Using laws of exponents, simplify and write the answer in exponential form:

$$a^4 \times b^4$$

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8. Using laws of exponents, simplify and write the answer in exponential form:

$$(3^4)^3$$

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9. Using laws of exponents, simplify and write the answer in exponential form:  $a^4 \times b^4$  (ii)  $(2^{20} \div 2^{15}) \times 2^3$

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10. Using laws of exponents, simplify and write the answer in exponential form:

$$(8^t \div 8^2)$$

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

$$\frac{2^3 \times 3^4 \times 4}{3 \times 32}$$

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

$$\left[ (5^2)^3 \times 5^4 \right] \div 5^7$$

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

$$25^4 \div 5^3$$

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

$$\frac{3 \times 7^2 \times 11^8}{21 \times 11^3}$$



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

$$\frac{3^7}{3^4 \times 3^3}$$



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

$$2^0 + 3^0 + 4^0$$



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

$$2^0 \times 3^0 \times 4^0$$



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

$$(3^0 + 2^0) \times 5^0$$

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

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

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

$$\left(\frac{a^5}{a^3}\right) \times a^8$$

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

$$\frac{4^5 \times a^8 b^3}{4^5 \times a^5 b^2}$$



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

$$(2^3 \times 2)^2$$



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23. Say true or false and justify your answer:

$$10 \times 10^{11} = 100^{11}$$



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24. Say true or false and justify your answer:

$$2^3 > 5^2$$



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25. Say true or false and justify your answer:

$$2^3 \times 3^2 = 6^5$$

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26. Say true or false and justify your answer:

$$3^0 = (1000)^0$$

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27. Express each of the following as a product of prime factors only in exponential form:

$$108 \times 192$$

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**28.** Express each of the following as a product of prime factors only in exponential form:

270

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**29.** Express each of the following as a product of prime factors only in exponential form:

$729 \times 64$

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**30.** Express each of the following as a product of prime factors only in exponential form:

768



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31. Simplify:

$$\frac{(2^5)^2 \times 7^3}{8^3 \times 7}$$



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32.

Simplify:

(i)



$$\frac{\left(2^5\right)^2 \times 7^3}{8^3 \times 7}$$

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33. 
$$\frac{3^5 \times 10^5 \times 25}{5^7 \times 6^5}$$



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1. Write the following number in the expanded forms :

279404, 3006194, 2806196, 120719, 20068

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2. Find the number from each of the following expanded forms:

$$8 \times 10^4 + 6 \times 10^3 + 0 \times 10^2 + 4 \times 10^1 + 5 \times 10^0$$

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3. Find the number from each of the following expanded forms: (a)



$$8 \times 10^4 + 6 \times 10^3 + 0 \times 10^2 + 4 \times 10^1 + 5 \times 10^0$$



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4. Find the number from each of the following expanded forms:

$$3 \times 10^4 + 7 \times 10^2 + 5 \times 10^0$$



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5. Find the number from each of the following expanded forms:

$$9 \times 10^5 + 2 \times 10^2 + 3 \times 10^1$$



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6. Express the following numbers in standard form:

(i) 5,00,00,000

(ii) 70,00,000

(iii) 3,18,65,00,000

(iv) 3,90,878

(v) 39087.8

(vi) 3908.78



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7. Express the following numbers in standard form: (i) 5,00,00,000 (ii) 70,00,000 (iii) 3,18,65,00,000 (iv) 3,90,878 (v) 39087.8 (vi) 3908.78

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8. Express the following numbers in the standard form: 3,18,65,00,000 (ii)  $846 \times 10^7$   $723 \times 10^9$

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9. Express the following number in standard form:

3, 90, 878

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10. Express the following number in standard form:

39087.8



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11. Express the following number in standard form:

3908.78

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12. Express the number apperaring in the following statements in standard form.

The distance between Earth and Moon is 384, 000, 000 m.

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

Speed of light in vacuum is 3000, 000, 00m/s.

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**14.** Express the number appearing in the following statements in standard form.

Diameter of the Earth is 1, 27, 56, 00 m.

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**15.** Express the number appearing in the following statements in standard form.

Diameter of the sun is 1, 400, 000, 000 m.

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**16.** Express the number appearing in the following statements in standard form.

In a galaxy there are on an average 100, 000, 000, 000 stars.

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

The universe is estimated to be about 12, 000, 000, 000 years old.

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

The distance of the sun from the centre of the milky way galaxy is estimated to be 300, 000, 000, 000, 000, 000, 000 m

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

60, 230, 000, 000, 000, 000, 000, 000 molecules are contained in a drop of water weighting 1.8gm.

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

The earth has 1, 353, 000, 000 cubic km of sea water.

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

The population of india was about 1, 027, 000, 000 in march, 2001.

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### Exercise Multiple Choice Question Level I

1. If  $2^{x-1} + 2^{x+1} = 1280$ , then find the value of  $x$

A. 8

B. 9

C. 10

D. 6

**Answer: B**



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2. Find the value of  $4^3 + \frac{1}{4^3}$

A.  $\frac{4043}{64}$

B.  $\frac{2049}{64}$

C.  $\frac{4097}{64}$

D.  $\frac{2093}{64}$

**Answer: C**



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3. Find the value of  $\left[(10)^{150} \div (10)^{146}\right]$ .

A. 1000

B. 10000

C. 100000

D.  $10^6$

**Answer: B**



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4.  $(2.4 \times 10^3) \div (8 \times 10^2) = ?$

A.  $3 \times 10^2$

B. 3

C.  $3 \times 10^5$

D. 30

**Answer: B**



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5.  $(1000)^7 \div 10^{18} = ?$

A. 10

B. 100

C. 1000

D. 10000

**Answer: C**



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6. If  $3^6 \times 9^2 = 3^n \times 3^2$ , then value of n is

A. 8

B. 12

C. 6

D. 5

**Answer: A**



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7. If  $\frac{9^n \times 3^5 \times (27)^3}{3 \times (81)^4} = 27$ , then the value of n is

A. 0

B. 2

C. 3

D. 4

**Answer: C**



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8. If  $5^a = 3125$ , then the value of  $5^{(a-3)}$  is 25 b. 125 c. 625 d. 1625

A. 25

B. 125

C. 625

D. 1625

**Answer: A**



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9. If  $\left( \frac{1}{(-7)^3} \div \frac{1}{7^8} \right) \div x = 1$ , then the value of  $x$  is

A.  $-5^7$

B.  $5^7$

C.  $-7^5$

D.  $7^5$

**Answer: C**



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10. If  $2^{2n-1} = \frac{1}{8^{n-3}}$ , then the value of  $n$  is – 2 b. 2 c. 0 d. 3

A. 3

B. 2

C. 0

D. – 2

**Answer: B**



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11.  $\frac{4^5 \times 3^5}{(12)^5 \times 9^2} = ?$

A.  $3^2 \times 2^5$

B.  $\frac{1}{3^4}$

C. 12

D.  $\frac{1}{4^3}$

**Answer: B**

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12. Assuming that  $x$  is a positive real number and  $a$ ,  $b$ ,  $c$  are rational

numbers, show that:  $\left(\frac{x^b}{x^c}\right)^a \left(\frac{x^c}{x^a}\right)^b \left(\frac{x^a}{x^b}\right)^c = 1$

A.  $x^{abc}$

B. 1

C.  $x^{ab+bc+ca}$

D.  $x^{a+b+c}$

**Answer: B**

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13. Differentiate  $\left(\frac{x^a}{x^b}\right)^{a+b} \cdot \left(\frac{x^b}{x^c}\right)^{b+c} \cdot \left(\frac{x^c}{x^a}\right)^{c+a}$  with respect to  $x$ .

A. 0

B.  $x^{abc}$

C.  $x^{a+b+c}$

D. 1

**Answer: D**



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14. The value of  $(8^{-25} - 8^{-26})$  is  $7 \times 8^{-25}$  b.  $7 \times 8^{-26}$  c.  $8 \times 8^{-26}$  d. none

of these

A.  $\frac{7}{8^{25}}$

B.  $\frac{7}{8^{26}}$

C.  $\frac{8}{8^{26}}$

D.  $\frac{8}{8^{25}}$

**Answer: B**



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15.  $49 \times 49 \times 49 \times 49 = 7^?$  a. 4 b. 7 c. 8 d. 16

A. 4

B. 7

C. 8

D. 16

**Answer: C**



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16. Number of prime factors is  $\frac{6^{12} \times (35)^{28} \times (15)^{16}}{(14)^{14} \times (21)^{21}}$  is 56 b. 66 c. 112 d.

none of these

A.  $2^6 \times 3^{16} \times 5^{12}$

B.  $3^{17} \times 5^{16} \times 7^5$

C.  $2^6 \times 5^{16} \times 7^{12}$

D.  $2^7 \times 3^{17} \times 7^5$

**Answer: B**



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17. If  $5^{(x+3)} = 25^{(3x-4)}$ , then the value of  $x$  is  $\frac{5}{11}$  b.  $\frac{11}{5}$  c.  $\frac{11}{3}$  d.  $\frac{13}{5}$

A.  $\frac{5}{11}$

B.  $\frac{11}{5}$

C.  $\frac{11}{3}$

D.  $\frac{13}{5}$

**Answer: B**



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18. If  $2^{n-1} + 2^{n+1} = 3$ , then  $n$  is equal to 0 b. 2 c.  $-2$  d.  $-1$

A. 0

B. 2

C.  $-1$

D.  $-2$

**Answer: D**



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19. If  $3^x - 3^{x-1} = 18$ , then the value of  $x^x$  is

A. 3

B. 8

C. 27

D. 216

**Answer: C**

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

A.  $\frac{27}{2}$

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

C.  $\frac{2}{27}$

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

**Answer: A**



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21. By what number should  $\left(\frac{3}{5}\right)^2$  be multiplied so that the product is  $\frac{3}{7}$  ?

A.  $\frac{25}{9}$

B.  $(25)/(21)$

C.  $(25)/(7)$

D.  $\frac{25}{3}$

Answer: B



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22. Find the value of x so that  $5^{2x} \times 5^3 = 5^6$ .

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

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

C. 3

D. 6

**Answer: A**



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23. Find the value of  $x$ , if  $\frac{2^{x-1} \cdot 4^{2x+1}}{8^{x-1}} = 64$ .

A. 1

B. 2

C. 3

D. 4

**Answer: A**



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24. If  $800 \times (x^3)^2 = 8 \times 10^8$ , then  $x =$

A. 6

B. 4

C. 3

D. 10

**Answer: D**



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25. Express  $32 \times 10000000$  in standard form.

A.  $3.2 \times 10^7$

B.  $32 \times 10^8$

C.  $3.2 \times 10^8$

D.  $32 \times 10^7$

**Answer: C**



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**26.** Usual form of  $-4.8 \times 10^8$  is

A.  $-4, 80, 00, 00, 000$

B.  $-48, 00, 00, 000$

C.  $-0.000000048$

D.  $-480$

**Answer: B**



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**27.** Simplify :  $7^{16} \times 7^5 \times \left(\frac{1}{7}\right)^{11}$

A.  $7^{32}$

B.  $7^{10}$

C.  $7^{21}$

D.  $7^{16}$

**Answer: B**

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28. If  $[5^9 \times 5^3] \div [5^{15} \div 5^3] = 5^m$ , then find the value of m.

A. 24

B. -6

C. 0

D. 12

**Answer: C**

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29. If  $\frac{x}{y} = \left(\frac{2}{3}\right)^3 \div \left(\frac{3}{2}\right)^2$ , then the value of  $\left(\frac{x}{y}\right)^3$  is

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

B.  $\left(\frac{2}{3}\right)^{15}$

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

D. 1

**Answer: B**

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30. Find the value of  $\left[\left\{\left(\frac{-3}{8}\right)^2\right\}^0\right]^7$ .

A. 0

B. 1

C.  $\left(\frac{-3}{8}\right)^{14}$

D.  $\left(\frac{-3}{8}\right)^9$

**Answer: B**

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31. Find the value of  $\frac{3^0 \times 4^0 + 2^0 \times 3^0}{16^0}$ .

A. 0

B. 1

C. 2

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

**Answer: C**

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32. Find 'a' such that  $\left(\frac{6}{7}\right)^a \times \left(\frac{6}{7}\right)^{3a} = \frac{1296}{2401}$ .

A. 4

B. 1

C. 0

D. 5

**Answer: B**

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33. Find the value of t, if  $\frac{9^0 \times 5^0 \times 7^0}{(-1)^{23} \times (-1)^5} = 7^t$ .

A. 1

B. 0

C. 28

D.  $7^2$

**Answer: B**

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34. If  $x = \left(\frac{2}{3}\right)^4 \div \left(\frac{2}{3}\right)^2$ , find the value of  $x^5$ .

A.  $\left(\frac{2}{3}\right)^{11}$

B.  $\left(\frac{2}{3}\right)^{10}$

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

D. 1

**Answer: B**



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35. What is the value of  $x$ , if  $64 \times (512)^2 = x^8$ ?

A. 5

B. 7

C. 2

D. 8

**Answer: D**



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## Exercise Multiple Choice Question Level II

1. Simplify :

$$\left(\frac{x^a}{x^b}\right)^4 \times \left(\frac{x^b}{x^c}\right)^3 \times \left(\frac{x^c}{x^a}\right)^2$$

A. 0

B.  $x$

C. 1

D.  $x^{2a-b-c}$

**Answer: D**



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2. Find the value of  $\frac{3^n \times 3^{2n+1}}{9^n \times 3^{n-1}}$ .

A. 8

B. 1

C. 27

D. 9

**Answer: D**



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3.  $\frac{2^{n+4} - 2 \times 2^{-n}}{2 \times 2^{(n+3)}} + 2^{-3}$  is equal to  $2^{n+1}$  b.  $\left(\frac{9}{8} - 2^n\right)$  c.  $\left(-2^{n+1} + \frac{1}{8}\right)$  d. 1

A.  $2^{n+1}$

B.  $\left(\frac{9}{8} - 2^n\right)$

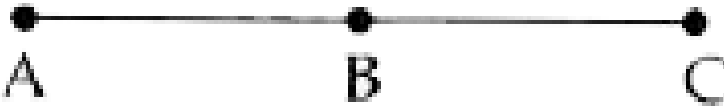
C.  $1/8$

D. 1

**Answer: D**

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4. There are three places, A, B, C in a straight line as shown below. If distance between place A and B is  $2.4 \times 10^6$  m and distance between B and C is  $5.2 \times 10^5$  m, then find the distance between place A and C in standard form.



A.  $292 \times 10^6 km$

B.  $2.92 \times 10^6 m$

C.  $292 \times 10^4 km$

D.  $2.92 \times 10^4 m$

**Answer: B**

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5. Length and width of a rectangular garden are 10200 m and 42000 m respectively. Find the perimeter of garden in standard form.

A.  $288 \times 10^5 km$

B.  $288 \times 10^3 km$

C.  $2.88 \times 10^3 m$

D.  $2.88 \times 10^5 m$

**Answer: D**



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6. which of the following is not equal to  $\left(\frac{-3}{4}\right)^4$ ?

A.  $\frac{(-3)^4}{4^4}$

B.  $\frac{3^4}{(-4)^4}$



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

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

**Answer: C**

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7. Which of the following is incorrect ?

A.  $3^2 \times 4^2 > 2^3 \times 2^4$

B.  $7^2 < 2^7$

C.  $(285)^0 < (-3)^2$

D.  $(-1)^{27} > (-1)^{14}$

**Answer: D**

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8. Which of the following is in the standard form ?

A.  $5.5 \times 10^3$

B.  $0.05 \times 10^3$

C. 5500

D.  $550 \times 10^2$

**Answer: A**



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9. Find m, if  $\left(\frac{3}{7}\right)^9 \div \left(\frac{3}{7}\right)^5 = \left(\frac{3}{7}\right)^{\frac{3m+2}{m-2}}$

A. 4

B. 10

C. -4

D. 15

**Answer: B**

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10. The product of exponential form of prime factors of 1125 is

A.  $(-3)^2 \times 5^3$

B.  $3^2 \times (-5)^2$

C.  $(-3)^2 \times (-5)^3$

D.  $3 \times 3 \times (-5) \times (-5)$

**Answer: A**

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11. Find the value of  $m$ , if  $\frac{(9^0 + 7^0) \times (9 + 7)}{5^0 + 3^0 + 9^0 + 7^0} = \frac{2^{5m+4}}{(2^2)^{2m+1}}$

A. 1

B. 4

C. 3

D.  $-5$

**Answer: A**

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12. Find the value of  $(3x)^{215}$ , if  $x = -1/3$ .

A. 1

B.  $-1$

C. 215

D. 645

**Answer: B**

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13.  $3^{18} + 3^{15}$  is divisible by

A. 31

B. 13

C. 28

D. 33

**Answer: C**



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14. The value of  $x$ , if  $5^x + 5^x + 5^x = 1875$ , is

A. 5

B. 4

C. 6

D. None of these

**Answer: B**



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15. If  $m^n \cdot n^m = 5184$ , then the value of  $m + n$  is

A. 5

B. 7

C. 4

D. 8

**Answer: B**



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**Exercise Matching**

1. Match the following :

**List-I**

(P) Find  $x$ , if  $\left(\frac{5}{4}\right)^5 \times \left(\frac{5}{4}\right)^{11} = \left(\frac{5}{4}\right)^{4x}$

(Q) Find  $x$ , if  $\left(\frac{2}{5}\right)^3 \times \left(\frac{2}{5}\right)^7 = \left(\frac{2}{5}\right)^{x-1}$

(R) Find  $x$ , if  $7776 \times 6^x = 6^7$

(S) Find  $x$ , if  $729 \times 81 = x^{10}$

**List-II**

(1) 2

(2) 3

(3) 11

(4) 4

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

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

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

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

**Answer: B**



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2. Match the following :

**List-I**

(P) Simplify :  $\frac{3^0 + 4^0 + 5^0}{3^1 + 4^1 + 5^1}$

(Q) Simplify :  $\left(\frac{-1}{4}\right)^4 + \left(\frac{-1}{2}\right)^5$

(R) Simplify :  $\frac{5 \times 10^4 + 3 \times 10^2}{10^4}$

(S) Simplify :  $\left(\frac{-1}{6}\right)^{3 \times 15 - 9 \times 5}$

**List-II**

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

(2)  $\frac{503}{100}$

(3) 1

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

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

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

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

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

**Answer: D**



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## Exercise Assertion And Reason Type

1. Evaluate:  $(1^0 + 2^0 + 3^0) \times (10^0) + 6^0 \left( \frac{3^0 - 4^0}{5^0} \right)$

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2. Evaluate:  $\frac{4^3 \times 216}{(24)^2 \times 6^2}$

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3. Find x if,  $(-2)^{19} \div \left( \frac{-1}{2} \right)^8 = (-2)^{2x+1}$

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

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5.

Assertion:

$$\left(\frac{-10}{3}\right) \times \left(\frac{-10}{3}\right) \times \left(\frac{-10}{3}\right) \times \left(\frac{-10}{3}\right) \times \left(\frac{-10}{3}\right) \times \left(\frac{-10}{3}\right) \times \left(\frac{-10}{3}\right) \times \left(\frac{-10}{3}\right)$$

Reason : Any number  $a$  can be written as,  $a = m \times 10^n$  in standard form, where  $m$  lies between 1 and 10 (including 1) and  $n$  is any integer.

- 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: B

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1. Express in standard form: 600, 000, 000, 000, 000, 000

A.  $60 \times 10^{20}$

B.  $6 \times 10^{20}$

C.  $6 \times 10^{21}$

D.  $6 \times 10^{18}$

**Answer: B**



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2. Express in standard form : 150, 000, 000, 000

A.  $1.5 \times 10^{11}$

B.  $15 \times 10^{11}$

C.  $15 \times 10^9$

D.  $150 \times 10^8$

**Answer: A**



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**3. Express the number in standard form 1, 353,000,000**

A.  $1.3 \times 10^8$

B.  $1.353 \times 10^7$

C.  $1.353 \times 10^8$

D.  $1.353 \times 10^9$

**Answer: D**



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## Exercise Comprehension Type Passage li

1. Simplify :  $\frac{25 \times 216 \times 729}{6^6 \times 5^5 \times 9^4}$

A.  $\frac{1}{(30)^7(9)^8}$

B.  $\frac{1}{(5)^6(6)^9(9)^7}$

C.  $\frac{1}{(5)^2(6)^3(9)^3}$

D.  $\frac{1}{(30)^3 \times 9}$

Answer: D

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2. Simplify:  $\left( \left( \frac{6}{5} \right)^2 \times x^8 \times y^7 \right) \div \left( 2^{10} \times \left( \frac{x}{3} \right)^4 \times \left( \frac{y}{3} \right)^3 \right)$

A.  $\frac{3^9}{5^2 \times 2^8} (xy)^4$

B.  $\frac{5^2 \times 2^5}{3^9} (xy)^4$

C.  $\left( \frac{3}{10} \right)^4 (xy)^4$

D.  $\frac{3^9}{5^2 \times 2^8} x^{12} y^8$

Answer: A

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3. Find the value of  $(2^3 + 3^3 + 4^3) \times \frac{1}{(24)^6}$ .

A.  $\frac{1}{(24)^3}$

B.  $\left(\frac{11}{3^6}\right)$

C.  $\frac{11}{3^4 \times 8^6}$

D.  $\frac{33}{(24)^6}$

**Answer: C**

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### Exercise Very Short Answer Type

1. What is the product of the square of  $\frac{1}{3}$  and cube of  $\frac{1}{2}$  ?

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2. What is the value of  $\left(\frac{2}{3}\right)^2$ ?

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3. What is the numerical coefficient of  $x^5$  in  $(3x^2) \times (-4x^3)$ ?

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4. What is the value of  $(9^0 + 2^0) \times (9^0 - 2^0)$ ?

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5. If  $\frac{x}{y} = \left(\frac{2}{5}\right)^2 + \left(\frac{2}{5}\right)^0$ , then find  $\left(\frac{x}{y}\right)^2$ .

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6. (i) The height of Mount Everest is  $8848m$ . Write it in standard form.
- (ii) The speed of light is  $300000000m/sec$ . Express it in standard form.
- (iii) The distance from the earth to the sun is  $149600000000m$ . Write it in standard form.

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7. Simplify:  $(-6)^2 \div (-6)^2$

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8. What is the value of  $x$ , if  $\left(-\frac{1}{2}\right)^4 \times (-2)^8 = (-2)^{4x}$ ?

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9. What is the value of  $x$ , if  $5^{4x} = (625)^6$ ?

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10. Simplify :  $343 \times 2^3 \div (14)^3$

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### Exercise Short Answer Type

1. Simplify :  $\frac{(243)^3 \times (243)^7}{7^5 \times (49)^5 \times (343)^2}$

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2. Simplify :  $\frac{\left(\frac{-5}{2}\right)^7 \div \left(\frac{-5}{2}\right)^3}{\left(\frac{4}{7}\right)^4 \div \left(\frac{4}{7}\right)^3}$

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3. Simplify and express as the power 3,  $(2^4 \times 2^5 \div 2^9) \times (729)^2$ .



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4. What is the value of  $\frac{(4)^4 + (2)^4 + (3)^4}{(4)^2 + (2)^2 + (3)^2}$ ?



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5. Find x, if  $\left(\frac{3}{4}\right)^{5+2x} \times \left(\frac{3}{4}\right)^{11-x} = \left(\frac{3}{4}\right)^{8x-5}$



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6. Find m, if  $\left(\frac{2}{9}\right)^6 \div \left(\frac{2}{9}\right)^3 = \left(\frac{2}{9}\right)^{\frac{m-1}{m+1}}$



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7. Simplify:  $\left(\frac{3}{5}\right)^5 \times \left(\frac{3}{5}\right)^6 \div \left(\frac{3}{5}\right)^3$ .



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8. Simplify :  $(216)^3 \times (2500)^2 \times (300)$

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9. Simplify :  $5 \times 10^6 + 4 \times 10^3 + 5 \times 10^2 \times \frac{1}{10}$

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

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## Exercise Long Answer Type

1. Perimeter of a rectangular garden is  $1.2 \times 10^5 m$  and length  $0.2 \times 10^5 m$ . Find the area of the garden in

standard form.

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2. Find the value of  $4.09 \times 10^7 + 2800000 + 3.2 \times 10^6 + 980000$  and express in standard form.

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3. If  $\left(\frac{9}{4}\right)^x \frac{8}{27}^{x-1} = \frac{2}{3}$ , then the value of  $x$  is 1 b. 2 c. 3 d. 4

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

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5. Simplify:  $\frac{3^2}{2^2} + \frac{\left(\frac{1}{16} \times \frac{1}{8}\right)^2}{\left(\frac{1}{4}\right)^3 \div \left(\frac{1}{2}\right)^3}$

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## Exercise Integer Numerical Value Type

1. What is the value of  $(-1)^{150}$ ?

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2. If  $3^6 = 3^{x-2}$ , then find x.

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3. What is the value of x, if  $2^{x+5} = 512$ ?

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4. What is the value of  $y$ , if  $(10)^y = 10000000$ ?

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5. What is the value of  $x$  so that  $3^x$  is 5 more than  $2^2$ ?

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6. Find  $x^x$ , if  $\frac{64}{27} = \left(\frac{4}{3}\right)^x$ .

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7. What is the value of  $\frac{1}{90^0} \times \frac{1}{999^0}$ ?

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8. Find x, if  $10^6 \div 100^2 = 10^{2x}$ .

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9. If  $(729)^2 = 9^x$ , then find 5x.

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10. What is the value of  $\left[ \frac{7}{(4/3)^0} \right]^3$  ?

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## Olympiad Hots Corner

1. The value of  $\frac{((243)^5)^4}{((32)^4)^5}$  is

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

B.  $\left(\frac{3}{2}\right)^{100}$

C.  $\frac{1}{2^3 \times 3^3}$

D.  $\frac{1}{2^4 \times 3^4}$

**Answer: B**

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2. Perimeter of a rectangular garden is  $2.2 \times 10^8$  km. Find the area of the garden in standard form.

A.  $8 \times 10^6 km^2$

B.  $2.8 \times 10^{15} km^2$

C.  $80 \times 10^8 km^2$

D.  $28 \times 10^{14} km^2$

**Answer: B**





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3. Which of the following statements is correct?

Statement I , If  $\left(\frac{5}{4}\right)^5 \times \left(\frac{5}{4}\right)^{11} = \left(\frac{5}{4}\right)^{8x}$  , then  $x = 2$ .

Statement II : If  $\left(\frac{2}{5}\right)^3 \times \left(\frac{2}{5}\right)^7 = \left(\frac{2}{5}\right)^{x-1}$  . Then  $x = 11$ .

- A. Only statement I
- B. Only statement II
- C. Both statement I and Statement II
- D. Neither statement I nor statement II

**Answer: C**



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4. Simplify :  $\frac{2p^{-8} \times 8q^{-4}}{2p^{-11} \times 8q^{-5}}$

- A.  $2^5$

B.  $2^6$

C.  $2^3$

D.  $2^4$

**Answer: B**



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5. A rectangular piece of land is to be sold off in smaller pieces. The total area of the land is  $2^{17}$  sq. miles. The pieces to be cut out as  $16^2$  sq. miles in size. How many smaller pieces of the land can be sold at the given size?

A.  $2^{15}$

B.  $16^4$

C.  $2^9$

D. None of these

**Answer: C**

6. Match the following.

**Column-I**

**Column-II**

(P) If  $2700 \times x^6 = 27 \times 10^8$ , then  $x =$  (1) 6

(Q) If  $pqr = 0$ , then  $\frac{\left(\left(x^p\right)^r\right)^{2q}}{x^{pqr}} =$  (2)  $\frac{1}{225}$

(R)  $\frac{2 \times 2^{n+3}}{2^{n+4} - 2^3 \times 2^n} + 2^2$  is equal to (3) 10

(S)  $\frac{(3^2)^5 \times (5^3)^4 \times (7^4)^5}{(7^2)^{10} \times (3^4)^3 \times (5^7)^2}$  (4) 1

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

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

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

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

**Answer: D**

7. Which of the following option is not correct?

A.  $16^2 \div 4^3 = 2^2$

B.  $3^2 \times 27 = 3^5$

C.  $[(-2)^2]^m = 4^m$

D.  $4^0 + 4^1 + 4^2 = 20$

**Answer: D**



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8. Match the following.

**Column-I**

**Column-II**

$$(P) \frac{3^4}{(3^0 + 7^0)^4} =$$

$$(1) 1$$

$$(Q) \left[ \left( \frac{3}{7} \right)^9 \div \left( \frac{3}{7} \right)^5 \right] \times \frac{7}{3} =$$

$$(2) 3^9$$

$$(R) \left( \left( \left( \frac{3}{7} \right)^9 \right)^0 \right)^{10} =$$

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

$$(S) \frac{(3^3)^3 \times 3^3 \times 7^3}{27 \times 343} =$$

$$(4) \left( \frac{3}{7} \right)^3$$

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

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

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

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

**Answer: B**

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9. If  $\frac{3^{2x-6}}{225} = \frac{5^2}{5^x}$ . Then the value of 'x' will be

A. 4

B. 2

C. 5

D. None of these

**Answer: A**



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10. What is value of  $\frac{(a^{10})^3}{(a^6)^5}$ ?

A. a

B.  $a^2$

C. 1

D.  $1/a$

**Answer: C**

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11. If  $\frac{32}{500} = \frac{(2)^3}{(5)^m}$ , then the value of m is

A. 2

B. 3

C. 4

D. 0

**Answer: B**

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12. The value of  $\frac{\left(\frac{2}{5}\right)^3 \times \left(\frac{1}{7}\right)^3}{\left(\frac{2}{5}\right)^2 \times \left(\frac{1}{7}\right)^4}$  is

A.  $\frac{2}{35}$

B.  $\frac{5}{14}$

C.  $14\frac{1}{2}$

D.  $2\frac{4}{5}$

**Answer: D**

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13. Find the value of  $x$ , if  $x^3 = \frac{125}{343}$ .

A. 1

B.  $\frac{7}{5}$

C.  $\frac{5}{7}$

D. 0

**Answer: C**

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14. If  $\frac{5^8 \times 6^7}{(25)^3 \times 6^4} = (3125)^b \times a^3$ , then find the value of  $a + b$ .

A.  $\frac{25}{3}$

B.  $\frac{3}{5}$

C.  $6\frac{2}{5}$

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

**Answer: C**



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15. Simplify and write as product of exponential form of primes ,

$$(20^{16} + 20^{13}) \times 20^3$$

A.  $2^{12 \times 5^6}$

B.  $2^6 \times 5^6$

C.  $20^6$

D. None of these

**Answer: D**



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