



MATHS

BOOKS - NAND LAL PUBLICATION

EXPONENTS AND POWERS

Try These

1. Write 172, 5642 and 6374 in an expanded form.



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2. Find five more such examples where a number is expressed in exponential form. Also identify the base and the exponent in each

case.

$$2^5$$



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3. Find five more such examples where a number is expressed in exponential form. Also identify the base and the exponent in each case.

$$4^3$$



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4. Find five more such examples where a number is expressed in exponential form. Also identify the base and the exponent in each case.

$$5^2$$



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5. Find five more such examples where a number is expressed in exponential form. Also identify the base and the exponent in each case.

$$8^3$$



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6. Find five more such examples where a number is expressed in exponential form. Also identify the base and the exponent in each case.

$$7^5$$



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7. Express

729 as a power of 3.

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8. Express

128 as a power of 2.

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9. Express

343 as a power of 7.

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10. Simplify and write in exponential form

$$2^5 \times 2^3$$



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11. Simplify and write in exponential form

$$p^3 \times p^2$$



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12. Simplify and write in exponential form

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



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13. Simplify and write in exponential form

$$a^3 \times a^2 \times a^7$$

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14. Simplify and write in exponential form

$$5^3 \times 5^7 \times 5^{12}$$

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15. Simplify and write in exponential form

$$(-4)^{100} \times (-4)^{20}$$

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16. Simplify and write in exponential form : (eg. : $11^5 \div 11^2 = 11^3$)

$$2^9 \div 2^3$$

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17. Simplify and write in exponential form : (eg. : $11^5 \div 11^2 = 11^3$)

$$10^8 \div 10^4$$

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18. Simplify and write in exponential form : (eg. : $11^5 \div 11^2 = 11^3$)

$$9^{11} \div 9^7$$

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19. Simplify and write in exponential form : (eg. : $11^5 \div 11^2 = 11^3$)

$$20^{15} \div 20^{13}$$

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20. Simplify and write in exponential form : (eg. : $11^5 \div 11^2 = 11^3$)

$$7^{13} \div 7^{10}$$

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21. Simplify and write the answer in exponential form

$$(6^2)^4$$

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22. Simplify and write the answer in exponential form

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



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23. Simplify and write the answer in exponential form

$$(7^{50})^2$$



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24. Simplify and write the answer in exponential form

$$(5^3)^7$$



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25. Put into another form using $a^m \times b^m = (ab)^m$

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

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26. Put into another form using $a^m \times b^m = (ab)^m$

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

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27. Put into another form using $a^m \times b^m = (ab)^m$

$$a^2 \times t^2$$

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28. Put into another form using $a^m \times b^m = (ab)^m$

$$5^6 \times (-2)^6$$



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29. Put into another form using $a^m \times b^m = (ab)^m$

$$(-2)^4 \times (-3)^4$$



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30. Put into another form using $a^m \div b^m = \left(\frac{a}{b}\right)^m$

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



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31. Put into another form using $a^m \div b^m = \left(\frac{a}{b}\right)^m$

$$2^5 \div b^5$$

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32. Put into another form using $a^m \div b^m = \left(\frac{a}{b}\right)^m$

$$(-2)^3 \div (b)^3$$

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33. Put into another form using $a^m \div b^m = \left(\frac{a}{b}\right)^m$

$$p^4 \div q^4$$

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34. Put into another form using $a^m \div b^m = \left(\frac{a}{b}\right)^m$

$$5^6 \div (-2)^6$$



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35. Expand by expressing powers of 10 in the exponential form :

172



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36. Expand by expressing powers of 10 in the exponential form :

5643



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37. Expand by expressing powers of 10 in the exponential form :

56439

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38. Expand by expressing powers of 10 in the exponential form :

176428

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39. The distance between the sun and the Saturn in

1433500000000 m or $1.4335 \times 10^{12}m$

The distance between Saturn and Uranus is 1439000000000 m or

$1.439 \times 10^{12}m$

The distance between the sun and the earth is 149600000000 m

or $1.496 \times 10^{11} m$

Can you tell which of the three distances is smallest?

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Exercise 13 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:

$$11^2$$

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4. Find the value of:

$$5^4$$

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5. Express the following in exponential form:

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

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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:

$$b \times b \times b \times b$$

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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:

$$2 \times 2 \times a \times a$$

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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 each of the following numbers using exponential notation:

$$512$$

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12. Express each of the following numbers using exponential notation:

343

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13. Express each of the following numbers using exponential notation:

729

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14. Express each of the following numbers using exponential notation:

3125

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

$$4^3 \text{ or } 3^4$$



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

$$5^3 \text{ or } 3^5$$



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

$$2^8 \text{ or } 8^2$$



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

$$100^2 \text{ or } 2^{100}$$



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

$$2^{10} \text{ or } 10^2$$



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

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21. Express each of the following as product of powers of their prime factors.

405

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

540

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

3,600

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24. Simplify:

2×10^3

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25. Simplify:

$7^2 \times 2^2$

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26. Simplify:

$$2^3 \times 5$$

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27. Simplify :

$$3 \times 4^4$$

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28. Simplify:

$$0 \times 10^2$$

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29. Simplify:

$$5^2 \times 3^3$$



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30. Simplify:

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



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31. Simplify :

$$3^2 \times 10^4$$



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32. Simplify:

$$(-4)^3$$

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33. Simplify:

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

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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

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



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37. Compare the following numbers

$$4 \times 10^{14}, 3 \times 10^{17}$$



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

$$3^2 \times 3^4 \times 3^8$$

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

$$6^{15} \div 6^{10}$$

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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. Using laws of exponents, 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:

$$(2^{20} \div 2^{15}) \times 2^3$$

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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:

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



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

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



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

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

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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 :

$$2^3 > 3^2$$

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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:

$$\frac{25 \times 5^2 \times t^8}{10^3 \times t^4}$$

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

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Exercise 13 3

1. Write the following numbers in expanded forms :

279404

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2. Write the following numbers in expanded forms :

3006194

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3. Write the following numbers in expanded forms :

2806196



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4. Write the following numbers in expanded forms :

120719



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5. Write the following numbers in expanded forms :

20068



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6. 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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7. Find the number from each of the following expanded forms:

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

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8. 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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9. 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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10. Express the following numbers in standard form:

5,00,00,000

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11. Express the following numbers in standard form:

70,00,000

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12. Express the following numbers in standard form:

3,18,65,00,000



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13. Express the following numbers in standard form:

3,90,878



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14. Express the following numbers in standard form:

39087.8



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15. Express the following numbers in standard form:

3908.78

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

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

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

Speed of light in vacuum is 300,000,000 m/s .

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

Diameter of the Earth is 1,27,56,000 m.

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19. 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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20. 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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21. 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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22. 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 m

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23. 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 weighing 1.8 gm

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24. 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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25. 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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Additional Questions For Practice Objective Type Questions Fill In The Blanks

1. The usual form of 6.92×10^{-3} is _

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2. $2^3 \div 2^1 = 2^x$ then the value of x is _.

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3. $\left(-\frac{1}{3}\right)^0 + (-3)^0$ is equal to _.

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4. $(1000)^0 = 10^n$ then the value of n is _.

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5. The expression $(x^3y^4)^2$ in the simplest form is _

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6. If base is 4 and exponent is -3 , then exponential form is _

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Additional Questions For Practice Objective Type Questions State Whether True Or False

1. Scientific notation for 0.00123 is

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2. The number for the expansion $3 \times 10^7 + 2 \times 10^2 + 5 \times 10^1$

3000025.

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3. The value of $(-3)^{-2}$ is $\frac{-1}{9}$

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4. $2^0 \times 4^0 = 8^0$

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5. The value of $(-1)^n = -1$ if n is odd

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



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Additional Questions For Practice Objective Type Questions

1. Match the following

- | | | |
|----------------------|---|------------------------------|
| (a) $a^m \times b^m$ | - | a^{m-n} |
| (b) $a^m + a^n$ | - | a^{m+n} |
| (c) $(a^m)^n$ | - | $\left(\frac{a}{b}\right)^m$ |
| (d) $(x)^0$ | - | $(a \times b)^m$ |
| (e) $a^m \times a^n$ | - | $a^{m \times n}$ |
| (f) $a^m \div b^m$ | - | 1 |



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Additional Questions For Practice Objective Type Questions Short Answer Type Questions

1. If $8^x \times (4)^{2x} = 2^{14}$, then find x



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2. Find x in $(2^{3x-1} + 10) \div 7 = 6$



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3. Solve $\frac{27^2 \times 8^2 \times 10^4}{5^3 \times 3^6 \times 2^6}$ using exponent



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4. $\frac{p}{q} = \left(\frac{2}{7}\right)^5 \div \left(\frac{7}{2}\right)^{-3}$ then find $\left(\frac{p}{q}\right)^{-2}$



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5. Find the value of $\left[\left(\frac{1}{2}\right)^2\right]^3 \times \left(\frac{1}{3}\right)^{-4} \times 3^{-2} \times \frac{1}{6}$



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6.

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



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7. Evaluate

$$\frac{(0.6)^0 - (0.1)^{-1}}{\left(\frac{3}{8}\right)^{-1} \left(\frac{3}{2}\right)^3 + \left(\frac{-1}{3}\right)^{-1}}$$



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8. Evaluate

$$\frac{(25)^{3/2} \times (243)^{3/5}}{(16)^{5/4} \times (8)^{4/3}}$$

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Additional Questions For Practice Objective Type Questions Hots A

1. Find the value of x in $36^{x-1} + 180 = 6^{2x-1}$

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Additional Questions For Practice Objective Type Questions Hots B

1. If $a^x = b^{\frac{1}{2}}$, $b^y = c^{\frac{1}{3}}$, $c^z = a^{\frac{1}{2}}$, find xyz

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Sample Paper For Practice Fill In The Blanks

1. In expression $(-3)^7$ the exponent is

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2. $(-2)^5 \times (-1)^{99} = \dots\dots\dots$

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3. $a \times a \times a \times b \times b \times b = \dots\dots\dots$

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4. If $(3)^n = 729$, then n is equal to

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5. $\left(\frac{-5}{3}\right)^{-1}$ is same as

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6. The standard form of 157.56 is

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Sample Paper For Practice State Whether True Or False

1. If x is a rational number then $x^n \times x^b = x^{a \times b}$

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2. Reciprocal of $\left(\frac{-2}{3}\right)^0$ is 1.

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3. $(-2)^{31}$ is a positive integer.

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4. $\frac{3^5}{5}$ is less than $\left(\frac{3}{5}\right)^3$

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5. $\left[\left(\frac{2}{7}\right)^3\right]^5 = \left(\frac{2}{7}\right)^8$



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6. The square of $\left(\frac{-3}{4}\right)$ is $\frac{9}{8}$



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Sample Paper For Practice

1. Match the following

- | | | |
|--|---|------------------------------|
| (a) $(x^2)^m = (x)^8$ the value of m is | - | 3^7 |
| (b) Simplest form of $(-2)^6$ is | - | -1 |
| (c) $(3^{20} \div 3^{15}) \times 3^2$ is | - | 4 |
| (d) $\frac{16}{81}$ in exponential form is written as | - | 2 |
| (e) $(-1)^5 \times (-1)^3 \times (-1)^1$ is same as | - | 64 |
| (f) Product of base and exponent in $\left(\frac{-2}{7}\right)^7$ is | - | $\left(\frac{2}{3}\right)^4$ |



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2. By what number should we multiply $(3)^{-7}$ so that the product is

3.



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3. By what number should $(-36)^{-1}$ be divided so that the quotient is $(-10)^{-1}$.



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4. Find the value of the following :

$$\left(\frac{1}{5}\right)^{-2} + \left(\frac{1}{7}\right)^{-2} + \left(\frac{1}{3}\right)^{-2}$$



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5. Find the value of the following :

$$\frac{2^0 + 3^0 + 4^0}{2^0 \times 3^0 \times 4^0}$$

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6. Find the value of the following :

$$\left[(5^3)^4 \times 5^7 \right] \div 5^{12}$$

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7. $\left(\frac{a}{b}\right) = \left(\frac{-2}{3}\right)^5 + \left(\frac{-2}{3}\right)^4$, find the value of $\left(\frac{a}{b}\right)^{-3}$

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8. Find the value of x in the following

$$27^x = \frac{9}{3^x}$$



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