



# MATHS

## BOOKS - NAND LAL PUBLICATION

### EXPONENTS AND POWER

#### Questions

1. What is  $10^{10}$  equal to?



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2. Find the value of  $2^{-2}$  in a similar manner



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3. Find the multiplicative inverse of the following :

$$2^{-4}$$



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4. Find the multiplicative inverser of the following :

$$10^{-5}$$



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5. Find the multiplicative inverser of the following :

$$7^{-2}$$



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6. Find the multiplicative inverse of the following :

$$5^{-3}$$



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7. Find the multiplicative inverser of the following :

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



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8. Expand the following numbers using exponents:

$$1025 \cdot 63$$



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9. Expand the following numbers using exponents:

$$1256 \cdot 249$$



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**10.** Simplify and write in exponents form :

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



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**11.** Simplify and write in exponential form:

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



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**12.** Simplify and write in exponential form:

$$3^2 \times 3^{-5} \times 3^6.$$



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**13.** Observe the following facts :

(1) The distance from the Earth to the Sun is

149,600,000,000m

(2) The speed of light is 300,000,000 m/sec.

(3) Thickness of class VII Mathematics book is

20mm

(4) The average diameter of a Red Blood cell is 0.00007mm.

(5) The thickness of human hair is in the range of 0.005 cm to 0.01 cm.

(6) The distance of moon from the Earth is 384,467,000 m. (approx.)

(7) The size of a plant cell is 0.00001275m.

(8) Average radius of the Sun is 695000km.

(9) Mass of propellant in a space shuttle solid rocket booster is 503600kg

(10) Thickness of a piece of paper is 0.0016cm.

(11) Diameter of a wire on a computer chip is 0.000003m.



(12) The height of Mount Everest is 8848m.

There some large number like 150,000,000,000m and some every small numbers like 0.000007m.

Identify very large and very small numbers from the above facts and write them in the adjacent table.

Very large numbers	Very small numbers
150,000,000,000m	0.000007m
.....	.....
.....	.....
.....	.....
.....	.....



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**14.** Write the following numbers in standard form:

0.000000564.



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**15.** Write the following numbers in standard form:

0.0000021



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**16.** Write the following numbers in standard form:

21600000



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**17.** Write the following number in standard form :

15240000



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## Exercise 12 1

1. Evaluate :  $3^{-2}$



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2. Evaluate :  $(-4)^{-2}$



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



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

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



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5. Simplify and express the result in power notation with positive exponent :  $\left(\frac{1}{2^3}\right)^2$



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

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



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

$$(3^{-4} \div 3^{10}) \times 3^{-5}$$



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

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



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9. Find the value of :  $(3^0 + 4^{-1}) \times 2^2$



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10. Find the value of :  $(2^{-1} \times 4^{-1}) \div 2^{-2}$



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11. Find the value of :

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



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12. Find the value of :  $(3^{-1} + 4^{-1} + 5^{-1})^{\circ}$



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13. Find the value of

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



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14. Evaluate :  $\frac{8^{-1} \times 5^3}{2^{-4}}$



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15. Evaluate :  $(5^{-1} \times 2^{-1}) \times 6^{-1}$



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**16.** Find the value of  $m$  for which

$$5^m \div 5^{-3} = 5^5$$



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



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



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19. Simplify :  $\frac{25 \times t^{-4}}{5^{-3} \times 10 \times t^{-8}} (t \neq 0)$



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



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## Exercise 12 2

1. Express the following numbers in standard form : 0.00000000000085



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2. Express the following numbers in standard form : 0.000000000000942



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3. Express the following numbers in standard form : 6020000000000000



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4. Express the following numbers in standard form : 0.00000000837



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5. Express the following numbers in standard form : 31860000000



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6. Express the following numbers in usual form

:  $3.02 \times 10^{-6}$



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7. Express the following numbers in usual form

:  $4.5 \times 10^4$



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**8.** Express the following numbers in usual form

:  $3 \times 10^{-8}$



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**9.** Express the following numbers in usual form

:  $1.0001 \times 10^9$



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**10.** Express the following numbers in usual

form :  $5.8 \times 10^{12}$



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**11.** Express the following numbers in usual

form :  $3.61492 \times 10^6$



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12. Express the number appearing in the following : statements in standard form : 1

micron is equal to  $\frac{1}{1000000}m$



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

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



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**14.** Express the number appearing in the following : Size of a bacteria is 0.0000005 m



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**15.** Express the number appearing in the following : Size of a plant cell is 0.00001275 m



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**16.** Express the number appearing in the following : Thickness of a thick paper is 0.07 mm



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



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## Additional Questions For Practice Objective Type Questions

1. Fill in the blank spaces.

0.0000565 can be written in scientific notation as



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2. Fill in the blank spaces.

The value of  $1^\circ + 2^\circ + 3^\circ + 4^\circ + 5^\circ + 6^\circ$

is



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3. Fill in the blank spaces.

If  $3^n = 729$  then



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4. Fill in the blank spaces.

$\left[ \left( \frac{-5}{3} \right)^2 \right]^5$  can be expressed as a power of

rational number with negative exponent as



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5. Fill in the blank spaces.

The simplest form of  $x^{a-b} \times x^{b-c} \times x^{c-a}$



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6. Fill in the blank spaces.

$$\left(\frac{5}{7}\right)^0 \times \left(\frac{5}{7}\right)^0 =$$



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7. State whether the given statements are true or false.

$(100)^\circ$  is smaller than  $(1000)^\circ$



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8. State whether the given statements are true or false.

The reciprocal of  $a^{-m}$  is  $\frac{1}{a^m}$



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9. State whether the given statements are true or false.

$$\left[ (16)^2 \times (16^5) \right]^0 = 1$$



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10. State whether the given statements are true or false.

If  $3^\circ = 4^\circ$  implies that  $3 = 4$



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11. State whether the given statements are true or false.

The value of  $3^2 - 2^3 = 3^0$



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12. State whether the given statements are true or false.

$(x^m)^n$  is equal to  $x^{m+n}$



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**13.** The 10th power of -1 is

A. 10

B. -1

C. 1

D. none of these

**Answer: C**



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14. The decimal form of  $0.05 \times 10^{-3}$  is

A. 0.00005

B. 0.005

C. 0.0005

D. none of these

**Answer: A**



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15. Which of the following is equal to  $\frac{7}{2}$

A.  $\left(\frac{2}{7}\right)^1$

B.  $\left(\frac{2}{7}\right)^0$

C.  $\left(\frac{2}{7}\right)^{-1}$

D. none of these

**Answer: C**



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16. The reciprocal of  $a^{-x}$  is

A.  $a^{-x}$

B.  $a^x$

C.  $x^{-a}$

D. none of these

**Answer: B**



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17.  $(-1)^{-235}$

A. 1

B. -1

C. 0

D. none of these

**Answer: B**



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18. If  $3^4 \times 9^2 = 9^x$  then the value of x is

A. 5

B. 7

C. 4

D. none of these

**Answer: C**



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# Additional Questions For Practice Short Answer Type Questions

1. Correct the mistakes in each of the following.

$$2.020 \times 10^{-3} = 0.0072020$$



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2. Correct the mistakes in each of the following.

$$6.7845 \times 10^4 = 6784500$$





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3. Correct the mistakes in each of the following.

$$0.003657 = 3.657 \times 10^3$$



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4. Correct the mistakes in each of the following.

$$5.07860 = 5.0786 \times 10^{-1}$$





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5. Find the multiplicative inverse of

$$\left(\frac{4}{3}\right)^3 \div \left(\frac{3}{4}\right)^{-6}$$



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6. Solve for x in  $\frac{2^{2x-2}}{2^{3x-2}} = 2^{-2}$



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$$7. \left(\frac{x^b}{x^c}\right)^a \times \left(\frac{x^c}{x^a}\right)^b \times \left(\frac{x^a}{x^b}\right)^c = 1$$



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8. By what number should  $(3)^{-1}$  be multiplied, so that the product is equal to  $(4)^{-1}$ .



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9. If  $a = 2$ ,  $b = -3$  then find the value of

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



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10. If  $a = 2$ ,  $b = -3$  then find the value of

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



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11. If  $a = 2$ ,  $b = -3$  then find the value of

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



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12. If  $a = 2$ ,  $b = -3$  then find the value of

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



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13. If  $\frac{x}{y} = \left(\frac{2}{3}\right)^{-2} \div \left(\frac{2}{5}\right)^{-1}$  find the value  
of  $\left(\frac{x}{y}\right)^{-3}$



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## 14. Simplify

$$\{2^{-1} - 3^{-1}\}^{-1} + \{6^{-1} - 9^{-1}\}$$



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## 15. Simplify

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



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## Additional Questions For Practice Long Answer Type Questions

1. Divide the sum of  $\left(\frac{1}{2}\right)^{-2}$  and  $\left(\frac{1}{3}\right)^{-2}$  by  
the difference of  $\left(-\frac{1}{5}\right)^{-1}$  and  $\left(-\frac{1}{4}\right)^{-1}$



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## Additional Questions For Practice Hots High Order Thinking Skill

1. Find the value of unknown in the following :

$$\left(\frac{1}{6}\right)^{-2} + \left(\frac{1}{8}\right)^{-2} = (1000)^x$$



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2. Find the value of unknown in the following :

$$\left(\frac{3}{8}\right)^{2x-3} \times \left(\frac{3}{8}\right)^{-1} = 1 \text{ find } x$$



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Sample Paper For Practice



1. Fill in the blanks.

$2^6 \times 2^{-8}$  can be expressed as a power of rational number with positive exponent as \_\_\_\_\_.



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2. Fill in the blanks.

If  $y = x^3$  then  $y^2$  is equal to \_\_\_\_\_.



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3. Fill in the blanks.

$$2 \times (3^1 \times 3^{-1} \times 3^{-1} \times 3^0) = \underline{\hspace{2cm}}.$$



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4. Fill in the blanks.

The usual form of  $9.876543 \times 10^4$  is         .



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5. Correct the false statement.

$$a^m \times a^n = a^{nm}$$



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6. Correct the false statement.

$$3^0 < (-1)^{235}$$



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7. Correct the false statement.

If  $2^n = 32$  then  $n = 2$



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8. Correct the false statement.

The multiplicative inverse of  $(-2)^{-3}$  is  $\frac{1}{-8}$



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9. The value of  $\left[(1234)^0\right]^5$  is equal to

A. 5

B. 0

C. 1

D. none of these

**Answer: C**



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**10.**  $x^3 \times y^3$  is equal to

a.  $(xy)^6$

b.  $(xy)^3$

c.  $(xy)^{-3}$

d. none

A.  $(xy)^6$

B.  $(xy)^3$

C.  $(xy)^{-3}$

D. none of these

**Answer: B**



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11.  $\left(\frac{-3}{2}\right)^{-5}$  can be written as

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

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

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

D. none of these

**Answer: A**



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12. The standard form of 256.003 is

a.  $2.56003 \times 10^6$

b.  $25.6003 \times 10^3$

c.  $2.56003 \times 10^2$

d. none of these

A.  $2.56003 \times 10^6$

B.  $25.6003 \times 10^3$

C.  $2.56003 \times 10^2$

D. none of these

**Answer: C**





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**13.** Planet A is at a distance of  $8.36 \times 10^7$  km from earth and planet B is  $7.28 \times 10^9$  km from earth. Which planet is nearer to earth?



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**14.** If  $9^x = 27^y$  then find the ratio of  $x : y$



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15. By what number should  $(-42)^{-1}$  be divided so that the quotient may be  $(6)^{-1}$ .



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16. Correct the mistakes in the following

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



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17. Correct the mistakes in the following

$$8^\circ - 6^\circ = 2^\circ$$



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18. Correct the mistakes in the following

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



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19. If  $\frac{x}{y} = \left(\frac{2}{3}\right)^5 \div \left(\frac{2}{3}\right)^3$  find  $\left(\frac{y}{x}\right)^{-2}$ .



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20. Find the value of

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

express it as the power on 10.



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21. Express  $(64)^{-2}$  as the power of (i) base 2.



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22. Express  $(64)^{-2}$  as the power of (ii) base 4.



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