MATHS

NCERT - NCERT Maths(Tamil)

REAL NUMBERS

Example

1. Show that every positive even integer is of the form 2q, and that every positive odd integer is of the form 2q + 1, where q is some integer.

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2. Show that any positive odd integer is of the form 4q+1 or 4q+3, where q is some integer.

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3. Consider the numbers of the form 4^n where n is a natural number. Check whether there is any value of n for which 4^n ends with zero?

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4. Find the HCF and LCM of 12 and 18 by the prime factorization method.

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5. Using the above theorems, without actual division, state whether decimal form of the following rational numbers are terminating or non-terminating, repeating decimals.

(i) $\frac{6}{125}$ (ii) $\frac{25}{32}$ (iii) $\frac{100}{81}$ (iv) $\frac{41}{75}$

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6. Write the decimal form of the following rational numbers without actual division.

(i) $\frac{35}{50}$ (ii) $\frac{21}{25}$ (iii) $\frac{7}{8}$

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7. Show that $\sqrt{2}$ is irrational.

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8. Show that $5 - \sqrt{3}$ is irrational.

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9. Show that $3\sqrt{2}$ is irrational.

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10. Prove that $\sqrt{2}+\sqrt{2}$ is irrational .

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11. Expand $\log \frac{343}{125}$

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12. Write 2log3+ 3log5 - 5log2 as a single logarithm.

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13. Solve $3^x = 5^{x-2}$

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14. Find x if $2\log 5 + \frac{1}{2}\log 9 - \log 3 = \log x$

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Do This

1. Find q and r for the following pairs of positive integers a and b, satisfying a = bq + r.

$a = 13, b = 3$

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2. Find q and r for the following pairs of positive integers a and b, satisfying a = bq + r.

$a = 80, b = 8$

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3. Find q and r for the following pairs of positive integers a and b, satisfying a = bq + r.

$a = 125, b = 5$

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4. Find q and r for the following pairs of positive integers a and b, satisfying a = bq + r.

$a = 132, b = 11$

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5. Find the HCF of the following by using Euclid algorithm.

50 and 70

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6. Find the HCF of the following by using Euclid algorithm.

96 and 72

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7. Find the HCF of the following by using Euclid algorithm.

$300 \text{ and } 550$

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8. Find the HCF of the following by using Euclid algorithm.

$1860 \text{ and } 2015$

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9.

Express 2310 as a product of prime factors. Also see how your friends have factorized the number. Have they done it same as you? Verify your final product with your friend's result. Try this for 3 or 4 more numbers. What do you conclude?

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10. Find the HCF and LCM of the following given pairs of numbers by prime factorisation method .

120,90

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11. Find the HCF and LCM of the following given pairs of numbers by prime factorisation method .

50,60

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12. Find the HCF and LCM of the following given pairs of numbers by prime factorisation method .

37,49

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13. Write the following terminating decimals in the form of $\frac{p}{q}, \neq 0$ and p,q are co primes

15.265

Write the denominators in $2^n 5^m$ form

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14. Write the following terminating decimals in the form of $\frac{p}{q}, \neq 0$ and p,q are co primes

0.1255

Write the denominators in $2^n 5^m$ form

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15. Write the following terminating decimals in the form of $\frac{p}{q}, \neq 0$ and p,q are co primes

0.4

Write the denominators in $2^n 5^m$ form

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16. Write the following terminating decimals in the form of $\frac{p}{q}, \neq 0$ and p,q are co primes

23.34

Write the denominators in $2^n 5^m$ form

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17. Write the following terminating decimals in the form of $\frac{p}{q}, \neq 0$ and p,q are co primes

1215.8

Write the denominators in $2^n 5^m$ form

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18. Write the denominator of the following rational numbers in $2^n 5^m$ form where n and m are non-negative integers and then write them in their decimal form

$\frac{3}{4}$

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19. Write the denominator of the following rational numbers in $2^n 5^m$ form where n and m are non-negative integers and then write them in their decimal form

$$\frac{7}{25}$$

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20. Write the denominator of the following rational numbers in $2^n 5^m$ form where n and m are non-negative integers and then write them in their

decimal form

$\frac{51}{64}$

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21. Write the denominator of the following rational numbers in $2^n 5^m$ form where n and m are non-negative integers and then write them in their decimal form

$\frac{14}{25}$

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22. Write the denominator of the following rational numbers in $2^n 5^m$ form where n and m are non-negative integers and then write them in their decimal form

$$\frac{80}{100}$$

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23. Write the following rational numbers in the decimal form and find out the block of repeating digits in the quotient.

$$\frac{1}{3}$$

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24. Write the following rational numbers in the decimal form and find out the block of repeating digits in the quotient.

$\frac{2}{7}$

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25. Write the following rational numbers in the decimal form and find out the block of repeating digits in the quotient.

$\frac{5}{11}$

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26. Write the following rational numbers in the decimal form and find out the block of repeating digits in the quotient.

$\frac{10}{13}$

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27. Verify the theorem proved above for p= 2, p = 5 and for a^2 = 1, 4, 9, 25, 36, 49, 64 and 81.

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28. Evaluate

2^1

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29. Evaluate

$(4.73)^0$

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30. Evaluate

0^3

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31. Evaluate

$(-1)^4$

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32. Evaluate

$(0.25)^{-1}$

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33. Evaluate

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

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34. Evaluate

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

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35. (a) Express 10, 100, 1000, 10000, is exponential form

(b) Express in simplest exponential form

(i) 16×64 (ii) 25×125 (iii) $128 \div 32$

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36. Write the following in logarithmic form.

$7 = 2^x$

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37. Write the following in logarithmic form.

$10 = 5^b$

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38. Write the following in logarithmic form.

$$\frac{1}{81} = 3^c$$

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39. Write the following in logarithmic form.

$$100 = 10^z$$

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40. Write the following in logarithmic form.

$$\frac{1}{257} = 4^a$$

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41. Write the following in exponential form.

$$\log_{10} 100 = 2$$

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42. Write the following in exponential form.

$$\log_5 25 = 2$$

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43. Write the following in exponential form.

$\log_2 2 = 1$

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44. Express the logarithms of the following as the sum of the logarithm

35×46

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45. Express the logarithms of the following as the sum of the logarithm

235×437

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46. Express the logarithms of the following as the sum of the logarithm

2437×3568

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47. Express the logarithms of the following as the difference of logarithms

$$\frac{23}{34}$$

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48. Express the logarithms of the following as the difference of logarithms

$$\frac{373}{275}$$

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49. Express the logarithms of the following as the difference of logarithms

$4325 \div 3734$

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50. Express the logarithms of the following as the difference of logarithms

$5055 \div 3303$

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51. Using $\log_a x^n = n \log_a x,$ expand the following

$\log_2 7^{25}$

Note : $\log x = \log_{10} x$

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52. Using $\log_a x^n = n \log_a x,$ expand the following

$\log_5 8^{50}$

Note: $\log x = \log_{10} x$

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53. Using $\log_a x^n = n \log_a x,$ expand the following

$\log 5^{23}$

Note: $\log x = \log_{10} x$

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54. Using $\log_a x^n = n \log_a x,$ expand the following

$\log 1024$

Note: $\log x = \log_{10} x$

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Think And Discuss

1.

Can you find the HCF of 1.2 and 0.12? Justify your answer.

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2. If r = 0, then what is the relationship between a, b and q in a = bq + r ?

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3. Let us observe the scale factor in the graph of

$y = 2^x$

On X - axis (Refer Ratio - proportion)

If 10 places = 1 unit

20 places = 2 units

40 places = 4 units, then

Can you imagine the corresponding value on X-axis,

with reference to the 5 on Y-axis?

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4. Does $\log_2 0$ exist ? Give reason .

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5. Prove

$\log_b b = 1$

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6. Prove

$\log_b 1 = 0$

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7. Prove

$\log_x b^x = x$

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8. If $y = \frac{x}{\sin x}$, then find $\frac{dy}{dx}$ using quotient rule.

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9. We can write $\log \frac{x}{y} = \log\left(x.\, y^{-1}\right)$ Can you prove that $\log \frac{x}{y} = \log x - \log y$ using product and power rules.

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10. We know that, if $7 = 2^x$ then $x = \log_2 7$. Then, what is the value of $2^{\log_2 7}$? Justify your answer. Generalise the above by taking some more examples for $a^{\log_a N}$

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Try This

1. Show that $3^n \times 4^m$ cannot end with the digit 0 or 5 for any natural numbers ‘n’and 'm'

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2. Solve the following

$\log_2 32 = x$

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3. Solve the following

$\log_5 625 = y$

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4. Solve the following

$\log_{10} 10000 = z$

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5. Solve the following

$\log_x 16 = 2 \therefore x^2 = 16 \Rightarrow x = \pm 4,$ Is is correct or not ?

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6. We know that $\log_{10} 100000 = 5$

Show that you get the same answer by writing $100000 = 1000 \times 100$ and then using the product rule. Verify the answer.

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7. We know $\log_2 32 = 5$. Show that we get the same answer by writing 32 as $\frac{64}{2}$ and then using the product rule. Verify your answer .

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8. We have $\log_2 32 = 5$. Show that we get the same result by writing $32 = 2^5$ and then using power rules. Verify the answer.

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9. Find the value of $\log_2 32$

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10. Find the value of $\log_c \sqrt{c}$

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11. Find the value of $\log_{10} 0.001$

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12. Find the value of $\log_{\frac{2}{3}} \frac{8}{27}$

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Exercise 1 1

1. Use Euclid's algorithm to find the HCF of

900 and 270

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2. Use Euclid's algorithm to find the HCF of

196 and 38220

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3. Use Euclid's algorithm to find the HCF of

1651 and 2032

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4. Use division algorithm to show that any positive odd integer is of the form 6q + 1, or 6q + 3 or 6q + 5, where q is some integer

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5. Use division algorithm to show that the cube of any positive integer is of the form 9 m, 9m + 1 or 9m + 8.

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6. Use division algorithm to show that the cube of any positive integer is of the form 9 m, 9m + 1 or 9m + 8.

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7. Show that one and only one out of n, n + 2 or n + 4 is divisible by 3, where n is any positive integer

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Exercise 1 2

1. Express each of the following numbers as a product of its prime factors.

140

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2. Express each of the following numbers as a product of its prime factors.

156

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3. Express each of the following numbers as a product of its prime factors.

3825

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4. Express each of the following numbers as a product of its prime factors.

5005

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5. Express each of the following numbers as a product of its prime factors.

7429

6. Find the LCM and HCF of the following integers by the prime factorization method.

12,15 and 21

7. Find the LCM and HCF of the following integers by the prime factorization method.

17, 23 and 29

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8. Find the LCM and HCF of the following integers by the prime factorization method.

8,9 and 25

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9. Find the LCM and HCF of the following integers by the prime factorization method.

72 and 108

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10. Find the LCM and HCF of the following integers by the prime factorization method.

306 and 657

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11. Check whether 6^n can end with the digit 0 for any natural number n.

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12. Explain why $7 \times 11 \times 13 + 13$ and $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$ are composite numbers.

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13. How will you show that $(17 \times 11 \times 2) + (17 \times 11 \times 5)$ is a composite number? Explain.

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14. What is the last digit of 6^{100} .

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Exercise 1 3

1. Write the following rational numbers in their decimal form and also state which are terminating and which are non-terminating, repeating decimal.

$\frac{3}{8}$

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2. Write the following rational number in its decimal form and also state whether the number is terminating or non-terminating, repeating decimal.

$\frac{229}{400}$

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3. Write the following rational numbers in their decimal form and also state which are terminating and which are non-terminating, repeating decimal.

$4\frac{1}{5}$

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4. Write the following rational numbers in their decimal form and also state which are terminating and which are non-terminating, repeating decimal.

$\frac{2}{11}$

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5. Write the following rational numbers in their decimal form and also state which are terminating and which are non-terminating, repeating decimal.

$$\frac{8}{125}$$

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6. Without performing division, state whether the following rational numbers will have a terminating decimal form or a non-terminating, repeating decimal form.

$$\frac{13}{3125}$$

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7. Without performing division, state whether the following rational numbers will have a terminating decimal form or a non-terminating, repeating decimal form.

$\frac{11}{12}$

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8. Without performing division, state whether the following rational numbers will have a terminating decimal form or a non-terminating, repeating

decimal form.

$$\frac{64}{455}$$

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9. Without performing division, state whether the following rational numbers will have a terminating decimal form or a non-terminating, repeating decimal form.

$$\frac{15}{1600}$$

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10. Without performing division, state whether the following rational numbers will have a terminating decimal form or a non-terminating, repeating decimal form.

$$\frac{29}{343}$$

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11. Without performing division, state whether the following rational numbers will have a terminating decimal form or a non-terminating, repeating decimal form.

$$\frac{23}{2^3.5^2}$$

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12. Without performing division, state whether the following rational numbers will have a terminating decimal form or a non-terminating, repeating decimal form.

$$\frac{129}{2^2.5^7.7^5}$$

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13. Without performing division, state whether the following rational numbers will have a terminating

decimal form or a non-terminating, repeating decimal form.

$$\frac{9}{15}$$

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14. Without performing division, state whether the following rational numbers will have a terminating decimal form or a non-terminating, repeating decimal form.

$$\frac{36}{100}$$

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15. Without performing division, state whether the following rational numbers will have a terminating decimal form or a non-terminating, repeating decimal form.

$$\frac{77}{210}$$

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16. Write the following rationals in decimal form using

$$\frac{13}{25}$$

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17. Write the following rational in decimal form using the Fundamental Theorem of Arithmetic

$$\frac{15}{16}$$

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18. Write the following rationals in decimal form using

$$\frac{23}{2^3.5^2}$$

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19. Write the following rationals in decimal form using fundamental theorem of arithmetic.

$$\frac{7218}{3^2.5^2}$$

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20. Write the following rationals in decimal form using

$$\frac{143}{110}$$

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21. Express the following decimals in the form of $\frac{p}{q}$, and write the prime factors of q. What do you observe?

4.123

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22. Express the following decimals in the form of $\frac{p}{q}$, and write the prime factors of q. What do you observe?

0.1201201

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23. Express the following decimals in the form of $\frac{p}{q}$, and write the prime factors of q. What do you observe?

4.123

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24. Express the following decimals in the form of $\frac{p}{q}$, and write the prime factors of q. What do you observe?

$0.\overline{63}$

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Exercise 1 4

1. Prove that the following are irrational.

$$\frac{1}{\sqrt{2}}$$

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2. Prove that the following are irrational.

$$\sqrt{3}+\sqrt{5}$$

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3. Prove that the following are irrational.

$6 + \sqrt{2}$

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4. Prove that the following are irrational.

$\sqrt{5}$

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5. Prove that the following are irrational.

$3 + 2\sqrt{5}$

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6. Prove that $\sqrt{p}+\sqrt{q}$ is an irrational, where p,q are primes.

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Exercise 1 5

1. Determine the value of the following.

$\log_{25} 5$

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2. Determine the value of the following.

$\log_{81} 3$

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3. Determine the value of the following.

$\log_2 \left(\frac{1}{16} \right)$

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4. Determine the value of the following.

$\log_7 1$

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5. Determine the value of the following.

$\log_x \sqrt{x}$

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6. Determine the value of the following.

$\log_2 512$

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7. Determine the value of the following.

$\log_{10} .0.01$

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8. Determine the value of the following.

$\log_{\frac{2}{3}}\left(\frac{8}{27}\right)$

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9. Determine the value of the following.

$2^{2+\log_2 3}$

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10. Write the following expressions as log N and find their values.

log 2 + log 5

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11. Write the following expressions as log N and find their values.

$\log_2 16 - \log_2 2$

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12. Write the following expressions as log N and find their values.

$3 \log_{64} 4$

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13. Write the following expressions as log N and find their values.

2 log 3 - 3 log 2

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14. Write the following expressions as log N and find their values.

log 10 + 2 log 3 - log 2

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15. Evaluate each of the following in terms of x and y, if it is given that $x = \log_2 3$ and $y = \log_2 5$

$\log_2 15$

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16. Evaluate each of the following in terms of x and y, if it is given that $x = \log_2 3$ and $y = \log_2 5$

$\log_2 7.5$

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17. Evaluate each of the following in terms of x and y, if it is given that $x = \log_2 3$ and $y = \log_2 5$

$\log_2 60$

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18. Evaluate each of the following in terms of x and y, if it is given that $x = \log_2 3$ and $y = \log_2 5$

$\log_2 6750$

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19. Expand the following.

$\log 1000$

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20. Expand the following.

$$\log\left(\frac{128}{625}\right)$$

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21. Expand the following.

$$\log x^2 y^3 z^4$$

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22. Expand the following.

$$\log\left(\frac{p^2 q^3}{r^4}\right)$$

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23. Expand the following.

$$\log \sqrt{\frac{x^3}{y^2}}$$

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24. f $x^2 + y^2 = 25xy$, then prove that 2 log(x + y) = 3log3 + logx + logy.

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25. If $\log\left(\frac{x+y}{3}\right) = \frac{1}{2}(\log x + \log y)$ then find the value of $\frac{x}{y} + \frac{y}{x}$

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26. If $(2.3)^x = (0.23)^y = 1000$, then find the value of $\frac{1}{x} - \frac{1}{y}$

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27. If $2^{x+1} = 3^{1-x}$ then find the value of x.

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28. Is (i) log 2 rational or irrational? Justify your answer.

(ii) log 100 rational or irrational? Justify your answer.

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Optional Exercise

1. Can the number 6^n, n being a natural number, end with the digit 5? Give reason.

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2. Is $7 \times 5 \times 3 \times 2 + 3$ a composite number? Justify your answer.

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3. Prove that $\left(2\sqrt{3} + \sqrt{5}\right)$ is an irrational number. Also check whether $\left(2\sqrt{3} + \sqrt{5}\right)\left(2\sqrt{3} - \sqrt{5}\right)$ is rational or irrational.

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4. If $x^2 + y^2 = 6xy$, prove that 2 log (x + y) = logx + logy + 3 log 2

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5. Find the number of digits in 4^{2013} , if $\log_{10} 2 = 0.3010.$

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