MATHS

BOOKS - MTG IIT JEE FOUNDATION

REAL NUMBERS

Illustrations

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

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2. By using Euclid's algorithm, find the largest number which divides 650 and 1170.

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

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4. Write the prime factorisation of the number 27300. In the factorisation find (i) the total number of primes and (ii) the total number of distinct primes.

5. Find the L.C.M. and H.C.F. of 9, 117 and 729 by the prime factorisation method.

6. Find the H.C.F. of (8,648) by prime factorisation and hence find the L.C.M.

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

8. Without actually performing the long division, state whether the following rational numbers will have a terminating decimal expansion or a nonterminating repeating decimal expansion.

$$\frac{31}{625}$$

9. Write 0.737373... $\frac{p}{q}$ in the simplest form and write the prime factors of q

10. Express $0.1\overline{56}$ as a fraction in simplest form.

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11. Find the H.C.F. and L.C.M. of 30, 72 and 432 using the prime factorisation method.

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12. Using Euclid's division algorithm, find H.C.F. of 274170 and 17017.

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13. In the following equations, find which variables x, y, z etc. represent rational or irrational numbers. $x^2 = 5$

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14. In the following equations, find which variables x, y, z etc. represent rational or irrational numbers. $y^2 = 9$

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15. In the following equations, find which variables x, y, z etc. represent rational or irrational numbers. $z^2 = 0.04$

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16. In the following equations, find which variables u ,v ,w etc. represent rational or irrational numbers. $u^2 = 17/4$

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17. In the following equations, find which variables u ,v ,w etc. represent rational or irrational numbers. $v^2 = 3$

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18. In the following equations, find which variables u ,v ,w etc. represent rational or irrational numbers. $w^2 = 27$

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19. In the following equations, find which variables x, y, z etc. represent rational or irrational numbers. $t^2 = 0.4$

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20. Give examples of two irrational numbers the product of which is: a rational number (ii) an irrational number

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21. Give examples of two irrational numbers the product of which is: a rational number (ii) an irrational number

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22. Give examples of two irrational numbers, whose quotient is a rational number

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23. Give examples of two irrational numbers, whose quotient is an irrational number

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24. Prove that if $x and y$ are odd positive integers, then $x^2 + y^2$ is even but not divisible by 4.

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25. Express $0.3\overline{6}$ as a fraction in simplest form.

26. Let a, b, c, d be positive rationals such that $a + \sqrt{b} = c + \sqrt{d}$, then either a = c and b = d or b and d are squares of rationals.

27. Show that one and only one out of n, n + 3, n + 6 or n + 9 is divisible by 4.

28. By using division algorithm, find the largest number which when divides 969 and 2059, the remainders obtained are 9 and 11 respectively.

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

30. For any positive real number x , prove that there exists an irrational number y such that `0

31. Prove that $\dfrac{1}{\sqrt{3}}$ is irrational.

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32. Find the HCF of 81 and 237 and express it as a linear combination of 81 and 237.

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33. If the HCF of 56 and 72 is m then find x and y such that $m = 56x + 72y$

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34. Express the surd $\dfrac{\sqrt[3]{5}}{\sqrt[3]{6}}$ with rational denominator.

35. Show that there is no positive integer n for which $\sqrt{n-1} + \sqrt{n+1}\, is\, rational.$

36. Prove that $\sqrt{n}$ is not a rational number. if n is not a perfect square.

37. Let a and b be positive integers. Show that $\sqrt{2}$ always lies between and $\dfrac{a}{b}$ and $\dfrac{a + 2b}{a + b}$.

38. For any positive integer n , prove that $n^3 - n$ divisible by 6.

39. Find the H.C.F. and L.C.M. of 38 and 10

1. Use Euclid's division algorithm to find the HCF of (i) 135 and 225 (ii) 196 and 38220 (iii) 867 and 255

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2. Use Euclid's division algorithm to find the H.C.F. of 196 and 38220

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3. Use Euclid's division algorithm to find the H.C.F. of 867 and 255

4. Show that any positive odd integer is of the form

$6q + 1$ or $6q + 3$ or $6q + 5$, where q is some integer.

5. An army contingent of 616 members is to march behind an army band of 32 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march ?

6. Use Euclid's division lemma to show that the square of any positive integer is either of the form 3m or 3m + 1 for some integer m.

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7. Use Euclid's division lemma to show that the cube of any positive integer is of the form $9m, 9m + 1$ or $9m + 8$.

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Ncert Section Exercise 1 2

1. Express each number as a product of its prime factors:

140

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2. Express each number as a product of its prime factors:

156

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3. Express each number as a product of its prime factors:

3825

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4. Express each number as a product of its prime factors:

5005

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5. Express each number as a product of its prime factors:

7429

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6. Find the L.C.M. and H.C.F. of the following pairs of integers and verify that $L.C.M \times H.C.F$=product of the two numbers 26 and 91

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7. Find the L.C.M. and H.C.F. of the following pairs of integers and verify that $L.\,C.\,M \times H.\,C.\,F$ = product of the two numbers. 51 and 18

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8. Find the LCM and HCF of the following pairs of integers and verify that $LLCM \times HCF = $ product of the two numbers.(i) 26 and91 (ii) 510 and 92 (iii) 336 and 54

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9. Find the LCM and HCF of the following integers by applying the prime factorisation method. (i) 12,15 and 21 (ii) 17, 23 and 29 (iii) 8,9 and 25

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10. Find the LCM and HCF of the following integers by applying the prime factorisation method. (i) 12,15 and 21 (ii) 17, 23 and 29 (iii) 8,9 and 25

▶ **Watch Video Solution**

11. Find the LCM and HCF of the following integers by applying the prime factorisation method. (i) 12,15 and 21

(ii) 17, 23 and 29 (iii) 8,9 and 25

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12. Given that HCF (306, 657) = 9, find LCM (306, 657).

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

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

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15. There is a circular path around a sports field. Soma takes 18 minutes to drive one round of the field, while Ravi takes 12 minutes for the same. Suppose they both start at the same point and at the same time, and go in the same direction. Afte

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Ncert Section Exercise 1 3

1. Prove that $\sqrt{5}$ is an irrational number and hence show that $3 + \sqrt{5}$ is also an irrational number.

2. Prove that $3 + 2\sqrt{5}$ is irrational.

3. Prove that the following are irrationals : (i) $\dfrac{1}{\sqrt{2}}$ (ii) $7\sqrt{5}$ (iii) $6 + \sqrt{2}$

1. Without actually performing the long division, state whether the following rational numbers will have terminating decimal expansion or a non-terminating repeating decimal expansion. Also, find the number of places of decimals after which the decimal expansion terminates. $\dfrac{15}{600}$ (ii) $\dfrac{13}{3125}$ (iii) $\dfrac{23}{2^3 5^2}$

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2. Without actually performing the long division, state whether the following rational numbers will have a

terminating decimal expansion or a nonterminating repeating decimal expansion: $71/8$

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3. Without actually performing the long division, state whether the following rational numbers will have a terminating decimal expansion or a nonterminating repeating decimal expansion: $64/455$

> ▶ **Watch Video Solution**

4. Without actually performing the long division, state whether the following rational numbers will have a

terminating decimal expansion or a nonterminating repeating decimal expansion: $15/1600$

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5. Without actually performing the long division, state whether the following rational numbers will have a terminating decimal expansion or a nonterminating repeating decimal expansion: $29/343$

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6. Without actually performing the long division, state whether the following rational numbers will have a

terminating decimal expansion or a nonterminating repeating decimal expansion: $\dfrac{23}{2^3 5^2}$

7. Without actually performing the long division, state whether the following rational numbers will have a terminating decimal expansion or a nonterminating repeating decimal expansion: $\dfrac{129}{2^2 5^7 7^5}$

8. Without actually performing the long division, state whether the following rational numbers will have a

terminating decimal expansion or a nonterminating repeating decimal expansion: $6/15$

9. Without actually performing the long division, state whether the following rational numbers will have terminating decimal expansion or a non-terminating repeating decimal expansion. $\dfrac{23}{8}$ (ii) $\dfrac{125}{441}$ (iii) $\dfrac{35}{50}$

10. Without actually performing the long division, state whether the following rational numbers will have

terminating decimal expansion or a non-terminating repeating decimal expansion. $\dfrac{77}{210}$ (ii) $\dfrac{129}{2^2 \times 5^7 \times 7^{17}}$

11. Write down the decimal expansions of those rational numbers in Question 1 above which have terminating decimal expansions.

12. The following real numbers have decimal expansions as given below. In each case, decide whether they are rational or not. If they are rational, and of the form $\dfrac{p}{q}$,

what can you say about the prime factors of q? (i)

43. 123456789 (ii) `0. 1201

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13. The following real numbers have decimal expansions

as given below. In each case, decide whether they are

rational or not. If they are rational, and of the form $\frac{p}{q}$,

what can you say about the prime factors of q? (i)

43. 123456789 (ii) `0. 1201

14. The following real numbers have decimal expansions as given below. In each case, decide whether they are rational or not. If they are rational, and of the form $\frac{p}{q}$, what can you say about the prime factors of q? (i) 43. 123456789 (ii) `0. 1201

Exercise Multiple Choice Questions Level 1

1. When 2^{256} is divided by 17, the remainder would be 1 (b) 14 (c) 16 (d) None of these

A. 1

B. 16

C. 14

D. none of these

Answer:

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2. If N is the sum of first 13986 prime numbers, then N is

always divisible by

A. 6

B. 4

C. 8

D. none of these

Answer:

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3. The rational number of the form $p/q, q \neq 0, p$ and q are positive integers, which represents $0.1\overline{34}$ i.e., (0.1343434...) is

A. $\dfrac{134}{999}$

B. $\dfrac{134}{990}$

C. $\dfrac{133}{999}$

D. $\dfrac{133}{990}$

Answer:

4. The least number which is a perfect square and is divisible by each of 16, 20 and 24 is

   A. 240

   B. 1600

   C. 2400

   D. 3600

Answer:

5. If n is an even natural number, then the largest natural number by which n(n + 1)(n + 2) is divisible, is

    A. 6

    B. 8

    C. 12

    D. 24

Answer:

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6. Find the least number which when divided by 15, leaves a remainder of 5, when divided by 25, leaves a remainder of 15 and when divided by 35 leaves a remainder of 25.

A. 515

B. 525

C. 1040

D. 1050

Answer:

7. If $(-1)^n + (-1)^{4n} = 0$ then n is

    A. any positive integer

    B. any negative integer

    C. any odd natural number

    D. any even natural number

Answer:

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8. The number $3^{13} - 3^{10}$ is divisible by

    A. 2 and 3 only

B. 3 and 10 only

C. 2, 3 and 10

D. 2, 3 and 13

Answer:

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9. A number lies between 300 and 400. If the number is added to the number formed by reversing the digits, the sum is 888 and if then unit's digit and the ten's digit change places, the new number exceeds the original number by 9. Find the number.

A. 339

B. 341

C. 378

D. 345

Answer:

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10. The H.C.F. of 280 and 674 is

A. 2

B. 4

C. 14

D. 28

Answer:

11. Find the value of x and state which of the given statement is/are required for it.

I. The L.C.M. of x and 18 is 36.

II. The H.C.F. of x and 18 is 2.

A. 1, only statement-I is required

B. 2, only statement-II is required

C. 4, statement-I and II both are required

D. none of these

Answer:

12. If H.C.F. (a, b) = 12 and $a \times b = 1800$, then L.C.M. (a,b)=

A. 3600

B. 900

C. 150

D. 90

Answer:

13. Which of the following rational numbers have non-terminating repeating decimal expansion?

A. $31/3125$

B. $71/512$

C. $23/200$

D. none of these

Answer:

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14. A rational number p/q has a terminating decimal expansion if prime factorization of q have

A. 3 only

B. 2 only

C. 5 only

D. both (b) and (c)

Answer:

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15. 2. $\overline{27}$ is

A. an integer

B. a rational number

C. an irrational number

D. None of these

Answer:

▶ **Watch Video Solution**

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16. If n is a natural number, then $9^{2n} - 4^{2n}$ is always divisible by 5 (b) 13 (c) both 5 and 13 (d) none of these

A. 11

B. 4

C. 5

D. 9

Answer:

17. If n is any natural number, then $9^n - 5^n$ ends with

A. 3

B. 4 or 6

C. 5

D. 8

Answer:

18. Which of the following rational numbers have non-terminating repeating decimal expansion?

A. $\dfrac{144}{225}$

B. $\dfrac{25}{36}$

C. $\dfrac{49}{256}$

D. $\dfrac{7}{250}$

Answer:

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19. If p and q are primes, then H.C.F. (p, q) will be

A. p

B. q

C. 1

D. pq

Answer:

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20. If H.C.F. (306, 1314) = 18, then L.C.M. (306,1314) is

A. 22338

B. 22334

C. 306

D. 1314

Answer:

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21. Any positive integer cannot be of the form $(q \in N)$

A. 8q+1

B. - 8q+3

C. 8q+6

D. 8q+5

Answer:

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22. Which of the following is not a prime factor of 3825?

A. 3

B. 5

C. 11

D. 17

Answer:

23. If p is prime, then H.C.F. and L.C.M. of p and p+1 would be

    A. H.C.F. = p, L.C.M. = p + 1

    B. H.C.F. = p(p+1), L.C.M. = 1

    C. H.C.F. = 1, L.C.M. = p(p+1

    D. None of these

Answer:

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24. After how many places, the decimal form of $\dfrac{125}{2^4 . 5^3}$ will terminate ?

A. Three places

B. Four places

C. Two places

D. None of these

Answer:

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25. $n^2 - 1$ is divisible by 8, if n is

A. an integer

B. a natural number

C. an odd integer

D. an even integer

Answer:

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26. 144 cartons of Coke Cans and 90 cartons of Pepsi Cans are to be stacked in a Canteen. If each stack is of the same height and is to contain cartons of the same drink, what would be the greatest number of cartons each stack would have?

A. 16

B. 17

C. 18

D. 19

Answer:

27. There is a circular path around a sports field. Priya takes 21 minutes to drive one round of the field, while Ravish takes 28 minutes for the same. Suppose they both started at the same point and at the same time, and go in the same direction. After how many minutes will they meet again at the starting point ?

A. 18

B. 12

C. 84

D. 36

Answer:

28. If d is the H.C.F. of 30, 72, find the value of x & y satisfying $d = 30x + 72y.$
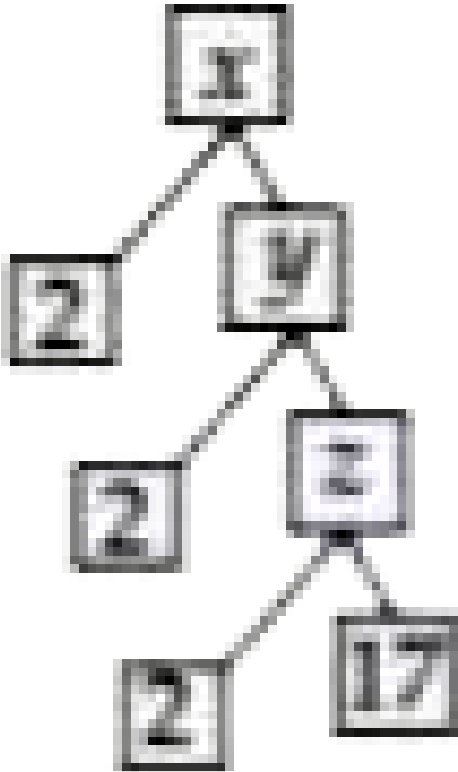
A. $x = 77, y = -32$

B. $x = -77, y = -32$

C. $x = 32, y = -77$

D. $x = 32, y = 77$

Answer:

29. Find the missing numbers x, y and z respectively in the following factor tree. `

A. 72, 68, 34

B. 136, 64, 34

C. 136, 68, 34

D. 34, 68, 144

Answer:

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30. Express $2.4\overline{178}$ in the form p//q.

A. $\dfrac{12077}{4995}$

B. $\dfrac{11072}{4999}$

C. $\dfrac{12075}{9999}$

D. $\dfrac{11075}{9999}$

Answer:

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31. The value of $1.\overline{34} + 4.\overline{12}$ is

A. $\dfrac{133}{99}$

B. $\dfrac{371}{29}$

C. $\dfrac{516}{99}$

D. $\dfrac{541}{99}$

Answer:

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32. For what least value of n where n is a natural number

5^n is divisible by 3?

    A. 1

    B. 0

    C. 2

    D. no value of n is possible.

Answer:

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33. Which of the following is a pair of co-primes ?

A. (14,35)

B. (18,25)

C. (31,93)

D. (32, 62)

Answer:

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Exercise Multiple Choice Questions Level 2

1. The sum of three prime numbers is 100. If one of them exceeds another by 36, then one of the numbers is 7 (b) 29 (c) 41 (d) 67

    A. 73

    B. 91

    C. 67

    D. 57

Answer:

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2. Find the least number which when divided by 12, leaves a remainder of 7; when divided by 15, leaves a remainder of 10 and when divided by 16, leaves a remainder of 11. (a) 115 (b) 235 (c) 247 (d) 475

A. 115

B. 235

C. 247

D. 475

Answer:

3. Two numbers are in the ratio of 15 : 11. If their H.C.F. is 13, find the numbers.

    A. 195 and 143

    B. 190 and 140

    C. 185 and 163

    D. 185 and 143

Answer:

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4. Which of the following is a rational number?

A. Sum of $2 + \sqrt{3}$ and its inverse

B. Square root of 18

C. Square root of $7 + 4\sqrt{3}$

D. None of these

Answer:

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5. Which of the following is/are True?

A. Product of two irrational numbers is always irrational number.

B. The sum of two irrational numbers is always irrational number.

C. Sum of a rational and an irrational numbers is always irrational number.

D. None of these

Answer:

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6. Find the HCF of 98, 56 and 84

A. 14

B. 7

C. 1

D. 98

Answer:

7. There are 156 , 208 and 260 students in group A , B and C respectively . Buses are to be hired to take them for a field trip . Find the minimum number of buses to be hired , if the same number of students should be accommodated in each bus and separate bus for separate group is needed.

A. 54,14

B. 52, 14

C. 54, 16

D. 52, 16

Answer:

8. 1. From a basket of mangoes when counted in twos there was one extra, counted in threes there were two extra, counted in fours there were three extra, counted in fives there were four extra, counted in sixes there were five extra. But counted in sevens there were no extra, Atleast how many mangoes were there in the basket?

A. 117

B. 133

C. 119

D. 126

Answer:

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9. Find the largest number that will divide 398, 436 and 542 leaving remainders 7,11 and 15 respectively.

A. 17

B. 19

C. 18

D. 16

Answer:

10. Find the greatest number of 6 digits exactly divisible by 24, 15 and 36.

A. 999998

B. 999999

C. 999720

D. 999724

Answer:

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11. Let N be the greatest number that will divide 1305 ,

4665 and 6905 leaving the same remainder in each case .

Then, sum of the digits in N is

A. 3

B. 4

C. 5

D. 7

Answer:

12. If $10^{2017} - 2017$ is expressed as integer, what is the sum of its digits?

A. 18144

B. 17468

C. 16466

D. 18564

Answer:

13. In a seminar. the number of participants in Hindi, English and Mathematics are $60, 84$ and 108 respectively. Find the minimum number of rooms required if, in each room the same number of participants are to be seated and all of them being in the same subject.

A. 10

B. 15

C. 20

D. 8

Answer:

14. Find the largest possible positive integer that divides, 125, 162 and 259 leaving remainder 5, 6 and 7 respectively.

A. 14

B. 18

C. 12

D. 16

Answer:

15. 144 cartons of Coke Cans and 90 cartons of Pepsi Cans are to be stacked in a Canteen. If each stack is of the same height and is to contain cartons of the same drink, what would be the greatest number of cartons each stack would have?

A. 180

B. 174

C. 170

D. 154

Answer:

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1. H.C.F. of two numbers is 10 and their L.C.M is 210, then the product of the two numbers is:

A. 2100

B. 510

C. 210

D. 4410000

Answer:

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2. L.C.M. of 6 and 91 is:

A. 546

B. 304

C. 1

D. 564

Answer:

3. Match the List.

List-I	List-II
(P) 13/125	(1) Irrational
(Q) $\sqrt{2}$	(2) Terminating decimal expansion
(R) (4, 7)	(3) Non-terminating repeating decimal expansion
(S) 61/455	(4) Co-prime numbers

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

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

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

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

Answer:

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1. Assertion : We can say that $3 \mid 93$ is true.

Reason: A non-zero integer a is said to divide an integer b if there exists an integer c such that b = ac.

    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:

2. Assertion : If L.C.M. = 182, product of integers is

26×91, then H.C.F. =13.

L.C.M. $\times$ Product of integers = H.C.F.

    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:

3. Assertion : H.C.F. of (11, 17) is 1.

Reason : If p and q are primes then H.C.F. (p, q) = 1.

    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:

4. Assertion : 29/9261 will have a non-terminating repeating decimal expansion.

Reason : Let a = p/q be a rational number such that p and q are co-prime and the prime factorisation of q is of the form $2^n \times 5^m$ where n and m are non-negative integers (whole numbers). Then a has a decimal expansion, which is non-terminating repeating.

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:

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5. Assertion : $\sqrt{2}$ is an irrational number.

Reason : If p be a prime, then $\sqrt{p}$ is an irrational number.

   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:

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1. The largest or greatest among common divisors of two or more integers is called the Greatest Common Divisor (GCD) or Highest Common Factor (H.C.F.)

The largest number which divides 285 and 1249 leaving remainders 9 and 7 respectively, is

A. 46

B. 6

C. 12

D. 138

Answer:

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2. The largest or greatest among common divisors of two or more integers is called the Greatest Common Divisor (GCD) or Highest Common Factor (H.C.F.)

Find H.C.F. (2002, 2618).

A. 11

B. 22

C. 154

D. 13

Answer:

3. The largest or greatest among common divisors of two or more integers is called the Greatest Common Divisor (GCD) or Highest Common Factor (H.C.F.)

Two brands of chocolate are available in packs of 24 and 15 respectively. If I need to buy an equal number of

chocolates of both kinds, then what is the least number of boxes of each kind I would need to buy?

A. 5,6

B. 5,8

C. 5,4

D. 12,14

Answer:

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Exercise Comprehension Type Passage I I

1. Every composite number can be expressed as a product of primes and this factorisation is unique except the order in which prime factor occurs.

Express 945 as a product of prime factors.

A. $3 \times 5^3 \times 7$

B. $3^2 \times 5^2 \times 7$

C. $3^3 \times 5 \times 7$

D. $21 \times 3^2 \times 5$

Answer:

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2. Every composite number can be expressed as a product of primes and this factorisation is unique except the order in which prime factor occurs.

Determine prime factorisation of 20570.

A. $2 \times 5 \times 11^2 \times 17$

B. $10 \times 11^2 \times 17$

C. $5 \times 3^4 \times 121$

D. $17 \times 10^2 \times 11$

Answer:

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3. Every composite number can be expressed as a product of primes and this factorisation is unique except the order in which prime factor occurs.

Determine prime factorisation of 205751.

    A. $49 \times 13 \times 19^2$

    B. $7^2 \times 13 \times 17 \times 19$

    C. $7 \times 13 \times 17 \times 91$

    D. $7 \times 13^3 \times 17 \times 19$

Answer:

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1. H.C.F. $\times$ L.C.M. = Product of two numbers.

The H.C.F. of two numbers is 16 and their product is 3072. Find their L.C.M.

    A. 182

    B. 121

    C. 192

    D. 3647

Answer:

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2. H.C.F. $\times$ L.C.M. = Product of two numbers.

The L.C.M. and H.C.F. of two numbers is 180 and 6 respectively. If one of the numbers is 30, find the other number.

A. 435

B. 36

C. 4290

D. 6

Answer:

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3. H.C.F. $\times$ L.C.M. = Product of two numbers.

The sum of two numbers is 135 and their H.C.F. is 27. If their L.C.M. is 162, the numbers are

    A. 108,27

    B. 72,54

    C. 81,54

    D. 99,36

Answer:

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Exercise Subjective Problems Very Short Answer Type

1. Define L.C.M. (Least Common Multiple).

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2. Fundamental Theorem of Arithmetic

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3. If two numbers and their L.C.M. is given, then how would we find H.C.F. of the numbers?

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4. Find the H.C.F. of

$$2^3 \times 3^2 \times 5 \times 7^4, \quad 2^2 \times 3^5 \times 5^2 \times 7^3, \quad 2^3 \times 5^3 \times 7^2$$

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5. Find the H.C.F. of 108, 288 and 360.

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6. Which of the following has terminating decimal expansion (i) 13/25 (ii) 9/3125?

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7. Find the HCF of 0.9 , 0.36 and 1.80 .

8. The product of two numbers is 4107. If the H.C.F. of these numbers is 37, then the greater number is (a) 101 (b) 107 (c) 111 (d) 185

9. Find the L.C.M. of 148 and 185.

10. If two positive integers 'm' and 'n' can be expressed as $m = ab^2$ and $n = a^3b$, a, b being prime numbers, then find L.C.M. (m, n).

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1. The H.C.F. of two numbers is 23 and the other two factors of their L.C.M. are 13 and 17. Find the larger of the two numbers.

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2. The sum of two numbers is 528 and their H.C.F. is 33. The number of pairs of numbers satisfying the above conditions is (a) 4 (b) 6 (c) 8 (d) 12

3. A, B and C start at the same time in the same direction to run around a circular stadium. A completes a round in 252 seconds, B in 308 seconds and C in 198 seconds, all starting at the same point. After what time will they meet again at the starting point? (a) 26 minutes 18 seconds (b) 42 minutes 36 seconds (c) 45 minutes (d) 46 minutes 12 seconds

4. Which of the integers (99, 101, 176, 182) has most number of divisors ?

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5. Find the number of natural numbers divisible by 5 between 1 and 1000.

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6. In a division sum, the divisor is 12 times the quotient and 5 times the remainder. If the remainder is 48, then the dividend is 2404 (b) 3648 (c) 4808 (d) 4848

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7. Find the divisors of 88, 91 and 100.

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8. Find the number of divisors of 392.

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9. There is a remainder of 4 when a number is divided by 7. What will be the remainder if the square of the same number is divided by 7?

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10. Find the least number which when divided by 6, 7, 8, 9 and 12 leaves the same remainder 1 in each case.

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1. Let n=640640640643, without actually computing n^2. prove that n^2 leave a remainder 1 when divided by 8

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2. Find the largest number of four digits exactly divisible by 12, 15, 18 and 27.

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3. If P is a prime, n is a positive integer and $n + p = 2000, LCM$ of n and p is 21879 then

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4. Find the smallest positive integer k such that (2000) (2001) k is a perfect cube.

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5. Let a, b, c, k be rational numbers such that k is not perfect cube if $a + bk^{\frac{1}{3}} + ck^{\frac{2}{3}} = 0$ prove that $a = b = c = 0$

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Exercise Subjective Problems Integer Numerical Value Type

1. The least number that must be added to 3105 to get a number exactly divisible by 21.

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2. Unit digit in $(264)^{102} + (264)^{103}$ is:

3. The greatest number that will divide 103, 127 and 175, so as to leave remainder 55 in each case is

4. Find the minimum number by which 891/3500 must be multiplied to make it a terminating decimal.

5. On dividing 12401 by a certain number, we get 76 as quotient, 13 as remainder and k as divisor. Find k.

6. The unit place digit of H.C.F. of $2^2 \times 3^2 \times 5^3 \times 7, 2^3 \times 3^3 \times 5^2 \times 7^2$ and $3 \times 5 \times 7 \times 11$ is

7. Three numbers are in the ratio 1:2:3 and their H.C.F. is 12. Then the positive square root of largest number is

8. Find numerator in the fractional representation of

$0.\overline{81}$ in lowest term.

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9. A rectangular courtyard 3.78 metres long and 5.25 metres wide is to be paved exactly with square tiles, all of the same size. Then the largest size of the tile which could be used for the purpose is n cm. Find n.

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10. The greatest number which can divide 1356, 1868 and 2764 leaving the same remainder 12 in each case, is square of _____.

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Olympiad Hots Corner

1. Which of the following have non-terminating repeating decimal?

    A. $2/25$

    B. $2/7$

    C. $\dfrac{231}{2^2 \times 5^2 \times 7}$

D. $\dfrac{1323}{6^3 \times (35)^2}$

Answer:

2. $\dfrac{a + \sqrt{a^2 - b^2}}{a - \sqrt{a^2 - b^2}} + \dfrac{a - \sqrt{a^2 - b^2}}{a + \sqrt{a^2 - b^2}}$

A. $\dfrac{a^2}{b^2}$

B. $\dfrac{b^2}{a^2}$

C. $\dfrac{a}{b}$

D. $\dfrac{2(2a^2 - b^2)}{b^2}$

Answer:

3. Find the smallest positive number from the numbers below.

A. $10 - 3\sqrt{11}$

B. $3\sqrt{11} - 10$

C. $51 - 10\sqrt{26}$

D. $18 - 5\sqrt{13}$

Answer:

4. The number 0.211211121111211111..... is a

    A. Terminating decimal

    B. Non-terminating repeating decimal

    C. Non-terminating and non-repeating decimal

    D. None of these

Answer:

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5. Express $0.\overline{13} + 2.\overline{31}$ as a rational number

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6. If a number is divided by 6, the remainder is 3 then what will be the remainder when the square of the same number is divided by 6 again?

A. 0

B. 1

C. 12

D. 3

Answer:

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7. Which of the following statements is incorrect?

A. The rational form of $17.\bar{6}$ is $\dfrac{53}{3}$

B. 0.423442344423... is a rational number.

C. The fractional form of $16 + 2.\bar{9}$ is $\dfrac{19}{1}$.

D. $\sqrt{25} + \sqrt{64}$ is a rational number.

Answer:

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8. If $a + b\sqrt{5} = \dfrac{2 - \sqrt{5}}{3 + \sqrt{5}}$, then, $a - b = ?$

A. 4

B. 16

C. $\dfrac{11}{4}$

D. $\dfrac{3}{2}$

Answer:

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9. What value will be obtained on simplifying $\dfrac{1}{\sqrt{6}+\sqrt{5}} + \dfrac{1}{\sqrt{9}+\sqrt{8}} + \dfrac{1}{\sqrt{7}+\sqrt{6}} + \dfrac{1}{\sqrt{8}+\sqrt{7}} + \sqrt{5}$?

A. $3 + \sqrt{5}$

B. $3 - \sqrt{5}$

C. 3

D. $\sqrt{5}$

Answer:

10. The decimal representation of $\dfrac{3}{2^{15} \times 5^{10}}$ will terminate after how many places of decimals?

A. 15

B. 10

C. 5

D. None of these

Answer:

11. √40

    A. 16, 24, 5, 80

    B. 8, 22, 38, 57

    C. 7, 19, 46,53

    D. 12, 28, 40, 45

Answer:

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12. A real number $\dfrac{2^2 \times 3^2 \times 7^3}{2^2 \times 5^3 \times 3^5 \times 7^4}$ will have _____

    A. Terminating decimal expansion

B. Non-terminating decimal expansion

C. Repeating decimal expansion

D. Both (b) and (c)

Answer:

13. Show that: $\dfrac{\left(a + \frac{1}{b}\right)^m x \left(a - \frac{1}{b}\right)^n}{\left(b + \frac{1}{a}\right)^m x \left(b - \frac{1}{a}\right)^n} = \left(\dfrac{a}{b}\right)^{m+n}$

A. $\left(\dfrac{a}{b}\right)^{m-n}$

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

C. $\left(\dfrac{b}{a}\right)^{m/n}$

D. $\left(\dfrac{b}{a}\right)^{mn}$

Answer:

14. Which of the following is incorrect?

    A. If x is a rational number in its lowest form such that the prime factorisation of denominator is not in the form $2^n 5^n$ (where m and n are non-negative integers), then it has a decimal expansion which is non terminating and repeating.

    B. $5 + \sqrt{2}$ is an irrational number.

C. Every composite number can be expressed as a product of primes.

D. None of these

Answer:

15. The lowest common multiple of two numbers is 14 times their highest common factor. The sum of L.C.M. and H.C.F. is 600. If one number is 80, then other number is

A. 600

B. 520

C. 280

D. 40

Answer:

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