MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

REAL NUMBERS

Others

1. Explain Euclid's Division Lemma

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2. Three sets of English, Hindi and Mathematics books have to be stacked in such a way that all the books are stored topic wise and the height of each stack is the same. The number of English books is 96, the number of Hindi books is 240 and the number of Mathematics books is 336. Assuming that the books are of the same thickness, determine the number of stacks of English, Hindi and Mathematics books.

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3. 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.

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

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5. Find the HCF and LCM of 144, 180 and 192 by prime factorisation method.

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

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7. Prove that a positive integer n is prime number, if no prime p less than or equal to $\sqrt{n}$ divides n.

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8. 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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9. prove that there are infinitely many positive integers.

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10. Determine the prime factorization of each of the following numbers: 13915 (ii) 556920

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11. Express each of the following positive integers as the product of its prime factors. 3825 (ii) 5005 (iii) 7429

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12. If a and b are two odd positive integers such that a > b, then prove that one of the two numbers $\frac{a+b}{2}$ and $\frac{a-b}{2}$ is odd and the other is even.

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13. Prove that one of every three consecutive positive integers is divisible by 3.

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14. Show that the square of an odd positive integer is of the form $8q + 1$, for some integer q.

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15. Prove that the square of any positive integer is of the form $5q, 5q + 1, 5q + 4$ for some integer q.

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16. 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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17. 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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18. Prove that $n^2 - n$ divisible by 2 for every positive integer n.

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19. The remainder when the square of any prime number greater than 3 is divided by 6 is

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20. Use Euclid's division algorithm to find the HCF of 4052 and 12576.

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21. Use Euclid's division algorithm to find the HCF of 210 and 55.

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

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23. What can you say about the prime factorisations of the denominators of the following rationals:

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24. If $p_1 and p_2$ are two odd prime numbers such that $p_1 > p_2,$ then $p12 - p22$ is an even number (b) an odd number an odd prime number (c) a prime number

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25. There is a circular path around a sports field. Priya takes 18 minutes to drive on round of the field, while Ravish 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. After how many minutes will they meet again at the starting point?

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26. A rectangular courtyard is 18m 72cm long and 13m 20cm broad. It is to be paved with square tiles of the same size. Find the least possible number of such tiles.

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27. If the prime factorization of a natural number n is $2^3 \cdot 3^2 \cdot 5^2 \cdot 6,$ write the number of consecutive zeros in n.

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28. A circular field has a circumference of 360km. Three cyclists start together and can cycle 48, 60 and 72 km, a day, round the field. When will they meet again?

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29. In a morning walk three persons step off together, their steps measure 80 cm, 85 cm and 90 cm respectively. What is the minimum distance each should walk so that he can cover the distance in complete steps?

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

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

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32. A merchant has 120 litres of oil of one kind, 180 litres of another kind and 240 litres of third kind. He wants to sell the oil by filling the three kinds of oil in tins of equal capacity. What should be the greatest capacity of such a tin?

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33. Two brands of chocolates are available in packs of 24 and 15 respectively. If I need to buy an equal number of chocolates of both kinds, what is the least number of boxes of each kind I would need to buy?

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34. What is the largest number that divides 626, 3127 and 15628 and leaves remainders of

1,2 and 3 respectively?

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35. Find the greatest number that will divide 445, 572 and 699 leaving remainders 4,5 and 6 respectively.

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36. Two tankers contain 850 litres and 680 litres of petrol respectively. Find the maximum

capacity of a container which can measure the petrol of either tanker in exact number of times.

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37. Two sets of English and social science books containing 336 and 96 respectively in a library have to be stacked in such a way that an the books are stored topic wise and the height of each stack is the same. Assuming that the books are of the same thickness,

determine the number of stacks. What are the characteristics of library?

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

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

15 respectively.

A. 15

B. 16

C. 17

D. 18

Answer: C

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40. 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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41. Prove that for any prime positive integer p, $\sqrt{p}$ is an irrational number.

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42. Let $ABCD$ be a tetrahedron such that the edges $AB, ACandAD$ are mutually perpendicular. Let the area of triangles $ABC, ACDandADB$ be 3, 4 and 5sq. units, respectively. Then the area of triangle BCD is

a. $5\sqrt{2}$ b. 5 c. $\frac{\sqrt{5}}{2}$ d. $\frac{5}{2}$

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43. 15 Pastries and 12 biscuit packets have been donated for a school fete. These are to

be packed in several smaller identical boxes with the same number of pastries and biscuit packets in each. How many biscuit packets and how many pastries will each box contain?

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44. The length, breadth and height of a room are 8m and 25cm, 6m and 75cm and 4m 50cm, respectively. Determine the longest rod which can measure the three dimensions of the room exactly.

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

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46. State whether the following are true or not: $3 \mid 93$ (ii) $6 \mid 28$ (iii) $0 \mid 4$ (iv) $5 \mid 0$ (v) $-2 \mid 8$

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47. State whether the following are true or not: $-7 \mid -35$ (ii) $6 \mid 6$ (iii) $8 \mid -8$ (iv) $13 \mid -25$ (v) $1 \mid -1$

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48. 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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49. Show that any positive integer is of the form $3q$ or, $3q + 1$ or, $3q + 2$ for some integer q .

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

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51. Show that $n^2 - 1$ is divisible by 8, if n is an odd positive integer.

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52. Show that the square of any positive integer is of the form $3m$ or, $3m + 1$ for some integer m .

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53. Use Euclids division Lemma to show that the cube of any positive integer is either of the form $9m$, $9m+1$ or, $9m+8$ for some integer m .

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54. Prove that the product of two consecutive positive integers is divisible by 2.

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

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56. Prove that if a positive integer is of the form $6q + 5$, then it is of the form $3q + 2$ for some integer q , but not conversely.

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57. Prove that the square of any positive integer of the form $5q + 1$ is of the same form.

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58. Prove that the square of any positive integer is of the form $4q$ or $4q + 1$ for some integer q.

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59. 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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60. A sweet seller has 420 kaju barfis and 130 badam barfis. She wants to stack them in such a way that each stack has the same number and they take up the least area of the tray.

What is the maximum number of barfis that can be placed in each stack for this purpose?

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61. Any 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?

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62. Find the largest number which divides 245 and 1029 leaving remainder 5 in each case.

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63. 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.

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64. Define HCF of two positive integers and find the HCF of the following pairs of numbers:

(i) 32 and 54 (ii) 18 and 24

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65. Define HCF of two positive integers and find the HCF of the following pairs of numbers:

(i) 70 and 30 (ii) 56 and 88

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66. Define HCF of two positive integers and find the HCF of the following pairs of numbers:

(i) 475 and 495 (ii) 75 and 243 (iii) 240 and 6552

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67. Define HCF of two positive integers and find the HCF of the following pairs of numbers:

(i) 155 and 1385 (ii) 100 and 190 (iii) 105 and 120

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68. 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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69. Find the HCF of 963 and 657 and express it as a linear combination of them.

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70. Express the HCF of 468 and 222 as $468x + 222y$ where x, y are integers in two different ways.

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71. If the HCF of 408 and 1032 is expressible in the form $1032\,m - 408 \times 5$, find m.

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72. If the HCF of 657 and 963 is expressible in the form $657\,x + 963 \times\ -15,$ find x.

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73. Find the largest number which divides 615 and 963 leaving remainder 6 in each case.

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74. Find the greatest number which divides 285 and 1249 leaving remainders 9 and 7 respectively.

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75. Find the greatest number which divides 285 and 1249 leaving remainders 9 and 7 respectively.

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76. Find the greatest number which divides 2011 and 2623 leaving remainders 9 and 5 respectively.

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77. 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?

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78. During a sale, colour pencils were being sold in packs of 24 each and crayons in packs of 32 each. If you want full packs of both and

the same number of pencils and crayons, how many of each would you need to buy?

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79. 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?

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80. A mason has to fit a bathroom with square marble tiles of the largest possible size. The size of the bathroom is 10 ft. by 8 ft. What would be the size in inches of the tile required that has to be cut and how many such tiles are required?

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81. Express each of the following positive integers as the product of its prime factors: (i)

140 (ii) 156 (iii) 234

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82. Prove that there is no natural number for which 4^n ends with the digit zero.

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83. Express each of the following integers as a product of its prime factors: (i) 420 (ii) 468 (iii) 945 (iv) 7325

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84. Determine the prime factorisation of each of the following positive integer: (a) 20570 (ii) 58500 (iii) 45470971

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

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86. Find the HCF and LCM of 90 and 144 by the prime factorisation method.

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87. Find the HCF of 96 and 404 by prime factorisation method. Hence, find their LCM.

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88. In a school there are two sections section A and section B of class X . There are 32 students in section A and 36 students in section B . Determine the minimum number of books required for their class library so that they can be distributed equally among students of section A or section B .

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89. Find the LCM and HCF of the following pairs of integers and verify that LCM $\times$ HCF $=$ Product of the integers: (a) 26 and 91 (ii) 510 and 92 (iii) 336 and 54

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90. 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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91. Find the LCM and HCF of the following integers by applying the prime factorisation method: (i) 40, 36 and 126 (ii) 84, 90 and 120 (iii) 24, 15 and 36

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

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93. Can two numbers has 16 as H.C.F. and 380 as L.C.M .

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94. The HCF of two numbers is 145 and their LCM is 2175. If one number is 725, find the other.

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95. The HCF of two numbers is 16 and their product is 3072. Find their LCM.

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96. The LCM and HCF of two numbers are 180 and 6 respectively. If one of the numbers is 30, find the other number.

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97. Find the smallest number which when increased by 17 is exactly divisible by both 520 and 468.

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

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99. Determine the number nearest to 110000 but greater than 100000 which is exactly divisible by each of 8, 15 and 21.

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100. Find the smallest number which leaves remainder 8 and 12 when divided by 28 and 32 respectively.

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101. What is the smallest number that, when divided by 35,56 and 91 leaves remainder of 7.

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102. What is the least number that is divisible by all the numbers 1 to 10

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103. Prove that $\sqrt{2}$ is an irrational number.

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104. Prove that $\sqrt{3}$ is an irrational number.

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

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106. Prove that $\sqrt{5}$ is an irrational number.

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107. Prove that $5 - \sqrt{3}$ is an irrational number.

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

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109. For any positive real number x, prove that there exists an irrational number y such that $0 < y < x$.

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110. Show that the following numbers are irrational. $\frac{1}{\sqrt{2}}$ (ii) $7\sqrt{5}$

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111. Show that the following numbers are irrational. $(i) 6+\sqrt{2}\,(ii) 3-\sqrt{5}$

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112. Prove that following numbers are irrationals:(i) $\frac{2}{\sqrt{7}}$

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113. Prove that following numbers are irrationals: $4+\sqrt{2}$ (ii) $5\sqrt{2}$

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114. Show that $2-\sqrt{3}$ is an irrational number.

Given $\sqrt{3}$ is irrational.

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115. Show that $3+\sqrt{2}$ is an irrational number.

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116. Prove that $\left(4-5\sqrt{2}\right)$ is an irrational number.

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117. Show that $5-2\sqrt{3}$ is an irrational number.

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118. Prove that $2\sqrt{3}-1$ is an irrational number

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119. Prove that $2-3\sqrt{5}$ is an irrational number.

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

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121. Prove that $\sqrt{3}+\sqrt{4}$ is an irrational number.

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122. If $p,\ q$ are prime positive integers, prove that $\sqrt{p}+\sqrt{q}$ is an irrational number.

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123. 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. $\frac{17}{8}$ (ii) $\frac{64}{455}$ (iii) $\frac{29}{343}$

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124. 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. $\frac{15}{600}$ (ii) $\frac{13}{3125}$ (iii) $\frac{23}{2^3 5^2}$

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125. Without actually performing the long division, state whether the following rational numbers will have terminating decimal

expansion or a non-terminating repeating decimal expansion. $\frac{23}{8}$ (ii) $\frac{125}{441}$ (iii) $\frac{35}{50}$

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126. Without actually performing the long division, state whether the following rational numbers will have terminating decimal expansion or a non-terminating repeating decimal expansion. $\frac{77}{210}$ (ii) $\frac{129}{2^2 \times 5^7 \times 7^{17}}$

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127. Write down the decimal expansions of the following rational numbers by writing their denominators in the form $2^m \times 5^n$, where m, n are non-negative integers. $\frac{3}{8}$ (ii) $\frac{13}{125}$ (iii) $\frac{7}{80}$

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128. Write down the decimal expansions of the following rational numbers by writing their denominators in the form $2^m \times 5^n$, where

m, n are non-negative integers. $\frac{14588}{625}$ (ii) $\frac{129}{2^2 \times 5^7}$

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129. What can you say about the prime factorisations of the denominators of the following rationals: (i) 43.123456789 (ii) $43.\overline{123456789}$ (iii) $27.\overline{142857}$ (iv) $0.\overline{12012001200012000}$.

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130. State Fundamental Theorem of Arithmetic.

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131. Write 98 as product of its prime factors.

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132. Write the exponent of 2 in the prime factorization of 144.

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133. Write the sum of the exponents of prime factors in the prime factorization of 98.

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134. If the product of two numbers is 1080 and their HCF is 30, find their LCM.

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135. Write the condition to be satisfied by q so that a rational number $\frac{p}{q}$ has a terminating decimal expansion.

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136. Write the condition to be satisfied by q so that a rational number $\frac{p}{q}$ has a non-terminating decimal expansion.

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137. Complete the missing entries in the following factor tree. (FIGURE)

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138. The decimal expansion of the rational number $\frac{43}{2^4 \times 5^3}$ will terminate after how many places of decimals?

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139. Has the rational number $\frac{441}{2^2 \times 5^7 \times 7^2}$ a terminating or a non-terminating decimal representation?

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140. Write whether $\frac{2\sqrt{45} + 3\sqrt{20}}{2\sqrt{5}}$ on simplification gives a rational or an irrational number.

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141. What is an algorithm?

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142. State Euclid Division lemma.

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143. If a and b are relatively prime numbers, then what is their HCF?

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144. If p and q are two prime numbers, then what is their LCM?

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145. What is the total number of factors of a prime number?

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146. What is a composite number?

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147. What is the HCF of the smallest composite number and the smallest prime number?

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148. HCF of two numbers is always a factor of their LCM (True / False).

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149. π is an irrational number (True / False).

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150. The sum of two prime numbers is always a prime number (True/false).

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151. The product of any three consecutive natural numbers is divisible by 6 (True/false).

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152. Every even integer is of the form $2m$, where m is an integer (True/false).

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153. Every odd integer is of the form $2m - 1$, where m is an integer (True/false).

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154. The product of two irrational numbers is an irrational number (True/false).

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155. The sum of two irrational numbers is an irrational number (True/false).

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156. For what value of n, $2^n \times 5^n$ ends in 5.

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157. If a and b are relatively prime numbers, then what is their HCF?

A. 0

B. 1

C. ab

D. None of these

Answer: null

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158. If a and b are relatively prime numbers, then what is their LCM?

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159. Two numbers have 12 as their HCF and 350 as their LCM (True/false).

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160. The exponent of 2 in the prime factorisation of 144, is (a) 4 (b) 5 (c) 6 (d) 3

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161. The LCM of two numbers is 1200. Which of the following cannot be their HCF? (a) 600 (b) 500 (c) 400 (d) 200

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162. If $n = 2^3 \times 3^4 \times 5^4 \times 7$, then the number of consecutive zeros in n , where n is a natural number, is (a) 2 (b) 3 (c) 4 (d) 7

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163. The sum of the exponents of the prime factors in the prime factorisation of 196, is (a) 1 (b) 2 (c) 4 (d) 6

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164. The number of decimal places after which the decimal expansion of the rational number $\frac{23}{2^2 \times 5}$ will terminate, is

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165. If two positive integers a and b are expressible in the form $a = pq^2$ and $b = p^3q$; $p,\ q$ being prime numbers, then LCM $(a,\ b)$ is

(a)pq (b) p^3q^3 (c) p^3q^2 (d) p^2q^2

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166. If two positive integers a and b are expressible in the form $a = pq^2$ and $b = p^3q$, p and q being prime numbers, then HCF (a, b) is

$a)pq$

$b) p^3 q^3$

$c) p^3 q^2$

$d) p^2 q^2$

A. pq

B. null

C. null

D. null

Answer: null

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167. If two positive integers m and n are expressible in the form $m = pq^3$ and $n = p^3q^2$, where p, q are prime numbers, then HCF $(m,\ n) =$

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168. LCM of a and 18 is 36 and HCF of a and 18 is 2, then a=

(a) 2 (b) 3 (c) 4 (d) 1

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169. The HCF of 95 and 152, is (a) 57 (b) 1

(c) 19 (d) 38

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170. a) 26 (b) 52 (c) 338 (d) 13

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171. If $a = 2^3 \times 3,\ \ b = 2 \times 3 \times 5,\ \ c = 3^n \times 5$ and LCM $(a,\ b,\ c) = 2^3 \times 3^2 \times 5$, then $n =$ (a) 1 (b) 2 (c) 3 (d) 4

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172. The decimal expansion of the rational number $\frac{14587}{1250}$ will terminate after (a) one decimal place (b) two decimal place (c) three decimal place (d) four decimal place

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173. If p and q are co-prime numbers, then p^2 and q^2 are (a) coprime (b) not coprime (c) even (d) odd

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174. Which of the following rational numbers have terminating decimal (i) $\frac{16}{225}$ (ii) $\frac{5}{18}$ (iii) $\frac{2}{21}$ (iv) $\frac{7}{250}$

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175. If 3 is the least prime factor of number a and 7 is the least prime factor of number b, then the least prime factor of a+b , is

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176. 3.27 is (a) an integer (b) a rational number (c) a natural number (d) an irrational number

A. (a) an integer

B. (b) a rational number

C. (c) a natural number

D. (d) an irrational number

Answer: null

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177. The smallest number by which $\sqrt{27}$ should be multiplied to get a rational number is (a) $\sqrt{27}$ (b) $3\sqrt{3}$ (c) $\sqrt{3}$ (d) 3

A. (a) $\sqrt{27}$

B. (b) $3\sqrt{3}$

C. (c) $\sqrt{3}$

D. (d) 3

Answer: null

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178. The smallest rational number by which $\frac{1}{3}$ should be multiplied so that its decimal expansion terminates after one place of

decimal, is ..... $(a)\frac{3}{10}$ $(b)\frac{1}{10}$ $(c)3$ $(d)\frac{3}{100}$

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179. If n is any natural number, then $6^n - 5^n$ always ends with ..... (a) 1 (b) 3 (c) 5 (d) 7

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180. The LCM and HCF of two rational numbers are equal, then the numbers must be (a) prime (b) co-prime (c) composite (d) equal

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181. If the sum of LCM and HCF of two numbers is 1260 and their LCM is 900 more than their HCF, then the product of two numbers is (a)

203400 (b) 194400 (c) 198400 (d) 205400

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