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| Division | 10th |
| Subject | Mathematics |
| Chapter | Number system |
| Author | Ruhani Kashni |
| Category | 04 |

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| **For any positive integer n, n3 – n is divisible by**  **(2020)** |
| 6 |
| 7 |
| 8 |
| 9 |
| a |
| Any positive integer can be of form 6q, or 6q+1, 6q+2, 6q+3, 6q+4, or 6q+5  For n= 6q  ⇒ (n-1) n(n+1) = (6q-1) (6q) (6q+1)  For n= 6q+1,  ⇒ (n-1) n(n+1) = (6q) (6q+1) (6q+2)  For n= 6q+2,  ⇒ (n-1) n(n+1) = (6q+1) (6q+2) (6q+3) |
| Let n be any positive integer, can be of form 6q, or 6q+1, 6q+2, 6q+3, 6q+4, or 6q+5. (From Euclid’s division lemma for b= 6)  We have **n3 – n = n(n2-1) = (n-1) n(n+1)**  For n= 6q  ⇒ (n-1) n(n+1) = (6q-1) (6q)(6q+1)  ⇒ (n-1) n(n+1) = 6[(6q-1) q(6q+1)]  ⇒ (n-1) n(n+1) = 6m, which is divisible by 6. [m= (6q-1) q(6q+1)]  For n= 6q+1,  ⇒ (n-1) n(n+1) = (6q) (6q+1) (6q+2)  ⇒ (n-1) n(n+1) = 6[q(6q+1) (6q+2)]  ⇒ (n-1) n(n+1) = 6m, which is divisible by 6. [m= q(6q+1) (6q+2)]  For n= 6q+2,  ⇒ (n-1) n(n+1) = (6q+1) (6q+2)(6q+3)  ⇒ (n-1) n(n+1) = 6[(6q+1)(3q+1)(2q+1)]  ⇒ (n-1) n(n+1) = 6m, which is divisible by 6. [m= (6q+1) |
| Real numbers introduction |

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| For any positive integer a and 3, there exist unique integers q and r such that a = 3q + r, where r must satisfy  (2020) |
| 1 < r < 3 |
| 0 < r < 3 |
| 0 ≤ r < 3 |
| 0 < r ≤ 3 |
| C |
| Division Algorithm, which states that for any positive integer 'a' and any positive integer 'b', there exist unique integers 'q' and 'r' such that:  a = bq + r |
| This statement expressing the Division Algorithm, which states that for any positive integer 'a' and any positive integer 'b', there exist unique integers 'q' and 'r' such that:  a = bq + r  b' is equal to 3, so the Division Algorithm can be expressed as:  a = 3q + r  where 'r' satisfies 0 ≤ r < 3.  - a is the dividend number  - 3 is the divisor.  - q is the quotient  - r is the remainder  The condition 0 ≤ r < 3 ensures that the remainder 'r' will always be between 0 (inclusive) and 3 (exclusive). In other words, 'r' can only be 0, 1, or 2. This is because if 'r' were 3 or greater, you could have subtracted another '3' from 'a' to obtain a smaller positive remainder. And if 'r' were negative, you could have subtracted fewer '3's to get a non-negative remainder. |
| Real numbers introduction |

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| L.C.M. of 23 × 32 and 22 × 33 is :  (2016) |
| 23 |
| 22 |
| 1526 |
| 1518 |
| D |
| Step 1: Prime factorization of the given numbers  Step 2: Identify the common and uncommon factors.  Step 3: Multiply common factors and uncommon factors separately  Step 4: LCM will be the product of common and uncommon factors |
| Step 1: Prime factorization of the given numbers 23×32 = (23) × (2×2×2×2×2×2)  = 23×26  22×33 = (2×11) × (3×3×3×3×3)  = 2×11×35  Step 2: Identify the common and uncommon factors  Common factors: 2 and 3  Uncommon factors: 23 and 11  Step 3: Multiply common factors and uncommon factors separately  Common factors: 2×3=6  Uncommon factors: 23×11=253  Step 4: LCM will be the product of common and uncommon factors  LCM of 23×32 and 22×33 = 6×253 = 1518  Therefore, the LCM of 23×32 and 22×33 is 1518. |
| Decimal expansions of real numbers |

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| The HCF and LCM of two numbers are 33 and 264 respectively. When the first number is completely divided by 2 the quotient is 33. The other number is?  (2019) |
| 130 |
| 131 |
| 132 |
| 133 |
| C |
| We can use the relationship between HCF, LCM, and the numbers A and B:  HCF (A, B) × LCM (A, B) = A × B  Plug in the values:  33 × 264 = A × B |
| 1.HCF (Highest Common Factor) of A and B is 33.  2.LCM (Least Common Multiple) of A and B is 264.  3.When A is divided by 2, the quotient is 33.  We can use the relationship between HCF, LCM, and the numbers A and B:  HCF (A, B) × LCM (A, B) = A × B  Plug in the values:  33 × 264 = A × B  Now, let's solve for A:  A = (33 × 264) / B  We also know that when A is divided by 2, the quotient is 33:  A / 2 = 33  Now, we can substitute this value of A/2 into the equation:  (33 × 264) / B / 2 = 33  Now, simplify:  (33 × 264) / (B × 2) = 33  Now, cancel out the common factor of 33:  264 / (2 × B) = 1  Now, solve for B:  264 = 2 × B  Divide both sides by 2:  B = 264 / 2  B = 132 |
| Decimal expansions of real numbers |

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| The ratio of H.C.F to L.C.M of the least composite number and the least prime number is :  (2019) |
| 3:1 |
| 1:5 |
| 1:2 |
| 5:1 |
| C |
| The least composite number is 4 because it is the smallest number that is not a prime number and can be factored into smaller whole numbers (2 × 2).  The least prime number is 2 because it's the smallest number that is only divisible by 1 and itself.  Now, let's calculate the HCF and LCM:  HCF (4, 2) = 2  LCM (4, 2) = 4 |
| The least composite number is 4, which has prime factors 2 and 2. The least prime number is 2.  The HCF (Highest Common Factor) of 4 and 2 is 2, because that is the largest number that divides both 4 and 2.  The LCM (Least Common Multiple) of 4 and 2 is 4, because that is the smallest number that is a multiple of both 4 and 2.  Therefore, the ratio of HCF to LCM of 4 and 2 is 2:4 or 1:2. |
| Euclid's division lemma |

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| If the HCF of 360 and 64 is 8, then their LCM is:  (2020) |
| 2880 |
| 1488 |
| 2771 |
| 1233 |
| A |
| Product of two numbers = HCF x LCM  HCF (360, 64) × LCM (360, 64) = (360 × 64) |
| Product of two numbers = HCF x LCM  HCF (360, 64) × LCM (360, 64) = (360 × 64)  Given that the HCF of 360 and 64 is 8,  8 × LCM (360, 64) = (360 × 64)  Now, solve for LCM:  LCM (360, 64) = (360 × 64) / 8  LCM (360, 64) = 45 × 64  LCM (360, 64) = 2880 |
| Euclid's division lemma |

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| Find the HCF of the numbers 540 and 630 , using prime factorization method.  (2021) |
| 60 |
| 70 |
| 80 |
| 90 |
| D |
| compare the prime factorizations of both numbers:  Prime factors in 540: 2, 3, 5  Prime factors in 630: 2, 3, 5, 7  Multiply the common prime factors with their minimum powers to find the HCF. |
| Prime Factors for 540: 2, 2, 3, 3, 3, and 5  Prime Factors for 630: 2, 3, 3, 5, and 7  Now that we have the list of prime factors, we need to find any which are common for each number.  To calculate the prime factor, we multiply these numbers together:  GCF = 2 x 3 x 3 x 5 = 90 |
| Fundamental theorem of arithmetic |

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| The difference of two numbers is 1365. On dividing the larger number by the smaller, we  get 6 as quotient and the 15 as remainder. What is the smaller number?  (2021) |
| 270 |
| 360 |
| 140 |
| 150 |
| A |
| The difference between the two numbers is 1365. So, we have:  L - x = 1365  When the larger number (L) is divided by the smaller number (x), we get a quotient of 6 and a remainder of 15. This can be expressed as:  L = 6x + 15 |
| Let the smaller number be x.  ⇒ Larger number = (x+1365)  ⇒ x+1365=6x+15  ⇒ 5x=1350  ⇒ x=270  ∴ Larger number is (270 + 1365) = 1635 |
| Fundamental theorem of arithmetic |

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| If x and y are the two digits of the number 653xy such that this number is divisible by 80,  then x + y =?  (2021) |
| 4 |
| 6 |
| 8 |
| 9 |
| B |
| If the number is divisible by another number, it will be divisible by its factors too.  The factors of 80=2×5×8  For the number to be divisible by both 2 and 5, the last digit should be 0  So, y=0 |
| If the number is divisible by another number, it will be divisible by its factors too.  The factors of 80=2×5×8  For the number to be divisible by both 2 and 5, the last digit should be 0  So, y=0  So we can rewrite the number as 653x0  Now For the number to be divisible by 8, last 3 digits should be divisible by 8  So 3x0 should be divisible by 8  So, x can be either 2 or 6 since 320 and 360 are divisible by 8  If x=2; then the number becomes 65320 which is not divisible by 80  If x=6; then the number becomes 65360 which is divisible by 80  Hence the value of x=6  So, x+y=6+0  = 6 |
| Relation between LCM and HCF of two numbers |

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| Find the HCF of 1848, 3058 and 1331.  (2022) |
| 9 |
| 10 |
| 11 |
| 12 |
| C |
| The Highest Common Factor (H.C.F) of two (or more) numbers is the largest number that divides evenly into both numbers. H.C.F is the largest of all the common factors. The HCF o1848,3058 and 1331.we have factors of 1848=11×2×2×2×3×7 3058=11×2×139 1331=11×11×11 |
| 3058 = 1848 × 1 + 1210  1848 = 1210 × 1 + 638  1210 = 638 × 1 + 572  638 = 572 × 1 + 66  572 = 66 × 8 + 44  66 = 44 × 1 + 22  44 = 22 × 2 + 0  ∴ HCF of 1848 and 3058 is 22.  Let us find the HCF of the numbers 1331 and 22.  1331 = 22 × 60 + 11  22 = 11 × 2 + 0  HCF of 1331 and 22 is 11 |
| Relation between LCM and HCF of two numbers |

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| 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?  (2023) |
| 7 |
| 8 |
| 9 |
| 10 |
| B |
| Using the Euclidean algorithm:  Divide 616 by 32: 616 ÷ 32 = 19 with a remainder of 8.  Divide 32 by 8: 32 ÷ 8 = 4 with no remainder. |
| Maximum number of columns = HCF of 616 and 32  616= 23×7×11  32=25  ∴ HCF of 616 and 32 =23 =8 |
| Decimal representation of rational numbers in terms of terminating |

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| Find the biggest number which can divide both 324 and 144  (2021) |
| 36 |
| 21 |
| 18 |
| 24 |
| A |
| Prime factorizing the two numbers we get,  324=3×3×3×3×2×2  144=3×3×2×2×2×2 |
| Prime factorizing the two numbers we get,  324=3×3×3×3×2×2  144=3×3×2×2×2×2  Now, taking the common factors between them gives us the HCF.  Therefore, HCF =2×2×3×3=36 |
| Decimal representation of rational numbers in terms of terminating |

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| **The decimal expansion of 22/7 is**  **(2022)** |
| Terminating |
| Non-terminating and non-repeating |
| Non-terminating and repeating |
| None of the above |
| C |
| A **non-terminating decimal** is a decimal representation of a number that goes on infinitely without repeating. |
| 22/7 = 3. 14285714286.. The decimal expansion of 22/7 is non-terminating and repeating.  where the digits 142857 repeat in a cycle. |
| Decimal representation of rational numbers in terms of non-terminating recurring decimals |

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| n² – 1 is divisible by 8, if n is?  (2020) |
| an integer |
| a natural number |
| an odd integer |
| an even integer |
| C |
| n² -1 = (2Q + 1) ² -1  = 4Q² + 4Q + 1 -1  = 4Q² + 4Q  Substituting Q = 1, 2, |
| n² -1 = (2Q + 1) ² -1  = 4Q² + 4Q + 1 -1  = 4Q² + 4Q  Substituting Q = 1, 2, …  When Q = 1,  4Q² + 4Q = 4(1) ² + 4(1) = 4 + 4 = 8, it is divisible by 8.  When Q = 2,  4Q² + 4Q = 4(2) ² + 4(2) =16 + 8 = 24, it is also divisible by 8.  When Q = 3,  4Q² + 4Q = 4(3) ² + 4(3) = 36 + 12 = 48, divisible by 8  It is concluded that 4Q² + 4Q is divisible by 8 for all natural numbers. |
| Decimal representation of rational numbers in terms of non-terminating recurring decimals |

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| The exponent of 2 in the prime factorization of 144, is  (2021) |
| 2 |
| 3 |
| 4 |
| 5 |
| C |
| Factorize 144 into its prime factors and then count the number of times the prime factor 2 appears. |
| 2 144  2 72  2 36  2 18  3 9  3 3  1  144 = 24 ×32  Exponent of 2 is 4. |
| Revisiting irrational numbers |

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| LCM of two numbers is 225 and their HCF is 5. If one number is 25, the other number will be:  (2022) |
| 5 |
| 25 |
| 45 |
| 55 |
| c |
| LCM × HCF = 1st Number× 2ndNumber |
| LCM × HCF = 1st Number× 2ndNumber  225 × 5 = 25 × x  X= =45 |
| Revisiting irrational numbers |

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| The HCF of two numbers is 15 and their LCM is 300. If one of the numbers is 60, the other is:  (2017) |
| 50 |
| 65 |
| 75 |
| 85 |
| c |
| LCM × HCF = 1st Number× 2ndNumber |
| First number × Second number = HCF × LCM  X= =75 |
| Convert decimals into fractions |

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| The product of two numbers is 4107. If the H.C.F. of the numbers is 37, the greater number is  (2014) |
| 111 |
| 107 |
| 211 |
| 312 |
| a |
| L.C.M= |
| L.C.M=  = =111 |
| Convert decimals into fractions |