01. Basic Arithmetic

1. In how many numbers between & does the number appear?

Answer:

* numbers with in units place (i.e. – )
* numbers with in tens place (i.e. – )
* But the number was counted twice.
* So,

1. The value of is

Answer:

1. The square root of can be

Answer:

* Square root of any positive number less than is greater than that number.
* Only one option that is greater than is

1. The difference between the largest and the smallest of the fractions , and is?

Answer:

* is the largest fraction
* Smallest fraction is

1. then is

Answer:

* Rationalize the denominator.

1. The greatest number that will divide and leaving remainders of and is

Answer:

* Effectively we want a number that will divide and .
* So GCD(, ) =

1. is not divisible by

Answer:

* (divisible by , and )
* (divisible by , and )
* So the expression is divisible by , and for all odd powers
* Last numbers of . And is not divisible by , so is also not divisible by

1. If seven numbers, each divisible by are added, the sum will be divisible by

Answer:

* Let the numbers be: 4a1 4a2 4a3 4a4 4a5 4a6 4a7 (where an is any integer)
* Sum: 4a1 + 4a2 + 4a3 + 4a4 + 4a5 + 4a6 + 4a7
* Sum: 4 (a1 + a2 + a3 + a4 + a5 + a6 + a7)
* The only thing that can be said for certain is the sum is divisible by **4**.

1. How many numbers between and are divisible by both and ?

Answer:

* Which numbers are divisible by and ? –> all multiples of their LCM and no other.
* So, we are looking for multiples of between and –> & –> numbers.

1. Three bells begin tolling at the same time and continue to do so at intervals , and seconds respectively. After how many seconds will the bells toll together for the first time after they begin tolling?

Answer:

* Bell : Rings at seconds interval – Rings at t1 seconds – t1 = 21n1 (where n1 is whole number)
* Bell : Rings at seconds interval – Rings at t2 seconds – t2 = 28n2 (where n2 is whole number)
* Bell : Rings at seconds interval – Rings at t3 seconds – t3 = 30n3 (where n3 is whole number)
* So, we are looking for t1 = t2 = t3, that is 21n1 = 28n2 = 30n3 (for whole number values of n1 , n2 and n3)
* 21n1 = 28n2 = 30n3 this condition will first occur at the beginning (for n1, n2 and n3 all = 0)
* But we are looking for the next occurrence, which will happen at LCM (, , )
* LCM (, , ) =

1. If is greater than but less than , which of the following is the largest?

Answer:

* The condition must hold for all values of between and .
* So, we can just substitute values and check.
* If for some value two options are giving same value (which is largest), just try some other value of the resolve the discrepancy. (NOTE: this issue will not occur in this question)
* Solution:

1. If , which of the following is the largest?

Answer:

* Substitute value
* Solution:

1. If is an integer, which of the following must be even?

Answer:

* Substitute value
* Solution:

1. If m, n, o, p and q are integers then must be even, when which of the following is even?

Answer:

* Either OR OR is even.
* Options only contain .

1. If 932 is divided by 5, then the remainder would be

Answer:

* 91 = 9
* 92 = 81
* 93 = 729
* For all even powers’ units place is 1.
* Last digit of 932 is 1. So, remainder would be **1**.

1. The sum of two numbers is and the difference of their squares is . What is the difference between the numbers?

Answer:

* 2 equations, 2 variables.
* –> –>

1. Find the least number which must be added to so that the resulting number is exactly divisible by .

Answer:

* I will use % symbol for modulo operation –> x % y gives the remainder when x is divided by y
* 15463 % 107 is 55
* 55 + x = 107
* x = **52**

1. A number when divided by 221 leaves a remainder 64. What is the remainder when the same number is divided by 13?

Answer:

* N % 221 = 64
* So, we can write N as
* Because 221n is completely divisible by 13, our equation reduces to

1. Find the greatest number which will divide 38, 45 and 52 and leave remainders 2, 3 and 4 respectively.

Answer:

* Same as Question 6
* Solution: **6**

1. If sum of two positive numbers is 24 and the difference of their squares is 48, what is the product of the two integers?

Answer:

* Same as Question 16
* Solution: x=11, y=13, x\*y = **143**

1. There are a few cards in the collection. If they are counted out 3 at a time, there are 2 cards left out, but if they are counted out 4 at a time, there is 1 card left out. How many cards are there in the collection?

Answer:

* Let the number be N, so it can be represented as
* N = 3n1 + 2 -> n1 = (N-2)/3 {where n1 is integer}
* N = 4n2 + 1 -> n2 = (N-1)/4 {where n2 is integer}
* n1 – n2 = (N-2)/3 - (N-1)/4 = (N–5)/12
* Since n1 and n2 are both integers n1 – n2 is also an integer, let it be x
* x = (N–5)/12 -> N = (12x+5)
* Check which option is of the form 12x+5, where x is an integer
* Solution: for ->
* Alternatively, plug-in all options and check which satisfies both conditions.

1. Mary Lou has dimes in a piggy bank. What is the least number of dimes that she can remove from the bank so that she could divide the remaining dimes equally among people?

Answer:

* {read as ‘modulo’ } { give the remainder when is divided by }

1. For how many of the integers from to is at least one of the two digits ?

Answer:

* Similar to Question
* Solution:

1. The sum of the three consecutive odd integers, , and , in ascending order, is . What is the sum of the three consecutive odd integers that immediately follow ?

Answer:

* General form of odd integers (where is any integer)
* So, let
* ,
* –>
* , , ,

1. There are chips on a table. Of as many of the chips as possible are to be arranged into an equal number of -chips and -chips stacks and the remaining chips are to be removed, how many of the chips are to be removed?

Answer:

* Let number of stacks be chips
* Total chips used