CAT-2008 question 7(Booklet-222)

The number of common terms in the two sequences 17, 21, 25… 417 and 16, 21, 26… 466 is

(1) 78 (2) 19 (3) 20 (4) 77 (5) 22

7. (3) Total number of terms in the sequence 17, 21, 25 … 417 is equal to $\frac{417-17}{4}+1=101$.

Total number of terms in the sequence 16, 21, 26 … 466 is equal to $\frac{466-16}{5}+1=91$.

Nth term of the first sequence = 4n + 13.

m^{th} term of the second sequence = 5m + 11.

As per the information given in the question 4n + 13 = 5m + 11

$\Rightarrow$ 5m – 4n = 2.

Possible integral values of n that satisfy 5m = 2 + 4n are (2, 7, 12 … 97)

Therefore, the total number of terms common in both the sequences is 20.

Hence, option (3) is the correct choice.

Career Launcher -QA Ex. 2

12. The number of common terms of the two sequences 17, 21, 25,..., 417 and 16, 21, 26, ... 466 .

a. 21 b. 29 c. 25 d. 91 e. 20

Solution:

12. e Let m^{th} term of the first sequence be equal to the n^{th} term of the second sequence. Then

17 + 4(m – 1) = 16 + 5(n – 1)

Or, 4m + 13 = 5n + 11

Or, 4m + 2 = 5n

$n=m-\frac{1}{5}(m-2)$

Since n is an integer, m – 2 must be a multiple of 5, i.e. m must be of the form 5k + 2, with k ≥ 0. Then n = 4k + 2. The first sequence has 101 terms and the second has 91 terms.

$\therefore 0 \le 5k+2 < 101$ and $0 \le 4k+2 \le 91$

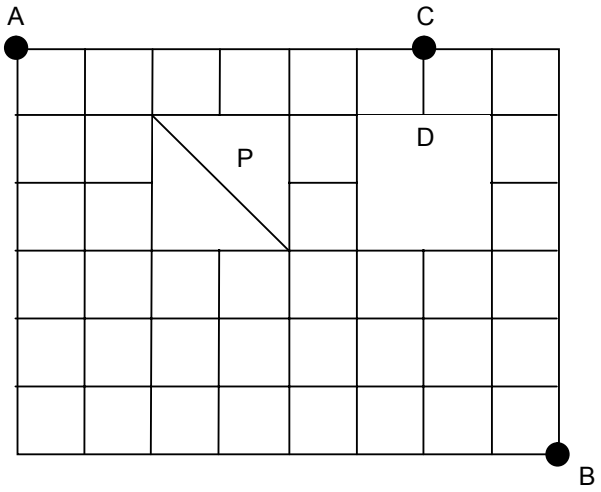
$\Rightarrow 0 \le k \le 19$

Hence, the given sequences have 20 common terms.

CAT-2008 question 9&10(Booklet-222)

Directions for questions 9 and 10:

The figure below shows the plan of a town. The streets are at right angles to each other. A rectangular park (P) is situated inside the town with a diagonal road running through it. There is also a prohibited region (D) in the town.



9. Neelam rides her bicycle from her house at A to her office at B, taking the shortest path. Then the number of possible shortest paths that she can choose is
(1) 60 (2) 75 (3) 45 (4) 90 (5) 72

10. Neelam rides her bicycle from her house at A to her club at C, via B taking the shortest path. Then the number of possible shortest paths that she can choose is
(1) 1170 (2) 630 (3) 792 (4) 1200 (5) 936

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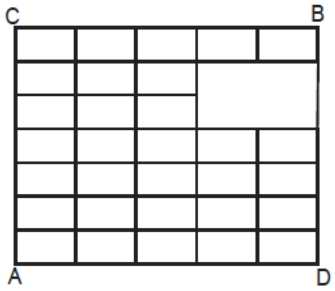
33. If the network of roads is as shown in the following figure, then find how many distinct shortest routes are possible if one has to travel from A to B.



a. 128 **b. 414** **c. 210** **d. 288** **e. None of these**