MATHS

BOOKS - V PUBLICATION

ARITHMETIC SEQUENCES

Question Bank

1. One cubic centimetre of iron weighs 7.8 grams. Write as sequences, the volumes of weights of Iron cubes of sides 1 centimetre, 2 centimetres and so on.

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2. Make the following number sequences, from the sequence of equilateral triangles, squares, regular pentagons and so on, of regular polygons:

Number of sides 3,4,5,.........Sum of interior angles
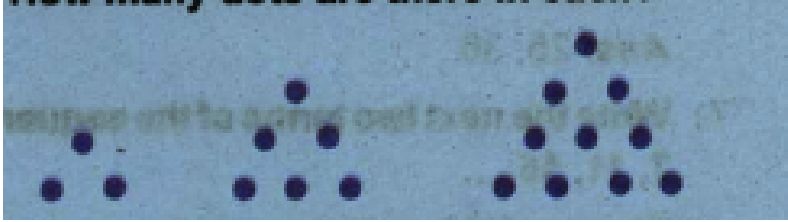
Sum of exterior angles

One interior angle

One exterior angle

3. Look at these triangles made with dots. How many dots. How many dots are there in each?

Compute the number of dots needed to make the next two triangles.

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4. Write down the sequences of natural numbers leaving remainder 1 on division by 3 and the sequence of natural numbers leaving remainder 2 on division by 3 .

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5. Write down the sequence of natural numbers ending in 1 or 6 and describe it in two other ways.

6. A tank contains 1000 litres of water and it flows out at the rate of 5 litres per second. How much water is there in the tank after each second? Write their numbers as a sequence.

7. Write the sequence of all three digit numbers. Which leaves remainder 3 on division by 7? Which is

the last term of this sequence?

8. Write the sequence starting from 1/2 and 1/4 is added subsequently.

9. The equilateral triangle having sldes 1 cm, 2 cm, 3 cm

(i) Write the sequence of perimetres.

(ii) Write the sequence of area.

10. Write the sequence of multiples of 3.

11. Write the next two terms of the sequence

1,8,27,64,.......

12. Write the next two terms of the sequence

1,4,9,16,.........

13. Write the next two terms of the sequence 7,11,15,..........

14. Write the algebraic expression for each of the sequences below:

i) Sequence of odd numbers

ii) Sequence of natural numbers which leave remainder 1 on division by 3.

iii)The sequence of natural numbers ending in 1.

iv)The sequence of natural numbers ending in 1 or 6.

15. For the sequence of regular polygons starting with an equilateral triangle, write the algebraic expressions for the sequence of the sums of interior angles, the sums of the exterior angles, the measures of an interior angle, and the measures of an exterior angle.

16. Write the algebraic expression of the 17 sequence

17/7, 31/7, 45/7,..........

17. Write the terms of the sequence '5 xx(1+6), 10 xx(2+6), 15 xx(3+6),20 xx(4+6) ......' in the form, first term '5 xx 1(1+6)', second term '5 xx 2(2+6)'

i)Write its algebra.

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18. In the staircase shown here the height of the first step is 10 centimetres and the height of each step after it is 17.5 centimetres.'(##VPU_TTT_MAT_X_P01_C01_E03_003_Q01##)'

i) How high from the ground would be someone climbing up, after each step?

ii) Write these numbers as a sequence.

19.   (##VPU_TTT_MAT_X_P01_C01_E03_003_Q01##)'In this picture, the perpendiculars to the bottom line are equally spaced. Prove that, continuing like this, the lengths of perpendiculars form and arithmetic sequence.

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20. Check whether each of the sequences given below is ah arithmetic sequence, give reaśons. For the arithmetic 'sequences, write the common difference

also.

i) Sequence of natural numbers

ii) Sequence of multiples of three

iii) Sequence of prime numbers,

iv) Sequence of square numbers

v) Sequence of powers of three

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21. Consider the sequence 6,10,14,.......

i)Is it an arithmetic sequence?

ii) Then what is the common difference?

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22. Look at the pattern of squares made by sticks of same length.'(##VPU_TTT_MAT_X_P01_C01_E03_Q01)

(VPU_TTT_MAT_X_P01_C01_E03_009_Q02##)'

i) Write the sequence of the number of sticks.in each.

ii) Is the sequence of the number 'of rectangles including squares in each figure an arithmetic sequence?

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23. The algebraic expression of a sequence is $x_n = 2n^2 + 3n + 4$.

Is it an arithmetic sequence?

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24. In each of 'the arithmetic sequence below, some terms are missing and. their poșitions are marked with O. Find them.

i) 24,42, O, O,..........

ii) O, 24,42, O,........

iii) O, O, 24,42,........

iv) 24,O,42, O, ...

v)O, 24, O, 42,......

vi)24,O,O, 42,...........

25. The terms in two positions of some arithmetic sequences are given below. Write the first five terms of each:

i) 3rd term 34 and 6th term 67

ii) 3rd term 43 and 6th term 76

iii) 3rd term 2 and 5th term 3

iv) 4th term 2 and 7th term 3

v)2nd term 5 and 5th term 2

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26. The 5th term of an arithmetic sequence is 38 and the 9th term is 66. What is its 25th term?

27. Is 101 a term of the arithmetic sequence 13,24,35...?

What about 1001?

28. How many three-digit numbers are there, which leave a remainder 3 on division by 7 ?

29. Fill up the empty cells of the square below such that the numbers in each, row and column form arithmetic sequences:'(##VPU_TTT_MAT_X_P01_C01_E03_009_Q01##)' What if we use other numbers instead of 1,4,28 and 7 ?

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30. In the table below, some arithmetic sequences are given with two numbers against each. Check whether each belongs to the sequence or not.'(##VPU_TTT_MAT_X_P01_C01_E04_007_Q01##)'

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31. The 8th term of an arithmetic sequence is 12 and its 12th term is 8 . What is the. algebraic expression for this sequence?

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32. A piece of folk math: a child asked a flock of birds, "How many are you? A bird replied. We and us again, with half of us and half of that With one more, Would make hundred" How many birds were there?

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33. Prove that the arithmetic sequence with first term 1/3 and common difference 1/6 contains all natural numbers.

34. Prove 'that the arithmetic sequence with first term 1/3 and common difference 2/3 contains all odd numbers, but no even number.

35. Prove that the squares of all the terms of the arithmetic sequerice 4,7,10,..... belong to the sequence.

36. Prove that the arithmetic sequence 5,8,11,......
contains no perfect squares.

37. Write the whole numbers in 'the arithmetic
sequence 11/8, 14/8, 17/8,..... Do they form an arithmetic
sequence?

38. Find the 20th term of an arithmetic sequence if its 6th term is 14 and 14th term is 6.

39. Consider an arithmetic sequence whose m^{th} term is 'n' and n^{th} term is 'm`.

i)Find the common difference of the sequence.

ii) Prove that (m+n+p)th term of the sequence is -p

40. The 10th term of an arithmetic sequence is 65 and its 15th term is 80 . Is 200 a term of this sequence?

41. Prove that the arithmetic sequence 7,11,15, ... does not contain perfect square.

42. Consider the arithmetic sequence -74,-68,-62,........ How many negative numbers are there in this

sequence? - Find the first positive. number in this sequence.

43. The angles in a 9 sided polygon are in arithmetic sequence.

Is 100° the smallest angle of the polygon?

- Justify your answer.

44. Write three arithmetic sequences with 30 as the sum of the first five terms.

45. The first term of an arithmetic sequence is 1 and the sum of the first four terms is 100 . Find the first four terms:

46. Prove that for any four consecutive. terms of an arithmetic sequence, the sum of the two terms on the two ends and the sum of the two terms in the middle are.the same.

47. Write four arithmetic sequences with 100 as the sum of the first four terms.

48. Write the first three terms of each of the arithmetic sequences described below:

i) First term 30, the sum of the first three terms is 300

ii) First term 30, the sum of the first.four terms is 300

iii) First term 30 , the sum of the, first five terms is 300

iv) First term 30 , the sum of the first six terms is 300

49. The sum of the first five terms of an arithmetic sequence is 150 and the'sum of the first ten terms is 550 .

i) What is the third term of the sequence?

ii) What is the eighth term?

iii) What are the first three terms of the sequence?

50. The angles of a pentagon are in arithmetic sequence. Prove that its smallest angle is greater than $36°$.

51. Find the sum of the first 25 terms of each of the arithmetic sequences below.

i) 11,22,33,........

ii) 12,23,34,..........

iii) 21,32,43,........

iv) 19,28,37,..........

v) 1,6,11,........

52. What is the difference between the sum of the first 20 terms and.the next 20 terms. of the arithmetic sequence 6,10,14,.........?

53. Calculate the difference between the sum of the first 20 terms of the arithmetic sequences 6,10,14,...... and 15,19,23,........

54. Find the sum of all three digit numbers, which are multiples of 9 .

55. The expressions for the sum to 'n' terms of some arithmetic sequences are given below. Find the expression for the nth term of each:

i) $n^2 + 2n$

ii) $2n^2 + n$

iii) $n^2 - 2n$

iv) $2n^2 - n$

v) $n^2 - n$

56. Calculate in head, the sums of the following' arithmetic sequences.

i) 51+52+53+ ...+70

ii) 1 1/2+ 2 1/2 +.....12 1/2

iii)1/2+1+1 1/2+ 2 +2 1/2+.....+12 1/2

57. Prove that the sum of any number of terms of the arithmetic sèquence: 16 , 24,32 , ... starting from the first, added. to 9 gives a perfect square.

58.

(##VPU_TTT_MAT_X_P01_C01_E07_008_Q01##)'i)Write

the next two.lines of the pattern above.

2) Write the first'and the last numbers of the toth line.

3) Find the sum of all the numbers in the first ten lines.

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59. Write the next two lines of the pattern above. Calculate the first and last terms of the '20^(th)' line.'(##VPU_TTT_MAT_X_P01_C01_E07_009_Q01##)'

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60. Consider two arithmetic sequences given below:

11,19,27,......

50, 55,60,......

- Is there a common number to these sequences at same term position?

- If yes, find the term,position?- Find the term.

61. What is the sum of first 40 natural numbers? [(1640 , 820 , 410 , 205)]

ii) Whât is the sum of first 40 terms of the arithmetic sequences 6,12,18,......?

iii) The sum of first 40 terms of an arithmetic sequence with common difference 6 , is '5120 .' Write down the aigebraic form of this sequence.

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62. Sum of the algebraic form of an arithmetic sequence is $4n^2 + 5n$. Write the sequence.

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63. Two terms of an arithmetic sequence having natural number terms are 50 and 85 . Also, 60 is not a term of this sequencé.

- Is 134 a term of this sequence?

- Justify your opinion.

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64. Find 'n' in the equation

$$2 \times 2^3 \times 2^5 \times \ldots \ldots \times 2^n = (0.125)^{-27}$$

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65. Algebraic form of an nth term of an arithmetic sequence is 8n-4. Prove that the sum of the n consecutive terms of this sequence is a perfect square.

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66. If the integers and its term positions of an arithmetic. sequence with first term 11/4 and common difference 3/4 is written as two sequences, what is the relation between thier common difference. Find out how it is related.

67. a) Is there any perfect square terms in the arithmetic sequence 12,17,22,27,.....

b) Can all the terms in an arithmetic sequerice be perfect square?

68. x_n is the nth term of an arithmetic sequence (common difference is not zero). If $x_a, x_b, x_c, \ldots$ is án arithmetic sequence, prove that a, b, c,..... is an arithmetic sequence.

69. Algebraic forms of two arithmetic sequences are 6n + 3 and 6n + 7

1) What is the difference between the first 75 terms?

70. The ratio between the 4th term and 8th term of an arithmetic

sequence is $5:11$. 10th term of this sequence is 56

i) What is the common difference of this sequence?

ii) Find the 16th term.

iii) Find the sum of first 25 terms.

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71. Using all terms of the arithmetic sequence

7,11,15,19,....

1)write three different arithmetic sequence without

any common term.

2) Write the commion difference of these sequences.

72. Consider an arithmetic sequence with first term 18 and common difference 3.

i) Write the terms of this sequence.

ii) Write the perfect square terms of this sequence. Check whether it is an arithmetic sequence.

73. Consider the arithmetic sequence -46,-42,-38,......, How many terms added from first to get the sum zero?

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74. Consider the arithmetic sequence 16,24,32,....... The sum of the first n consecutive numbers, with which number should be added to get a perfect square number.

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75. Consider the arithmetic sequence 18/7, 32/7, 46/7,.... is there any intergers in this sequence? ii). Sum of first some terms is an integer what is the least number of terms?

76. In an arithmetic sequence n^{th} term is m and m^{th} term is n, prove that its common difference is -1.

77. Write three arithmetic sequences with. sum 70 and having 5 terms.

78. Sum of the first 15 terms of an arithmetic sequençe is 495 and sum of first 25 terms is 1325 .

i) What is the common difference of this sequence?

ii) What is the first term?

iii) What is the sum of first n terms of this sequence?

79. Sum of first 9 terms of an arithmetic sequence is

261, and

the sum of next 6 terms is 444.

i)- Find the first term and common difference.

ii) Write the algebraic form of the sequence:

iii) Write the algebraic.form of the sum.

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80. 98 is a term of the sequence having common

difference 7. Is 2016 a term of this sequence? Why?

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81. What is sum of the first.20 natural numbers?

ii) The algebraic form of an arithmetic sequence is 6n+5. Find the sum of the first 20 terms of this sequence.

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82. Consider the arithmetic sequence 171,167,163,...

i) Is '0' a term of this sequence? Why?

ii) How many positive terms are in this sequence?

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83. Consider 'the arithmetic sequence 10,17,24,....

i) What is its algebraic form?

ii) Prove that there is no perfect square in this sequence.

84. Polygons like triangle, rilateral, pentagon, hexagon, are drawn as shown below by increasing the number of sides one at a time:'(##VPU_TTT_MAT_X_P01_C01_E09_005_Q01##)'

i) Write the sequence of the sum of the. angles of each polygon.

ii) Write down the number of possible diagonals in each polygon as a sequence.

iii) Write down the algebraic form of the above two sequences.

85. In an arithmetic sequence, m times the nth term is equal to n times the mth term. Prove that. its first term and common difference are equal.

86. The algebraic form of an arithmetic sequence is 7n+3

i) What is the remainder when each term. of this sequence is divided by 7 ?

ii) How many numbers are there in between 100 and 300 in this sequence?

87. 10th term of an arithmetic sequence is 82 , If its common difference is 8 , find the position of the term 250 in the sequence.

88. ....,18,..., 28 are four consecutive terms of an arithmetic sequence. Fill up the blanks

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89. 45 is a term in the sequence whose common difference is 2 . Check whether the sum of any 17 terms of this sequence will be 2018 ?Why?

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90. If 3/2, 5/3, 11/6 are the first three terms of an arithmetic sequence, find the first integer term in this sequence.

91. $5^1 \times 5^3 \times 5^5 \times ....5^{2n-1} = (25)^{72}$ Find n.

92. The algebraic expression of an arithmetic' sequence is 3-5n. Find.

a)Its common difference

b) First term

c) Form the sequence

93. Write the arithmetic sequence with first term 8 and common difference 3 .

b) Check whether 100 is a term of this sequence?

c) Check whether the difference of any. two terms of this sequence will be 2017.

d) Find the position of the term 125 in this sequence.

94. a)Age of 9 numbers in a calender is giveri below, The number in the middle column is23. Fill the remaining columns.'(##VPU_TTT_MAT_X_P01_C01_E09_015_Q01##)'

b) In another square of such 9 numbers, the product of first and last numbers is 36 . Find the number in the middle column.'(##VPU_TTT_MAT_X_P01_C01_E09_015_Q01##)'

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95. What is the sum of first 20 natural. numbers?

b) Find the sum of .first 20 terms of 4,8 , 12,....

c) If 3 is added to each term in the above sequence, write down the algebraic expression of the new sequence.

d) Find the sum of first 20 terms of the new sequence.

96. 23rd term of an arithmetic sequence is 32. 35th term is 104. Then

a) What is the common difference?

b) Which is the middle term of first 35 terms of this sequence?

c) Find the sum of first 35 terms of this sequence.

97. a) How many numbers are there in the '30^(th) ' row of this number pyramid?

b) Which is the last number in' the '30^(th) ' row?

c) Which is the first number' in the '30^(th)' row?

d) What is the sum of all terms in the first 30 rows?

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98. n, 3n, 5n,... is an arithmetic sequence.

a) What is the common difference?

b) Prove that the sum of first 'n' terms of this sequence is n^3.

c) Then find the sum of 15 terms of the sequence 15,45,75,......

99. 23,30,37,.... is an arithmetic sequence

a) Write the algebraic form of the sequence.

b) Write the algebraic form of the sum of n terms of the sequence.

c) Prove that the square of any term of this sequence will not be a term in this sequence.
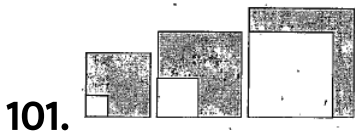
d) Prove that there will be so many, perfect squares in this sequence.

100. Write down the first three terms of the sequence of natural numbers leaving remainder 1 on division by 5. Check whether 510 is a term of above sequence.

101.

'In these figures, the sides. of the smaller squares are in the arithmetic sequence 2,5,8,.... and the sides of the larger squares are in the arithmetic sequence 5,8,11,....
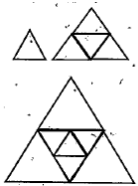
a) Write down the algebraic form of each sequence.

b) Write down the algebraic form of. the sequence of areas of the shaded portion in each figure.

102.

The first figure above is an equilateral triangle of sides 2 centimetres. The second figure is obtained by drawing lines passing thròugh' the vertices and parallei to the sides of the triangle in the first figure. The third figure is got by drawing lines' passing through the veritces and parallel to the sides of the

triangle in the second figure.

a) Write the sequence of perimeters of biggest triangle in each figure obtained by continuing this process.

b)Write the sequence of areas of biggest triangle in each figure:

c)Write algebraic forms of both of the above sequences.

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103. The first term of an arithmetic sequence is 2 and the common difference is 4 .

a) Find the sum of the first ten terms of this sequence.

b) Find the sum of ten terms from the second term to the eleventh term.

.c) Is it possible that the sum of any consecutive ten terms of the sequence is 500 why?

104. The 25th term of an arithmetic sequence is 140 and the 27th term is 166 . What is its common difference? What is its 35th term?

105. Sum of the first five terms of an arithmetic sequence is 45. What is the third term? Write the first two terms. Write another arithmetic sequence having the sum of the first five terms as 45.

106. a) Find the least three digit number which leaves a remainder one on division by 9

b) How many three digit numbers are there, which leave a remainder one on division by 9?

c) Find the sum of all such numbers.

107. Read the mathematical concept given below carefully and understand it. Then answer the following questions. Diagonal of a polygon is a line joining two non-adjacent vertices. See this table.

108. The algébraic form of an arithmetic sequence is 5n+3. a) What is the first term of the sequence? b) What will be the remainder if the terms of the sequence are divided by 5?

109. The algebraic form for the sum of first n terms of an arithmetic sequence is $2n^2+8n'$. How many consecutive terms of the sequence, starting from the first, are to be added to get 330 ?

110. There are 20 terms in an arithmetic sequence. Sum of the first and last term is 88 :

a) What is the sum of the 2nd and 19th terms?

b) If the 10th term is 42 , what is the 11th term?

c) What is the common difference of the sequence?

d) What is the first term?

111. Consider the numbers between 100 and 300 which leave remainder 2 on division by 3

a) Which is the first number in this sequençe?

b) Which is the last number in this sequence?

c). How many such numbers are there in this sequence?

d) Find the, sum of all numbers in the sequence.

112. Consider the arithmetic sequence 13,23,33,... What is the first three digit term of this sequence?

113. The algebraic form of an arithmetic sequence is 5n+4

a) What is its first term?

b) What is the difference of its 10th and 20th terms?

c) Can the difference of any two terms of this sequences be 368?

114. a) Write the sequence of odd numbers greater than 1

b) What is the algebraic form of this sequence?

c) Algebraic form of the arithmetic sequence

3/6,5/6,7/6,....

d) Prove that this sequence does not contain any natural number.

115. The sum of first 9 terms of an arithmetic sequence

is 45 and the sum of first 18 terms is 171

a) What is the sum of its 10th to 18th terms?

b) What is its 5th term?

c) Find its 14th term.

d). Find the sum of 5th to 14th terms.

116. Arithmetic sequence is $\frac{1}{7}, \frac{2}{7}, \frac{3}{7} \ldots$ What is the sum of the first 7 terms of this sequence?

117. a) What is the remainder on dividing the terms of the arithmetic sequence 100,107,114,.. by 7?

b) Write the sequence of all three digit numbers. Which leaves remainder 3 on division by 7? Which is the last term of this sequence?

118. Find the following sum:

a) 1+2+3+.....+100

b) 1+3+5+....+99

c) 2+4+6+..... 100

d) 3+7+11+....+199

119. If the terms of the arithmetic sequence

2/9,3/9,4/9,5/9,..... are represented as $x_1, x_2, x_3, ...$

then

a)$x_1 + x_2 + x_3 = ..$ b)$x_4 + x_5 + x_6 = ...$

c) Find the sum of first 9 terms.

d) What is the sum of first 300 terms?

120. Consider the arithmetic sequence 6,11 ,16,21,.....

a) Find the common difference.

b) Write the algebraic form of the sequence.

121. Consider, the arithmetic sequence 2x+1,4x-1,5 x+1,....

a) Find x.

b) Write the algebraic form of the sequence.

c) Find the position of 195 in this sequence.

122. Write the algebraic form of 1,4,7,10,... Is 100 a term of this sequence. Why ? Prove that the square of any term of this sequence belongs to that sequence.

123. Algebraic form of an arithmetic sequence is 6n+3

a) Find the sum of first 20 terms of the sequence:

b) Write the algebraic expression of the sum.

124. Consider the arithmetic sequence 17,20,23,26,......

a) Write the algebraic form of this sequence.

b) Is 400 a term of this sequence?.

c) Is the square of any term of this sequence belongs to this sequence? Why?