Patterns word problems

1. The second and third terms of a sequence are 16 and 27. The difference between successive terms in the sequence is always constant.

   (a) Determine the general formula for the sequence.

   (b) Calculate the first 5 terms of the sequence.

2. The state library started with a donation of 9 books in the first year. After 10 years of annual book donations, it had 540 books. The number of books donated every year increased by a constant number, c.

3. A man arranges to pay off a debt of $3600 by 40 annual installments which form an arithmetic sequence. When 30 of the instalments are paid, he dies leaving one-third of the debt unpaid, find the value of the first installment.

4. There are 25 trees at equal distances of 5m in a line with a well, the distance of the well from the nearest tree being 10m. A gardener waters all the trees separately starting from the well and he returns to the well after watering each tree to get water for the next. Find the total distance the gardener will cover in order to water all the trees.

5. A sum of $700 is to be used to give seven cash prizes to students of a school for their overall academic performances. If each price is $20 less than its preceding prize, find the value of each prize.

6. The sum of the 4th and 8th terms of an AP is 24 and the sum of the 6th and the 10th terms is 44. Find the first three terms of the AP

Answers

1) a) General term = $a_n = 5 + 11d$
   b) 5, 16, 27, 38, 49

2) 10
3) First installment =51
4) 3500m
5) 160,140,120,100,80,60,40
6) -13, -8, -3