

SEQUENCES & SERIES: MORE PROBLEMS

1. In a variation of the potato race, tennis balls were placed at 5 metres, 10, 15, 20, 25, 30, 35, 40, 45 and 50 metres from the start. Each competitor had to run from the start, collect a tennis ball from 5m and carry it back to the start, then run to collect a ball from 10m and return with it and so on until all 10 balls were back at the start.
How far did each competitor run?
2. $7p, 8p - 1, 9p - 2$, are successive terms of an A.P. Determine the value of p and hence the three terms.
3. The population of a certain town increases by 9% each year. If the town had 40 000 residents on 1st January 2005,
(i) How many people would the town have on 1st January 2010?
(ii) In what year would the population first exceed 100 000?
4. Express the following recurring decimals in the form $\frac{m}{n}$ where m and n are integers with no common factor.
(i) $0.\dot{4}$ (ii) $0.\dot{3}\dot{6}$ (iii) $0.\dot{8}1\dot{9}$ (iv) $23.\dot{6}\dot{3}$
5. The fifth term of a G.P. is 64 times the second term. The sum of the first 2 terms and the first 5 terms is 3114. Determine the common ratio and the first term.
6. Show that $\log 3, \log 9, \log 81$, are three terms of a G.P. Write down the next term.
7. Bluey bought a car for \$12 000. The car depreciated by 18% of its value each year. What is the car worth (to the nearest \$1) after 5 years?
8. Frank and Elsie each invest \$9 000 for 6 years at 8% compound interest. Frank's fund compounds interest annually and Elsie's fund compounds monthly. How much more than Frank's investment is Elsie's investment worth after 6 years?
9. Pauline paid \$900 into a superannuation fund every 6 months. The fund pays interest at the rate of 8% per annum, compounded monthly. What would Pauline's superannuation be worth (to the nearest \$1) immediately after she made her 40th deposit?
10. Lawrence and Eva borrowed \$250 000 for 20 years to buy a house. The interest was 7% per annum, compounded annually. Calculate the monthly repayments.

Answers:

1. 550m
2. $p = 4$ terms 28, 31, 34
3. (i) 61 545 (ii) 2015 (10.63 years so approx. Aug. 2015)
 $\frac{4}{9}$ $\frac{4}{11}$ $\frac{91}{111}$ $\frac{709}{30}$
4. (i) $\frac{4}{9}$ (ii) $\frac{4}{11}$ (iii) $\frac{91}{111}$ (iv) $\frac{709}{30}$
5. $r = 4, a = 19$.
6. G.P. $\log 3, \log 9, \log 81 = \log 3, 3\log 3, 9\log 3$ $r = 3$
7. \$ 4449
8. \$239.65 (Elsie \$14521.52 – Frank \$14281.87)
9. \$86 892
10. \$1966.52