

## SEQUENCES & SERIES PROBLEMS

1. In a variation of the potato race, tennis balls were placed at 10 metres, 20 metres, 30 metres, 40 metres and 50 metres from the start. Each competitor had to run from the start, collect a tennis ball from 10m and carry it back to the start, then run to collect a ball from 20m and return with it and so on until all 5 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 12% each year. If the town had 60 000 residents on 1<sup>st</sup> January 2000,  
(i) How many people would the town have on 1<sup>st</sup> January 2006?  
(ii) In what year would the population first exceed 200 000?
4. Express the following recurring decimals in the form  $\frac{m}{n}$  where  $m$  and  $n$  are integers with no common factor.  
(i)  $0.\dot{7}$       (ii)  $0.\dot{6}4$       (iii)  $0.\dot{3}1\dot{8}$       (iv)  $1.5\dot{1}$
5. The fifth term of a G.P. is 9 times the third term. The sum of the first 3 terms and the first 5 terms is 1608. Determine the common ratio and the first term.
6. Is the series  $\log 2$ ,  $\log 4$ ,  $\log 8$ ,  $\log 16$ , ..... an A.P. or a G.P.? Justify your answer and state the common difference or common ratio.
7. Mugsey bought a car for \$8 000. The car depreciated by 15% of its value each year. What is the car worth (to the nearest \$1) after 5 years?
8. Pat and Herb each invest \$8 000 for 5 years at 6% compound interest. Pat's fund compounds interest annually and Herb's fund compounds monthly. How much more than Pat's investment is Herb's investment worth after 5 years?
9. Olivia paid \$1600 into a superannuation fund at the beginning of each year. The fund pays interest at the rate of 8% per annum, compounded annually. What would Olivia's superannuation be worth (to the nearest \$1) immediately after she made her 40<sup>th</sup> deposit?
10. Toby and Sarah borrowed \$300 000 for 25 years to buy a house. The interest was 8% per annum, compounded monthly. Calculate the monthly repayments.

### Answers:

1. 300m
2.  $p = 3$  terms 21, 25, 29
3. (i) 118 429      (ii) 2010      (10.6 years so approx July/Aug. 2010)
4. (i)  $\frac{7}{9}$       (ii)  $\frac{64}{99}$       (iii)  $\frac{106}{333}$       (iv)  $\frac{68}{45}$
5.  $r = 3$ ,  $a = 12$ .
6. A.P.  $\log 4 = 2\log 2$ ,  $\log 8 = 3\log 2$ ,  $\log 16 = 4\log 2$   $d = \log 2$
7. \$ 3550
8. \$85.00 (Herb \$10790.80 – Pat \$10705.80)
9. \$414 490
10. \$2315.45