



## SEQUENCES AND ALGEBRA TEST

### 3° ESO



**Exercise 1: (1.5 points)** Find the general term in the following series:

- a)  $\{7, 21, 63, 189, 567 \dots\} \rightarrow a_n = 7 \cdot 3^{n-1}$   
b)  $\{30, 23, 16, 9, 2 \dots\} \rightarrow a_n = 30 - 7(n-1)$   
c)  $\left\{2, \frac{3}{4}, \frac{4}{9}, \frac{5}{16}, \frac{6}{25}, \dots\right\} \rightarrow a_n = \frac{n+1}{n^2}$

**Exercise 2: (1 point)** In an arithmetic progression we know that  $a_{72} = 512$  and the first term is 15. Find the general term and the sum of the first one hundred terms.

$$a_n = 15 + 7(n-1) \quad S_{100} = 36150$$

**Exercise 3: (1 point)** In a geometric progression we know that  $a_7 = 576$  and  $a_{13} = 36864$ . Find the general term and the sum of the first thirty-seven terms.  $a_n = 9 \cdot 2^{n-1}$   $S_{100} = 1.24 \cdot 10^{12}$

**Exercise 4: (0.75 points)** How many terms are there in the sequence  $\{5, 11, 17, 23, 29, \dots, 491\}$   
 $n = 82$

**Exercise 5: (0.75 points)** 15 years ago half a kilo of coffee (yes, I am obsessed) cost 3€ but it has increased an average of 5% per year since then. What's the price nowadays? 5.94€

**Exercise 6: (1.25 points)** Given the polynomials:

$$P(x) = 5x^3 - 6x^2 + 9 \quad Q(x) = -x^3 + x - 7 \quad R(x) = 2x - 5$$

Work out the value of  $P - Q$  and  $P \cdot R$

$$P - Q = 6x^3 - 6x^2 - x + 16$$

$$P \cdot R = 10x^4 - 37x^3 + 30x^2 + 18x + 45$$

**Exercise 7: (2 points)**

a) Expand these expressions using quadratic multiplication formulas:

$$a1) (7x + 5y)^2 = 49x^2 + 70xy + 25y^2$$

$$a2) (3w^5 - 2) \cdot (3w^5 + 2) = 9w^{10} - 4$$

$$a3) (x^6 - 9x^3)^2 = x^{12} - 18x^9 + 81x^6$$

b) Take out common factors:

$$14x^5y^3 - 21x^4y^2 + 35x^3y - 5x^2y = x^2y(14x^3y^2 - 21x^2y + 35x - 5)$$



**Exercise 8: (1.75 points)** Solve the following equations:

a)  $x - \frac{5x-7}{6} = \frac{1}{2} - \frac{9-3x}{4} \rightarrow x = 5$

b)  $\frac{13x-5}{2x+7} = \frac{9}{4} \rightarrow x = \frac{83}{34}$

