

1. Use the binomial theorem to complete this expansion.

$$(3x+2y)^4 = 81x^4 + 216x^3y + \dots$$

(Total 4 marks)

2. Complete the following expansion.

$$(2 + ax)^4 = 16 + 32ax + \dots$$

(Total 6 marks)

3. Consider the expansion of  $(x^2 - 2)^5$ .

- (a) Write down the number of terms in this expansion.  
 (b) The first four terms of the expansion in descending powers of  $x$  are

$$x^{10} - 10x^8 + 40x^6 + Ax^4 + \dots$$

Find the value of  $A$ .

(Total 6 marks)

4. Find the term containing  $x^{10}$  in the expansion of  $(5 + 2x^2)^7$ .

(Total 6 marks)

5. Determine the constant term in the expansion of  $\left(x - \frac{2}{x^2}\right)^9$ .

(Total 4 marks)

6. Consider the binomial expansion  $(1+x)^4 = 1 + \binom{4}{1}x + \binom{4}{2}x^2 + \binom{4}{3}x^3 + x^4$ .

- (a) By substituting  $x = 1$  into both sides, or otherwise, evaluate  $\binom{4}{1} + \binom{4}{2} + \binom{4}{3}$ .

- (b) Evaluate  $\binom{9}{1} + \binom{9}{2} + \binom{9}{3} + \binom{9}{4} + \binom{9}{5} + \binom{9}{6} + \binom{9}{7} + \binom{9}{8}$ .

(Total 4 marks)