

**Binomial Expansion Exam Questions MS (from OCR 4722)**

**Q1, (Jan 2011, Q1)**

(i)  $(1 + 2x)^7 = 1 + 14x + 84x^2$

**B1** Obtain  $1 + 14x$

**M1** Attempt third term

**A1** 3 Obtain  $84x^2$

(ii)  $(2 - 5x)(1 + 14x + 84x^2)$   
 coeff of  $x^2 = -70 + 168$   
 $= 98$

**M1** Attempt at least one relevant product

**A1ft** Obtain two correct unsimplified terms (not necessarily summed) – either coefficients or still with powers of  $x$  involved

**A1** 3 Obtain 98

**Q2, (Jan 2010, Q3)**

<b>(i)</b> $(2 - x)^7 = 128 - 448x + 672x^2 - 560x^3$	<b>M1</b>	Attempt (at least) two relevant terms – product of binomial coeff, 2 and $x$ (or expansion attempt that considers all 7 brackets)
	<b>A1</b>	Obtain $128 - 448x$
	<b>A1</b>	Obtain $672x^2$
	<b>A1</b> <b>4</b>	Obtain $-560x^3$

<b>(ii)</b> $-560 \times (1/4)^3 = -35/4$	<b>M1</b>	Attempt to use coeff of $x^3$ from <b>(i)</b> , with clear intention to cube $1/4$
	<b>A1</b> <b>2</b>	Obtain $-35/4$ ( $w^b$ ), (allow $35/4$ from $+560x^3$ in <b>(i)</b> )
	<b>6</b>	

**Q3, (Jun 2010, Q3)**

<b>3 (i)</b> $(1 + 1/2x)^{10} = 1 + 5x + 11.25x^2 + 15x^3$	<b>B1</b>	Obtain $1 + 5x$
	<b>M1</b>	Attempt at least the third (or fourth) term of the binomial expansion, including coeffs
	<b>A1</b>	Obtain $11.25x^2$
	<b>A1</b>	Obtain $15x^3$
	<b>4</b>	

<b>(ii)</b> $\text{coeff of } x^3 = (3 \times 15) + (4 \times 11.25) + (2 \times 5) = 100$	<b>M1</b>	Attempt at least one relevant term, with or without powers of $x$
	<b>A1 ft</b>	Obtain correct (unsimplified) terms (not necessarily summed) – either coefficients or still with powers of $x$ involved
	<b>A1</b> <b>3</b>	Obtain 100

**Q4 (Jan 2009, Q7)**

<p>(i) <math>6k^2a^2 = 24</math>  <math>k^2a^2 = 4</math>  <math>ak = 2</math> <b>A.G.</b></p>	<p>M1* Obtain at least two of <math>6, k^2, a^2</math>                      M1dep* Equate <math>6k^m a^n</math> to 24                      A1 <b>3</b> Show <math>ak = 2</math> convincingly – no errors allowed</p>
-----	
<p>(ii) <math>4k^3a = 128</math>  <math>4k^3\left(\frac{2}{k}\right) = 128</math>  <math>k^2 = 16</math>  <math>k = 4, a = \frac{1}{2}</math></p>	<p>B1 State or imply coeff of <math>x</math> is <math>4k^3a</math>                      M1 Equate to 128 and attempt to eliminate <math>a</math> or <math>k</math>                      A1 Obtain <math>k = 4</math>                      A1 <b>4</b> Obtain <math>a = \frac{1}{2}</math>  <b>SR</b> B1 for <math>k = \pm 4, a = \pm \frac{1}{2}</math></p>
-----	
<p>(iii) <math>4 \times 4 \times \left(\frac{1}{2}\right)^3 = 2</math></p>	<p>M1 Attempt <math>4 \times k \times a^3</math>, following their <math>a</math> and <math>k</math> (allow if still in terms of <math>a, k</math>)                      A1 <b>2</b> Obtain 2 (allow <math>2x^3</math>)</p>



**Q6, (Jun 2013, Q3)**

<b>(i)</b>	$(2 + 5x)^6 = 64 + 960x + 6000x^2$	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p><b>[4]</b></p>	<p>Attempt at least first 2 terms— products of binomial coeff and correct powers of 2 and 5x</p> <p>Obtain <math>64 + 960x</math></p> <p>Attempt 3rd term – product of binomial coeff and correct powers of 2 and 5x</p> <p>Obtain <math>6000x^2</math></p>
<b>(ii)</b>	$(9 + 6cx \dots)(64 + 960x + \dots)$ $(9 \times 960) + (6c \times 64) = 4416$ $8640 + 384c = 4416$ $384c = -4224$ $c = -11$	<p>M1*</p> <p>M1d*</p> <p>A1</p> <p><b>[3]</b></p>	<p>Expand first bracket and attempt at least one relevant product</p> <p>Equate sum of the two relevant terms to 4416 and attempt to solve for <math>c</math></p> <p>Obtain <math>c = -11</math></p>





**Q9, (Jun 2016, Q3)**

<b>(i)</b>	$3^3 + (3 \times 3^2 \times kx) + (3 \times 3 \times (kx)^2) + (kx)^3$ $= 27 + 27kx + 9k^2x^2 + k^3x^3$	M1	Attempt expansion
		A1	Obtain at least two correct terms
		A1	Obtain at least one further correct term
		A1	Obtain fully correct simplified expansion
<b>(ii)</b>	$9k^2 = 27$ $k^2 = 3$ $k = \pm\sqrt{3}$	M1	Equate their coeff of $x^2$ to their constant term and attempt to solve for $k$
		A1	Obtain $k = \pm\sqrt{3}$
		<b>[2]</b>	



**Q10, (Jan 2008, Q10)**

<p>(i) <math>(2x + 5)^4 = (2x)^4 + 4(2x)^3 \cdot 5 + 6(2x)^2 \cdot 5^2 + 4(2x) \cdot 5^3 + 5^4</math>  <math>= 16x^4 + 160x^3 + 600x^2 + 1000x + 625</math></p>	<p>M1* M1* A1dep* A1 4</p>	<p>Attempt expansion involving powers of <math>2x</math> and <math>5</math> (at least 4 terms) Attempt coefficients of 1, 4, 6, 4, 1 Obtain two correct terms Obtain a fully correct expansion</p>
<p>(ii) <math>(2x + 5)^4 - (2x - 5)^4 = 320x^3 + 2000x</math></p>	<p>M1 A1 2</p>	<p>Identify relevant terms (and no others) by sign change oe Obtain <math>320x^3 + 2000x</math> cwo</p>
<p>(iii) <math>9^4 - (-1)^4 = 6560</math> and <math>7360 - 800 = 6560</math> <b>A.G.</b>  <math>320x^3 - 1680x + 800 = 0</math>  <math>4x^3 - 21x + 10 = 0</math>   <math>(x - 2)(4x^2 + 8x - 5) = 0</math>  <math>(x - 2)(2x - 1)(2x + 5) = 0</math>  Hence <math>x = \frac{1}{2}, x = -2\frac{1}{2}</math></p>	<p>B1 M1 A1√  A1 M1 A1 6</p>	<p>Confirm root, at any point Attempt complete division by <math>(x - 2)</math> or equiv Obtain quotient of <math>ax^2 + 2ax + k</math>, where <math>a</math> is their coeff of <math>x^3</math> Obtain <math>(4x^2 + 8x - 5)</math> (or multiple thereof) Attempt to solve quadratic Obtain <math>x = \frac{1}{2}, x = -2\frac{1}{2}</math></p>

SR: answer only is B1 B1