Binomial 1 Answers

1)

7.(i) $(2-x^2)^5 = 2^5 + 5\times2^4(-x^2) + 10\times2^3\times(-x^2)^2$ etc		
Powers of 2 and $(\pm x^2)$ more or less correct.	M1	Correct use of powers – even if no (–)s.
Binomial coefficients used correctly.	M1	Correct use of binomial coeffs.
$\rightarrow$ $32 - 80x^2 + 80x^4 - 40x^6 + 10x^8 - x^{10}$	A1	All correct.
(ii) $(1 + x^2)^2 = 1 + 2x^2 + x^4$	B1	Independent of anything else.
Attempt to multiply and pick out 3 terms	M1	Reasonable attempt with 3 terms.
$\rightarrow (-40 + 160 - 80)\,x^6 \Rightarrow 40$	A1	Correct only.
	6	

2)

3. (i) $32 - 80x + 80x^2$	B1 x 3	Allow 2^5 for 32 (if whole series is given, mark the 3 terms).
(ii) $(k + x) \times$ (i)		
Coeff. of x is $-80k + 32$	M1	Must be 2 terms considered.
Equated with $-8 \rightarrow k = \frac{1}{2}$ or 0.5	A1√	For solution of $k = (-8 - a) \div (b)$
	[5]	

3)

9. (a) $\left(x - \dfrac{1}{2x^5}\right)^{18}$	B1	For $_{18}C_3$ or $_{18}C_{15}$
$_{18}C_{15}\,(x)^{15}\,(1/2x^5)^3$	B1	For $(\pm\frac{1}{2})^3$ – even if in $(1/2x)^3$
$\rightarrow 18.17.16(-\frac{1}{8}) \div 6$		
$\rightarrow -102$	B1	Co
	[3]	
(b) $(1 + kx)^n$		
Coeff of $x^2 = {}_nC_2k^2$	B1	Co.
Coeff of $x^3 = {}_nC_3k^3$	B1	Co.
Equating and changing to factorials	M1	Needs attempt at nCr
$\rightarrow k = 3/(n-2)$	A1	Co
or equivalent without factorials	[4]	

4)

11 (a) (i) $32 + 80x + 80x^2 + 40x^3 + 10x^4 + x^5$ **B3, 2, 1**
All coefficients to be resolved

(ii) $x = \sqrt3 \Rightarrow x^3 = 3\sqrt3, \quad x^5 = 9\sqrt3$ **B1 B1**

$32 + 80\sqrt3 + 240 + 120\sqrt3 + 90 + 9\sqrt3 = 362 + 209\sqrt3$ **B1**

(b) $\ldots + x^4(-4/x)^3\ldots \times {}_7C_4$ (or $_7C_3$) $= 35 = -2240$ **M1 A1 A1**

[9]

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5)

8 {7}	(I) $^8C_r x^r (k/x^3)^{8-r}$ $\Rightarrow$ $r-3(8-r)=0$ $\Rightarrow$ $r=6$	M1 A1
	$^8C_6 k^2 = 252$ $\Rightarrow$ $k^2=9$ $\Rightarrow$ $k=3$	M1 A1
	(II) $(x+3/x^3)^8$ $\Rightarrow$ $\ldots + 8x^7(3/x^3) + \ldots$	B1
	$(1-x^4/4)(x^8+24x^4+252+\ldots)$ $\Rightarrow$ Coefficient of $x^4 = 24-63 = -39$	M1 A1√

6)

4. (i) $(2+u)^5 = 32 + 80u + 80u^2$	B2,1,0	One lost for each error
		[2]	
(ii) Replaces u by $2x-5x^2$	M1	Recognises and uses the link.
-400 from 'u' term or $+320$ from 'u²' term	B1	Co (may be implied by answer)
Also … $+80(2x-5x^2)^2$	M1	Needs to look at 2 terms for x^2
$\rightarrow -400 + 320 = -80$	A1√	From his original expansion.
	[4]	

7)

(i) evidence of 27 or 56 in correct place	B1	
1512	B1	
(ii) 28 x 9	B1	
complete plan	M1	
504	A1	[5]

8)

(i) 15 or 2^4	B1	
240	B1	
(ii) 160	B1	
$(240) + \left(-\dfrac{1}{4}\right) \times (160)$	M1	
200	A1	

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