



Pure Year 1 exam questions Edexcel

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Ch. 8: The Binomial Expansion

June 2022 Question 6

6. (a) Find the first 4 terms, in ascending powers of x , of the binomial expansion of

$$\left(3 - \frac{2x}{9}\right)^8$$

giving each term in simplest form.

(4)

$$f(x) = \left(\frac{x-1}{2x}\right)\left(3 - \frac{2x}{9}\right)^8$$

- (b) Find the coefficient of x^2 in the series expansion of $f(x)$, giving your answer as a simplified fraction.

(2)

ANSWER

Question	Scheme	Marks	AOs
6(a)	3^8 or 6561 as the constant term	B1	1.1b
	$\left(3 - \frac{2x}{9}\right)^8 = \dots + {}^8C_1(3)^7\left(-\frac{2x}{9}\right) + {}^8C_2(3)^6\left(-\frac{2x}{9}\right)^2 + {}^8C_3(3)^5\left(-\frac{2x}{9}\right)^3 + \dots$ $= \dots + 8 \times (3)^7\left(-\frac{2x}{9}\right) + 28 \times (3)^6\left(-\frac{2x}{9}\right)^2 + 56(3)^5\left(-\frac{2x}{9}\right)^3$	M1 A1	1.1b 1.1b
	$= 6561 - 3888x + 1008x^2 - \frac{448}{3}x^3 + \dots$	A1	1.1b
		(4)	
(b)	Coefficient of x^2 is $\frac{1}{2} \times "1008" - \frac{1}{2} \times " - \frac{448}{3} "$	M1	3.1a
	$= \frac{1736}{3}$ (or $578 \frac{2}{3}$)	A1	1.1b
		(2)	
(6 marks)			

Video solution:

<https://youtu.be/jDXn-OKC4I8>

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November 2021 Question 8

8. $g(x) = (2 + ax)^8$ where a is a constant

Given that one of the terms in the binomial expansion of $g(x)$ is $3402x^5$

(a) find the value of a .

(4)

Using this value of a ,

(b) find the constant term in the expansion of

$$\left(1 + \frac{1}{x^4}\right)(2 + ax)^8$$

(3)

ANSWER

Question	Scheme	Marks	AOs
8 (a)	$(2 + ax)^8$ Attempts the term in $x^5 = {}^8C_5 2^3 (ax)^5 = 448a^5 x^5$	M1 A1	1.1a 1.1b
	Sets $448a^5 = 3402 \Rightarrow a^5 = \frac{243}{32}$	M1	1.1b
	$\Rightarrow a = \frac{3}{2}$	A1	1.1b
		(4)	
(b)	Attempts either term. So allow for 2^8 or ${}^8C_4 2^4 a^4$	M1	1.1b
	Attempts the sum of both terms $2^8 + {}^8C_4 2^4 a^4$	dM1	2.1
	$= 256 + 5670 = 5926$	A1	1.1b
		(3)	
			(7 marks)

November 2020 Question 6

6. (a) Find the first 4 terms, in ascending powers of x , in the binomial expansion of

$$(1 + kx)^{10}$$

where k is a non-zero constant. Write each coefficient as simply as possible.

(3)

Given that in the expansion of $(1 + kx)^{10}$ the coefficient of x^3 is 3 times the coefficient of x ,

- (b) find the possible values of k .

(3)

ANSWER

Question	Scheme	Marks	AOs
6 (a)	$(1 + kx)^{10} = 1 + \binom{10}{1}(kx)^1 + \binom{10}{2}(kx)^2 + \binom{10}{3}(kx)^3 \dots$	M1 A1	1.1b 1.1b
	$= 1 + 10kx + 45k^2x^2 + 120k^3x^3 \dots$	A1	1.1b
		(3)	
(b)	Sets $120k^3 = 3 \times 10k$	B1	1.2
	$4k^2 = 1 \Rightarrow k = \dots$	M1	1.1b
	$k = \pm \frac{1}{2}$	A1	1.1b
		(3)	
			(6 marks)

June 2019 Question 8

8. (a) Find the first 3 terms, in ascending powers of x , of the binomial expansion of

$$\left(2 + \frac{3x}{4}\right)^6$$

giving each term in its simplest form.

(4)

- (b) Explain how you could use your expansion to estimate the value of 1.925^6
You do not need to perform the calculation.

(1)

ANSWER

Question	Scheme	Marks	AOs
8(a)	2^6 or 64 as the constant term	B1	1.1b
	$\left(2 + \frac{3x}{4}\right)^6 = \dots + {}^6C_1 2^5 \left(\frac{3x}{4}\right)^1 + {}^6C_2 2^4 \left(\frac{3x}{4}\right)^2 + \dots$	M1	1.1b
	$= \dots + 6 \times 2^5 \left(\frac{3x}{4}\right)^1 + \frac{6 \times 5}{2} \times 2^4 \left(\frac{3x}{4}\right)^2 + \dots$	A1	1.1b
	$= 64 + 144x + 135x^2 + \dots$	A1	1.1b
		(4)	
(b)	$\frac{3x}{4} = -0.075 \Rightarrow x = -0.1$ So find the value of $64 + 144x + 135x^2$ with $x = -0.1$	B1ft	2.4
		(1)	
			(5 marks)

November 2020 Question 4 Paper 2 (A-Level)

4. In the binomial expansion of

$$(a + 2x)^7 \quad \text{where } a \text{ is a constant}$$

the coefficient of x^4 is 15 120

Find the value of a .

(3)

ANSWER

Question	Scheme	Marks	AOs
4	${}^7C_4 a^3 (2x)^4$	M1	1.1b
	$\frac{7!}{4!3!} a^3 \times 2^4 = 15120 \Rightarrow a = \dots$	dM1	2.1
	$a = 3$	A1	1.1b
		(3)	
			(3 marks)

June 2018 Question 11

11. (a) Find the first 3 terms, in ascending powers of x , of the binomial expansion of

$$\left(2 - \frac{x}{16}\right)^9$$

giving each term in its simplest form.

(4)

$$f(x) = (a + bx)\left(2 - \frac{x}{16}\right)^9, \text{ where } a \text{ and } b \text{ are constants}$$

Given that the first two terms, in ascending powers of x , in the series expansion of $f(x)$ are 128 and $36x$,

(b) find the value of a ,

(2)

(c) find the value of b .

(2)

ANSWER

Question	Scheme	Marks	AOs
11(a)	$\left(2 - \frac{x}{16}\right)^9 = 2^9 + \binom{9}{1} 2^8 \cdot \left(-\frac{x}{16}\right) + \binom{9}{2} 2^7 \cdot \left(-\frac{x}{16}\right)^2 + \dots$	M1	1.1b
	$\left(2 - \frac{x}{16}\right)^9 = 512 + \dots$	B1	1.1b
	$\left(2 - \frac{x}{16}\right)^9 = \dots - 144x + \dots$	A1	1.1b
	$\left(2 - \frac{x}{16}\right)^9 = \dots + \dots + 18x^2 (+ \dots)$	A1	1.1b
		(4)	
(b)	Sets '512' $a = 128 \Rightarrow a = \dots$	M1	1.1b
	$(a =) \frac{1}{4}$ oe	A1 ft	1.1b
		(2)	
(c)	Sets '512' $b + '-144'a = 36 \Rightarrow b = \dots$	M1	2.2a
	$(b =) \frac{9}{64}$ oe	A1	1.1b
		(2)	
			(8 marks)