A Level · Edexcel · Maths

2 hours 39 questions

4.1 Binomial Expansion

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Easy (9 questions)	/28
Medium (10 questions)	/40
Hard (10 questions)	/38
Very Hard (10 questions)	/40
Total Marks	**/146**

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Easy Questions

1 Evaluate

(i) $4!$
(ii) ${}^5C_2$
(iii) ${}^6C_3$

(3 marks)

2 Show that, for all values of k,

$${}^kC_1 = k$$

(2 marks)

3 Expand $(x+2)^4$.

(3 marks)

4 Find the first three terms, in ascending powers of x, in the expansion of $(3+2x)^8$.

(3 marks)

5 Find the coefficient of the x^2 term in the expansion of $(2-x)^5$.

(3 marks)

6 Expand .$(2x-3)^6$.

(3 marks)

7 In the expansion of $(p+x)^{12}$, the coefficient of the x^5 term is 12 976 128.
Find the value of p.

(3 marks)

8 (a) Find the first three terms in the expansion of $(5+2x)^5$.

(3 marks)

(b) Use your answer to part (a) to estimate the value of $(5.04)^5$.

(2 marks)

9 In the expansion of $(p+x)^4$, where p is a non-zero constant, the coefficient of the x^2 term is twice the coefficient of the x term. Find the value of p.

(3 marks)

Medium Questions

1 Expand $(2+x)^4$.

(3 marks)

2 Find the coefficient of the term in x^3 in the expansion of $(2-x)^8$.

(3 marks)

3 (a) Find the first three terms, in ascending powers of x, in the expansion of $(3+x)^4$.

(3 marks)

(b) Use your answer to part (a) to estimate $(3.1)^4$.

(2 marks)

4 In the expansion of $(a-x)^4$, the coefficient of the x^2 term is 96.
Given that $a>0$, find the value of a.

(2 marks)

5 (a) Find the first three terms in the expansion of $(9-2x)^5$.

(3 marks)

(b) Use your answer to part (a) to estimate $(8.9)^5$.

(2 marks)

6 In the expansion of $(a-2x)^5$, the coefficient of the x^2 term is equal to the coefficient of the x^3 term. Find the value of a.

(4 marks)

7 In the expansion of $(3+px)^6$, the coefficient of the x^4 term is four times the coefficient of the x^2 term. Find the possible values of p.

(3 marks)

8 (a) Find the first three terms in the expansion of $(3+2x)^8$.

(3 marks)

(b) Given that x is small such that x^3 and higher powers of x can be ignored show that

$$(1+x)(3+2x)^8 \approx 6561 + 41553x + 116640x^2$$

(3 marks)

9 In the expansion of $(p+qx)^5$, the coefficients of the x^2 term and the x^3 term are equal.

Find p in terms of q.

(4 marks)

10 (a) In the expansion of $(a+bx)^4$, the coefficient of the x^2 term is equal to the coefficient of the x^3 term.

Show that $\frac{a}{b}=\frac{2}{3}$.

(3 marks)

(b) Given that a and b are integers, and that $10<b<15$, find the values of a and b.

(2 marks)

Hard Questions

1 Fully expand $(4-x)^4$.

(3 marks)

2 Fully expand $(2-\frac{1}{3}x)^4$.

(4 marks)

3 Find the coefficient of the term in x^4 in the expansion of $(3+2x)^9$.

(3 marks)

4 (a) Find the first three terms, in ascending powers of x, in the expansion of $(5-2x)^4$.

(3 marks)

(b) Use your answer to part (a) to estimate $(4.5)^4$.

(2 marks)

5 In the expansion of $(4-px)^6$, the coefficient of the x^4 term is 19 440.
Given that p is a positive integer find the value of p.

(3 marks)

6 In the expansion of $(3a-2x)^6$, the coefficient of the x^3 term is equal to the coefficient of the x^4 term. Find the value of a.

(3 marks)

7 (a) Find the first three terms in the expansion of $(2-3x)^7$.

(3 marks)

(b) Given that x is small such that x^3 and higher powers of x can be ignored show that

$$(1-2x)(2-3x)^7 \approx 128 - 1600x + 8736x^2$$

(3 marks)

8 In the expansion of $(p+qx)^8$, the coefficients of the x^2 term and the x^6 term are equal.

Find p in terms of q.

(3 marks)

9 In the expansion of $(1+x)^n$, the coefficient of the x^3 term is 84.

Find the value of n.

(3 marks)

10 In the expansion of $(a+bx)^4$, the coefficient of the x^3 term is 216.

In the expansion of $(a+bx)^6$, the coefficient of the x^4 term is 4860.

Find the possible values of a and b.

(5 marks)

Very Hard Questions

1 Expand .$(3-2x)^5$

(3 marks)

2 Find the coefficient of the term in x^4 in the expansion of $(4-3x)^7$..

(3 marks)

3 Given that ${}^nC_3 = 35$ find the value of n.

(3 marks)

4 (a) Use the first three terms, in ascending powers of x, in the expansion of $(3-5x)^4$ to find an approximation for $(2.6)^4$.

(5 marks)

(b) Using your calculator, find the percentage error in the approximation from part (a) to the exact value of $(2.6)^4$.

(2 marks)

5 In the expansion of $(m-\frac{1}{4}x)^5$, the coefficient of the x^3 term is -10.
Find the possible values of m.

(3 marks)

6 In the expansion of $(3a+\frac{1}{2}x)^6$, the coefficient of the x^3 term is equal to the coefficient of the x^5 term. Find the values of a, giving your answers in the form $\frac{\sqrt{m}}{n}$, where m and n are integers to be found.

(3 marks)

7 (a) Find the first three terms in the expansion of $(4-3x)^9$.

(3 marks)

(b) Given that x is small such that x^3 and higher powers of x can be ignored show that

$$(3-2x^2)(4-3x)^9 \approx 786432 - 5308416x + 15400960x^2$$

(3 marks)

8 In the expansion of $(p+qx)^9$, the coefficient of the x^3 term is double that of the x^5 term. Find p in terms of q.

(3 marks)

9 In the expansion of $(1-3x)^n$, the coefficient of the x^3 term is -3240.

Find the value of n.

(4 marks)

10 In the expansion of $(a+bx)^8$, the coefficient of the x^5 term is -870 912.

In the expansion of $(a+bx)^{12}$, the coefficient of the x^3 term is -1 557 135 360.

Find the possible values of a and b.

(5 marks)