

1.) Consider the expansion of $(x + 2)^{11}$.

(a) Write down the number of terms in this expansion.

(1)

(b) Find the term containing x^2 .

(4)

(Total 5 marks)

2.) (a) Expand $(2 + x)^4$ and simplify your result.

(3)

(b) Hence, find the term in x^2 in $(2 + x)^4 \left(1 + \frac{1}{x^2}\right)$.

(3)

(Total 6 marks)

3.) Find the term in x^4 in the expansion of $\left(3x^2 - \frac{2}{x}\right)^5$.

(Total 6 marks)

4.) The fifth term in the expansion of the binomial $(a + b)^n$ is given by $\binom{10}{4} p^6 (2q)^4$.

(a) Write down the value of n .

(1)

(b) Write down a and b , in terms of p and/or q .

(2)

(c) Write down an expression for the sixth term in the expansion.

(3)

(Total 6 marks)

5.) Let $f(x) = x^3 - 4x + 1$.

(a) Expand $(x + h)^3$.

(2)

(b) Use the formula $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ to show that the derivative of $f(x)$ is $3x^2 - 4$.

(4)

(c) The tangent to the curve of f at the point $P(1, -2)$ is parallel to the tangent at a point Q . Find the coordinates of Q .

(4)

(d) The graph of f is decreasing for $p < x < q$. Find the value of p and of q .

(3)

- (e) Write down the range of values for the gradient of f .

(2)

(Total 15 marks)

- 6.) Find the term in x^3 in the expansion of $\left(\frac{2}{3}x - 3\right)^8$.

(Total 5 marks)

- 7.) (a) Expand $(x - 2)^4$ and simplify your result.

(3)

- (b) Find the term in x^3 in $(3x + 4)(x - 2)^4$.

(3)

(Total 6 marks)

- 8.) Consider the expansion of the expression $(x^3 - 3x)^6$.

- (a) Write down the number of terms in this expansion.

- (b) Find the term in x^{12} .

(Total 6 marks)

- 9.) One of the terms of the expansion of $(x + 2y)^{10}$ is ax^8y^2 . Find the value of a .

(Total 6 marks)

- 10.) (a) Expand $\left(e + \frac{1}{e}\right)^4$ in terms of e .

(4)

- (b) Express $\left(e + \frac{1}{e}\right)^4 + \left(e - \frac{1}{e}\right)^4$ as the sum of three terms.

(2)

(Total 6 marks)

- 11.) 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 .

Working:

Answers:

(a)

(b)

(Total 6 marks)

12.) Given that $(3 + \sqrt{7})^3 = p + q\sqrt{7}$ where p and q are integers, find

(a) p ;

(b) q .

Working:

Answers:

(a)

(b)

(Total 6 marks)

13.) When the expression $(2 + ax)^{10}$ is expanded, the coefficient of the term in x^3 is 414 720. Find the value of a .

Working:

Answer:

.....

(Total 6 marks)

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

Working:

Answer:

.....

(Total 6 marks)

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

Working:

Answer:

.....

(Total 6 marks)

- 16.) Complete the following expansion.

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

Working:

Answer:

.....

(Total 6 marks)

17.) Consider the expansion of $\left(3x^2 - \frac{1}{x}\right)^9$.

- (a) How many terms are there in this expansion?
- (b) Find the constant term in this expansion.

Working:

Answers:

- (a)
- (b)

(Total 6 marks)

18.) Find the coefficient of x^3 in the expansion of $(2 - x)^5$.

Working:

Answer:

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(Total 6 marks)

19.) Use the binomial theorem to complete this expansion.

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

Working:

Answer:

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(Total 4 marks)

20.) 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 $\binom{9}{1} + \binom{9}{2} + \binom{9}{3} + \binom{9}{4} + \binom{9}{5} + \binom{9}{6} + \binom{9}{7} + \binom{9}{8}$.

Working:

Answers:

(a)

(b)

(Total 4 marks)

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

Working:

Answer:

.....

(Total 4 marks)

22.) Find the coefficient of a^5b^7 in the expansion of $(a + b)^{12}$.

Working:

Answer:

.....

(Total 4 marks)

23.) Find the coefficient of x^5 in the expansion of $(3x - 2)^8$.

Working:

Answer:

.....

(Total 4 marks)

24.) Find the coefficient of a^3b^4 in the expansion of $(5a + b)^7$.

Working:

Answer:

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(Total 4 marks)