

1

- (a) Find the first 3 terms in ascending powers of x of the binomial expansion of $\left(2 + \frac{x}{2}\right)^6$

(4)

- (b) Use your expansion to find an estimate for the value of 2.05^6

(2)

(Total for question 1 is 6 marks)

2

- (a) Find the first 3 terms in ascending powers of x of the binomial expansion of $\left(2 - \frac{x}{8}\right)^7$

(4)

- (b) $f(x) = (ax + b)\left(2 - \frac{x}{8}\right)^7$ where a and b are constants. Given that the first two terms, in ascending powers of x , in the series expansion of $f(x)$ are 384 and $-104x$, find the values of a and b .

(4)

(Total for question 2 is 8 marks)

3

(a) Fully expand $(p + q)^5$

(4)

(b) The probability of Dave being late for school on any day is 0.1. Let p represent the probability that Dave is late on a given day. Using the last two terms of the binomial expansion, or otherwise, find the probability that Dave is late no more than one time in a school week.

(3)

(Total for question 3 is 7 marks)

4

- (a) Expand $(1 + 4x)^8$ in ascending powers of x , up to and including x^3 , simplifying each coefficient in the expansion.

(5)

- (b) Showing your working clearly, use your expansion to find, to 5 significant figures an approximation for 1.04^8 .

(2)

(Total for question 4 is 7 marks)

5

- (a) Find the first four terms, in ascending powers of x , of the binomial expansion $(2 + kx)^6$

(4)

- (b) Given that the coefficient of the x^3 term in the expansion is -20 , find the value of k

(3)

(Total for question 5 is 7 marks)

6

- (a) Find the first three terms, in ascending powers of x , of the binomial expansion $(1 - 2x)^5$

(4)

- (b) Find the first three terms, in ascending powers of x , of the binomial expansion $(1 + x)(1 - 2x)^5$

(3)

(Total for question 6 is 7 marks)

7

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

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

Giving each term in its simplest form.

(4)

- (b) $f(x) = (ax + b) \left(2 + \frac{x}{8}\right)^8$, where a and b are constants. Given the first two terms, in ascending powers of x , in the series expansion of $f(x)$ are 28 and $62x$, find the values of a and b .

(4)

(Total for question 7 is 8 marks)

8

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

$$\left(3 + \frac{2x}{5}\right)^6$$

Giving each term in its simplest form.

(4)

- (b) Explain how you could use your expansion to find an approximation for 2.92^6 . You do not need to perform the calculation.

(1)

(Total for question 8 is 5 marks)

9

- (a) Find the first 4 terms, in ascending powers of x , of the binomial expansion of $(1 + kx)^{10}$ where k is a non-zero constant. Write each coefficient as simply as possible.

(3)

- (b) Given the coefficient of x^3 is twice the coefficient of x , find the possible values of k .

(3)

(Total for question 9 is 6 marks)

10 $f(x) = (2 + kx)^6$, where k is a constant.

(a) Given that one of the terms in the binomial expansion of $f(x)$ is $2500x^3$, find the value of k .

(4)

(b) Using this value of k find the constant term in the expansion of $\left(2 + \frac{4}{x}\right)(2 + kx)^6$.

(3)

(Total for question 10 is 7 marks)

11

(a) Find the first 3 terms in the expansion of $(1 - 4x)^5$ in ascending powers of x .

(3)

(b) Using your expansion, approximate $(0.992)^5$

(2)

(Total for question 11 is 5 marks)

- 12** In the expansion of $(1 + x)^n$ where $n > 4$ the coefficient of x^4 is 7.5 times the coefficient of x^2 . Find the value of n .

(Total for question 12 is 5 marks)

- 13** Prove that $(3 + 2x)^4 + (3 - 2x)^4 \geq 162$. Fully justify your answer.

(Total for question 13 is 6 marks)

- 14** In the binomial expansion of $(\sqrt{5} + \sqrt{3})^4$ there are two irrational terms. Find the difference between these two terms.

(Total for question 14 is 3 marks)

- 15** Find the first 4 terms in the expansion of $(2 - 5x)^7$ in ascending powers of x .

(Total for question 15 is 4 marks)

16 Find the coefficient of the x term in the binomial expansion of $(4 - x)^5$

(Total for question 16 is 2 marks)

17 Find the first 3 terms in the expansion of $(1 - 3x)^6$ in ascending powers of x .

(Total for question 17 is 3 marks)

18

- (a) Find and simplify the first three terms in the expansion of $(2 + 3x)^5$ in ascending powers of x

(3)

- (b) In the expansion of $(1 + ax)(2 + 3x)^5$ the coefficient of x^2 is 752. Find the value of a .

(3)

(Total for question 18 is 6 marks)

19

(a) Expand $(1 - 2x)^4$ in ascending powers of x .

(2)

(b) Using your expansion find the exact value of $(0.98)^4$

(3)

(Total for question 19 is 5 marks)

20 Find the binomial expansion of $(5 - 2x)^3$

(Total for question 20 is 3 marks)
