AS SB1 Ex 9 Binomial expansions (answers at end)

Mixed practice 9

1. ${}^nC_2 = \frac{n!}{2!6!}$. What is the value of n?
2. Find the coefficient of x^5 in the expansion of $(2-x)^{12}$.
3. Fully expand and simplify $(2x^{-1}+5y)^3$.
4. Find the coefficient of x^2y^6 in $(3x+2y^2)^5$.
5. $a = 2-\sqrt{2}$. Using binomial expansion or otherwise, express a^5 in the form $m+n\sqrt{2}$.
6. Find the constant term in the expansion of $(x^3-2x^{-1})^4$.
7. Fully expand and simplify $\left(x^2-\frac{2}{x}\right)^4$.
8. The constant term in the expansion of $\left(x^2+\frac{a}{x^4}\right)^9$ is $-\frac{28}{9}$. What is the value of a?
9. Find the coefficient of d^{11} in the expansion of $(2+5d)(1+d)^{14}$.
10. Find the coefficient of x^6 in the expansion of $(1-x^2)(1+x)^5$.
11. **i** Find the binomial expansion of $(2x+5)^4$, simplifying the terms.

    ii Hence show that $(2x+5)^4-(2x-5)^4$ can be written as $320x^3+kx$, where the value of the constant k is to be stated.

    iii Verify that $x=2$ is a root of the equation $(2x+5)^4-(2x-5)^4=3680x-800$, and find the other possible values of x.

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12. The expansion of $(2x+ay)^n$ contains the term $20x^3y^2$.

    a Write down the value of n.

    b Find the value of a where a is positive.

    c Find the first four terms in ascending powers of y.

    d Hence or otherwise, find 20.05^n correct to the nearest hundred. You do not need to justify the accuracy of your approximation.
13. Find the coefficient of x^2 in the expansion of $\left(2x+\frac{1}{\sqrt{x}}\right)^5$.
14. $(1+ax)^n = 1+10x+40x^2+\ldots$

    Find the values of a and n.
15. **a** Sketch the graph of $y=(x+2)^3$.

    b Find the binomial expansion of $(x+2)^3$.

    c Find the exact value of 2.01^3.

    d Solve the equation $x^3+6x^2+12x+16=0$.
16. In the binomial expansion of $(k+ax)^4$ the coefficient of x^2 is 24.

    i Given that a and k are both positive, show that $ak=2$.

    ii Given also that the coefficient of x in the expansion is 128, find the values of a and k.

    iii Hence find the coefficient of x^3 in the expansion.

Mixed practice 9

1 $n = 8$

2 $-101\,376$

3 $8x^{-3} + 60x^{-2}y + 150x^{-1}y^2 + 125y^3$

4 720

5 $232 - 164\sqrt{2}$

6 -32

7 $x^8 - 8x^5 + 24x^2 - 32x^{-1} + 16x^{-4}$

8 $-\frac{1}{3}$

9 5733

10 -5

11 **a** $16x^4 + 160x^3 + 600x^2 + 1000x + 625$

b $k = 2000$ **c** $x = 0.5, -2.5$

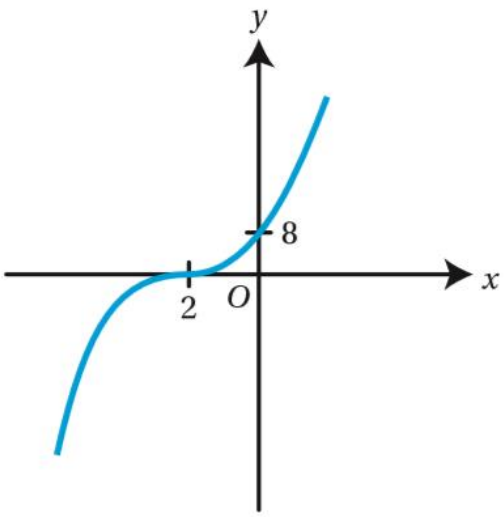
12 **a** $n = 5$ **b** $a = 0.5$

c $32x^5 + 40x^4y + 20x^3y^2 + 5x^2y^3$ **d** $3\,240\,200$

13 80

14 $a = 2, n = 5$

15 **a**



b $x^3 + 6x^2 + 12x + 8$ **c** 8.120601

d $x = -4$

16 **a** proof **b** $k = 4, a = \frac{1}{2}$ **c** 2