5 Find the constant term in the expansion of:

a $\left(x+\frac{2}{x^2}\right)^{15}$ **b** $\left(x-\frac{3}{x^2}\right)^{9}$.

6 **a** Write down the first 6 rows of Pascal's triangle.

b Find the sum of the numbers in:

i row 1 **ii** row 2 **iii** row 3 **iv** row 4 **v** row 5.

c Copy and complete:

The sum of the numbers in row n of Pascal's triangle is .....

d Show that $(1+x)^n = \binom{n}{0} + \binom{n}{1}x + \binom{n}{2}x^2 + ... + \binom{n}{n-1}x^{n-1} + \binom{n}{n}x^n$.

Hence deduce that $\binom{n}{0} + \binom{n}{1} + \binom{n}{2} + ... + \binom{n}{n-1} + \binom{n}{n} = 2^n$.

Example 8 **Self Tutor**

Find the coefficient of x^5 in the expansion of $(x+3)(2x-1)^6$.

$$(x+3)(2x-1)^6$$
$$= (x+3)[(2x)^6 + \binom{6}{1}(2x)^5(-1) + \binom{6}{2}(2x)^4(-1)^2 + ...]$$
$$= (x+3)(2^6x^6 - \binom{6}{1}2^5x^5 + \binom{6}{2}2^4x^4 - ....)$$

(1) (2)

So, the terms containing x^5 are $\binom{6}{2}2^4x^5$ from (1)

and $-3\binom{6}{1}2^5x^5$ from (2)

$\therefore$ the coefficient of x^5 is $\binom{6}{2}2^4 - 3\binom{6}{1}2^5 = -336$

7 **a** Find the coefficient of x^5 in the expansion of $(x+2)(x^2+1)^8$.

b Find the term containing x^6 in the expansion of $(2-x)(3x+1)^9$. Simplify your answer.

8 Consider the expression $\left(x^2y - 2y^2\right)^6$. Find the term in which x and y are raised to the same power.

9 **a** The third term of $(1+x)^n$ is $36x^2$. Find the fourth term.

b If $(1+kx)^n = 1 - 12x + 60x^2 - ....$, find the values of k and n.

10 Find a if the coefficient of x^{11} in the expansion of $\left(x^2 + \frac{1}{ax}\right)^{10}$ is 15.

REVIEW SET 7A

1 Use the formula $\binom{n}{r} = \frac{n!}{r!(n-r)!}$ to evaluate $\binom{6}{4}$.

2 Use the binomial expansion to find: **a** $(x-2y)^3$ **b** $(3x+2)^4$

3 Find the constant term in the expansion of $\left(2x^2 - \frac{1}{x}\right)^6$.

4 Use Pascal's triangle to expand $(a+b)^6$.

Hence, find the binomial expansion of: **a** $(x-3)^6$ **b** $\left(1+\frac{1}{x}\right)^6$

5 Expand and simplify $(\sqrt{3}+2)^5$. Give your answer in the form $a+b\sqrt{3}$ where $a, b \in \mathbb{Z}$.

6 Consider the expansion of $\left(3x^2+\frac{1}{x}\right)^6$.

a How many terms does the expansion include?

b Find the constant term.

c Show that the expansion has no terms involving x^5.

7 The first two terms in a binomial expansion are shown below:

$$(a+b)^4 = e^{4x} - 4e^{2x} + ...$$

a Find a and b. **b** Copy and complete the expansion.

REVIEW SET 7B

1 Find the coefficient of x^3 in the expansion of $(x+5)^6$.

2 Use the expansion of $(4+x)^3$ to find the exact value of $(4.02)^3$.

3 Find the coefficient of x^{-6} in the expansion of $\left(2x-\frac{3}{x^2}\right)^{12}$.

4 Find the term containing x^5 in the expansion of $(2x+3)(x-2)^6$.

5 Find k in the expansion $(m-2n)^{10} = m^{10} - 20m^9n + km^8n^2 - .... + 1024n^{10}$.

6 Find c given that the expansion $(1+cx)(1+x)^4$ includes the term $22x^3$.

7 **a** Write down the first four and last two terms of the binomial expansion $(2+x)^n$.

b Hence evaluate the series $2^n + \binom{n}{1}2^{n-1} + \binom{n}{2}2^{n-2} + \binom{n}{3}2^{n-3} + ... + 2n + 1$.