Pascal's triangle and finite binomial expansion

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. Write the coefficients of $(a+b)^5$. [2 marks]

Each interior Pascal entry is the sum of the two entries above it.

Answer: 1, 5, 10, 10, 5, 1.

2. Expand $(x+1)^3$. [2 marks]

Use the Pascal row 1, 3, 3, 1.

Answer: x^3+3x^2+3x+1.

3. Expand $(x-2)^3$. [2 marks]

$x^3+3x^2(-2)+3x(-2)^2+(-2)^3$.

Answer: $x^3-6x^2+12x-8$.

4. Find the coefficient of x^3 in $(x+2)^5$. [2 marks]

Choose two brackets contributing 2: $\binom{5}{2}2^2=40$.

Answer: 40.

5. Find the constant term in $(3x-2)^4$. [2 marks]

The only constant term takes -2 from all four brackets: $(-2)^4=16$.

Answer: 16.

6. Show that the sum of coefficients of $(2x+1)^4$ is 81. [3 marks]

Setting x to 1 adds the coefficients because every power of 1 is 1.

Answer: Substitute $x=1$: $3^4=81$.