Binomial Expansions - Answers

Exercise A

1 a $16x^4 + 32x^3y + 24x^2y^2 + 8xy^3 + y^4$

b $p^5 - 5p^4q + 10p^3q^2 - 10p^2q^3 + 5pq^4 - q^5$

c $1 + 8x + 24x^2 + 32x^3 + 16x^4$

d $81 + 108x + 54x^2 + 12x^3 + x^4$

e $1 - 2x + \frac{3}{2}x^2 - \frac{1}{2}x^3 + \frac{1}{16}x^4$

f $256 - 256x + 96x^2 - 16x^3 + x^4$

g $32x^5 + 240x^4y + 720x^3y^2 + 1080x^2y^3$
$+ 810xy^4 + 243y^5$

h $x^6 + 12x^5 + 60x^4 + 160x^3 + 240x^2 + 192x + 64$

2 a $90x^3$ **b** $80x^3y^2$ **c** $-20x^3$

d $720x^3$ **e** $120x^3$ **f** $-4320x^3$

g $1140x^3$ **h** $-241\,920x^3$

3 a $1 + 10x + 45x^2 + 120x^3$

b $1 - 10x + 40x^2 - 80x^3$

c $1 + 18x + 135x^2 + 540x^3$

d $256 - 1024x + 1792x^2 - 1792x^3$

e $1024 - 2560x + 2880x^2 - 1920x^3$

f $2187 - 5103x + 5103x^2 - 2835x^3$

g $x^8 + 16x^7y + 112x^6y^2 + 448x^5y^3$

h $512x^9 - 6912x^8y + 41\,472x^7y^2 - 145\,152x^6y^3$

4 $a = \pm\frac{1}{2}$

5 $b = -2$

6 $1, \dfrac{5 \pm \sqrt{105}}{8}$

7 $1 - 0.6x + 0.15x^2 - 0.02x^3$, $0.941\,48$, accurate to 5 dp

8 $1024 + 1024x + 460.8x^2 + 122.88x^3$, 1666.56, accurate to 3 sf

Exercise B

1 a $1 + 8x + 28x^2 + 56x^3$

  b $1 - 12x + 60x^2 - 160x^3$

  c $1 + 5x + \frac{45}{4}x^2 + 15x^3$

  d $1 - 15x + 90x^2 - 270x^3$

  e $128 + 448x + 672x^2 + 560x^3$

  f $27 - 54x + 36x^2 - 8x^3$

  g $64 - 576x + 2160x^2 - 4320x^3$

  h $256 + 256x + 96x^2 + 16x^3$

  i $128 + 2240x + 16\,800x^2 + 70\,000x^3$

3 $a = 162, b = 135, c = 0$

4 a $p = 5$ b -10 c -80

5 $1 + 16x + 112x^2 + 448x^3$, $1.171\,648$, accurate to 4 sf

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Exercise C

1 a $p = 16$ b 270 c -1890

2 a $A = 8192, B = -53\,248, C = 159\,744$

3 a $1 - 20x + 180x^2 - 960x^3$

  b $0.817\,04$, $x = 0.01$

4 a $1024 - 153\,60x + 103\,680x^2 - 414\,720x^3$

  b 880.35

5 a $81 + 216x + 216x^2 + 96x^3 + 16x^4$

  b $81 - 216x + 216x^2 - 96x^3 + 16x^4$

  c 1154

6 a $n = 8$ b $\frac{35}{8}$

7 a $81 + 1080x + 5400x^2 + 12\,000x^3 + 10\,000x^4$

  b $1\,012\,054\,108\,081$, $x = 100$

8 a $1 + 24x + 264x^2 + 1760x^3$

  b $1.268\,16$

  c $1.268\,241\,795$

  d $0.006\,45\%$ (3 sf)

9 $x^5 - 5x^3 + 10x - \dfrac{10}{x} + \dfrac{5}{x^3} - \dfrac{1}{x^5}$

10 b $\dfrac{4096}{729} + \dfrac{2048}{81}x + \dfrac{1280}{27}x^2 + \dfrac{1280}{27}x^3$

11 a $64 + 192x + 240x^2 + 160x^3 + 60x^4 + 12x^5 + x^6$

  b $k = 1560$

12 a $k = 1.25$ b 3500

13 a $A = 64, B = 160, C = 20$ b $x = \pm\sqrt{\frac{3}{2}}$

14 a $p = 1.5$ b 50.625