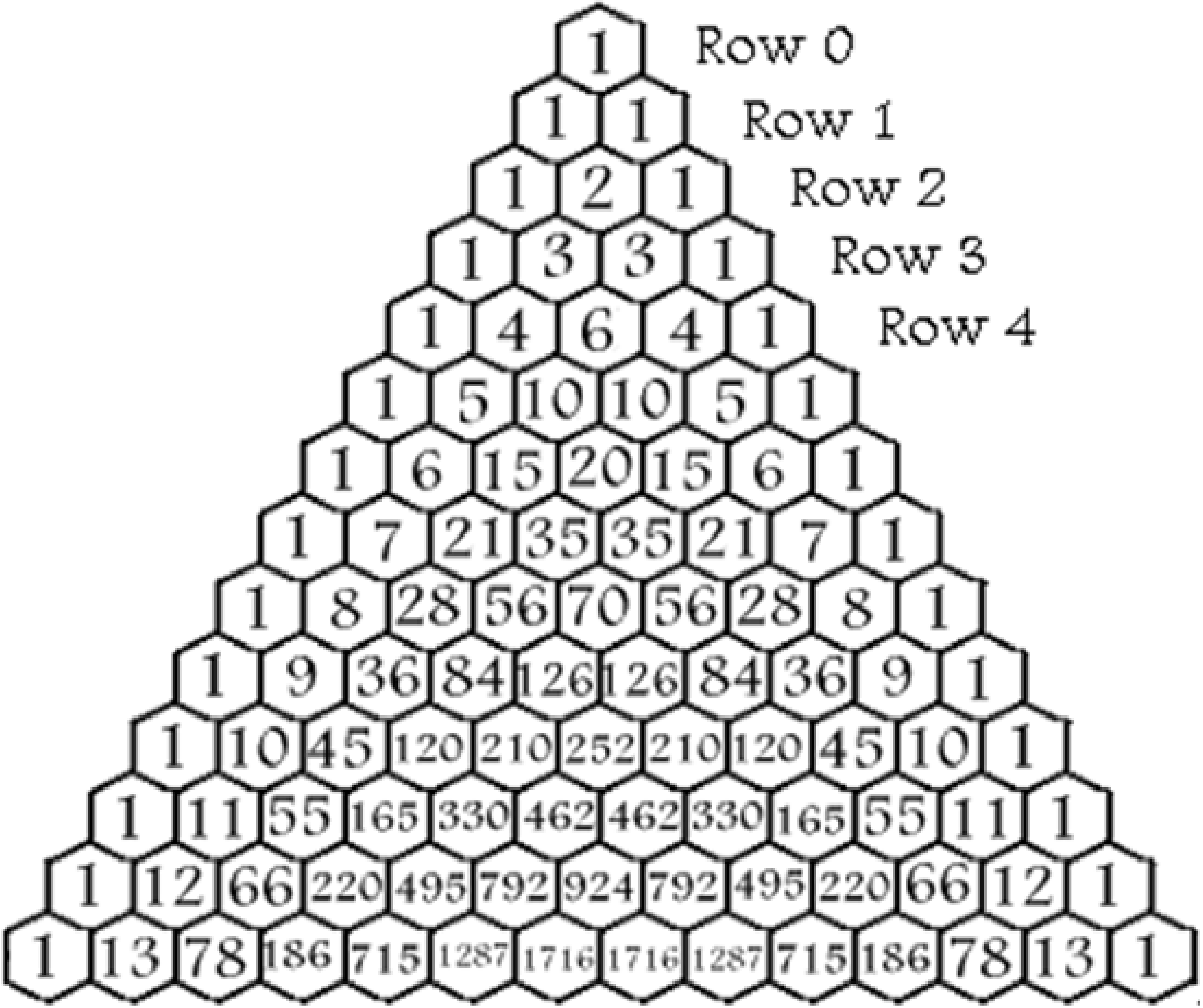
Pascal's Triangle is a triangular array of the binomial coefficients. It is named after the French mathematician Blaise Pascal. Pascal's triangle determines the coefficients which arise in binomial expansions.


Row 0
Row 1
Row 2
Row 3
Row 4
1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1
1 8 28 56 70 56 28 8 1
1 9 36 84 126 126 84 36 9 1
1 10 45 120 210 252 210 120 45 10 1
1 11 55 165 330 462 462 330 165 55 11 1
1 12 66 220 495 792 924 792 495 220 66 12 1
1 13 78 186 715 1287 1716 1716 1287 715 186 78 13 1

Example 1: Expand $(x+2)^4$

$$\underline{1}\,(x)^4\cancel{(2)} + \underline{4}\,(x)^3(2)^1 + \underline{6}\,(x)^2(2)^2$$

$$+ \underline{4}\,(x)^1(2)^3 + \underline{1}\,\cancel{(x)}(2)^4$$

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

Example 2: Expand $(x-3)^4$

$$\underline{1}(x)^4\cancel{(-3)^0} + \underline{4}(x)^3(-3)^1 + \underline{6}(x)^2(-3)^2$$

$$+\ \underline{4}(x)^1(-3)^3 + \underline{1}\cancel{(x)^0}(-3)^4$$

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

Example 3: Expand $(x+4)^5$

$$\underline{1}(x)^5\cancel{(4)^0} + \underline{5}(x)^4(4)^1 + \underline{10}(x)^3(4)^2$$

$$+ \underline{10}(x)^2(4)^3 + \underline{5}(x)^1(4)^4 + \underline{1}\cancel{(x)^0}(4)^5$$

$$\underline{1}x^5 + \underline{20}x^4 + \underline{160}x^3 + \underline{640}x^2 + \underline{1280}x + \underline{1024}$$

Example 4: What is the x^4 term in the expansion of $(3x-2)^8$?

$$\underline{70}(3x)^4(-2)^4$$

$$70 \cdot 3^4 \cdot (-2)^4 x^4$$

$$90720x^4$$

Example 5: What is the x^3 term in the expansion of $(2x+3)^5$?

$$10\,(2x)^3(3)^2$$

$$10 \cdot 2^3 \cdot 3^2\, x^3$$

$$720x^3$$

Example 6: What is the x^3 term in the expansion of $(2x+10)^5$?

Left to reader