



Air maths tuition

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Binomial Expansion: Rational Powers

$$(1+a)^n \equiv 1 + na + \frac{n(n-1)}{2!} a^2 + \frac{n(n-1)(n-2)}{3!} a^3 + \dots$$
$$\sqrt{1-2x} \equiv (1-2x)^{1/2}$$
$$\equiv 1 + \binom{1/2}{1} (-2x) + \binom{1/2}{2} (-2x)^2 + \binom{1/2}{3} (-2x)^3 + \dots$$
$$\equiv 1 - x - \frac{x^2}{2} - \frac{x^3}{2} - \dots$$

$$\frac{3}{2-x} \equiv 3(2-x)^{-1}$$
$$\equiv 3 \left[2 \left(1 - \frac{x}{2} \right) \right]^{-1}$$
$$\equiv 3(2)^{-1} \left(1 - \frac{x}{2} \right)^{-1}$$
$$\equiv \frac{3}{2} \left[1 + (-1) \left(-\frac{x}{2} \right) + \frac{(-1)(-2)}{2!} \left(-\frac{x}{2} \right)^2 + \dots \right]$$
$$\equiv \frac{3}{2} \left[1 + \frac{x}{2} + \frac{x^2}{4} + \dots \right] \equiv \frac{3}{2} + \frac{3x}{4} + \frac{3x^2}{8} + \dots$$

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