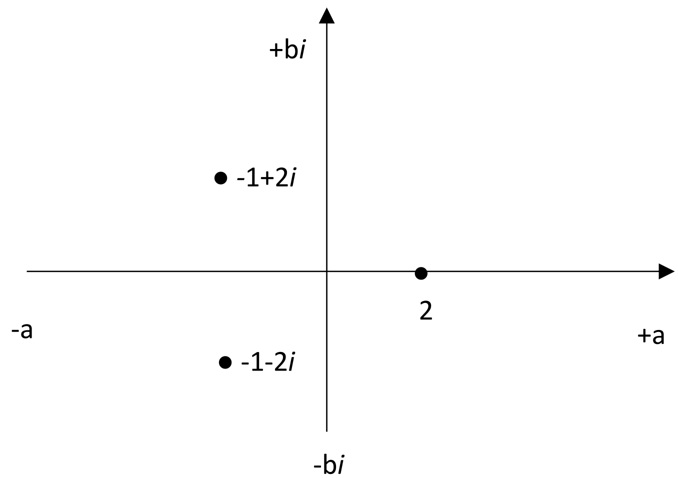
	Revision 2 Answers
1	The general term is $\binom{10}{r}(x)^{10-r}\left(\frac{1}{x}\right)^r = \binom{10}{r}\frac{x^{10-r}(1)^r}{x^r} = \binom{10}{r}(1)^r x^{10-2r}$ The independent term occurs when $x^{10-2r} = x^0,\ r = 5$ $\binom{10}{5}(1)^5 x^0 = 252$
2	$\frac{4x+17}{(x+3)^2} = \frac{A}{x+3} + \frac{B}{(x+3)^2}$, $4x + 17 = A(x+3) + B$ $A = 4\ and\ B = 5$ $$\frac{4x+17}{(x+3)^2} = \frac{4}{x+3} + \frac{5}{(x+3)^2}$$
3(a) (b) (c)	$y = 3tan\,u,\ u = \sin x$ $\frac{dy}{dx} = 3\sec^2 u \times \cos x = 3\cos x \sec^2(\sin x)$ $y = u^{\frac{1}{2}},\ u = \ln z, z = 4x$ $\frac{dy}{dx} = \frac{1}{2\sqrt{u}} \times \frac{1}{z} \times 4 = \frac{4}{8x\sqrt{\ln 4x}} = \frac{1}{2x\sqrt{\ln 4x}}$ $\frac{dy}{dx} = \frac{(-\sin x)x - 1(\cos x)}{x^2} = \frac{-x\sin x - \cos x}{x^2} = -\frac{x\ sinx + \cos x}{x^2}$
4	$$\frac{d}{dx}(x^2) + \frac{d}{dx}(3xy) + \frac{d}{dx}(y^2) = \frac{d}{dx}(-1)$$ $$2x + 3y + (3x)\frac{dy}{dx} + (2y)\frac{dy}{dx} = 0$$ $$2x + 3y = (-3x - 2y)\frac{dy}{dx}$$ $$\frac{dy}{dx} = -\frac{2x+3y}{3x+2y}$$ The gradient of the tangent is $-\frac{-2+3}{-3+2} = 1$, The equation of the tangent is $y = x + 2$

5	Roots of $z = -1 + 2i$ and $z = -1 - 2i$ Leads to $(z + 1 + 2i)(2 + 1 - 2i) = z^2 + 2z + 5$ Thus $z^3 + z - 10 = (z - 2)(z^2 + 2z + 54)$ Roots are $z = -1 \pm 2i$ and $z = 2$ 
6	The sum to infinity is $\frac{80}{1-\frac{1}{3}} = 120$
7	$f(x) = tanx$, $f'(x) = \sec^2 x$ $f''(x) = 2\sec x \sec x\ \tan x\ = 2\sec^2 x\ \tan x$ $f'''(x) = 4\sec^2 x \tan x \tan x\ + 2\sec^2 x \sec^2 x\ = 4\sec^2 x \tan^2 x + 2\sec^4 x$ $f(0) = 0,\ f'(0) = 1,\ f''(0) = 0,\ f'''(2)$ $f(x) = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!}$ and so on, hence $f(x) = x + \frac{1}{3}x^3 \ldots$
8	For $x = 1,\ u = 2$ For $x = 0,\ u = 1$ If $u = 1 + x^2 \ \rightarrow\ du = 2x\,dx,\quad \frac{du}{2} = x\,dx$ $\int_0^1 \frac{x}{\sqrt{(1+x^2)}}\,dx = \int_1^2 \frac{1}{2\sqrt{u}}du = \frac{1}{2}\int_1^2 u^{-\frac{1}{2}}du = \frac{1}{2}\left[2\sqrt{u}\right]_1^2 = \sqrt{2} - 1$