Question number	Scheme	Marks
6 (a)	$\sqrt{9-x}=3\left(1-\frac{x}{9}\right)^{\frac{1}{2}} \Rightarrow p=3, \quad q=-\frac{1}{9}$	B1B1 [2]
(b)	$3\left(1-\frac{x}{9}\right)^{\frac{1}{2}} =$ $3\left\{1+\left(\frac{1}{2}\right)\left(-\frac{x}{9}\right)+\frac{\left(\frac{1}{2}\right)\left(-\frac{1}{2}\right)\left(-\frac{x}{9}\right)^2}{2!}+\frac{\left(\frac{1}{2}\right)\left(-\frac{1}{2}\right)\left(-\frac{3}{2}\right)\left(-\frac{x}{9}\right)^3}{3!}+\ldots\right\}$ $=3\left(1-\frac{x}{18}-\frac{x^2}{648}-\frac{x^3}{11664}\right)=3-\frac{x}{6}-\frac{x^2}{216}-\frac{x^3}{3888}$	M1 A1A1 [3]
(c)	$\frac{31}{4}=9-x \Rightarrow x=\frac{5}{4}$ $\sqrt{\frac{31}{4}} \approx 3-\frac{1.25}{6}-\frac{1.25^2}{216}-\frac{1.25^3}{3888}=2.783930523... \approx 2.78393$	B1 M1A1 [3]
		Total 8 marks

(a)	B1	$p=3$ or $\sqrt{9}$ or $9^{\frac{1}{2}}$	May be shown in their $3\left(1-\frac{x}{9}\right)^{\frac{1}{2}}$ (allow isw)
	B1	$q=-\frac{1}{9}$	
(b)	M1	Attempt to use the binomial expansion for their $(1+qx)^{\frac{1}{2}}$. Must have first term 1, three more terms with ascending powers of x, 2 or 2! and 6 or 3! Seen, and their $\left(-\frac{x}{9}\right)$ used at least once. No simplification needed. Ignore terms beyond x^3	
	A1	Two algebraic terms correct in the expansion of $3\left(1-\frac{x}{9}\right)^{\frac{1}{2}}$. Must be single fractions, not necessarily in lowest terms. Ignore terms beyond x^3	
	A1	All four terms correct and in lowest terms. Ignore terms beyond x^3	
(c)	B1	Identify $x=\frac{5}{4}$ as the value needed to make $\sqrt{9-x}=\sqrt{\frac{31}{4}}$	
	M1	Substitute their x into each of the algebraic terms of their expansion of $\sqrt{9-x}$	
	A1	2.78393 **given to 5DP**.	