

Question 4 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{1}{\sqrt{9-x}} = (9-x)^{-\frac{1}{2}} = 9^{-\frac{1}{2}} \left(1 - \frac{x}{9}\right)^{-\frac{1}{2}}$	M1	This mark is given for rearranging $\frac{1}{\sqrt{9-x}}$ to attempt a binomial expansion
	$\left(1 - \frac{x}{9}\right)^{-\frac{1}{2}} =$	M1	This mark is given for an attempt at a binomial expansion
	$1 + \left(-\frac{1}{2}\right)\left(-\frac{x}{9}\right) + \frac{\left(-\frac{1}{2}\right) \times \left(-\frac{3}{2}\right)}{2} \left(-\frac{x}{9}\right)^2$	A1	This mark is given for a fully correct binomial expansion
	$\frac{1}{\sqrt{9-x}} = \frac{1}{3} + \frac{1}{54}x + \frac{1}{648}x^2$	A1	This mark is given for a fully correct expansion with the first three terms
(b)(i)	$x = -18$, since the expansion is only valid for $ x < 9$	B1	This mark is given for the correct value chosen with a correct reason

(b)(ii)	$x = -\frac{2}{3}$, since the smaller value will give the more accurate approximation	B1	This mark is given for the correct value chosen with a correct reason
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