4 (a)	$\dfrac{1}{\sqrt{4-x}}=(4-x)^{-\frac{1}{2}}=4^{-\frac{1}{2}}\times(1\pm......$	M1	2.1
	Uses a "correct" binomial expansion for their $(1+ax)^n=1+nax+\dfrac{n(n-1)}{2}a^2x^2+$	M1	1.1b
	$\left(1-\dfrac{x}{4}\right)^{-\frac{1}{2}}=1+\left(-\dfrac{1}{2}\right)\left(-\dfrac{x}{4}\right)+\dfrac{\left(-\frac{1}{2}\right)\times\left(-\frac{3}{2}\right)}{2}\left(-\dfrac{x}{4}\right)^2$	A1	1.1b
	$\dfrac{1}{\sqrt{4-x}}=\dfrac{1}{2}+\dfrac{1}{16}x+\dfrac{3}{256}x^2$	A1	1.1b
		(4)	
(b) (i)	States $x=-14$ and gives a valid reason. Eg explains that the expansion is not valid for $\lvert x\rvert>4$	B1	2.4
		(1)	
(b)(ii)	States $x=-\dfrac{1}{2}$ and gives a valid reason. Eg. explains that it is closest to zero	B1	2.4
		(1)	
			(6 marks)

(a)

M1: For the strategy of expanding $\dfrac{1}{\sqrt{4-x}}$ using the binomial expansion.

You must see $4^{-\frac{1}{2}}$ oe and an expansion which may or may not be combined.

M1: Uses a correct binomial expansion for their $(1\pm ax)^n=1\pm nax\pm\dfrac{n(n-1)}{2}a^2x^2+$

Condone sign slips and the "*a*" not being squared in term 3. Condone $a=\pm1$
Look for an attempt at the correct binomial coefficient for their *n*, being combined with the correct power of *ax*

A1: $\left(1-\dfrac{x}{4}\right)^{-\frac{1}{2}}=1+\left(-\dfrac{1}{2}\right)\left(-\dfrac{x}{4}\right)+\dfrac{\left(-\frac{1}{2}\right)\times\left(-\frac{3}{2}\right)}{2}\left(-\dfrac{x}{4}\right)^2$ unsimplified

FYI the simplified form is $1+\dfrac{x}{8}+\dfrac{3x^2}{128}$ Accept the terms with commas between.

A1: $\dfrac{1}{\sqrt{4-x}}=\dfrac{1}{2}+\dfrac{1}{16}x+\dfrac{3}{256}x^2$ Ignore subsequent terms. Allow with commas between.

Note: Alternatively $(4-x)^{-\frac{1}{2}}=4^{-\frac{1}{2}}+\left(-\dfrac{1}{2}\right)4^{-\frac{3}{2}}(-x)+\dfrac{\left(-\frac{1}{2}\right)\left(-\frac{3}{2}\right)}{2}4^{-\frac{5}{2}}(-x)^2+..$

M1: For $4^{-\frac{1}{2}}+.....$ **M1:** As above but allow slips on the sign of *x* and the value of *n* **A1:** Correct unsimplified (as above) **A1:** As main scheme

(b) Any evaluations of the expansions are irrelevant.

Look for a suitable value and a suitable reason for both parts.

(b)(i)

B1: Requires $x=-14$ with a suitable reason.

Eg. $x=-14$ as the expansion is only valid for $|x|<4$ or equivalent.

Eg ' $x=-14$ as $|-14|>4$" or ' I cannot use $x=-14$ as $\left|\frac{-14}{4}\right|>1$ '

Eg. ' $x=-14$ as is outside the range $|x|<4$ '

Do not allow ' -14 is too big' or ' $x=-14, |x|<4$ ' either way around without some reference to the validity of the expansion.

(b)(ii)

B1: Requires $x=-\frac{1}{2}$ with a suitable reason.

Eg. $x=-\frac{1}{2}$ as it is 'the smallest/smaller value' or ' $x=-\frac{1}{2}$ as the value closest to zero' (that will give the more accurate approximation). The bracketed statement is not required.