

Question	Scheme	Marks	AOs
2 (a)	$(1+4x)^{\frac{1}{2}} = 1 + \frac{1}{2} \times 4x + \frac{\frac{1}{2} \times -\frac{1}{2}}{2!} \times (4x)^2 + \frac{\frac{1}{2} \times -\frac{1}{2} \times -\frac{3}{2}}{3!} \times (4x)^3$	M1 A1	1.1b 1.1b
	$= \underline{1+2x} - 2x^2 + 4x^3 + \dots$	<u>B1</u> A1	1.1b 1.1b
		<b>(4)</b>	
(b)	<p>The expansion is not valid if <math> x  &gt; \frac{1}{4}</math></p> <p><math>\frac{25}{4} &gt; \frac{1}{4}</math> so should not be used</p>	B1	2.4
		<b>(1)</b>	
(c)	<p>Substitutes <math>x = \frac{1}{100}</math> into <math>(1+4x)^{\frac{1}{2}}</math> gives <math>\frac{\sqrt{26}}{5}</math></p>	M1	1.1b
	<p>Explains that <math>x = \frac{1}{100}</math> is substituted into <math>1+2x-2x^2+4x^3</math> and you multiply the result by 5</p>	A1	2.4
		<b>(2)</b>	

**(7 marks)**

**Notes:**

**(a)**

**M1:** Attempts the binomial expansion with  $n = \frac{1}{2}$  to get the correct structure for term 3 or term 4.

For example look, for term 3, a form  $\frac{\frac{1}{2} \times -\frac{1}{2}}{2!} \times (*x)^2$

**A1:** Correct (unsimplified) term3 and term 4

**B1:**  $1+2x$

**A1:**  $-2x^2 + 4x^3$

**(b)**

**B1:** For a correct explanation as to why  $x = \frac{25}{4}$  should not be used. The explanation must reference the  $\frac{1}{4}$  and not just state that it is too big.

**(c)**

**M1:** Substitutes  $x = \frac{1}{100}$  into  $(1+4x)^{\frac{1}{2}}$  gives  $\frac{\sqrt{26}}{5}$

**A1:** Requires a full (and correct) explanation as to how the expansion can be used to estimate  $\sqrt{26}$