Question	Scheme	Marks
9(a)	$\left(1-8x^2\right)^{-\frac{1}{2}} = 1+\left(-\frac{1}{2}\right)\left(-8x^2\right)+\frac{\left(-\frac{1}{2}\right)\left(-\frac{1}{2}-1\right)\left(-8x^2\right)^2}{2!}$ $+\frac{\left(-\frac{1}{2}\right)\left(-\frac{1}{2}-1\right)\left(-\frac{1}{2}-2\right)\left(-8x^2\right)^3}{3!}$	M1
	$\left(1-8x^2\right)^{-\frac{1}{2}} = 1+4x^2+24x^4+160x^6+\ldots$	A1A1 [3]
(b)	$\left((a+bx)"\left(1+4x^2+24x^4+160x^6\right)"=\right)\left(a+bx+4ax^2\right)+4bx^3+24ax^4$	M1A1ft
	$4b=20 \Rightarrow b=5$	A1
	$24a=48 \Rightarrow a=2$	A1 [4]
(c)	$\left(\int_0^{0.2} \mathrm{g}(x)\ \mathrm{d}x = \int_0^{0.2}\left(\frac{2+5x}{\sqrt{1-8x^2}}\right)\mathrm{d}x = \right)$	
	$\int_0^{0.2}\left("2"+"5"x+"8"x^2+"20"x^3+"48"x^4\right)\mathrm{d}x$	M1
	$\left(\int_0^{0.2} \mathrm{g}(x)\ \mathrm{d}x = \right)\left["2x+\frac{5x^2}{2}+\frac{8x^3}{3}+\frac{20x^4}{4}+\frac{48x^5}{5}"\right]_0^{0.2}$	M1
	$\left(\int_0^{0.2} \mathrm{g}(x)\ \mathrm{d}x = \right)"2\times0.2+\frac{5\times0.2^2}{2}+\frac{8\times0.2^3}{3}+\frac{20\times0.2^4}{4}+\frac{48\times0.2^5}{5}"$	M1
	$=0.532405333\approx0.5324$	A1
	Note: The calculator value is 0.5347698	[4]
		Total 11 marks

Part	Mark	Notes
(a)	M1	For an attempt at the binomial expansion. The expansion must: • Begin with 1 • The denominators must be correct • The powers of $-8x^2$ must be correct eg $\left(-8x^2\right)^2$ Do not allow missing brackets unless recovered later – this is a general point of marking. Ignore any terms with powers higher than 3. Allow a misread of $\frac{1}{2}$ for $-\frac{1}{2}$ but **not** $8x^2$ for $-8x^2$ - see gen guidance for misreads.
	A1	Following M1 (this is a general point of marking, A marks can only follow M marks). All conditions above met and at least one **algebraic** term correct and simplified.
	A1	Fully correct and simplified
(b)	M1	For attempting to expand $(a+bx)(1+cx^2+dx^4+.....)$ to reach at least the correct terms in x^3 and x^4 for their expansion from part (a) ie $4bx^3$ and $24ax^4$ or cbx^3 and dax^4 Ignore terms with powers higher than 4. It is only necessary to see the correct terms (for their expansion) in x^3 and x^4. They must be using an expansion from (a) of the form $1+cx^2+dx^4+.....$ This mark may be implied from any following working.
	A1ft	For a fully correct expansion in terms of x, a and b,up to the term in x^4 or for $4b = 20$ AND $24a = 48$. **or** if using an incorrect expansion from part (a) of the form $1+cx^2+dx^4+.....$ for a fully correct expansion **or** $cb = 20$ AND $da = 48$. Ignore terms with powers higher than 4.
	A1ft	Either a or b correct ft their expansion from (a) of the form $1+cx^2+dx^4+.....$ **and** $cb = 20$ AND $da = 48$.
	A1ft	Both a and b correct. ft their expansion from (a) of the form $1+cx^2+dx^4+.....$ **and** $cb = 20$ AND $da = 48$.
(c)	M1	For using their expansion from (b) with the correct limits. Although their expression does not need to be fully correct, it must be clear it has arisen from attempting to find a and b in part (b) and using these values. The expression must include the **first** 5 terms in their expansion of the form $p+qx+rx^2+sx^3+tx^4$ from part (b) using their a and b and may include more for this mark. It is not necessary to see the integral sign, if the candidate clearly integrates later. Similarly, if the limits are not present until substitution, this mark can be awarded.
	M1	For an attempt to integrate an expression (see general guidance) – no power of x to decrease. This is not a dependent method mark and the mark is for an attempt to integrate, **but** they must integrate all their terms and there must be a minimum of 2 algebraic terms.
	M1	For substitution of the given limits the correct way around. There must be at least one correct substitution of limits into their **changed** expression with a minimum of 2 algebraic terms (ie this again is not a dependent method mark). 0 need not be substituted if substitution into the changed expression gives an evaluation of 0. This may be implied by a correct answer, but must be shown if the final answer is not correct.
	A1	For awrt 0.5324 ie condone more decimal places.
The question does not demand that students use algebraic integration or show their working clearly and therefore **a correct answer of 0.5324….** may imply the method marks and full marks should be awarded. A value of 0.5347…..will score 0 marks.		