Question	Scheme	Marks	AOs
9(a)(i)	$50x^2+38x+9\equiv A(5x+2)(1-2x)+B(1-2x)+C(5x+2)^2$ $\Rightarrow B=\ldots \quad \text{or} \quad C=\ldots$	M1	1.1b
	$B=1$ and $C=2$	A1	1.1b
(a)(ii)	E.g. $x=0$ $x=0\Rightarrow 9=2A+B+4C$ $\Rightarrow 9=2A+1+8\Rightarrow A=\ldots$	M1	2.1
	$A=0$*	A1*	1.1b
		(4)	
(b)(i)	$\dfrac{1}{(5x+2)^2}=(5x+2)^{-2}=2^{-2}\left(1+\dfrac{5}{2}x\right)^{-2}$ or $(5x+2)^{-2}=2^{-2}+\ldots$	M1	3.1a
	$\left(1+\dfrac{5}{2}x\right)^{-2}=1-2\left(\dfrac{5}{2}x\right)+\dfrac{-2(-2-1)}{2!}\left(\dfrac{5}{2}x\right)^2+\ldots$	M1	1.1b
	$2^{-2}\left(1+\dfrac{5}{2}x\right)^{-2}=\dfrac{1}{4}-\dfrac{5}{4}x+\dfrac{75}{16}x^2+\ldots$	A1	1.1b
	$\dfrac{1}{(1-2x)}=(1-2x)^{-1}=1+2x+\dfrac{-1(-1-1)}{2!}(2x)^2+.$	M1	1.1b
	$\dfrac{1}{(5x+2)^2}+\dfrac{2}{1-2x}=\dfrac{1}{4}-\dfrac{5}{4}x+\dfrac{75}{16}x^2+\ldots+2+4x+8x^2+\ldots$	dM1	2.1
	$=\dfrac{9}{4}+\dfrac{11}{4}x+\dfrac{203}{16}x^2+\ldots$	A1	1.1b
(b)(ii)	$\lvert x\rvert<\dfrac{2}{5}$	B1	2.2a
		(7)	
			(11 marks)

Notes

(a)(i)

M1: **Uses a correct identity** and makes progress using an appropriate strategy (e.g. sub $x=\frac{1}{2}$) to find a value for *B* or *C*. May be implied by one correct value (cover up rule).

A1: Both values correct

(a)(ii)

M1: Uses an appropriate method to establish an equation connecting *A* with *B* and/or *C* and uses their values of *B* and/or *C* to find a suitable equation in *A*.

Amongst many different methods are:

Compare terms in x^2 $\Rightarrow 50=-10A+25C$ which would be implied by $50=-10A+25\times\text{"}2\text{"}$

Compare constant terms or substitute $x=0 \Rightarrow 9=2A+B+4C$ implied by $9=2A+1+4\times 2$

A1*: Fully correct proof with no errors.

Note: The second part is a proof so it is important that a suitable proof/show that is seen.

Candidates who write down 3 equations followed by three answers (with no working) will score M1 A1 M0 A0

(b)(i)

M1: Applies the key steps of writing $\frac{1}{(5x+2)^2}$ as $(5x+2)^{-2}$ and takes out a factor of 2^{-2} to form an expression of the form $(5x+2)^{-2}=2^{-2}(1+{*}x)^{-2}$ where * is not 1 or 5

Alternatively uses direct expansion to obtain $2^{-2}+\ldots$

M1: Correct attempt at the binomial expansion of $(1+{*}x)^{-2}$ up to the term in x^2

Look for $1+(-2){*}x+\frac{(-2)(-3)}{2}{*}x^2$ where * is not 5 or 1.

Condone sign slips and lack of $*^2$ on term 3. ....

Alt Look for correct structure for 2nd and 3rd terms by direct expansion. See below

A1: For a fully correct expansion of $(2+5x)^{-2}$ which may be unsimplified. This may have been combined with their 'B'

A direct expansion would look like $(2+5x)^{-2}=2^{-2}+(-2)2^{-3}\times 5x+\frac{(-2)(-3)}{2}2^{-4}\times(5x)^2$

M1: Correct attempt at the binomial expansion of $(1-2x)^{-1}$

Look for $1+(-1){*}x+\frac{(-1)(-2)}{2}{*}x^2$ where * is not 1

dM1: Fully correct strategy that is dependent on the previous **TWO** method marks.

There must be some attempt to use their values of B and C

A1: Correct expression or correct values for p, q and r.

(b)(ii)

B1: Correct range. Allow also other forms, for example $-\frac{2}{5}<x<\frac{2}{5}$ or $x\in\left(-\frac{2}{5},\frac{2}{5}\right)$

Do not allow multiple answers here. The correct answer must be chosen if two answers are offered