Question Number	Scheme	Marks	AOs
7 (a)	$f(x)=\dfrac{2\left(x-5\right)^2}{\sqrt{x}}=\dfrac{2x^2-20x+50}{\sqrt{x}}=$ e.g. $"2"x^{\frac{3}{2}}-"20"x^{\cdots}+"50"x^{-\frac{1}{2}}$	M1	1.1b
	$=2x^{\frac{3}{2}}-20x^{\frac{1}{2}}+50x^{-\frac{1}{2}}$	A1 A1	1.1b 1.1b
		(3)	
(b)	$\left\{\int f(x)\,dx=\right\}\ \dfrac{4}{5}x^{\frac{5}{2}}-\dfrac{40}{3}x^{\frac{3}{2}}+100x^{\frac{1}{2}}+c$	M1 A1ft A1	1.1b 1.1b 1.1b
		(3)	
(c) (i)	$\left\{f'\left(x\right)=\right\}\ 3x^{\frac{1}{2}}-10x^{-\frac{1}{2}}-25x^{-\frac{3}{2}}$	M1 A1ft	1.1b 1.1b
(ii)	Sets $3x^{\frac{1}{2}}-10x^{-\frac{1}{2}}-25x^{-\frac{3}{2}}=0$ **and** $\Rightarrow 3x^2-10x-25=0$ *	A1*	2.1
	$x=5$ only	B1 (A1 on EPEN)	2.3
		(4)	
			(10 marks)

Notes:

(a)

M1: Multiplies out the numerator to create a 3TQ and divides at least two of the terms by $\sqrt{x}$ to form at least two correct indices. The coefficients should be used to determine whether the correct indices are on the correct terms.

A1: At least 2 correct terms from $2x^{\frac{3}{2}}-20x^{\frac{1}{2}}+50x^{-\frac{1}{2}}$ with simplified coefficients and indices processed. Do not accept e.g. $\dfrac{50}{\sqrt{x}}$ for either A mark.

A1: Fully correct $2x^{\frac{3}{2}}-20x^{\frac{1}{2}}+50x^{-\frac{1}{2}}$ with simplified coefficients and indices processed.

(b) **Note that marks in (b) and (c) cannot be scored the wrong way round. If responses are unlabelled then the first attempt is marked as part (b) and the second is marked as (c)**

M1: Increases the index by 1 for at least one of their **fractional** indices from part (a).
It must be clear that the index has increased by 1. The order might clearly imply this, or the coefficient may be used to imply this.

A1ft: At least 2 correct terms of $\dfrac{4}{5}x^{\frac{5}{2}}-\dfrac{40}{3}x^{\frac{3}{2}}+100x^{\frac{1}{2}}$ o.e. which may have unsimplified coefficients (the indices must be processed) and follow through on correct integration of two of their terms from part (a) with **fractional** indices.
If they have the + *c* this is not considered to be one of their correct terms.

A1: $\frac{4}{5}x^{\frac{5}{2}} - \frac{40}{3}x^{\frac{3}{2}} + 100x^{\frac{1}{2}} + c$ o.e. including the + *c* and ISW after a correct integral is seen.

Condone inclusion of a spurious integral sign. Accept $-13.\dot{3}$ in place of $-\frac{40}{3}$ but not –13.3...

(c)(i) Mark parts (c)(i) and (c)(ii) together.

M1: Decreases the index by 1 for at least one of their **fractional** indices from part (a).

It must be clear that the index has decreased by 1. The order might clearly imply this, or the coefficient may be used to imply this.

A1ft: At least 2 correct terms of $3x^{\frac{1}{2}} - 10x^{-\frac{1}{2}} - 25x^{-\frac{3}{2}}$ o.e. which may have unsimplified coefficients (the indices must be processed) and follow through on correct differentiation of two of their terms from part (a) with **fractional** indices.

A1*: Achieves $3x^{\frac{1}{2}} - 10x^{-\frac{1}{2}} - 25x^{-\frac{3}{2}} = 0$ o.e. with processed indices **and** proceeds to $3x^2 - 10x - 25 = 0$ with no errors.

Must have come from a correct simplified f(*x*) from part (a) (or a clear restart).

Must include the = 0 in the given answer and in at least one of the previous lines.

$3x^{\frac{1}{2}} - 10x^{-\frac{1}{2}} - 25x^{-\frac{3}{2}} = x^{-\frac{3}{2}}\left(3x^2 - 10x - 25\right) = 0 \Rightarrow 3x^2 - 10x - 25 = 0$ is also acceptable.

(c)(ii)

B1: $x = 5$ only. Any other answers must be discarded or *x* = 5 must be clearly selected.

Ignore any reference to *y*, so condone coordinates e.g. (5, *k*) where *k* is any number.