Question Number	Scheme	Marks
6(a)	$\dfrac{2(4)^2+a\times4+b}{4\sqrt{4}}=7\Rightarrow 32+4a+b=56\Rightarrow 4a+b=24$ *	M1A1*
		(2)
(b)	$4a+b=24,\ a+b=-9\Rightarrow a=11,\ b=-20$	M1A1
	$\dfrac{x^{\frac{3}{2}}}{2}+\dfrac{11x^{\frac{1}{2}}}{4}-5x^{-\frac{1}{2}}$	M1
	$\displaystyle\int \dfrac{x^{\frac{3}{2}}}{2}+\dfrac{11x^{\frac{1}{2}}}{4}-5x^{-\frac{1}{2}}\ \mathrm{d}x\Rightarrow \text{Two of } \dfrac{x^{\frac{5}{2}}}{5},\ \dfrac{"11"x^{\frac{3}{2}}}{6},\ \dfrac{"-20"}{2}x^{\frac{1}{2}}$	dM1A1ft
	$\dfrac{(4)^{\frac{5}{2}}}{5}+\dfrac{11(4)^{\frac{3}{2}}}{6}-10(4)^{\frac{1}{2}}+c=-5\Rightarrow c=...$	M1
	$\left(\mathrm{f}(x)=\right)\dfrac{1}{5}x^{\frac{5}{2}}+\dfrac{11}{6}x^{\frac{3}{2}}-10x^{\frac{1}{2}}-\dfrac{91}{15}$	A1
		(7)
(c)	$(7,-5)$	B1
		(1)
		(10 marks)

Mark (a) and (b) together

(a)

M1 Attempts to substitute $x=4$ into $\mathrm{f}'(x)$ and sets equal to 7. Condone slips or incorrect manipulation prior to substituting in $x=4$ provided the intention is clear.

A1* Rearranges and achieves the given answer with no errors and at least one intermediate stage of working seen.

(b)

M1 Attempts to solve the two equations in *a* and *b* simultaneously to find a value for *a* or *b*. You do not need to be concerned with the mechanics of the rearrangement. Implied by any value for *a* or *b*

A1 $a=11,\ b=-20$ (correct values for *a* and *b* scores M1A1)

M1 Attempts to split the fraction and achieves at least one term with a correct index i.e. $x^{\frac{3}{2}}$, $x^{\frac{1}{2}}$ or $x^{-\frac{1}{2}}$ (for the relevant term). Do not allow for e.g. $\dfrac{\dots}{x^{\frac{1}{2}}}$ but the required index $x^{-\frac{1}{2}}$ may be implied by further work. You do not need to be concerned by the coefficient of the term, which may be in terms of *a* or *b*.

Do not allow to be scored for e.g. $\dfrac{2x^2}{4\sqrt{x}}\rightarrow ...x^{\frac{1}{2}}$

dM1 Increases the power by one on one of the terms in *x* with a correct index. It is dependent on the previous method mark. $x^{\frac{3}{2}}\rightarrow x^{\frac{5}{2}}$, $x^{\frac{1}{2}}\rightarrow x^{\frac{3}{2}}$ or $x^{-\frac{1}{2}}\rightarrow x^{\frac{1}{2}}$. The index does not need to be processed for this mark e.g. $x^{\frac{3}{2}}\rightarrow x^{\frac{3}{2}+1}$.

Do not award this mark for increasing the power by one on the denominator term.

If either *a* or *b* are not numerical then A0ftM0A0 is scored for the remaining marks in part (b)

Condone using numerical values for both *a* and *b* which appear with no evidence of working.

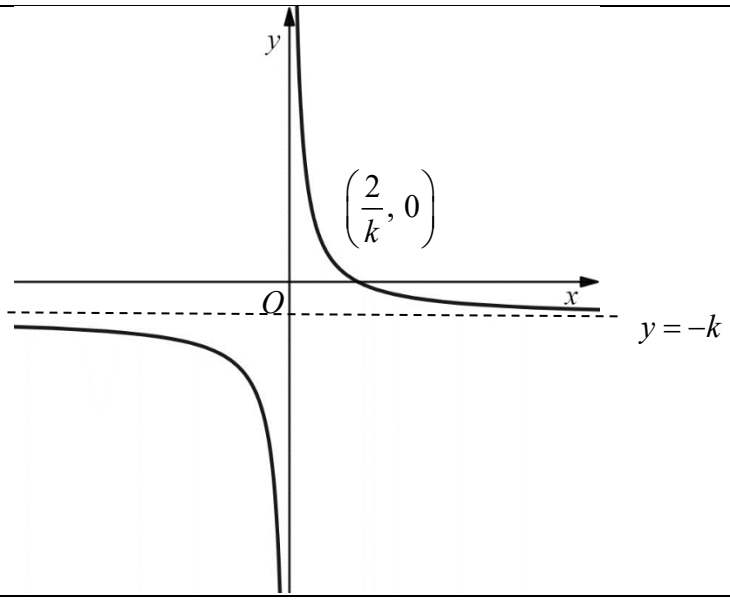
A1ft **Two correct terms of** $\frac{1}{5}x^{\frac{5}{2}}$ or $\frac{"11"}{6}x^{\frac{3}{2}}$ or $\frac{"-20"}{2}x^{\frac{1}{2}}$ The coefficients of the terms do not need to be simplified, but the index must be processed (follow through their *a* and/or *b* which must be numerical but both must have been found)

M1 Either states e.g. $x=4, y=-5$ and states a value for *c* or attempts to substitute $(4,-5)$ into their changed expression with a constant of integration and proceeds to find a value for *c*. They must have a constant of integration in their expression to score this mark.
You do not need to check the mechanics of their rearrangement.

A1 $\left(f(x)=\right)\frac{1}{5}x^{\frac{5}{2}}+\frac{11}{6}x^{\frac{3}{2}}-10x^{\frac{1}{2}}-\frac{91}{15}$ or exact simplified equivalent. isw once a correct answer is seen.
Must have the correct value for *c* substituted in.
Condone $-6.0\dot{6}$ for $-\frac{91}{15}$ but not e.g. -6.07 or $-6.066....$
Accept $\left(f(x)=\right)\frac{1}{30}\left(6x^{\frac{5}{2}}+55x^{\frac{3}{2}}-300x^{\frac{1}{2}}-182\right)$

(c) Check by the question or at the start of their work in the main body of the text

B1 $(7,-5)$ May be written as $x=7,\ \ y=-5$. Condone missing brackets.

Question Number	Scheme	Marks
7(a)		B1B1B1
		(3)
(b)	$-kx-6=\frac{2}{x}-k \Rightarrow -kx^2-6x=2-kx \Rightarrow kx^2+(6-k)x+2=0$ $(6-k)^2-4\times k\times 2 \Rightarrow k^2-20k+36$ $\Rightarrow \text{CVs}=2,18 \Rightarrow k<"2" \text{ or } k>"18"$ $(0<)k<2 \text{ or } k>18$	M1 dM1A1 M1 A1
		(5)
		(8 marks)

(a)

B1 Correct positive reciprocal shape graph in the correct position:

- The left branch must appear in quadrant 3 only
- The right branch must appear in both quadrants 1 and 4 only
- It must be drawn on a set of axes
- Condone slips provided a maximum or minimum is not intended

B1 Intersects the x-axis at $\left(\frac{2}{k}, 0\right)$ only. Condone $\left(0, \frac{2}{k}\right)$ provided it is marked in the correct place. May just see $\frac{2}{k}$ labelled which is acceptable. Do not be concerned by missing brackets.

B1 $y=-k$ Dashed lines are not needed on the sketch but if this asymptote is indicated on the sketch with dashed/solid lines then it must be a horizontal asymptote below the x-axis. Ignore any reference to a vertical asymptote. $y=-k$ must be labelled on the diagram (not just $-k$) or if labelled as $-k$ then $y=-k$ must be clearly identified as the asymptote in their working. Do not withhold this mark if they appear to have two horizontal asymptotes i.e. if the right branch is only in quadrant 1.