Question Number	Scheme	Marks
3(a)	$\log_{10} y = \frac{5}{16}x + 1.5$	M1A1
		(2)
(b)	$\log_{10} y = "\frac{5}{16}"x + "1.5" \Rightarrow y = 10^{"\frac{5}{16}"x + "1.5"}$	M1
	$\Rightarrow y = 10^{"\frac{5}{16}"x} \times 10^{"1.5"}$	M1
	$y = 31.6 \times 2.05^x$	A1
		(3)
		Total 5

(a)

M1: Scored for a complete attempt to get the equation of the line condoning $\log_{10} y \leftrightarrow y \leftrightarrow l$ and an incorrect sign on the gradient. So, allow for $(\log_{10} y) = \pm\frac{1.5}{4.8}x + 1.5$ o.e. and for $\frac{y-0}{x+4.8} = \pm\frac{1.5}{4.8}$

If this is attempted via simultaneous equations the mark is scored when the candidate reaches $m = \pm 0.3125$ $c = 1.5$

A1: Correct equation. e.g. $\log_{10} y = \frac{5}{16}x + 1.5$ or equivalent such as $16\log_{10} y = 5x + 24$

The $\log_{10}$ must not appear as "ln" but allow as "log" or "lg"

(b)

Main Method: Starting with their $\log_{10} y = mx + c$

M1: "Removes" the logs in their equation. e.g. $\log_{10} y = "m"x + "c" \Rightarrow y = 10^{"m"x + "c"}$

M1: "Correct" strategy to obtain values of *k* and *b* or else proceeding correctly to a form $y = 10^{"\frac{5}{16}"x} \times 10^{"1.5"}$

Allow for $k = 10^{"1.5"} (= 31.6)$ and $b = 10^{"\frac{5}{16}"} = (2.05)$. Note that you may see $10^{1.5}$ as $10\sqrt{10}$

A1: Correct equation produced, $y = 31.6 \times 2.05^x$, and no errors seen.

Condone correct working followed by $k = 31.6, b = 2.05$ with the equation being implied

cso ....the values must be 31.6 and 2.05, not values rounding to these numbers or exact values like $10\sqrt{10}$.

Note: A solution may be fudged from working similar to the following

$\log_{10} y = mx + c \Rightarrow y = 10^{mx} + 10^{c} \Rightarrow y = 31.6 + 2.05^x \Rightarrow y = 31.6 \times 2.05^x$

This will score Special case: M0 M1 A0

Alternative Method: Starting with $y = kb^x$

M1: Takes logs of both sides and applies at least one correct log law

e.g. $\log_{(10)} kb^x = \log_{(10)} k + \log_{(10)} b^x$, $\log_{(10)} b^x = x\log_{(10)} b$

M1: "Correct" strategy to obtain values for *k* and *b* from their $y = mx + c$

So $\log_{10} k = "c" \Rightarrow k = 10^{c}$ and $\log_{10} b = "m" \Rightarrow b = 10^{m}$

A1: Correct equation produced $y = 31.6 \times 2.05^x$ and no errors seen.

Condone correct working followed by $k = 31.6, b = 2.05$ with the equation being implied

cso ....the values must be 31.6 and 2.05, not values rounding to these numbers.

Correct answers for *k* and *b* without any working scores M0 M1 A0. Instructions on the paper state that they should show sufficient working to make their method clear.

Question Number	Scheme	Marks
4(a)	Any correct constant, so for $A=2$ or $B=3$ or $C=-1$ or $D=5$	B1
	$2x^4+15x^3+35x^2+21x-4=Ax^2(x+3)^2+Bx(x+3)^2+C(x+3)^2+D$ $\Rightarrow A=...,B=...,C=...,D=...$ or $2x^4+15x^3+35x^2+21x-4\div(x^2+6x+9)=...x^2+...x+...+\frac{...}{(x+3)^2}$	M1
	2 correct of $A=2,B=3,C=-1,D=5$	A1
	$A=2,B=3,C=-1,D=5$	A1
		(4)
(b)	$\int f(x)\,dx=\int\left(2x^2+3x-1+\frac{5}{(x+3)^2}\right)dx=\frac{2x^3}{3}+\frac{3x^2}{2}-x-\frac{5}{x+3}(+c)$	M1A1ftA1
		(3)
		Total 7

(a)

B1: One correct constant or one correct term in $Ax^2+Bx+C+\frac{D}{(x+3)^2}$

M1: Complete method for finding *A, B, C* and *D*
For example substitution/comparing coefficients/long division
Via substitution/comparing coefficients the minimum required is an identity of the correct form (condoning slips) followed by values for *A, B, C* and *D.*
See scheme but there are other versions including
$2x^4+15x^3+35x^2+21x-4=(Ax^2+Bx+C)(x+3)^2+D\Rightarrow A=...,B=...,C=...,D=...$

Via division look for a divisor of x^2+6x+9, a quotient that is a quadratic and a remainder that is either linear or a constant term.
It could be attempted by dividing by $(x+3)$ twice.

FYI, the first division gives $2x^3+9x^2+8x-3$ with a remainder of 5
A1: 2 correct constants following the award of M1
For division, when the remainder is a linear term, it would be scored for two correct of Ax^2+Bx+C
A1: All correct following the award of M1

(b)

M1: $\int\frac{D}{(x+3)^2}dx\to\frac{k}{x+3}$ where *k* is a constant.

This may be awarded following a term of $\int\frac{\alpha x+D}{(x+3)^2}dx$ following division**.**

Look for $\int\frac{\alpha x+D}{(x+3)^2}dx$ being correctly split and $\to\int\frac{\alpha x}{(x+3)^2}dx+\int\frac{D}{(x+3)^2}dx\to$ something $+\frac{k}{x+3}$