Question Number	Scheme	Marks
2	$(1+px)^{10} = 1+10px+\frac{10\times 9}{2}p^2x^2+\frac{10\times 9\times 8}{6}p^3x^3+\ldots$	
	Sets $10p=15 \Rightarrow p=1.5$ o.e.	M1 A1
	Finds the value of $45p^2 \Rightarrow q=101.25$ o.e.	M1 A1
	Finds the value of $120p^3 \Rightarrow r=405$	M1 A1
		(6) **(6 marks)**

M1: Sets $10p=15 \Rightarrow p=\ldots$ or $10px=15x \Rightarrow p=\ldots$

Alternatively score for a correct simplified expansion of $(1+px)^{10} = 1+10px+45p^2x^2+120p^3x^3+\ldots$

A1: $p=1.5$ o.e. Candidates who simply state that $p=1.5$ can be awarded M1, A1

M1: Finds a value for $45p^2$ or $\frac{10\times 9}{2}p^2x^2$ or equivalent using their value of *p* which may or may not have been found via a correct method.

A1: States a correct value for $q=101.25$ o.e following the award of M1

M1: Finds the value for $120p^3$ or $\frac{10\times 9\times 8}{3!}p^3x^3$ or equivalent using their value of *p* which may or may not have been found via a correct method.

A1: States a correct value for $r=405$ following the award of M1

Special Case I: Candidates who leave the x^2 AND x^3 in their answer

Candidates who show a correct method but state $q = 101.25x^2$ **AND** $r = 405x^3$ following M1, A1 can score SC 1,1,1,1,1,0

Special Case II: Candidates who find the value of *p* and then expand $\left(1+\frac{3}{2}x\right)^{10}$

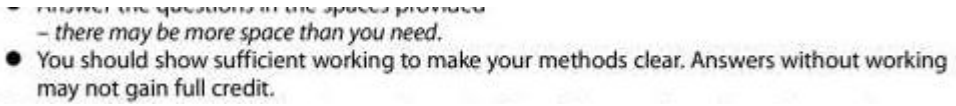
Candidates who show a correct method to find *p* then expand $\left(1+\frac{3}{2}x\right)^{10} = 1+15x+101.25x^2+405x^3$ without explicitly stating *q* and *r* can be awarded all of the marks

Answers with limited or no working;

If the candidate gives a correct expansion of $(1+px)^{10}$, whether simplified or not, then all marks are available.

E.g $(1+px)^{10} = 1+10px+45(px)^2+120(px)^3 \Rightarrow p=\frac{3}{2}, q=\frac{405}{4}, r=405$ scores 6 marks

If the candidate just writes down values without any valid equations/working then we will apply the following.


– there may be more space than you need.
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.

So just stating $p = 1.5$, $q = 101.25$ and $r = 405$ without the necessary equations or expansion is SC: 1,1,1,0,0,0

Question Number	Scheme	Marks
3.(a)	$300\,000 = 3\times 2^{-k} \Rightarrow 2^{-k} = 100000 \Rightarrow -k = \dfrac{\log 100000}{\log 2}$	M1
	$(k) = -16.61$	A1
		(2)
(b) (i)	Strip width = 1.5	B1
	$\dfrac{1.5}{2}\{4.243 + 0.023 + 2(1.5 + 0.530 + 0.188 + 0.066)\}$ = 6.63	M1, A1
		(3)
(ii)	$\displaystyle\int_{-0.5}^{7} 2^{-x}\,\mathrm{d}x + \int_{-7}^{0.5} 2^{x}\,\mathrm{d}x = \frac{1}{3}\times\text{"6.63"} + \frac{1}{3}\times\text{"6.63"} = 4.42$	M1, A1
		(2)
		(7 marks)

(a)

M1: Correct **use of logs** leading to an expression or value for x or $-x$.

Alternatively applies the correct **use of logs** leading to an expression for k or $-k$

There are lots of variations, examples of which include

- $(\pm k) = \dfrac{\log 100000}{\log 2}$, $(\pm x) = \log_2 \dfrac{1}{100000}$ and $(\pm x) = \dfrac{\ln 100000}{\ln 2}$
- $300\,000 = 3\times 2^{-k} \Rightarrow \log 300000 = \log 3 - k\log 2 \Rightarrow k = \ldots$

Condone a slip on the number of zeros (4 or 6 zeros can still score this method mark)

It cannot be scored if they incorrectly combine the 3 and the 2 and work from $6^{-k} = 300\,000$

A1: AWRT –16.61 following M1. ISW after a correct answer

Note that the answer only is M0, A0. The demand is that the candidates use logs