7. $y = kx^n$

$\log_5 y = \log_5 kx^n$

$= \log_5 k + \log_5 x^n$

$\log_5 y = \log_5 k + n\log_5 x$

$y = mx + c$

n = gradient

$\log_5 k$ = y intercept

$n = \frac{3 - -1}{0 - 2} = \frac{4}{-2} = -2$

$\log_5 k = 3$

$5^3 = k$

$k = 125$

$y = 125x^{-2}$

Question			Generic scheme	Illustrative scheme	Max mark
7.			**Method 1**	**Method 1**	**5**
			•[1] state equation of line	•[1] $\log_5 y = -2\log_5 x + 3$	
			•[2] introduce logs	•[2] $\log_5 y = -2\log_5 x + 3\log_5 5$	
			•[3] use laws of logs	•[3] $\log_5 y = \log_5 x^{-2} + \log_5 5^3$	
			•[4] use laws of logs	•[4] $\log_5 y = \log_5 5^3 x^{-2}$	
			•[5] state k and n	•[5] $k = 125,\ n = -2$	
			Method 2	**Method 2**	
			•[1] state equation of line	•[1] $\log_5 y = -2\log_5 x + 3$	
			•[2] use laws of logs	•[2] $\log_5 y = \log_5 x^{-2} + 3$	
			•[3] use laws of logs	•[3] $\log_5 \frac{y}{x^{-2}} = 3$	
			•[4] use laws of logs	•[4] $\frac{y}{x^{-2}} = 5^3$	
			•[5] state k and n	•[5] $k = 125, n = -2$	
			Method 3	**Method 3** **The equations at •[1], •[2], and •[3] must be stated explicitly.**	
			•[1] introduce logs to $y = kx^n$	•[1] $\log_5 y = \log_5 kx^n$	
			•[2] use laws of logs	•[2] $\log_5 y = n\log_5 x + \log_5 k$	
			•[3] interpret intercept	•[3] $\log_5 k = 3$	
			•[4] use laws of logs	•[4] $k = 125$	
			•[5] interpret gradient	•[5] $n = -2$	

Question		Generic scheme	Illustrative scheme	Max mark
7.	**(continued)**			
		Method 4	**Method 4**	
		$\bullet^1$ interpret point on log graph	$\bullet^1$ $\log_5 x = 0$ and $\log_5 y = 3$	
		$\bullet^2$ convert from log to exponential form	$\bullet^2$ $x = 1, y = 5^3$	
		$\bullet^3$ interpret point and convert	$\bullet^3$ $\log_5 x = 2$ **and** $\log_5 y = -1$ $x = 5^2$ and $y = 5^{-1}$	
		$\bullet^4$ substitute into $y = kx^n$ and evaluate k	$\bullet^4$ $5^3 = k(1)^n \Rightarrow k = 125$	
		$\bullet^5$ substitute other point into $y = kx^n$ and evaluate n	$\bullet^5$ $5^{-1} = 5^3 \times 5^{2n}$ $\Rightarrow 3 + 2n = -1$ $\Rightarrow n = -2$	

Notes:

1. In any method, marks may only be awarded within a valid strategy using $y = kx^n$.
2. Markers must identify the method which best matches the candidates approach; markers must not mix and match between methods.
3. Penalise the omission of base 5 at most once in any method.
4. In Method 4, candidates may use $(2, -1)$ for $\bullet^1$ and $\bullet^2$ and (0,3) for $\bullet^3$.
5. Do not accept $k = 5^3$.
6. In Method 3, do not accept $m = -2$ or gradient $= -2$ for $\bullet^5$.
7. Accept $y = 125x^{-2}$ for $\bullet^5$.

Commonly Observed Responses:
