(6)

$$y = ax^b$$

$$\log_5 y = \log_5 ax^b$$

$$\log_5 y = \log_5 a + \log_5 x^b$$

$$\log_5 y = \underbrace{\log_5 a}_{c} + \underbrace{b}_{m} \log_5 x$$

$$m = \frac{10-(-2)}{4-0} = \frac{12}{4} = 3$$

$c = -2$ from the graph.

So $b = 3$

and $-2 = \log_5 a$

$$5^{-2} = a$$

$$a = \frac{1}{5^2} = \frac{1}{25}$$

Question			Generic scheme	Illustrative scheme	Max mark
6.			**Method 1**	**Method 1**	5
			•[1] state linear equation	•[1] $\log_5 y = 3\log_5 x - 2$	
			•[2] introduce logs	•[2] $\log_5 y = 3\log_5 x - 2\log_5 5$	
			•[3] use laws of logs	•[3] $\log_5 y = \log_5 x^3 - \log_5 5^2$	
			•[4] use laws of logs	•[4] $\log_5 y = \log_5 \frac{x^3}{5^2}$	
			•[5] state a and b	•[5] $a = \frac{1}{25}, b = 3$ or $y = \frac{x^3}{25}$	
			Method 2	**Method 2**	5
			•[1] state linear equation	•[1] $\log_5 y = 3\log_5 x - 2$	
			•[2] use laws of logs	•[2] $\log_5 y = \log_5 x^3 - 2$	
			•[3] use laws of logs	•[3] $\log_5 \frac{y}{x^3} = -2$	
			•[4] use laws of logs	•[4] $\frac{y}{x^3} = 5^{-2}$	
			•[5] state a and b	•[5] $a = \frac{1}{25}, b = 3$ or $y = \frac{x^3}{25}$	
			Method 3	**Method 3** **The equations at •[1], •[2] and •[3] must be stated explicitly**	5
			•[1] introduce logs to $y = ax^b$	•[1] $\log_5 y = \log_5 ax^b$	
			•[2] use laws of logs	•[2] $\log_5 y = b\log_5 x + \log_5 a$	
			•[3] interpret intercept	•[3] $\log_5 a = -2$	
			•[4] use laws of logs	•[4] $a = \frac{1}{25}$	
			•[5] interpret gradient	•[5] $b = 3$	

Question	Generic scheme	Illustrative scheme	Max mark

6. (continued)

Notes

1. In any method, marks may only be awarded within a valid strategy using $y=ax^b$. For example, see Candidates C and D.
2. Markers must identify the method which best matches the candidate's approach; markers must not mix and match between methods.
3. Penalise the omission of base 5 at most once in any method.
4. Where candidates use an incorrect base then only $\bullet^2$ **and** $\bullet^3$ are available (in any method).
5. Do not accept $a=5^{-2}$.
6. In Method 3, do not accept $m=3$ or gradient $=3$ for $\bullet^5$.
7. Do not penalise candidates who score out "log" from equations of the form $\log_5 m=\log_5 n$.

Commonly Observed Responses

Candidate A - missing equations at $\bullet^1$, $\bullet^2$ and $\bullet^3$ in Method 3

$a=\frac{1}{25}$ $\bullet^4$ ✓

$b=3$ $\bullet^5$ ✓

Candidate B - no working - Method 3

$b=\frac{1}{25}$ $\bullet^4$ ✗

$a=3$ $\bullet^5$ ✗

Candidate C - Method 2

$y=3x-2$

$\log_5 y=3\log_5 x-2$ $\bullet^1$ ✓

$\log_5 y=\log_5 x^3-2$ $\bullet^2$ ✓

$y=x^3-2$ $\bullet^3$ ✗ $\bullet^4$ ✗ $\bullet^5$ ✗

Candidate D - Method 2

$\log_5 y=3\log_5 x-2$ $\bullet^1$ ✓

$\log_5 y=\log_5 x^3-2$ $\bullet^2$ ✓

$\frac{y}{x^3}=-2$ $\bullet^3$ ✗ $\bullet^4$ ✗ $\bullet^5$ ✗

Candidate E - use of coordinate pairs

$\log_5 x=4$ **and** $\log_5 y=10$ $\bullet^1$ ✓

$x=5^4$ and $y=5^{10}$ $\bullet^2$ ✓

$\log_5 x=0$, $\log_5 y=-2$

$\Rightarrow x=1,\ y=5^{-2}$ $\bullet^3$ ✓

$5^{-2}=a\times 1^b \Rightarrow a=\frac{1}{25}$ $\bullet^4$ ✓

$5^{10}=5^{-2}\times 5^{4b} \Rightarrow -2+4b=10$

$\Rightarrow b=3$ $\bullet^5$ ✓

Candidates may use $(0,-2)$ for $\bullet^1$ and $\bullet^2$ and $(4,10)$ for $\bullet^3$.