⑨ $\log_a 5 + \log_a 80 - 2\log_a 10 = \log_a 5 + \log_a 80 - \log_a 10^2$

$= \log_a \frac{5 \times 80}{100}$

$= \log_a \frac{400}{100}$

$= \log_a 4$

Question			Generic scheme	Illustrative scheme	Max mark
9.			**Method 1** •[1] apply $\log_a x + \log_a y = \log_a xy$ •[2] apply $m\log_a x = \log_a x^m$ •[3] apply $\log_a x - \log_a y = \log_a \frac{x}{y}$ and express in required form	**Method 1** •[1] $\log_a (5\times 80)$… stated or implied by •[3] •[2] …$-\log_a 10^2$ stated or implied by •[3] •[3] $\log_a 4$	**3**
			Method 2 •[1] apply $m\log_a x = \log_a x^m$ •[2] apply $\log_a x - \log_a y = \log_a \frac{x}{y}$ •[3] apply $\log_a x + \log_a y = \log_a xy$ and express in required form	**Method 2** •[1] …$-\log_a 10^2$ stated or implied by •[3] •[2] …$+\log_a\left(\frac{80}{10^2}\right)$ stated or implied by •[3] •[3] $\log_a 4$	

Notes:

1. Where an error at the •[1] or •[2] stage leads to a non-integer value for k, •[3] is still available.
2. Each line of working must be equivalent to the line above within a valid strategy. See commonly observed responses.
3. Where candidates apply the laws of logarithms in the incorrect order see Candidates A and B.
4. Where candidates do not consider the '2', a maximum of 1/3 is available. See Candidate C.
5. Do not penalise the omission of the base of the logarithm.
6. Correct answer with no working, award 3/3.
7. Where candidates form an invalid equation, •[1] and •[2] may only be awarded for working with $\log_a 5 + \log_a 80 - 2\log_a 10$ on one side of the equation; •[3] is not available.

Commonly Observed Responses:

Candidate A

$\log_a 5 + 2\log_a\left(\frac{80}{10}\right)$

$2\log_a\left(\frac{5\times 80}{10}\right)$

$\log_a (40)^2$

$\log_a 1600$

Award 1/3

Candidate B

$\log_a 400 - 2\log_a 10$

$2\log_a\left(\frac{400}{10}\right)$

$\log_a (40)^2$

$\log_a 1600$

Award 2/3

Candidate C – ignoring the 2

$\log_a 5 + \log_a 80 - 2\log_a 10$

$\log_a 5 + \log_a \frac{80}{10}$

$\log_a 40$

Award 1/3