

# INDICES AND LOGARITHMS KCSE QUESTIONS WITH ANSWERS

## MODEL27042023

- 1 Without using a calculator, solve for  $x$  in the equation

$$0.5^x \times 0.125^{1-x} = 32$$

- 2 Solve for  $x$  given

$$\left(\frac{1}{8}\right)^x \times 64^2 = 256$$

- 3 Given that  $\sqrt[3]{9^4} = 3^n$ , find the value of  $n$ .

- 4 Use logarithms to evaluate,

$$\sqrt[3]{\frac{(1.654)^2}{45.73 \times 0.56}}$$

- 5 Without using mathematical tables or a calculator, evaluate

$$27^{\frac{2}{3}} \times \left(\frac{81}{16}\right)^{\frac{-1}{4}}$$

- 6 Use logarithm tables to evaluate

$$\frac{2347 \times 0.4666}{\sqrt[3]{0.0924}}$$

MARKING SCHEME

1

$$\left(\frac{1}{2}\right)^x + \left(\frac{1}{8}\right)^{1-x} = 2^5$$

$$2^{-x} + 2^{-3(1-x)} = 2^5 \checkmark$$

$$-x + -3 + 3x = 5 \checkmark$$

$$2x - 3 = 5$$

$$2x = 8$$

$$x = 4 \checkmark$$

M1

M1

A1

③

2

$\left(\frac{1}{2^3}\right)^x \times \left(2^6\right)^2 = \left(2^4\right)^2$ $2^{-3x} \cdot 2^{12} = 2^8$ $12 - 3x = 8$ $x = 4/3$ $= 1 \frac{1}{3}$	M1	For writing in index form
	M1	

3

<p>ALT.</p> $9^{4/3} = 7^{1/3} n$ M1	$\sqrt[3]{9^4} = 3^n$	M1	<p>ALT.</p> <p>Base 3 (both sides) <math>\frac{4}{3} \log 7 = n</math></p> $= \frac{4 \log 7}{3 \log 2} = n$
$\frac{4}{3} = \frac{1}{2} n$ M1	$3^4 = 3^n$	M1	
$n = \frac{8}{3}$ A1	$n = \frac{8}{3} = 2 \frac{2}{3}$	A1	
		4	

4

<p>No. Log</p> <p>(1.654)<sup>2</sup> 0.2185 × 2</p> <p>0.4370</p> <p>45.73 1.6602</p> <p>0.56 1.7482 or (-0.2518)</p> <p>1.4084</p> <p>1.0286 or (-0.9714) × <math>\frac{1}{3}</math></p> <p>1.6762 or -0.3238</p> <p>= 0.4745</p>	M1	All logs correct 0.2185, 1.6602, 1.74
	M1	Correct squaring and multiplication for 0.4370 and 1.4084
	M1	Correct cube root and division for 1.6762 or -0.3238
	A1	accept 0.4744 is anti-log table error.
	4	

5

$$\begin{aligned}
 27^{\frac{2}{3}} \times \left(\frac{81}{16}\right)^{-\frac{1}{4}} &= (3^3)^{\frac{2}{3}} \times \left(\frac{3^4}{2^4}\right)^{-\frac{1}{4}} \\
 &= 3^2 \times \left(\frac{3}{2}\right)^{-1} \\
 &= 3^2 \times \frac{2}{3} \\
 &= 6
 \end{aligned}$$

6

1.	23.47	→	3.3705	M <sub>1</sub>	All 3 logs 3√tables Attempt to add logs M <sub>0</sub> M <sub>1</sub>
	0.4666	→	1.6689 = 3.0394	M <sub>1</sub>	
	$\sqrt[3]{0.0924}$	→	$\frac{2.9657}{3} = \frac{1.6552}{3}$	M <sub>1</sub>	
	$2.422 \times 10^3$	←	3.3842	A <sub>1</sub>	Attempt to divide by 3 & sin
	$2.422 \times 10^3$			4 marks	Accept standard form.
	$0.423 \times 10^3$		$2422^3$		