

Exponentials & Logarithms

Practice Test (SAC) | Non-CAS

Question and Answer Book

Mathbanks Practice Assessment

- Reading time is **5 minutes**
- Writing time is **45 minutes**

Materials supplied

- Question and Answer Book of 13 pages
- Formula Sheet

Instructions

Students are **not** permitted to bring any technology (calculators or software), or notes of any kind, into the assessment room.

Students are **not** permitted to bring mobile phones and/or any unauthorised electronic devices into the assessment room.

Contents

pages

7 questions (31 marks) 2–13



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Instructions

- Answer **all** questions in the spaces provided.
 - Write your responses in English.
 - In all questions where a numerical answer is required, an **exact** value must be given unless otherwise specified.
 - In questions where more than one mark is available, appropriate working **must** be shown.
 - Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.
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Question 1 (2 marks)

Simplify $\frac{12a^2b^{-3}}{3a^{-1}b} \div \left(\frac{2a^3b^{-1}}{ab^2}\right)^2$. Express your answer using positive indices.

Question 2 (3 marks)Solve the following for x .

a. $\frac{x^5 \times x^{-2}}{x^6} = \frac{1}{27}$

1 mark

b. $\log_3(9x) - 2\log_3(x) = -1$

2 marks

Question 3 (4 marks)Solve the following for x .

a. $2^{2x} - 6 \times 2^x + 8 = 0$

2 marks

b. $\log_{10}(x) - 2\log_{10}(3) + \log_{10}(2) = 0$

2 marks

Question 4 (6 marks)

a. Solve the following for x .

i. $4^{-x} = 2^{2x-12}$

2 marks

ii. $\log_5(4x + 3) - \log_5(x - 2) = 1$

2 marks

b. Simplify $\frac{8^{3a+1} \times 4^{2-a}}{2^{5-2a}}$.

2 marks

Question 5 (6 marks)

Consider the function $y = 4 \times 2^{2x-1}$.

- a. Write down the equation of the horizontal asymptote.

1 mark

- b. Find the coordinates of the y -intercept.

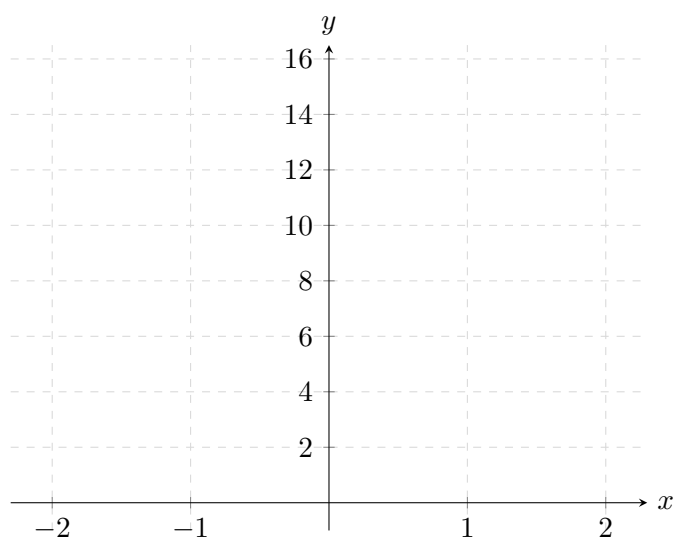
1 mark

- c. Find the coordinates of the point on the graph where $x = \frac{1}{2}$.

1 mark

d. Sketch the graph of $y = 4 \times 2^{2x-1}$ on the axes below.

2 marks



e. State the range.

1 mark

Question 6 (4 marks)

Find the values of a and b , and the equation, if $y = a \log_8(bx)$ contains the points $(2, 0)$ and $(16, 3)$.

Question 7 (6 marks)

Consider the function $y = 3^x - 9$.

a. Write down the equation of the horizontal asymptote.

1 mark

b. Find the coordinates of the y -intercept.

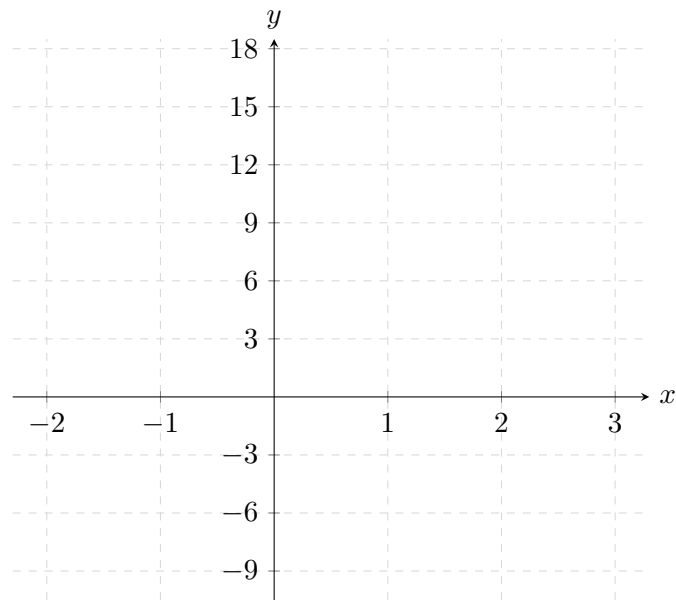
1 mark

c. Find the coordinates of the x -intercept.

1 mark

d. Sketch the graph of $y = 3^x - 9$ on the axes below.

2 marks



e. State the range.

1 mark

Mathematical Methods Units 1 & 2 formulas

Functions and graphs

distance formula	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
midpoint formula	midpoint = $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

Straight line graphs

general equation	$y = mx + c$
equation through point (x_1, y_1)	$y - y_1 = m(x - x_1)$
gradient	$m = \frac{y_2 - y_1}{x_2 - x_1}$

Mensuration

circumference of a circle	$2\pi r$	area of a circle	πr^2
volume of a sphere	$\frac{4}{3}\pi r^3$	volume of a cylinder	$\pi r^2 h$

Calculus

$\frac{d}{dx}(x^n) = nx^{n-1}$	$\int x^n dx = \frac{1}{n+1}x^{n+1} + c, n \neq -1$
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Probability

$\Pr(A) = 1 - \Pr(A')$	$\Pr(A \cup B) = \Pr(A) + \Pr(B) - \Pr(A \cap B)$
$\Pr(A B) = \frac{\Pr(A \cap B)}{\Pr(B)}$	

About Mathbanks

Mathbanks is an online question bank for VCE Mathematics. It contains thousands of original, exam-style questions — each written with a complete worked solution and mark scheme — organised by topic and by difficulty across Mathematical Methods Units 1 & 2 and Units 3 & 4.

About This Test

This practice test features the index laws, exponential and logarithmic equations, the laws of logarithms, and the graphs of exponential and logarithmic functions, with a focus on non-CAS algebraic techniques commonly assessed in VCE Mathematical Methods Units 1 & 2. Students practise simplifying expressions using the index laws, solving exponential equations by equating powers and by substitution, and solving logarithmic equations using the log laws and change of base. The test develops fluency with converting between exponential and logarithmic form, condensing and expanding expressions with the log laws, and finding unknown bases and exponents. Graphing topics include sketching exponential and logarithmic functions, identifying the horizontal or vertical asymptote, finding x - and y -intercepts, stating domain and range, and interpreting the effect of dilations, reflections and translations. Students also determine function rules from key features and solve problems involving exponential and logarithmic relationships.



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