

Mixed Functions & Relations #2

Practice Test (SAC) | 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 11 pages
- Formula Sheet

Instructions

Students are permitted to bring into the assessment room: one approved CAS technology (calculator or software) and, if desired, one scientific calculator, and one bound reference.

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

Contents

pages

2 questions (29 marks) 2–11



Scan QR Code for
[Test Solutions](#)



Scan QR Code for
[1000s More Exam Questions](#)

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.
-

Question 1 (13 marks)

For $f(x) = \sqrt{9 - x^2}$.

- a. State the maximum domain for $f(x)$. 2 marks

- b. The given domain of $f(x)$ is $[a, b]$, $b > 0$. Find the minimum value of a such that $f^{-1}(x)$ exists. 1 mark

c. For $[a, b] = [1, 3]$, find $f^{-1}(x)$ and state its domain.

3 marks

Consider $h(x) = f(-2(x - 1))$.

d. State the sequence of transformations that maps $f(x)$ to the graph of $h(x)$.

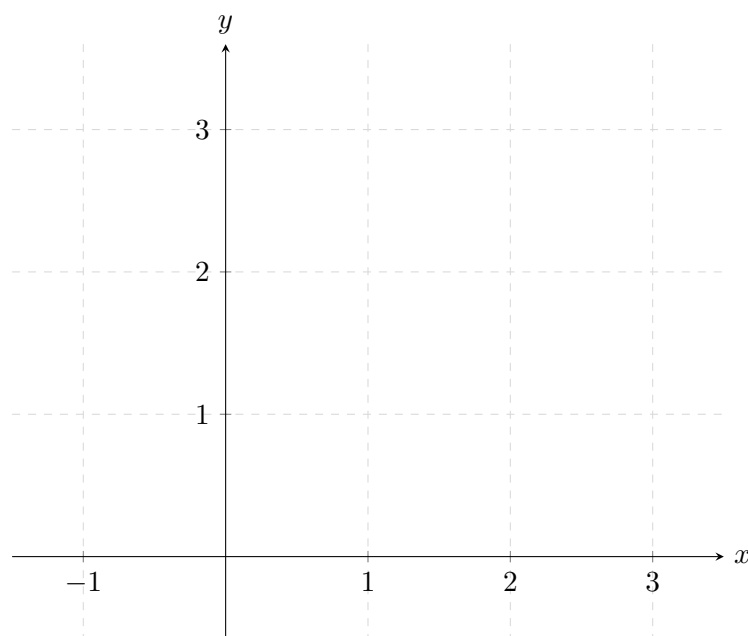
3 marks

- e. Find the equation of $h(x)$ in the form $h(x) = \sqrt{ax^2 + bx + c}$.

1 mark

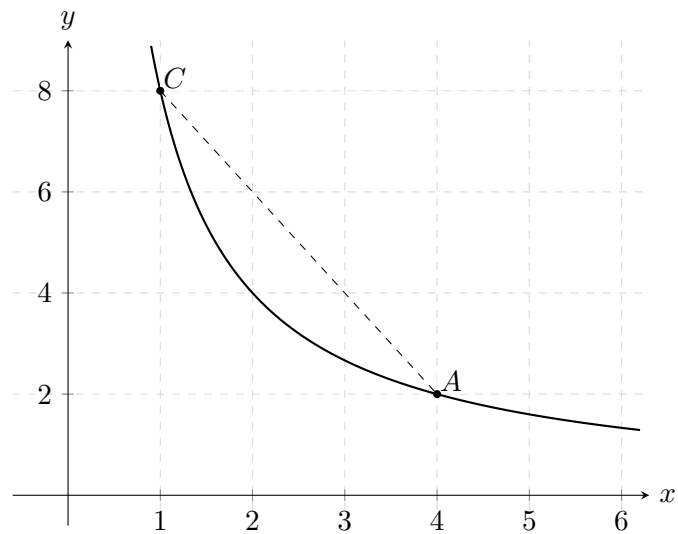
- f. Sketch the graph of $y = h(x)$ over an appropriate domain, labelling all intercepts and the turning point.

3 marks



Question 2 (16 marks)

The diagram below shows part of the graph of the function $f : \mathbb{R}^+ \rightarrow \mathbb{R}$, $f(x) = \frac{8}{x}$. The line segment CA is drawn from $C(1, f(1))$ to $A(a, f(a))$, where $a > 1$.



- a. If $a = 2$, show that the gradient of CA is -4 .

1 mark

- b.** Find the coordinates of the point on the curve f where the gradient of the tangent equals -4 . Express your solution with a rational denominator. 3 marks

- c.** Calculate the gradient of CA in terms of a . 2 marks

- d. At what value of x , where $1 < x < a$, does the tangent to f have the same gradient as the line CA ? 2 marks

- e. Find the distance as a function of m , $d(m)$, from the origin to the point $(m, f(m))$ on the curve f . 2 marks

f. Find the value of m such that this distance is a minimum.

2 marks

g. For that value of m , find the equation of the line connecting $(0, 0)$ and $(m, f(m))$.

2 marks

h. Show that the line found above is a normal to the curve f .

2 marks

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

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

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 brings together functions and relations from across VCE Mathematical Methods Units 1 & 2 in extended, application-based questions designed for CAS-enabled assessment. Students use CAS technology to work with domains and ranges, inverse functions and restricted domains, and the graphs of square-root and other functions, and to analyse gradients, secants and coordinate-geometry relationships on a curve. The test develops fluency with constructing and manipulating function rules, solving equations and inequalities, and interpreting results in context. Students find inverse functions and their domains, calculate gradients between points on a graph both numerically and in terms of a parameter, and locate points that satisfy given conditions. Topics span inverse functions, coordinate geometry, and applications where a function must be built, solved and interpreted with the aid of technology.



Scan QR Code for
Test Solutions



Scan QR Code for
1000s More Exam Questions

Test Solution Link: <https://mathbanks.com/unit-1-2/topic-tests/mixed-functions-and-relations-applications-2>
1000+ Exam Qs Questionbank: <https://mathbanks.com/unit-1-2/questionbank>