

Transformations

Practice Test (SAC) | Non-CAS

Question and Answer Book

Mathbanks Practice Assessment

- Reading time is **5 minutes**
- Writing time is **65 minutes**

Materials supplied

- Question and Answer Book of 15 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 (43 marks)	2–15



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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 (5 marks)

Let $f(x) = x^3$.

- a. The graph of f is translated 2 units to the left and 3 units up to produce the graph of g . Write the rule for $g(x)$ and state the coordinates of the point of inflection. 2 marks

- b. The graph of f is dilated by a factor of 3 from the x -axis to produce the graph of h . Write the rule for $h(x)$. 1 mark

- c. Describe the sequence of transformations that maps the graph of $y = x^3$ onto the graph of $y = (x - 5)^3 + 2$. 2 marks

Question 2 (5 marks)

Let $f(x) = \sqrt{x}$.

- a. The graph of f is translated 4 units to the right and 2 units down to produce the graph of g .
- i. Write the rule for $g(x)$. 1 mark

- ii. State the domain of g . 1 mark

- b.** The graph of f is dilated by a factor of 2 from the y -axis and then reflected in the x -axis to produce the graph of q . Write the rule for $q(x)$. 1 mark

- c.** The graph of f is dilated by a factor of $\frac{1}{2}$ from the x -axis and then translated 1 unit up to produce the graph of p . Write the rule for $p(x)$ and state the range of p . 2 marks

Question 3 (5 marks)

The graph of $y = x^2$ is transformed to produce the graph of $y = g(x)$, where $g(x) = 2x^2 - 8x + 5$.

a. Express $g(x)$ in the form $a(x - h)^2 + k$.

2 marks

b. Hence describe the sequence of transformations that maps the graph of $y = x^2$ onto the graph of $y = g(x)$.

2 marks

c. State the coordinates of the turning point of g .

1 mark

Question 4 (6 marks)

Let $f(x) = x^3 - 4x$.

- a. Find the coordinates of the x -intercepts of the graph of f .

2 marks

- b. The graph of f is dilated by a factor of $\frac{1}{2}$ from the y -axis to produce the graph of g . Write the rule for $g(x)$ and find the coordinates of its x -intercepts.

3 marks

- c. The graph of f is translated so that the point $(2, 0)$ is mapped to the point $(5, 3)$. 1 mark
Write the rule for the resulting function $p(x)$.

Question 5 (6 marks)

The graph of the function $f(x) = \frac{1}{x} + 2$ is a hyperbola.

- a. Find the domain and range of the inverse function f^{-1} . 2 marks

The graph of f is reflected in the x -axis and then dilated by a factor of 2 from the y -axis to produce the graph of h .

b. Find the rule for $h(x)$.

2 marks

c. State the equations of the asymptotes of h .

2 marks

Question 6 (6 marks)

A quadratic function g has rule $g(x) = x^2 + 2x - 8$.

- a.** Find the value of k for which the equation $g(x) + k = 0$ has exactly one solution. 2 marks

- b.** Find the values of h for which the equation $g(x - h) = 0$ has:

- i.** two positive solutions; 1 mark

- ii.** two negative solutions; 1 mark

iii. one positive and one negative solution.

2 marks

Question 7 (10 marks)

A cubic function f has rule $f(x) = (x + 1)(x - 2)(x - 4)$.

a. Solve the equation $f(x - 3) = 0$.

2 marks

b. Solve the equation $f(x + 1) = 0$.

1 mark

c. It is known that the equation $f(x) + k = 0$ has a solution $x = 0$.

i. Find the value of k .

1 mark

ii. Hence solve the equation $f(x) + k = 0$.

2 marks

d. The equation $f(x - h) = 0$ has a solution $x = 0$. Find the possible values of h .

2 marks

- e. Find the values of h such that $f(x - h) = 0$ has only one positive solution. 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

$\frac{d}{dx}(x^n) = nx^{n-1}$	$\int x^n dx = \frac{1}{n+1}x^{n+1} + c, n \neq -1$
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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 transformations of graphs — dilations, reflections and translations — with a focus on non-CAS techniques commonly assessed in VCE Mathematical Methods Units 1 & 2. Students practise applying single and combined transformations to functions and their graphs, writing the rule of a transformed function, and describing in words the sequence of transformations that maps one graph onto another. The test develops fluency with the effect of transformations on coordinates, key features, and the domain and range, with mapping notation and image points, and with identifying transformations from a given rule or graph. Graphing topics include sketching the image of a graph under one or more transformations, labelling intercepts, asymptotes and endpoints, and matching transformed rules to their graphs. Students also determine unknown transformation parameters from given information and solve problems involving transformed functions.



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