Year 11 Mathematics Advanced

Topic: Working with Functions (2 of 12)
Review Questions: Introduction to Functions and Relations
Term 3, 2026

How to use this review set

These are real past-paper questions, grouped by question pattern. The grey label on each question shows where it is from and its marks.

- The questions are grouped by the pattern that keeps coming up in exams, a few of each in a row, running from the plainer patterns into the harder ones near the end. Work through them and you will meet every type an exam can throw at you.
- This set **is your diagnostic**. Working through it shows you exactly which patterns are solid and which need work. Attempt every question properly in your own book, and go back to your notes to help you work through tough questions if needed.
- Every question you get wrong, need help with or struggle with goes in your **Mistakes Log**, which you should be working on daily to get you exam-ready.

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Functions and relations

1. Evaluate and use function notation
2. Classify a relation or function (one-to-one, many-to-one, vertical line test)

Domain, range and reading graphs

3. Find the natural domain of a function
4. Find the range and state domain and range
5. Zeros, intercepts and reading values from a graph
6. Number of solutions and intersections from graphs

Functions and relations

1. Evaluate and use function notation

Q1 James Ruse 2022 Trial Q13(a) · **1 mark**

Let $f(x) = -x^2 + x + 4$. Find $f(3)$.

Q2 Baulkham Hills 2024 Prelim Q22(a) · **1 mark**

If $f(x) = \sqrt{x-4}$, find $f(5)$.

Q3 Sydney Grammar 2021 Prelim Q12(d)(i) · **1 mark**

Consider the function $g(x) = 1 - x$. Find $g(-2a)$.

Q4 Trinity Grammar 2020 Trial Q12 · **2 marks**

If $m(k) = k^2$, simplify the expression $m(k+1) - m(k)$.

Q5 Killara 2023 Trial Q20 · **2 marks**

If $f(x+1) = x^2 + 3x + 5$, find $f(x)$.

Q6 North Sydney Boys 2024 Prelim Q26 · **2 marks**

A function $f(x)$ with range $(0, \infty)$ is such that $f(a) \times f(b) = f(a+b)$ for any real numbers a and b. Show that $f\left(\frac{a}{2}\right) = \sqrt{f(a)}$ for any real number a.

2. Classify a relation or function (one-to-one, many-to-one, vertical line test)

Q7 Sydney Boys 2023 Trial Q3 · **1 mark**

The following set of ordered pairs is a relation.

$$\{(-2, 3),\ (-4, 5),\ (3, 2),\ (-2, 1),\ (7, 2)\}$$

Which of the following types is this relation?

(A) one to one

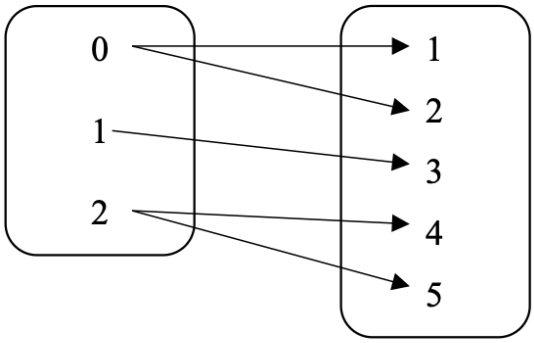
(B) one to many

(C) many to many

(D) many to one

Q8 Hornsby Girls 2021 Trial Q1 · **1 mark**

What type of relation is shown in the mapping diagram below?



(A) One-to-One

(B) One-to-Many

(C) Many-to-One

(D) Many-to-Many

Q9 Sydney Grammar 2023 Trial Q12(a) · **1 mark**

Classify the relation $y = 3x - 4$ as one-to-one, many-to-one, one-to-many, or many-to-many.

Q10 Sydney Grammar 2023 Trial Q12(b) · **1 mark**

Classify the relation $x^2 + y^2 = 25$ as one-to-one, many-to-one, one-to-many, or many-to-many.

Q11 Shore 2023 Prelim Q15 · **3 marks**

Consider the function $f(x) = 3^{x-1}$.

(a) Sketch the curve $y = f(x)$, clearly showing any asymptote(s), intercept(s), and one other point.

(b) Using your graph above, explain why $f(x) = 3^{x-1}$ is a function.

Q12 Gosford 2023 Prelim Q7 · **1 mark**

What domain makes the function $f(x) = -2x^2 - 8x + 10$ one-to-one?

(A) $(-\infty, -2]$

(B) $(-\infty, 18]$

(C) $(-\infty, \infty)$

(D) $(-\infty, 2]$

Domain, range and reading graphs

3. Find the natural domain of a function

Q13 Barker 2021 Prelim Q3 · **1 mark**

What is the domain of the function $y = \sqrt{5x - 2}$?

(A) $[0, \infty)$

(B) $\left[\frac{2}{5}, \infty\right)$

(C) $\left(\frac{2}{5}, \infty\right)$

(D) $\left(-\infty, \frac{2}{5}\right)$

Q14 Kambala 2023 Prelim Q6 · **1 mark**

The domain for the function $f(x) = \sqrt{2 - x}$ is:

(A) $[0, \infty)$

(B) $(-\infty, 2]$

(C) $[2, \infty)$

(D) $(-\infty, \infty)$

Q15 Fort St 2022 Trial Q1 · **1 mark**

What are the values of x for which $f(x) = \sqrt{x^2 - 3x}$ is defined?

(A) $0 \leq x \leq 3$

(B) $x \geq 3$

(C) $x \leq 0$ or $x \geq 3$

(D) all real x

Q16 Knox 2022 Prelim Q4 · **1 mark**

Let $f(x) = \dfrac{1}{\sqrt{x-5}}$. Which of the following is the natural domain of $f(x)$?

(A) $(-\infty, 5)$

(B) $[5, \infty)$

(C) $(5, \infty)$

(D) $[-5, 5]$

Q17 Caringbah 2021 Trial Q34 · **1 mark**

State the natural domain of the function $f(x) = \dfrac{1}{\sqrt{2-x^2}}$.

Q18 Killara 2024 Trial Q4 · **1 mark**

What is the domain of $f(x) = \log_2(1-2x)$?

(A) $x > \frac{1}{2}$

(B) $x > -\frac{1}{2}$

(C) $x < \frac{1}{2}$

(D) $x < -\frac{1}{2}$

Q19 Abbotsleigh 2023 Trial Q5 · **1 mark**

What is the domain of the function $f(x) = \ln(3-x) + \sqrt{x-2}$?

(A) $(2, 3)$

(B) $[2, 3)$

(C) $(2, 3]$

(D) $[2, 3]$

4. Find the range and state domain and range

Q20 Blacktown Boys 2024 Trial Q1 · 1 mark

Which of the following is the range of the function $f(x) = x^2 + 3$?

(A) $[3, \infty)$

(B) $(3, \infty)$

(C) $(-\infty, 3)$

(D) $(-\infty, \infty)$

Q21 Hurlstone 2023 Trial Q1 · 1 mark

The linear function $f(x) = 5 - x$ has range $[-4, 5)$. Which of the following gives the domain of the function?

(A) $(0, 9]$

(B) $(0, 1]$

(C) $[5, -4)$

(D) $(-9, 0)$

Q22 SCEGGS 2022 Prelim Q12 · 2 marks

State the domain and range for the function $y = \sqrt{2x - 3}$.

Q23 Knox 2023 Prelim Q32 · 2 marks

State the domain and range for the function $y = 2\sqrt{x} - 3$.

Q24 Hurlstone 2024 Trial Q11 · 2 marks

State the domain and range of the function $y = 2\sqrt{16 - x^2}$.

Q25 St George Girls 2021 Trial Q1 · 1 mark

Which interval gives the range of the function $y = \dfrac{\sqrt{25 - x^2}}{5}$?

(A) $[0, 5]$

(B) $[0, 1]$

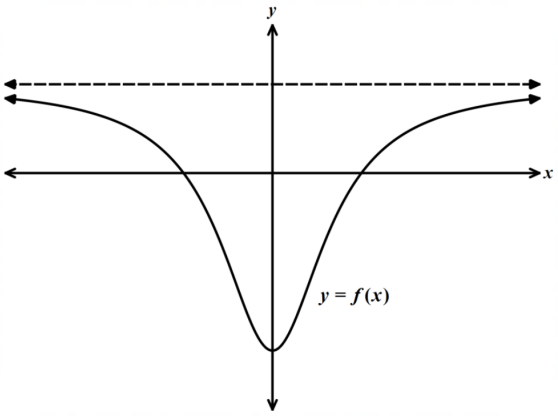
(C) $[-5, 5]$

(D) $[-1, 1]$

5. Zeros, intercepts and reading values from a graph

Q26 Pymble 2022 Prelim Q4 · **1 mark**

The sketch of $y = f(x)$ is shown.



Which of the following is *not* a solution to $f(x) = 0$?

(A) $x = -5$

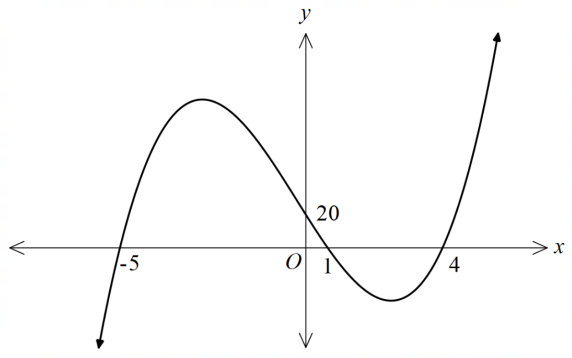
(B) $x = 1$

(C) $x = 4$

(D) $y = 20$

Q27 Hurlstone 2023 Trial Q16(a) · **1 mark**

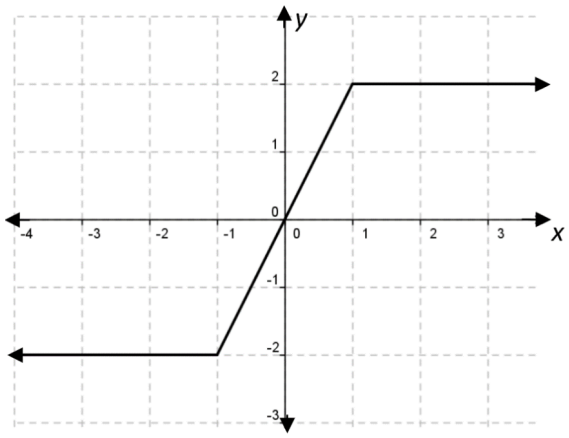
Consider the graph $y = f(x)$ shown below.



Evaluate $f(-3) + 2f(2)$.

Q28 North Sydney Girls 2020 Trial Q3 · **1 mark**

The following diagram shows the graph of $y = f(x)$.



Which of the following is the solution to $f(x) \geq 0$?

(A) $(-\infty, -2)$

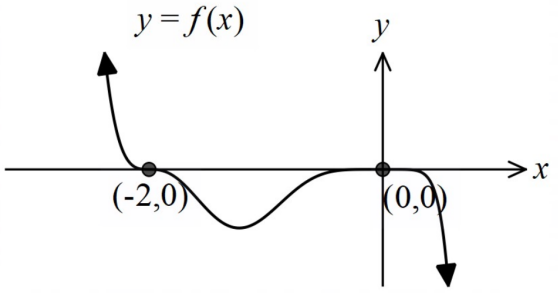
(B) $(-2, 0) \cup (0, \infty)$

(C) $(-2, 0) \cup [0, \infty)$

(D) $(-\infty, -2] \cup [0, \infty)$

Q29 St George Girls 2021 Prelim Q7(a) · **1 mark**

Write an equation for the graph below.



Q30 North Sydney Boys 2024 Prelim Q10(a) · **2 marks**

In the space below, sketch the graph of the function $y = \sqrt{4 - x}$, showing the intercepts on the axes.

6. Number of solutions and intersections from graphs

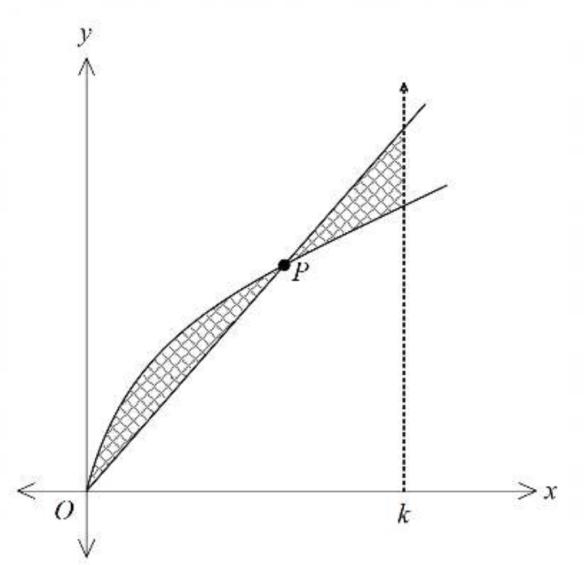
Q31 Pymble 2022 Trial Q32(a) · **1 mark**

The diagram shows the region bounded between the two curves $y = \sqrt{x}$ and $y = x$. The point P is the point of intersection of the curves (other than the origin). Write down the coordinates of P.

Diagram to be inserted:
`adv-working-with-functions-d2-q31.png`

Q32 Penrith 2020 Trial Q27(a) · **1 mark**

The curves $y = x^2$ and $y = \sqrt{x}$ meet at a point B in the first quadrant. Show that the x-coordinate of B is 1.



Q33 Sydney Grammar 2025 Trial Q4 · **1 mark**

How many solutions does the equation $x^2 = \cos x$ have?

(A) 0

(B) 1

(C) 2

(D) 3

Q34 Trinity Grammar 2020 Trial Q7 · **1 mark**

The graph of $y = e^x(1 + x)$ is shown below.

Diagram to be inserted:
`adv-working-with-functions-d2-q34.png`

How many solutions are there to the equation $e^x(1 + x) = x^3 + 1$?

(A) 0

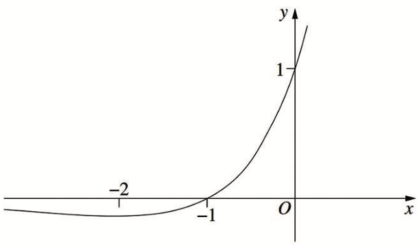
(B) 1

(C) 2

(D) 3

Q35 Knox 2023 Trial Q10 · **1 mark**

The graph shows $y = f(x)$ and $y = g(x)$, where $f(x) = \ln x$ and $g(x) = x^2 - 1$.



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How many solutions does the equation $\left[f(x)\right]^2 - \left[g(x)\right]^2 = 0$ have?

(A) 0

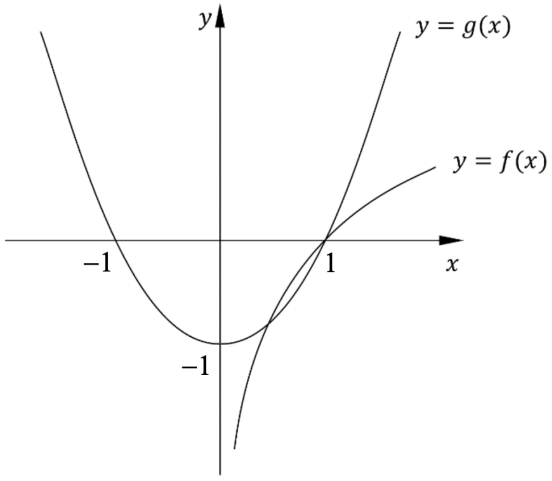
(B) 1

(C) 2

(D) 3

Q36 James Ruse 2020 Trial Q22 · **2 marks**

The diagram below shows the graph of $y = e^x(x + 1)$.



Using a graphical method, determine the number of solutions to the equation

$$2e^x(1 + x) = 2 - 3x - 2x^2.$$

You may use the diagram above in your solution.