Year 11 Mathematics Advanced

Topic: Working with Functions (11 of 12)
Review Questions: Absolute Value Functions
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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Finding equations and counting solutions

7. Find the equation/parameters and count solutions

Absolute value expressions and graphs

1. Evaluate and simplify absolute value expressions

Q1 International Grammar 2021 Prelim Q8 · **1 mark**

What is the value of $|3 - 5|$?

(A) 8

(B) 2

(C) -8

(D) -2

Q2 Barker 2021 Prelim Q1 · **1 mark**

Which of the following is the value of $|5 - 7| + | - 6| - | - 5| + 2| - 3|$?

(A) -9

(B) -7

(C) 9

(D) 19

Q3 Gosford 2024 Prelim Q12 · **1 mark**

Evaluate $\big|6 - |7 \times (-4)| \times 3\big|$.

Q4 James Ruse 2022 Trial Q5 · **1 mark**

Which of the following is *not* equivalent to $\sqrt{(x-1)^2}$?

(A) $|1 - x|$

(B) The distance from x to 1 on the number line

(C) $\begin{cases} x - 1 & \text{when } x \geq 1 \\ 1 - x & \text{when } x < 1 \end{cases}$

(D) $x - 1$

Q5 Normanhurst Boys 2023 Trial Q1 · **1 mark**

Simplify $\sqrt{x^2 + 2x + 1} - \sqrt{x^2 - 2x + 1}$ (for $x \geq 1$).

(A) -2

(B) 2

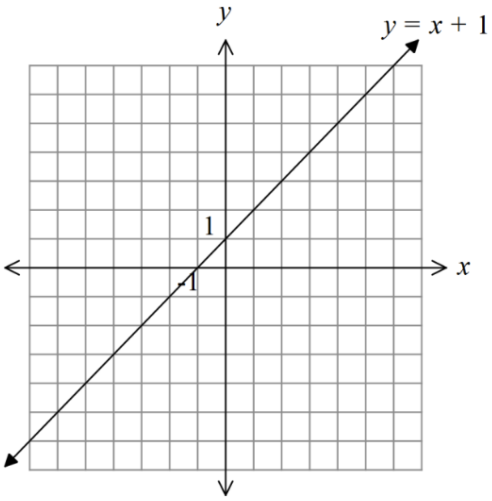
(C) $2x$

(D) $2x + 2$

2. Sketch y = —ax + b— and transformations

Q6 Presbyterian 2023 Prelim Q34(a) · **1 mark**

On a number plane, graph $y = |x - 3|$.



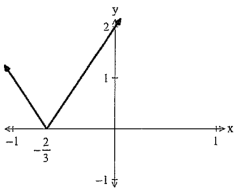
Q7 North Sydney Boys 2024 Prelim Q14(a) · **1 mark**

Sketch the graph of $y = |2x - 6|$.

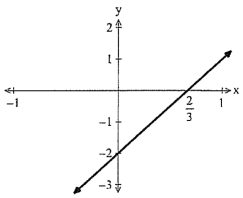
Q8 Killara 2024 Trial Q1 · **1 mark**

Which diagram is the correct sketch of $y = |3x - 2|$?

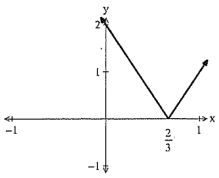
A.



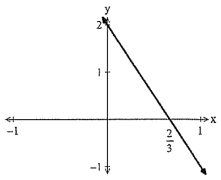
B.



C.



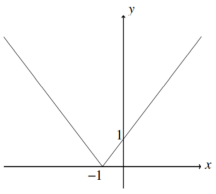
D.



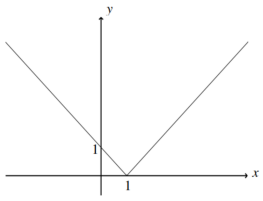
Q9 Knox 2022 Prelim Q6 · **1 mark**

Which graph shows $y = |x| - 1$?

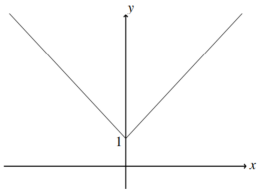
(A)



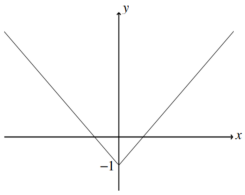
(B)



(C)



(D)

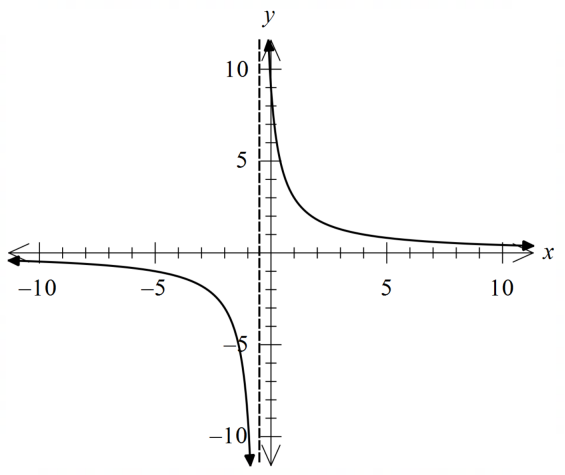


Q10 Sydney Girls 2023 Trial Q16 · **2 marks**

Sketch the curve $y = |x - 5| + 2$, showing all important features.

Q11 Baulkham Hills 2023 Trial Q28(b) · **2 marks**

On a number plane, graph the equation $y = 5 - 2|x + 2|$, showing all essential features.



Q12 Hurlstone 2023 Prelim Q11(f) · **3 marks**

Sketch $y = f(x)$ for the function $f(x) = |x - 3| + 1$ on the domain $[-4, 1]$. Show all important features.

Solving equations and inequalities

3. Solve absolute value equations —ax + b— = k

Q13 Hurlstone 2024 Prelim Q1 · **1 mark**

Which of the following is the solution to the equation $|x - 7| = 6$?

(A) $x = 13$

(B) $x = 1$ or $x = 13$

(C) $x = -13$ or $x = -1$

(D) $x = -13$ or $x = 13$

Q14 North Sydney Girls 2023 Trial Q11 · **2 marks**

Solve $|5 - x| = 3$.

Q15 North Sydney Girls 2023 Prelim Q12 · **2 marks**

Solve the equation $|3x - 5| = 7$.

Q16 Kambala 2024 Prelim Q11 · **2 marks**

Solve the equation $\left|\frac{x}{2} - 3\right| = 1$.

Q17 Sydney Grammar 2022 Prelim Q9(e) · **4 marks**

Consider the function $y = |x + 2|$.

(i) Sketch the graph of $y = |x + 2|$, showing all intercepts.

(ii) Hence or otherwise solve $|x + 2| = 3$.

4. Solve absolute value inequalities —ax + b— ¡ k or ¿= k

Q18 Hornsby Girls 2023 Trial Q6 · 1 mark

The solution of $|x - 1| > 2$ is:

(A) $x > 3$

(B) $x < -1,\ x > 3$

(C) $x < -1$

(D) $x \leq -1,\ x \geq 3$

Q19 Sydney Grammar 2020 Trial Q12 · 1 mark

Solve $|2x - 1| > 5$.

Q20 Caringbah 2021 Trial Q14 · 2 marks

Solve $|7x - 12| \geq 16$.

Q21 Girraween 2021 Trial Q11(b) · 3 marks

Solve $|3x + 2| < 5$ and draw the solution on the number line.

Q22 Hurlstone 2024 Trial Q14(b) · 2 marks

The graph of $y = 2|x - 1| - 3$ is a V-shape with vertex $(1, -3)$ and x-intercepts at $x = -\frac{1}{2}$ and $x = \frac{5}{2}$. Hence, or otherwise, solve the inequation $2|x - 1| - 3 < -1$.

5. Solve with the variable on both sides (—f— = line or —f— = —g—)

Q23 Girraween 2025 Trial Q12 · 3 marks

Solve the equation $|2x - 3| = 9x$.

Q24 Normanhurst Boys 2024 Trial Q11 · 3 marks

(a) Sketch the graph of $y = |x - 1|$ for $x \in [-4, 4]$.

(b) Using the sketch from part (a) or otherwise, solve $|x - 1| = 2x + 4$.

Q25 James Ruse 2023 Trial Q13 · **2 marks**

Solve $|4x - 8| = 3|x + 2|$.

Q26 Sydney Grammar 2023 Prelim Q12(c)(ii) · **1 mark**

By sketching $y = |x - 3|$ and $y = |2x + 6|$ on the same number plane, or otherwise, solve

$$|x - 3| = |2x + 6| \qquad \text{for } -3 \leq x \leq 3.$$

Q27 Hornsby Girls 2022 Prelim Q14(b) · **1 mark**

The graphs of $y = |x|$ and $y = 3 - \frac{x}{2}$ meet at $x = -6$ and $x = 2$. Hence, or otherwise, solve

$$|x| \leq 3 - \tfrac{x}{2}.$$

Q28 North Sydney Boys 2022 Trial Q18 · **5 marks**

(a) On the axes below, sketch the graphs of $y = |x - 3|$ and $y = \left|\frac{2}{5}x\right|$, giving the coordinates of the points where the graphs meet.

(b) Hence, solve the inequation $\left|\frac{2}{5}x\right| < |x - 3|$.

6. Solve graphically: absolute value against a line or curve

Q29 Girraween 2020 Trial Q25(a) · **2 marks**

On the same set of axes, sketch the graphs of $y = |x - 1|$ and $y = 2x + 4$ for $-4 \leq x \leq 4$.

Q30 Presbyterian 2023 Prelim Q34(b) · **1 mark**

The graph of $y = |x - 3|$ has been drawn. By also drawing the line $y = x + 1$ on the same axes, solve $x + 1 = |x - 3|$ graphically.

Diagram to be inserted:
`adv-working-with-functions-d11-q30.png`

Q31 Fort St 2022 Prelim Q7(d) · **5 marks**

Consider the equation $|x - 2| = 4$.

(i) Solve the equation $|x - 2| = 4$.

(ii) Draw a sketch of $y = |x - 2|$ and $y = 4$ on the same set of axes, clearly indicating the coordinates of any points of intersection and the intercepts.

(iii) Hence, or otherwise, solve the inequality $|x - 2| < 4$.

Q32 Hornsby Girls 2022 Prelim Q14(a) · **2 marks**

Given that $f(x) = |x|$ and $g(x) = 3 - \frac{x}{2}$, sketch the graphs of $y = f(x)$ and $y = g(x)$ on the same number plane, labelling the point(s) of intersection.

Q33 Sydney Grammar 2024 Trial Q27 · **5 marks**

Consider the functions $f(x) = 3 - x$ and $g(x) = |2x - 4|$.

(a) On the same number plane, sketch the graphs of $f(x) = 3 - x$ and $g(x) = |2x - 4|$, showing any intercepts and points of intersection.

(b) Hence, or otherwise, solve the inequality $|2x - 4| < 3 - x$.

(c) Find all possible values of the constant a so that $|2x - 4| < a - x$ has real solutions.

Q34 2023 HSC Q19 · **4 marks**

Consider the functions $f(x) = |x - 1|$ and $g(x) = (1 - x)(3 + x)$.

(a) Sketch the graphs of $f(x)$ and $g(x)$ on the same set of axes, showing the x-intercepts.

(b) Hence, or otherwise, solve the inequality $|x - 1| < (1 - x)(3 + x)$.

Finding equations and counting solutions

7. Find the equation/parameters and count solutions

Q35 Blacktown Boys 2020 Trial Q13(a) · **2 marks**

The graph of $f(x) = |ax + b|$ is shown below.

Diagram to be inserted:
`adv-working-with-functions-d11-q35.png`

What are the values of a and b?

Q36 Barker 2020 Trial Q17(a) · **3 marks**

The function $f(x) = |x|$ is transformed, and the equation of the new function is of the form $y = k\,f(x+b)+c$, where k, b and c are constants. The graph of the new function is shown below.

Diagram to be inserted:
`adv-working-with-functions-d11-q36.png`

What are the values of k, b and c?

Q37 Barker 2024 Prelim Q6 · **1 mark**

Determine the value(s) of k for which $|2k - 1| = k$.

(A) 1 only

(B) $\frac{1}{3}$ only

(C) -1 or $-\frac{1}{3}$

(D) 1 or $\frac{1}{3}$

Q38 Hornsby Girls 2022 Trial Q29 · **6 marks**

Consider the function $y = |2x + 5|$.

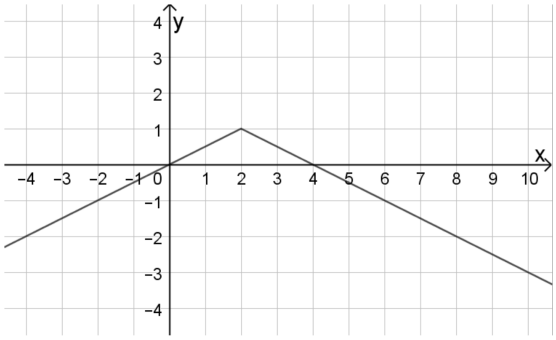
(a) Sketch the graph of $y = |2x + 5|$, clearly labelling the x- and y-intercepts.

(b) Hence, or otherwise, solve $|4x + 10| + 2 = 8$.

(c) By using the graph sketched in part (a), or otherwise, state the value(s) of m such that $|2x + 5| = m$ has no solutions.

Q39 2023 HSC Q27(a) · **3 marks**

The graph of $y = f(x)$, where $f(x) = a|x - b| + c$, passes through the points $(3, -5)$, $(6, 7)$ and $(9, -5)$.



Find the values of a, b and c.

Q40 North Sydney Boys 2024 Prelim Q14(b) · **2 marks**

Hence, or otherwise, determine the values of k for which $x + k = |2x - 6|$ has exactly two solutions.

Q41 2023 HSC Q27(b) · **2 marks**

The graph of $y = f(x)$, where $f(x) = a|x - b| + c$, passes through the points $(3, -5)$, $(6, 7)$ and $(9, -5)$ (as in the previous question, so that $f(x) = -4|x - 6| + 7$).

Diagram to be inserted:
`adv-working-with-functions-d11-q41.png`

The line $y = mx$ cuts the graph of $y = f(x)$ in two distinct places. Find all possible values of m.