Year 11 Mathematics Advanced

Topic: Working with Functions (3 of 12)
Review Questions: Linear 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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Gradient, distance and angle

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Gradient, distance and angle

1. Gradient, distance and midpoint

Q1 Moriah 2021 Prelim Q16(a) · **1 mark**

A line passes through the points $A(2, -5)$ and $B(-1, 1)$ on the Cartesian plane. Find the gradient of the line AB.

Q2 Sydney Tech 2023 Trial Q1 · **1 mark**

What is the gradient of the line with equation $3x - 7y + 1 = 0$?

(A) $-\frac{7}{3}$

(B) $-\frac{3}{7}$

(C) $\frac{3}{7}$

(D) $\frac{7}{3}$

Q3 Sydney Grammar 2021 Prelim Q9(c) · **2 marks**

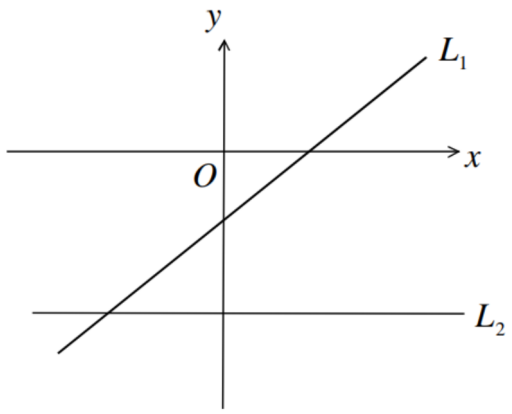
Find the distance between the points $(-5, 2)$ and $(4, -1)$, leaving your answer in simplified surd form.

Q4 Kambala 2021 Prelim Q1(a) · **1 mark**

$\triangle ABC$ has vertices $A(-3, 1)$, $B(5, -3)$ and $C(4, 5)$. Point D is the midpoint of AB. Determine the coordinates of the midpoint D.

Q5 Killara 2023 Prelim Q9 · **1 mark**

In the figure shown below, the equations of the straight lines L_1 and L_2 are $bx + ay = ac$ and $y = \frac{1}{c}$ respectively, where a, b and c are constants.



Which of the following statements are true?

$$\text{I. } c < 0 \qquad \text{II. The gradient of } L_1 = -\frac{b}{a} \qquad \text{III. } 0 < bc < 1$$

(A) I and II only

(B) I and III only

(C) II and III only

(D) I, II and III

2. Angle of inclination and angle between lines

Q6 Sydney Grammar 2022 Trial Q1 · **1 mark**

Which of the following is the angle of inclination of the line $y = \frac{9}{8}x - 5$?

(A) 42°

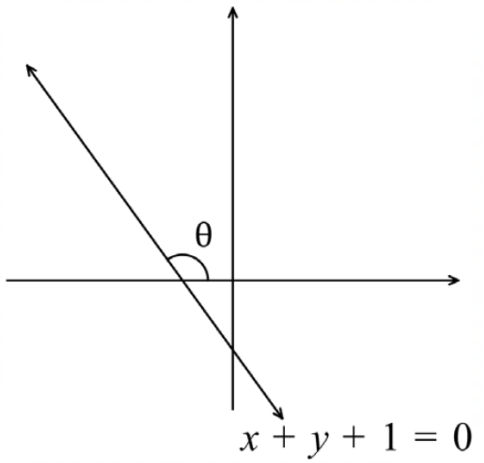
(B) 48°

(C) 132°

(D) 138°

Q7 Baulkham Hills 2022 Trial Q18 · **2 marks**

Determine the angle of inclination θ of the line $x + y + 1 = 0$.



Q8 Gosford 2024 Prelim Q8 · **1 mark**

Find the acute angle between the lines $y = 3x - 4$ and $y = \frac{6}{5}x + 3$, correct to the nearest degree.

(A) 72°

(B) 50°

(C) 21°

(D) 22°

Equations and graphs of lines

3. Graphing a line and reading its equation from a graph

Q9 Sydney Grammar 2020 Trial Q1 · **1 mark**

Which of the following correctly expresses y as the subject of the formula $2x - 5y + 3 = 0$?

(A) $y = \dfrac{2x + 3}{2}$

(B) $y = \dfrac{x + 3}{5}$

(C) $y = \dfrac{2}{5}x + \dfrac{3}{5}$

(D) $y = \dfrac{2}{5}x - \dfrac{3}{5}$

Q10 HSC 2025 Q2 · **1 mark**

Which graph could represent $y = 4x$?

Diagram to be inserted:
`adv-working-with-functions-d3-q10.png`

(A) Graph A

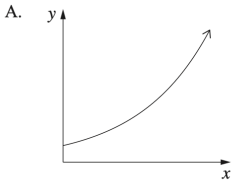
(B) Graph B

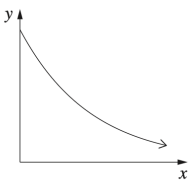
(C) Graph C

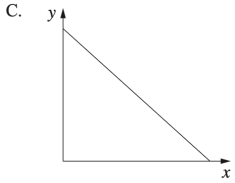
(D) Graph D

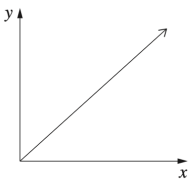
Q11 Killara 2024 Prelim Q7 · **1 mark**

Determine the equation of the line shown below.

A. 

B. 

C. 

D. 

(A) $y = \frac{2\pi}{3}x + 3$

(B) $y = -\frac{2\pi}{3}x + 3$

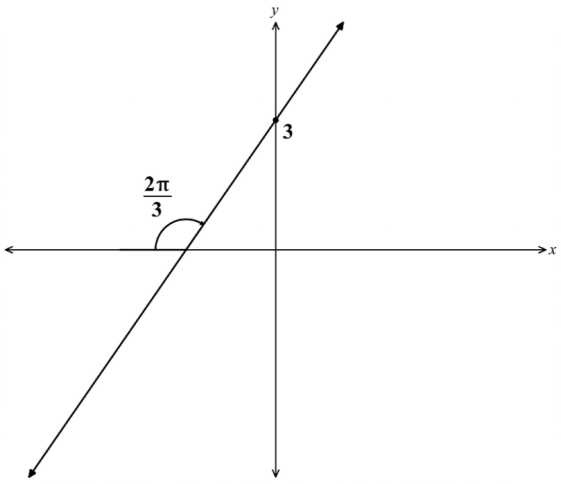
(C) $y = -\sqrt{3}x + 3$

(D) $y = \sqrt{3}x + 3$

Q12 Killara 2024 Prelim Q10 · **1 mark**

The straight lines ℓ_1 and ℓ_2 shown below have equations $x + ay = b$ and $x + cy = d$ respectively. Which of the following are true?

I. $a < c$ II. $b > d$ III. $a + b < c + d$



(A) I and II

(B) I and III

(C) II and III

(D) I, II and III

4. Finding the equation of a line

Q13 Girraween 2020 Trial Q8 · **1 mark**

Let M be the midpoint of $(-1, 4)$ and $(5, 8)$. The equation of the line through M with gradient $-\frac{1}{2}$ is:

(A) $x + 2y - 10 = 0$

(B) $x + 2y - 14 = 0$

(C) $2x + y - 10 = 0$

(D) $2x - y - 14 = 0$

Q14 Kambala 2023 Prelim Q3 · **1 mark**

Which of the following is the equation of the line that passes through $(2, -1)$ and $(5, 3)$?

(A) $4x + 3y - 11 = 0$

(B) $3x - 4y + 11 = 0$

(C) $4x - 3y - 11 = 0$

(D) $3x - 4y - 11 = 0$

Q15 Girraween 2022 Prelim Q9(a)(i) · **2 marks**

The line ℓ_1 passes through the point $(9, -4)$ and has gradient $\frac{1}{3}$. Find the equation of ℓ_1 in general form.

Q16 Sydney Girls 2023 Trial Q13 · **3 marks**

Two points have coordinates $P\left(4,\ b^2 + 2b + 2\right)$ and $Q\ (3,\ 3b + 3)$. It is given that the line PQ is parallel to the line $x + y = 1$. Find the value(s) of b.

5. Parallel and perpendicular lines

Q17 Barker 2024 Prelim Q1 · **1 mark**

Determine the gradient of the line perpendicular to $y = \frac{x}{2} - 5$.

(A) -2

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

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

(D) 2

Q18 Sydney Grammar 2021 Prelim Q6 · **1 mark**

What is the equation of the line parallel to $y = 2x - 1$ with x-intercept $(-3, 0)$?

(A) $2x - y - 3 = 0$

(B) $x + 2y + 3 = 0$

(C) $x - 2y + 6 = 0$

(D) $2x - y + 6 = 0$

Q19 Sydney Grammar 2023 Trial Q11 · **2 marks**

Find the equation of the line perpendicular to $y = 2x - 1$ passing through the point $A(0, -7)$.

Q20 Barker 2024 Prelim Q12(c) · **3 marks**

Determine the equation of the line that is parallel to the interval joining the points $A(3, 5)$ and $B(6, 10)$, and passes through the point $C(-3, -1)$. Leave your answer in general form.

Q21 Knox 2022 Prelim Q15(e) · **4 marks**

The perpendicular bisector of the interval CD has equation $4x - 3y + 16 = 0$. If the point C has coordinates $(-9, 10)$, find the coordinates of D.

Solving, modelling, regions and bisectors

6. Solving linear equations, inequalities and simultaneous systems

Q22 Knox 2023 Prelim Q11 · 2 marks

Solve $t - \dfrac{t+4}{2} = 10$.

Q23 Trinity Grammar 2024 Trial Q1 · 1 mark

What values of x satisfy $3 - 2x \geq 8$?

(A) $x \leq -\dfrac{11}{2}$

(B) $x \geq -\dfrac{11}{2}$

(C) $x \leq -\dfrac{5}{2}$

(D) $x \geq -\dfrac{5}{2}$

Q24 Baulkham Hills 2023 Prelim Q13 · 2 marks

Solve the simultaneous equations.

$$2x + y = 3, \qquad x + 3y = -1.$$

Q25 Baulkham Hills 2022 Prelim Q5 · 1 mark

Which of the following is the point of intersection of the two lines $3x - 4y + 6 = 0$ and $x - y - 1 = 0$?

(A) $(0, 0)$

(B) $(-2, -3)$

(C) $(10, 9)$

(D) $(11, 10)$

Q26 Girraween 2023 Prelim Q8(d) · 4 marks

Show that the three lines given by the equations $3x + 5y + 7 = 0$, $x + 2y + 2 = 0$, and $2x - y + 9 = 0$ are concurrent.

7. Linear modelling: cost, income and break-even

Q27 Hills Grammar 2025 Trial Q1 · **1 mark**

Which equation describes the relationship between the two variables a and b?

Diagram to be inserted:
`adv-working-with-functions-d3-q27.png`

(A) $b = 2a + 3$

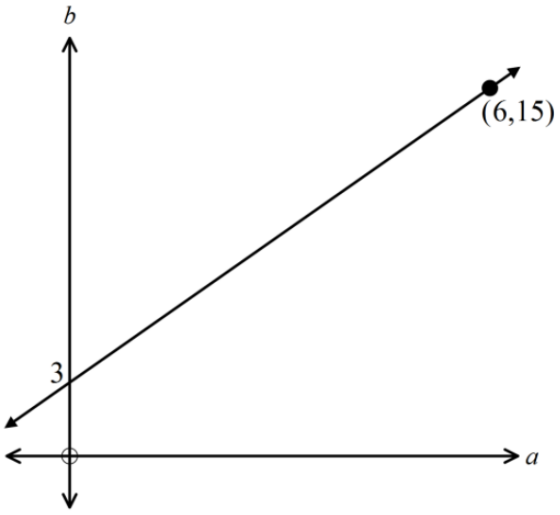
(B) $b = 3a + 2$

(C) $b = 6a + 3$

(D) $b = 6a + 15$

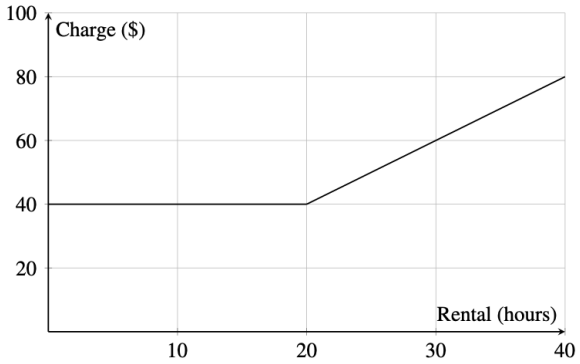
Q28 Knox 2024 Trial Q15(a) · **1 mark**

Company A charges a fixed cost of \$40 for the first 20 hours of hiring an electric bike, and an additional rate of \$2 per hour thereafter. How much does the company charge for renting an electric bike for 35 hours?



Q29 Knox 2024 Trial Q15(c) · **1 mark**

Company A charges a fixed cost of \$40 for the first 20 hours of hiring an electric bike, and an additional rate of \$2 per hour thereafter. Company B charges a rate of \$4 per hour, with no fixed cost. Determine after how many hours Company B will cost more than Company A.



8. Area and regions bounded by lines and axes

Q30 Knox 2023 Prelim Q25 · **2 marks**

The line L with equation $3x+4y-24=0$ crosses the x axis at A and the y axis at B. Find the area of triangle OAB, where O is the origin.

Q31 Gosford 2023 Trial Q14(a) · **3 marks**

Show that the points $A(17,1)$, $B(2,-5)$ and $C(-4,10)$ are the vertices of a right-angled triangle.

Q32 Girraween 2021 Trial Q20(a)(ii) · **2 marks**

The points A and C lie on the y axis and the point B lies on the x axis. The line AB has equation $y=\sqrt{3}x-3$ and the line BC (which is perpendicular to AB) has equation $y=-\dfrac{1}{\sqrt{3}}x+1$. Find the area of the triangle ABC.

Diagram to be inserted:
`adv-working-with-functions-d3-q32.png`

9. Perpendicular bisector of two points

Q33 Sydney Girls 2021 Prelim Q2(c) · **2 marks**

Given the points $A(10, 2)$ and $B(2, 8)$, find the equation of the perpendicular bisector of AB.

Q34 Sydney Grammar 2021 Prelim Q10(c) · **3 marks**

Find the equation of the perpendicular bisector of the interval joining the points $(2, 6)$ and $(-1, 5)$, writing your final answer in general form.

Q35 Sydney Tech 2025 Trial Q22 · **3 marks**

Find the equation of the line through the midpoint of the interval from $A(3, 2)$ to $B(-7, 8)$ perpendicular to the line $\frac{x}{6} + \frac{y}{2} = 1$.

Q36 Barker 2021 Prelim Q13(d) · **3 marks**

Find the exact equation of the straight line which passes through the midpoint of $(0, -5)$ and $(4, -1)$ and is perpendicular to the line that makes an angle of $30°$ with the positive x-axis.

Q37 Sydney Girls 2025 Trial Q16 · **3 marks**

The points $P(1, -2)$ and $Q(7, 1)$ lie on the circumference of a circle. Show that the centre of the circle lies on the line $4x + 2y = 15$.