Name	Date started	Target end date

WJEC GCSE Mathematics and Numeracy (Double Award) — Question Pack

Equations of straight lines in the form $y = mx + c$: reading gradient and y-intercept from a graph, writing the equation of a line, and recognising

REVISE
.wales

3.07 — Linear graphs — $y = mx + c$, parallel & perpendicular

Spec 2.4.1, 2.4.2, 2.4.3, 2.4.6 — Unit 2 (no calculator)

Equations of straight lines in the form $y = mx + c$: reading gradient and y-intercept from a graph, writing the equation of a line, and recognising parallel ($m_1 = m_2$) and perpendicular ($m_1 m_2 = -1$) lines. Sourced from legacy WJEC GCSE Mathematics Higher calculator-allowed papers, organised for revision under the 2025 spec.

2025 SPECIFICATION

Estimated time for entire question pack: ~40 minutes

*Derived from the GCSE Higher pace of **~1.5 min/mark** (27 marks across 9 questions).*

*You are advised to **not** attempt to complete all of this in one sitting.*

ABOUT THIS QUESTION PACK

This is a **focused single-topic practice pack**, not a single mock paper. Questions are organised against the 2025 specification.

Questions are ordered chronologically by sitting, with custom-written and SAM questions at the end.

INSTRUCTIONS

Use black ink or black ball-point pen. Show all working — method marks are awarded for clear setup.

*A calculator is **not** permitted on any question in this pack (Unit 2 is the non-calculator paper).*

Linear graphs — $y = mx + c$, parallel & perpendicular — what the new spec asks

WJEC GCSE Mathematics (first teaching 2025) · Unit 2: non-calculator.

Equation of a line 2.4.1

- Recognise the form $y = mx + c$ for a straight line.
- Identify m as gradient, c as y-intercept.
- Rearrange any linear equation into this form before quoting m and c.

Gradient 2.4.2

- Gradient $= \Delta y / \Delta x$ between two points on the line.
- Positive going up, negative going down, zero for horizontal.
- Use clear lattice points to avoid reading errors.

Parallel & perpendicular 2.4.3

- Parallel: equal gradients ($m_1 = m_2$).
- Perpendicular: gradients multiply to -1 ($m_1 m_2 = -1$).
- Show working by rearranging each equation into $y = mx + c$ form.

Working with lines 2.4.6

- Test whether a point lies on a line by substitution.
- Find intersection points by solving simultaneously.
- Quote the gradient or intercept in the form requested by the question.

Crib sheet »

Linear graphs — $y = mx + c$, parallel & perpendicular in one page

Quick-reference notes — revisit before each question. Don't use during the questions.

The form $y = mx + c$

m is the *gradient* — rise over run.

c is the y-intercept — where the line crosses the y-axis.

Rearrange any linear equation into this form before reading off m and c.

Reading gradient from a graph

$$\text{gradient} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x}$$

Pick two clear lattice points, e.g. $(1, 4)$ and $(3, 10)$ ⇒ gradient $= \dfrac{10 - 4}{3 - 1} = 3$.

Going down left-to-right means negative gradient.

Finding the equation

1. Compute the gradient m.
2. Read off the y-intercept c, or substitute a known point and solve.
3. Write $y = mx + c$.

Parallel lines

Parallel lines have **equal gradients**.

To show two lines are parallel, rearrange both into $y = mx + c$ and confirm the m values match.

$3y = 9x + 5$ and $y = 3x - 2$ are parallel: both have gradient 3.

Perpendicular lines

$$m_1 \times m_2 = -1$$

Perpendicular gradients are *negative reciprocals*.

If $m_1 = 2$, then $m_2 = -\frac{1}{2}$.

If $m_1 = -\frac{3}{4}$, then $m_2 = \frac{4}{3}$.

Rearranging to $y = mx + c$

Given $2y = 5x - 4$: divide by 2 ⇒ $y = \frac{5}{2}x - 2$. Gradient $\frac{5}{2}$, intercept -2.

Given $5x + y + 3 = 0$: $y = -5x - 3$.

Gradient -5, intercept -3.

Point lies on line?

Substitute the point's (x, y) into the equation.

If LHS = RHS, the point is on the line.

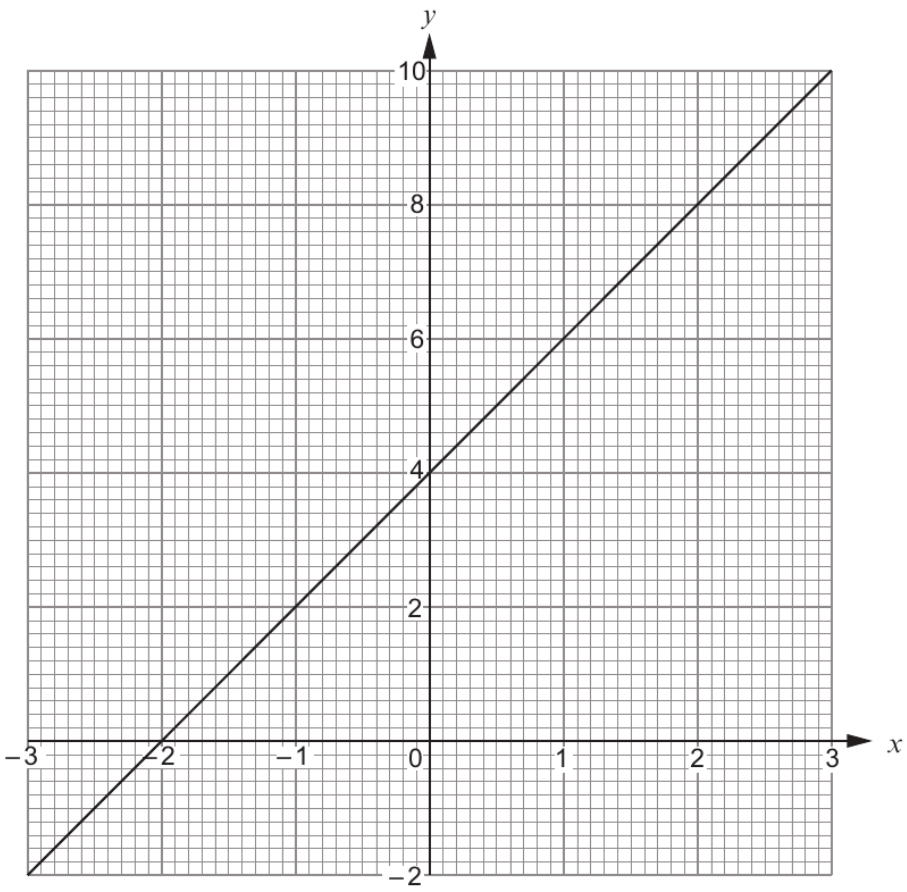
$2y = 3x + 4$ and point $(2, 5)$: $2(5) = 10$ and $3(2) + 4 = 10$. Yes, on the line.

Common traps

- Forgetting to divide every term when rearranging (e.g. $3y = 6x + 9 \Rightarrow y = 2x + 3$, not $y = 6x + 9$).
- Sign errors on intercept when moving c across.
- Confusing parallel with perpendicular.
- Reading gradient from non-lattice points.

Examiner only

6. *(a)* The diagram below shows the graph of a straight line for values of x from −3 to 3.



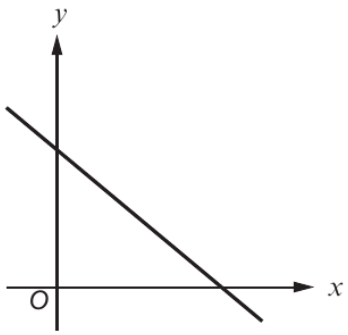
(i) Write down the gradient of the above line. [1]

(ii) Write down the equation of the line in the form $y = mx + c$, where m and c are whole numbers. [2]

(b) Without drawing, show that the line $2y = 5x - 3$ is parallel to the line $4y = 10x + 7$. You must show working to support your answer. [2]

Examiner only

4. *(a)*



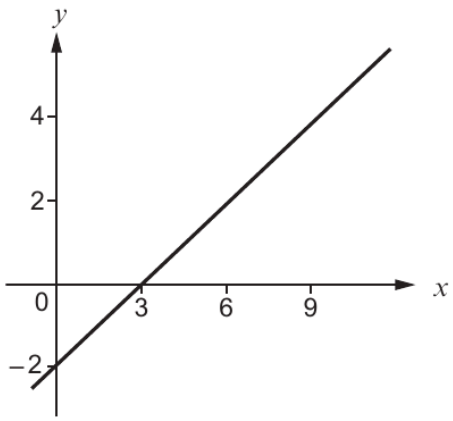
Which **one** of the following equations could represent the line shown in the graph above?
Circle your answer. [1]

$y = -x - 2$ $y = -x + 2$ $y = x + 2$ $y = x - 2$ $y = -x.$

(b) Which **one** of the following points lies on the line $2y = 3x + 4$?
Circle your answer. [1]

(2, –5) (5, 2) (–2, 5) (2, 5) (–2, –5)

(c)



What is the gradient of the line shown in the graph above?
Circle your answer. [1]

$\frac{3}{2}$ $-\frac{3}{2}$ $\frac{2}{3}$ $-\frac{2}{3}$ -6

Examiner only

9. *(a)* Circle the equation of a straight line that is parallel to the line $3y = 2x + 6$. [1]

$3y = 2x + 7$ $2y = 3x + 6$ $3y = -2x + 6$ $-3y = 2x + 6$ $2y = -3x + 6$

(b) Circle the equation of a straight line that is perpendicular to the line $y = 5x - 3$. [1]

$y = \frac{x}{5} + 3$ $y = 5x + 3$ $y = 5x + \frac{1}{3}$ $y = -5x + 3$ $y = \frac{-x}{5} + 3$

Examiner only

6. *(a)* What is the gradient of the straight line with equation $6y = 3x + 7$?
Circle the correct answer. [1]

$\frac{1}{2}$ 6 2 3 $\frac{7}{6}$

(b) What is the value of y at the point where the line $5x + y + 3 = 0$ crosses the y-axis?
Circle the correct answer. [1]

0 –5 3 –3 $\frac{5}{3}$

(c) What are the coordinates of the point where the lines with equations $x + y = 7$ and $x - y = 3$ intersect?
Circle the correct answer. [1]

(4, 3) (7, 4) (5, 2) (3, 7) (−5, 2)

Examiner only

(b) The object is made from a material which has a density of 2·4 g/cm^3.
Calculate the mass of the object.
Give your answer in kg, correct to the nearest kg. [3]

Mass = ... kg

8. The equation of a straight line is $y = 8x - 5$.
What is the gradient of the line?

Circle the correct answer. [1]

$\frac{1}{8}$ -5 8 5 1

Examiner only

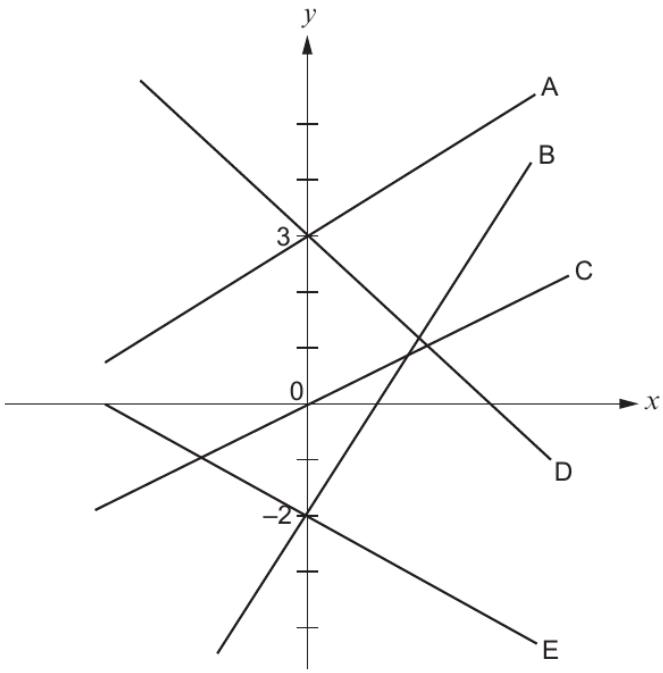
9. *(a)* Which one of the following equations represents a straight line that is parallel to the line $2y = 5x - 4$?
Circle your answer. [1]

$y = 2{\cdot}5x + 3$ $y = 5x - 2$ $y = 0{\cdot}4x - 4$ $y = -0{\cdot}4x - 2$ $2y = -5x + 4$

(b) Which one of the following equations represents a straight line that intersects the line $y = 7x - 5$ on the y-axis?
Circle your answer. [1]

$y = 7x + 5$ $y = 5 - 7x$ $y = 3x + 5$ $y = 0$ $y = 3x - 5$

(c)

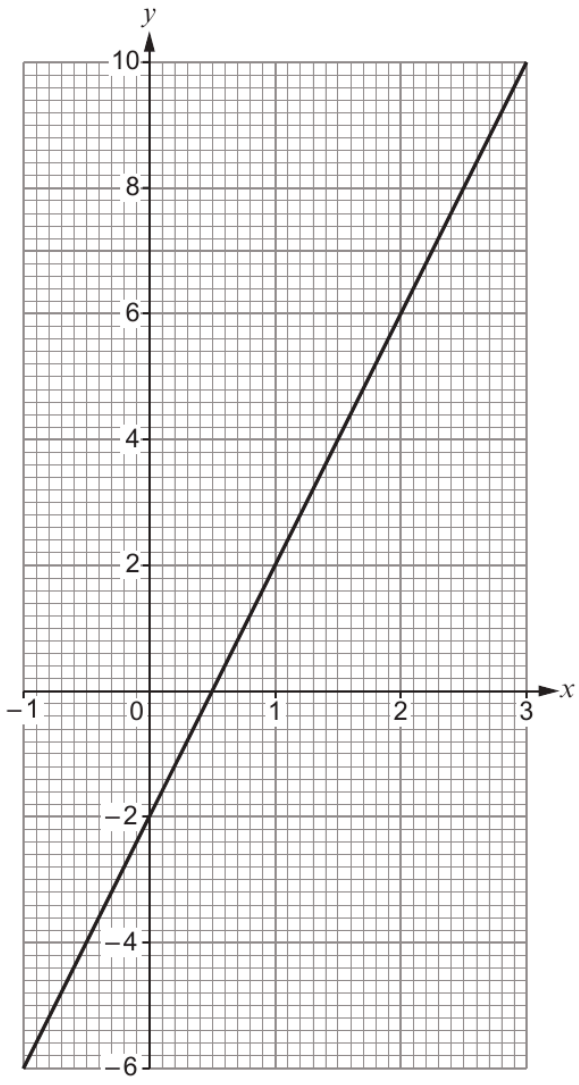


Which one of the five straight lines shown above could represent the equation $y = -2x + 3$?
Circle your answer. [1]

Line A Line B Line C Line D Line E

Examiner only

5. The diagram below shows the graph of a straight line for values of x from –1 to 3.



(a) (i) Write down the gradient of the line above. [1]

.....

.....

Examiner only

(ii) Write down the equation of the line in the form $y = mx + c$. [2]

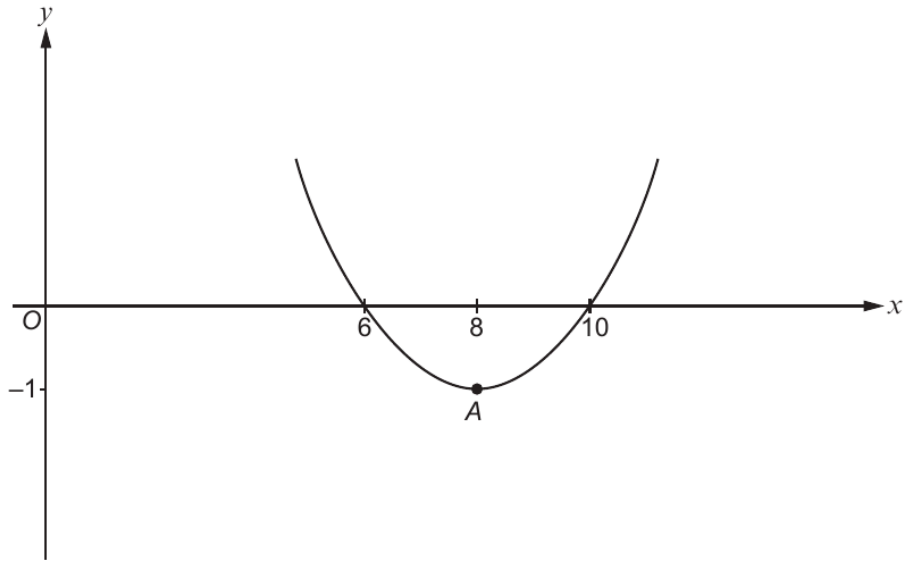
(b) Show that the lines

$$y = 3x - 8 \quad \text{and} \quad 2y - 6x = 23$$

are parallel to each other. [2]

Examiner only

20. The diagram shows a sketch of $y = f(x)$.
The point where the curve has a gradient of 0 is labelled *A* and has coordinates (8, –1).



On the axes below, sketch the curve $y = f(x+3)$.
You must:

- indicate the coordinates of any point where the new curve crosses an axis
- complete the coordinates of the point on the curve where the gradient is 0. [3]

The coordinates of the point on the curve where the gradient is 0 are (..... , ...).

Examiner only

21. (a) A box contains seven black counters, three white counters and one red counter.
Aled takes two counters at random from the box. These counters are not replaced.

Calculate the probability that the two counters that Aled chose are both the same colour. [3]

(b) A second box contains n yellow cards and $(n+1)$ red cards.
Delyth takes two cards at random from the second box. These cards are not replaced.

What is the probability that the two cards that Delyth chose are both yellow?
Give your answer as an algebraic fraction in its simplest form. [3]

END OF PAPER

Examiner only

5. The equation of a straight line is $y = -3x + 7$.

(a) What is the gradient of the line?
Circle the correct answer. [1]

$\frac{1}{3}$ $-\frac{1}{3}$ 3 −3 7

(b) What are the coordinates of the point where the line intersects the y-axis?
Circle the correct answer. [1]

(−3, 7) (0, −3) (0, 3) (0, −7) (0, 7)