

E3.5 Equations of linear graphs

Name: _____ Class: _____ Date: _____ **Total: 12 marks**

KEY WORDS y-intercept 纵截距 • gradient 斜率 • rearrange 变形 • substitute 代入
• axis 坐标轴

Objective

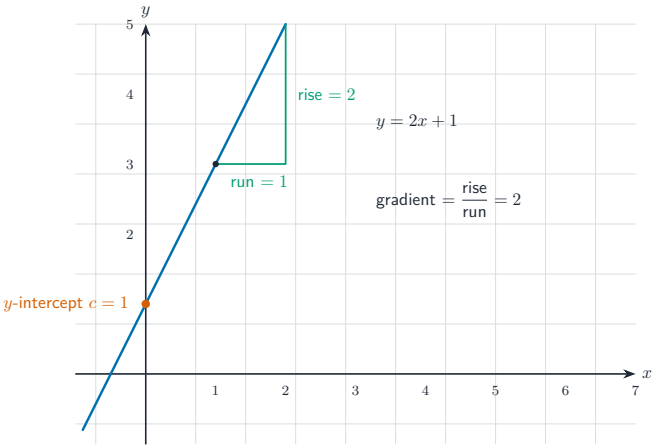
Build the skills to answer Extended exam questions on **equations of linear graphs** 直线方程 — using the form $y = mx + c$, reading the **gradient** 斜率 and **y-intercept** 纵截距 from a rearranged equation, and finding the equation of a line through two given points.

You must be able to:

- write down the equation of a line from its gradient and y -intercept
- rearrange an equation into the form $y = mx + c$ before reading m and c
- find the equation of the line through two points, and where a line crosses the axes

1 Worked examples

- **Rearrange to $y = mx + c$ FIRST, then read it off**



m is the gradient and c is where the line crosses the y -axis

- **The form:** $y = mx + c$, where m is the gradient and c the y -intercept.
- **Rearrange first.** From $2y = 6x - 5$ divide everything by 2: $y = 3x - 2.5$, so $m = 3$ and $c = -2.5$. Reading $m = 6$ off the original is the standard error.
- **Through two points:** find m from the gradient formula, then substitute ONE of the points to find c .
- **Axes:** the y -axis is where $x = 0$; the x -axis is where $y = 0$.

Answer shapes (marked by **method marks** — M1 for a correct method, A1 for the correct answer): the gradient, and the substitution used to find c , are separate method marks.

2 Practice

2.1 Write down the equation of the line with gradient 4 and y -intercept -3 . [1]

2.2 Find the gradient and the y -intercept of the line $2y = 6x - 5$. [2]

2.3 Find the equation of the line through $(0, 5)$ with gradient -2 . [1]

3 Exam-style questions

3.1 A line passes through $A(1, 4)$ and $B(5, 16)$.

(a) Find the gradient of the line. [2]

(b) Find the equation of the line in the form $y = mx + c$. [3]

3.2 The line $y = 2x - 6$ crosses the axes at two points.

(a) Write down the coordinates of the point where it crosses the y -axis. [1]

(b) Find the coordinates of the point where it crosses the x -axis. [2]

Solutions

Marking: **M1** a correct method, **A1** the correct answer.

Each answer shows the steps, then the **result**.

2.1

- substitute $m = 4$ and $c = -3$

$$\mathbf{y = 4x - 3}$$

2.2

- divide the whole equation by 2: $y = 3x - 2.5$

$$\mathbf{m = 3, \quad c = -2.5}$$

2.3

- the point $(0, 5)$ IS the y -intercept, so $c = 5$

$$\mathbf{y = -2x + 5}$$

3.1

(a)

$$\bullet \quad \frac{16 - 4}{5 - 1} = \frac{12}{4}$$

$$\mathbf{= 3}$$

(b)

- $y = 3x + c$, and substituting $A(1, 4)$ gives $4 = 3(1) + c$
- $c = 1$

$$\mathbf{y = 3x + 1}$$

- check with B : $3(5) + 1 = 16$, which matches

3.2

(a)

- the y -intercept is $c = -6$

$$\mathbf{(0, -6)}$$

(b)

- set $y = 0$: $0 = 2x - 6$

$$\mathbf{x = 3, \text{ so } (3, 0)}$$