

C3.2 Drawing linear graphs

Name: _____ Class: _____ Date: _____

Total: 20 marks

KEY WORDS vertical 竖直 • horizontal 水平 • axes 坐标轴

Objective

Use drawing linear graphs to solve Core IGCSE Mathematics problems.

You must be able to:

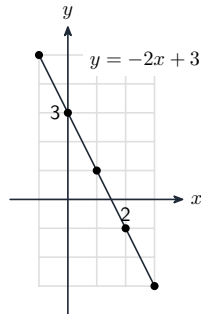
- Complete a linear table and choose suitable graph scales
- Plot points and draw the requested domain
- Read estimates from a line and interpret its intercept

1 Key knowledge and worked examples

■ Key knowledge: Drawing linear graphs

For $y = mx + c$, choose at least two x values and calculate y ; a third point checks the line. Plot carefully, label the axes and use a ruler through the points. Extend the line across the requested domain. A horizontal line has constant y ; a vertical line has constant x .

■ Worked example: Drawing linear graphs

Draw $y = -2x + 3$ for $-1 \leq x \leq 3$.

- At $x = -1, 0, 1, 2, 3$, substitution gives $y = 5, 3, 1, -1, -3$.
- Plot $(-1, 5), (0, 3), (1, 1), (2, -1), (3, -3)$ and join with a ruler.
- The line falls 2 units for each 1 unit right. At $x = 0$ it crosses the vertical axis at 3.

■ Method check

A straight-line graph needs at least two accurate points; a third checks the table. Label units before reading a contextual estimate.

2 Practice

2.1 Complete values for $y = x + 2$ at $x = -2, 0, 2$. [2]

2.2 Draw $y = 3x - 1$ for $0 \leq x \leq 2$ on graph paper. [2]

2.3 Draw $y = 4$ for $-2 \leq x \leq 3$. [2]

2.4 Draw $x = -1$ for $-3 \leq y \leq 3$. [2]

3 Exam-style questions

3.1 Apply the drawing linear graphs methods below. Show working and include units where appropriate.

(a) Calculate values for $y = -x + 5$ at $x = 0, 2, 5$. [2]

(b) Draw the line for $0 \leq x \leq 5$ on graph paper. [2]

(c) Use the graph to find x when $y = 2$, and state the y -axis crossing. [2]

3.2 A hire cost follows $C = 18t + 10$ yuan for t hours, with $0 \leq t \leq 4$.

(a) Complete a table at $t = 0, 2, 4$ and draw the cost graph. [3]

(b) Use the graph to estimate the cost for 2.5 h and the hire time for a budget of 64 yuan. Explain the meaning of the vertical-axis intercept. [3]

Solutions

Award method and answer marks as indicated; accept equivalent correct methods.

2.1

- $y = x + 2$ gives 0, 2, 4.

2.2

- Plot $(0, -1)$, $(1, 2)$, $(2, 5)$ and join with a ruler.

2.3

- **Horizontal ruled segment from $(-2, 4)$ to $(3, 4)$.**

2.4

- **Vertical ruled segment from $(-1, -3)$ to $(-1, 3)$.**

3.1

(a)

- The values are 5, 3, 0.

(b)

- **Rule a line through $(0, 5)$, $(2, 3)$, $(5, 0)$ over the stated domain.**

(c)

- The point $(3, 2)$ gives $x = 3$; the y -axis crossing is $(0, 5)$.

3.2

(a)

- The costs are **10, 46, 82 yuan**.
- Plot on labelled t and C axes with suitable scales, then join by a straight line only over the stated interval.

(b)

- At 2.5 h the cost is **55 yuan**.
- At 64 yuan the time is **3 h**.
- The intercept 10 yuan represents the fixed hire charge, even before any time charge.