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Straight Lines

Solutions & Answer Key

Full worked solutions, marking scheme & answer key

IGCSE Mathematics

The Panda Math Tutor

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Companion to the *Student Worksheet*

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Note

About this booklet. These are the complete solutions to every question in the *Straight Lines — Student Worksheet*. Question numbers match exactly: gradient G1–G7, equation of a line E1–E8, finding the equation N1–N6, parallel and perpendicular P1–P8, midpoint M1–M6, length D1–D6, intersection I1–I6, applications R1–R5, the Mixed Review MR1–MR12, and the examination questions Q1–Q8 of Part III.
Each solution quotes the formula before substituting and works one step at a time. Part V collects the common mistakes to watch for, and Part VI is a quick answer key for fast marking.

4 Part IV — Complete Solutions

Note

Each solution names the formula being applied and shows the steps in order, exactly as the notes recommend. Depth is scaled to difficulty — brief for basic questions, fuller for the harder ones. Where a check is quick, it is included, because substituting back is the fastest way to catch a slip.

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4.1 Solutions — The Gradient of a Line

Solution G1

Using $m = \dfrac{y_2 - y_1}{x_2 - x_1}$ with $(1, 4)$ and $(5, 16)$:

$$m = \frac{16 - 4}{5 - 1} = \frac{12}{4} = \boxed{3}.$$

The gradient is positive, so the line slopes uphill from left to right.

Solution G2

(a) $m = \dfrac{3 - 9}{8 - 2} = \dfrac{-6}{6} = \boxed{-1}$ (downhill).

(b) $m = \dfrac{18 - 2}{5 - (-3)} = \dfrac{16}{8} = \boxed{2}$ (uphill).

Solution G3

(a) $m = \dfrac{-5-7}{2-(-4)} = \dfrac{-12}{6} = \boxed{-2}$.

(b) $m = \dfrac{1-(-3)}{2-(-6)} = \dfrac{4}{8} = \boxed{\dfrac{1}{2}}$.

Common Mistake

Subtracting a negative adds: $2-(-4) = 6$. A sign slip here flips the whole answer.

Solution G4

(a) $m = \dfrac{5-5}{6-(-2)} = \dfrac{0}{8} = \boxed{0}$ — the two points have the same y-coordinate, so the line is **horizontal**.

(b) $m = \dfrac{8-(-1)}{3-3} = \dfrac{9}{0}$, which is $\boxed{\text{undefined}}$ — the two points have the same x-coordinate, so the line is **vertical**.

Solution G5

(a) y increases as x increases $\Rightarrow$ $\boxed{\text{positive}}$.
(b) y falls from 3 to -7 as x increases $\Rightarrow$ $\boxed{\text{negative}}$.
(c) Both y-coordinates are -6 $\Rightarrow$ $\boxed{\text{zero}}$ (horizontal).
(d) Both x-coordinates are -4 $\Rightarrow$ $\boxed{\text{undefined}}$ (vertical).

Solution G6

Substitute into the gradient formula:

$$\frac{1-k}{10-2} = -\frac{1}{2} \implies \frac{1-k}{8} = -\frac{1}{2}.$$

Multiply both sides by 8:

$$1-k = -4 \implies k = \boxed{5}.$$

Check: through $(2,5)$ and $(10,1)$, $m = \dfrac{1-5}{8} = -\dfrac{1}{2}$. ✓

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Preview ends here

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