

inkMaths

ANSWER BOOK

Straight lines

Coordinate geometry · Year 12–13

8 questions · 20 marks

NAVY EDITION

SECTION A · Warm-up

- A1** The gradient is $m = (-3 - 3)/(4 - 1) = -2$. Point-gradient form with $(1, 3)$: $y - 3 = -2(x - 1)$, which tidies to $2x + y - 5 = 0$. Substituting the second point, $8 - 3 - 5 = 0$, is a one-line check that catches most slips. [2]
- A2** Perpendicular gradients multiply to -1 , so each is the negative reciprocal: $-3/2$ for the first, and $1/4$ for the second. Flip the fraction, change the sign. [2]

SECTION B · Standard

- B1** $m = (1 - (-1))/(7 - 3) = 2/4 = 1/2$. Through $(3, -1)$: $y + 1 = (1/2)(x - 3)$. Doubling clears the fraction: $2y + 2 = x - 3$, so $x - 2y - 5 = 0$. And $7 - 2 - 5 = 0$ confirms the second point lies on it. [3]
- B2** The midpoint is $(4, 6)$ and the segment's gradient is $8/6 = 4/3$, so the bisector's gradient is $-3/4$. Through $(4, 6)$: $y - 6 = -(3/4)(x - 4)$, which clears to $3x + 4y - 36 = 0$. Both ingredients, midpoint and negative reciprocal, carry a mark each. [2]
- B3** Rearranging the given line, $y = 2 - (2/3)x$, so its gradient is $-2/3$ and the perpendicular gradient is $3/2$. Through $(4, -1)$: $y + 1 = (3/2)(x - 4)$, which doubles to $2y + 2 = 3x - 12$, giving $3x - 2y - 14 = 0$. Reading the gradient straight from the coefficients as $-a/b$ works too, if it is quoted correctly. [3]
- B4** The intercept 30 is the starting height in centimetres; the gradient -2.5 says the candle burns down 2.5 cm every hour. Setting $H = 10$: $2.5t = 20$, so $t = 8$ hours. At $t = 12$ the model gives $H = 0$, and beyond that a negative height, so it cannot apply after 12 hours. [3]

SECTION C · Stretch

- C1** $(7 - k)/(5 - 2) = 3$, so $7 - k = 9$ and $k = -2$. Setting up the gradient with the unknown left in is where the marks sit; the algebra is one line. [2]
- C2** A vertical line has no gradient: the run is zero, so the fraction is undefined. The rule compares two gradients and needs both to exist; the lines are perpendicular by geometry, not by the product test. Every other perpendicular pair obeys the rule. [2]