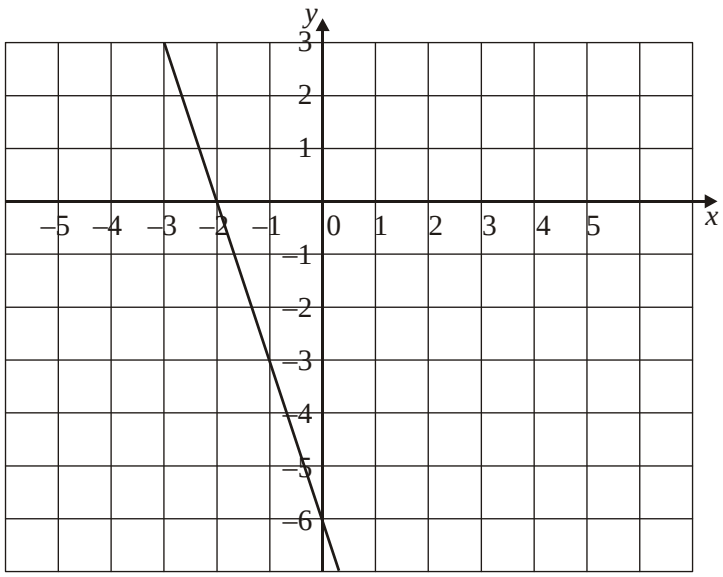
IB Questionbank Mathematical Studies 3rd edition

Linear eq P1 MS

0 min
0 marks

1.



(a) line passes through (–2, 0) (A1)
line is straight (A1)
negative gradient (line must be straight for mark to be awarded) (A1)
correct gradient (line must be straight for mark to be awarded) (A1) (C4)

(b) $y - 0 = -3(x + 2)$ **or** $3x + y = 3(-2) + 1(0)$ **or** $y = -3x + c$ *etc* (M1)
$3x + y = -6$ (or equivalent) (A1)(A1)(A1) (C4)

Note: *Award (C4) ft for $y = -3x +$ candidate's y-intercept (or equivalent).*
Otherwise award:
(A1) for y with = in a linear equation,
(A1) for $y = -3x$ or $y + 3x$ seen or for $m = -3$
(A1) for candidate's y-intercept included in a linear expression.
Do not *ft candidate's gradient if it is wrong in the diagram, no mark for stand alone $-3x$*

[8]

2. (a) $0 + 2y = 12$ or $x + 2(0) = 12$ (M1)
P(0, 6) (accept $x = 0$, $y = 6$) (A1)
Q(12,0) (accept $x = 12$, $y = 0$) (A1) (C3)

Notes: *Award (M1) for setting either value to zero.*
Missing coordinate brackets receive (A0) the first time this occurs. Award (A0)(A1)(ft) for P(0,12) and Q(6, 0).

(b) $x + 2(x - 3) = 12$ (M1)
(6, 3) (accept $x = 6$, $y = 3$) (A1)(A1) (C3)

Note: *(A1) for each correct coordinate.*
Missing coordinate brackets receive (A0)(A1) if this is the first time it occurs.

[6]

3. (a) gradient = $\frac{-4}{3}$ or –1.33(3 s.f.) (A1) (C1)

(b) $y = \frac{-4}{3}x + 4$ (A1) (C1)

OR $4x + 3y - 12 = 0$
OR equivalent form

Note: *the y-intercept must be 4, allow follow through from part (a)*

(c) $y = \frac{-4}{3}x - 4$ (M1)

Note: *award (M1) for y-intercept as –4*

$4x + 3y + 12 = 0$ or $\frac{4}{3}x + y + 4 = 0$ (A1) (C2)

[4]

4. (a) –2 (A1) (C1)

Note: *Accept (0, –2)*

(b) $-\frac{1}{2}$ (A1) (C1)

(c) 2 (A1)(ft) (C1)

Note: *Follow through from their answer to part (b).*

(d) $y = 2x + c$ (can be implied)
$7 = 2 \times 3 + c$ (M1)
$c = 1$ (A1)(ft)
$y = 2x + 1$

Notes: *Award (M1) for substitution of (3, 7), (A1)(ft) for c. Follow through from their answer to part (c).*

OR

$y - 7 = 2(x - 3)$ (M1)(M1)

Note: *Award (M1) for substitution of their answer to part (c), (M1) for substitution of (3, 7).*

$2x - y + 1 = 0$ ***or*** $-2x + y - 1 = 0$ (A1)(ft) (C3)

Note: *Award (A1)(ft) for their equation in the stated form.*

[6]

5. (a) $m(AB) = \frac{-3-3}{7-4} = -2$ (M1)(A1) (C2)

Note: *Award (M1) for attempt to substitute into correct gradient formula.*

(b) (i) $m(AC) = \frac{1}{2}$ (A1)(ft)

(ii) $\frac{p-3}{0.5-4}=\frac{1}{2}$ (*or equivalent method*) (M1)(A1)(ft)

Note: *Award (M1) for equating gradient to* $\frac{1}{2}$*. (A1) for correct substitution.*

$p = 1.25$ (A1)(ft) (C4)

[6]

6. (a) Gradient = $\frac{(5-1)}{(4-2)}$ (M1)

Note: *Award (M1) for correct substitution in the gradient formula.*

= 2 (A1) (C2)

(b) Midpoint = (3, 3) (accept $x = 3$, $y = 3$) (A1) (C1)

(c) Gradient of perpendicular = $-\frac{1}{2}$ (A1)(ft)

$y = -\frac{1}{2}x + c$ (M1)

$3 = -\frac{1}{2} \times 3 + c$

$c = 4.5$

$y = –0.5x + 4.5$ (A1)(ft)

OR

$y – 3 = –0.5(x – 3)$ (A1)(A1)(ft)

Note: *Award (A1) for –0.5, (A1) for both threes.*

OR

$2y + x = 9$ (A1)(A1)(ft) (C3)

Note: *Award (A1) for 2, (A1) for 9.*

[6]

7. (a) $4y = –x – 34$ or similar rearrangement (M1)

Gradient = $-\frac{1}{4}$ (A1) (C2)

(b) $m = 4$ (A1)(ft)

Note: *(A1) Change of sign* (A1)(ft) (C2)
(A1) Use of reciprocal

(c) *Reasonable attempt to solve equations simultaneously* (M1)

(–2, –8) (A1)(ft) (C2)

Note: *Accept $x = –2$ $y = –8$*
Award (A0) if brackets not included.

[6]

8. (a) $y = –x + 2$ or $x + y = 2$ or $x + y – 2 = 0$ (A1)

(b) Midpoint M: $\left(\frac{0+2}{2}, \frac{2+0}{2}\right) = (1, 1)$ (M1)

gradient = 1 (A1)

$1 = 1(1) + (b) \Rightarrow b = 0$

$y = x$ (A1)

[4]