Answers - Revision Exercise 1
(Coordinate Geometry – Straight Lines)

1

(a)	$AB:\ m = -\frac{4}{3}$, $BC:\ m = \frac{3}{4}$ (s.c. $AB: \frac{4}{3}$, $BC: \frac{3}{4}$ B1)	B1, M1 A1√ (3)
(b)	$BC = \sqrt{(8^2 + (k-4)^2)}$ $(= \sqrt{(k^2 - 8k + 80)})$ $BC^2 = \ldots$ M1	M1 A1 (2)
(c)	$(k^2 - 8k + 80) = 100$ (Their $BC^2 = 100$)	M1
	$k^2 - 8k - 20 = 0$ $(k-10)(k+2) = 0$	M1 A1
	$\underline{k = 10}$, $k = -2$ (rejected)	A1, [redacted] (4)
(d)	$\underline{(11, 6)}$	B1 B1 (2)

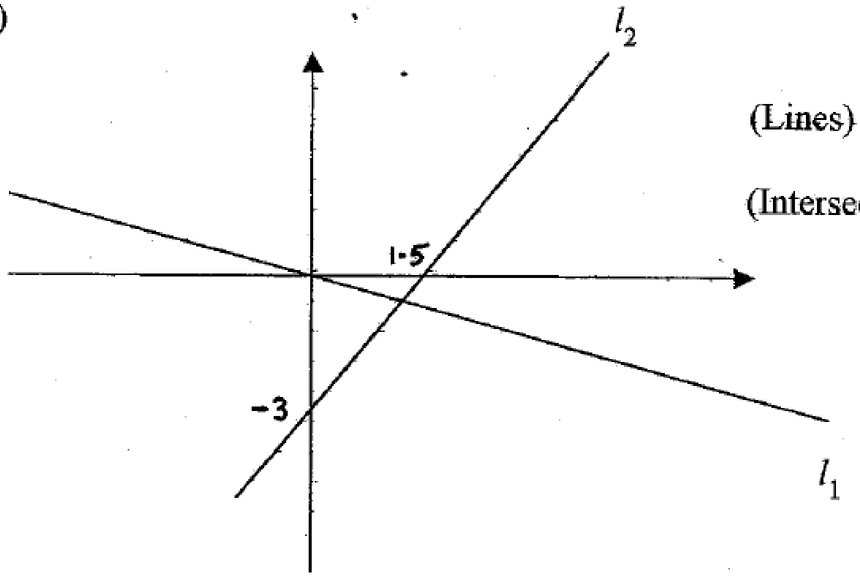
2

(a)	Gradient of $AB = \frac{4}{8} = \frac{1}{2}$	M1 A1 (2)
(b)	Gradient of $C = -2$, $\frac{4-2}{k-7} = -2$ (or full Pythag.method)	M1
	$\underline{k = 6}$	A1 (2)
(c)	$AB = \sqrt{(4^2 + 8^2)}$	M1 A1
	$= \sqrt{80} = \sqrt{16}\sqrt{5} = \underline{4\sqrt{5}}$	A1 (3)
(d)	$BC = \sqrt{(1^2 + 2^2)} = \sqrt{5}$ (or $AC = \sqrt{(7^2 + 6^2)} = \sqrt{85}$)	B1ft
	Area of $ABC = \frac{1}{2}(4\sqrt{5} \times \sqrt{5}) = \underline{10}$	M1 A1 (3)
	Other <u>exact</u> methods can score M1 A2.	
	Non-exact methods score M1 A0 (but may gain the B1).	
(e)	$y - 2 = -2(x - 7)$	[redacted] B1
	$2x + y - 16 = 0$	[redacted] B1 (2)

(f)	When $y = 0$, $x = 8$ $D(8, 0)$	
	When $x = 0$, $y = 16$ $E(0, 16)$ (both)	B1√
	Mid-point $\underline{(4, 8)}$	M1 A1ft (3)

3

(a)



(Lines) B1 B1

(Intersections) B1 **(3)**

(b) $-\frac{1}{4}x = 2x - 3$ $\quad \frac{9}{4}x = 3$ $\quad x = \frac{4}{3}$ $\quad y = -\frac{1}{3}$ M1 A1 A1 **(3)**

(c) Perp. to l_1 : $m = 4$ B1

$y + \frac{1}{3} = 4\left(x - \frac{4}{3}\right)$ M1

$12x - 3y - 17 = 0$ A1 **(3)**

(3)

4.

(i)	Midpoint $= (\frac{1+3}{2}, \frac{1+5}{2}) = (2,3)$ Grad of AC $y = \frac{5-1}{3-1} = 2 \Rightarrow$ Grad of perp $= -\frac{1}{2}$ $\Rightarrow y-3 = -\frac{1}{2}(x-2) \Rightarrow -2y+6 = x-2 \Rightarrow x+2y=8$	B1 M1 A1 M1 A1 **5**	
(ii)	-2+10 = 8, so B lies on the line. B to (2,3) $= \begin{pmatrix} 4 \\ -2 \end{pmatrix} \Rightarrow (2,3)$ to D $= \begin{pmatrix} 4 \\ -2 \end{pmatrix} \Rightarrow$ D is $(6,1)$	B1 M1 A1 A1 **4**	
(iii)	MA=$\sqrt{(2-1)^2+(3-1)^2} = \sqrt{5}$ MB $= \sqrt{(2--2)^2+(3-5)^2} = \sqrt{20}$ Area $=$ 2.MA.MB $= 2\sqrt{5}.\sqrt{20} = 20$	M1 A1 A1 **3**	Use to find area Both

5

(i)	Grad AB $= \frac{4-3}{2--2} = \frac{1}{4}$ Grad BD $= \frac{-4-4}{4-2} = -4$ $\Rightarrow m_1 m_2 = -1 \Rightarrow$ perpendicular	B1 B1 **2**	Both
(ii)	AB $= \sqrt{(4-3)^2+(2+2)^2} = \sqrt{17}$ BD $= \sqrt{(-4-4)^2+(4-2)^2} = \sqrt{68}$ $\Rightarrow$ Area $= \sqrt{17}.\sqrt{68} = \sqrt{17}.2\sqrt{17} = 34$	M1 M1, A1 **3**	c.a.o
(iii)	CD : $\frac{y+4}{-3+4} = \frac{x-4}{8-4} \Rightarrow 4y+16 = x-4$ $\Rightarrow 4y = x-20$ $\Rightarrow x=0, \quad y=-5$ i.e. $X(0,-5)$	M1 E1 **2**	
(iv)	Midpoint of BX is $\left(\frac{2+0}{2}, \frac{4-5}{2}\right) = \left(1, -\frac{1}{2}\right)$ Midpoint of AD is $\left(\frac{-2+4}{2}, \frac{3-4}{2}\right) = \left(1, -\frac{1}{2}\right)$	M1 E1 **2**	Attempt at any valid method

(v)	Parallelogram = Trapezium MBCD + Triangle MAB Triangle BXC = Trapezium MBCD + Triangle MXD And triangle MAB is congruent to triangle MXD (SAS) So area of triangle BXC = 34	B1	
	$\text{BX} = \sqrt{(2-0)^2 + (4+5)^2} = \sqrt{85}$	M1	
	$\Rightarrow \text{Area} = \frac{1}{2}\text{BX} \times \text{Perp} = 34 \Rightarrow \text{Perp} = \frac{68}{\sqrt{85}} = \frac{4}{5}\sqrt{85}$	A1 **3**	Or equivalent

6

(a)	$y-(-4) = \frac{1}{3}(x-9)$ or $\frac{y-(-4)}{x-9} = \frac{1}{3}$	M1 A1
	$3y - x + 21 = 0$ (o.e.) (condone 3 terms with integer coefficients e.g. $3y+21=x$)	A1
		(3)
(b)	Equation of l_2 is: $y = -2x$ (o.e.)	B1
	Solving l_1 and l_2 : $-6x - x + 21 = 0$	M1
	p is point where $x_p = 3$, $y_p = -6$ x_p or y_p	A1
	y_p or x_p	A1f.t. $(-2x)$
		(4)
(c)	(l_1 is $y = \frac{1}{3}x - 7$) C is (0, -7) or OC = 7	B1f.t.
	Area of $\Delta OCP = \frac{1}{2}OC \times x_p$, $= \frac{1}{2} \times 7 \times 3 = 10.5$ or $\frac{21}{2}$	M1 A1c.a.o.
		(3)

7

(a) $m = \frac{8-2}{11+1} \quad (= \frac{1}{2})$

M1 A1

$y - 2 = \frac{1}{2}(x - -1)$ or $y - 8 = \frac{1}{2}(x - 11)$ o.e.

M1

$y = \frac{1}{2}x + \frac{5}{2}$ accept exact equivalents

(b) Gradient of $l_2 = -2$

M1

Equation of l_2: $y - 0 = -2(x - 10)$ [$y = -2x + 20$]

M1 $\frac{1}{2}x + \frac{5}{2} = -2x + 20$

M1

$\underline{x = 7 \text{ and } y = 6}$

(c) $RS^2 = (10-7)^2 + (0-6)^2 (= 3^2 + 6^2)$

M1

$RS = \sqrt{45} = 3\sqrt{5}$ (*)

(d) $PQ = \sqrt{12^2 + 6^2}, = 6\sqrt{5}$ or $\sqrt{180}$ or $PS = 4\sqrt{5}$ and $SQ = 2\sqrt{5}$

M1,A1

Area $= \frac{1}{2} PQ \times RS = \frac{1}{2} 6\sqrt{5} \times 3\sqrt{5}$

dM1

$\underline{= 45}$

8

(a)	P: $x = 0$ $\quad y = -2$	B1
	Mid-point: $\left(\frac{(0+5)}{2}, \frac{(-2-3)}{2}\right) = \left(\frac{5}{2}, -\frac{5}{2}\right)$	M1 A1ft
(b)	Gradient of l_1 is $\frac{3}{2}$, so gradient of l_2 is $-\frac{2}{3}$	B1
	l_2: $\quad y - (-3) = -\frac{2}{3}(x - 5)$	M1 A1ft
	$2x + 3y = 1$	A1
(c)	Solving: $\quad 3x - 2y = 4$	
	$2x + 3y = 1 \qquad x = \frac{14}{13}$	M1 A1
	$y = \frac{-5}{13}$	M1 A1ft