Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Parallel and perpendicular lines

Time allowed: 1 hour

Subject code **0580**

Mathematics

Questions from Paper 1, Paper 2, Paper 3 and Paper 4

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.
You may use a calculator.

Total marks

/ 49

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.
- Unless a question says otherwise, give answers that are not exact to 3 significant figures, and angles in degrees to 1 decimal place.

Information

- This paper has 10 questions worth 49 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 The equation of line L is $y = 5x - 3$.

(a) Write down the gradient of line L.

..... [1]

(b) Write down the equation of a line parallel to line L.

$y =$ ..... [1]

(a) Equations of straight lines (y = mx + c) (b) Parallel lines Click for more variations

1(a)	5	**1**	
1(b)	$5x + k$ $(k \neq -3)$	**1**	

2 Find the gradient of a line that is perpendicular to $8y + 4x = 5$.

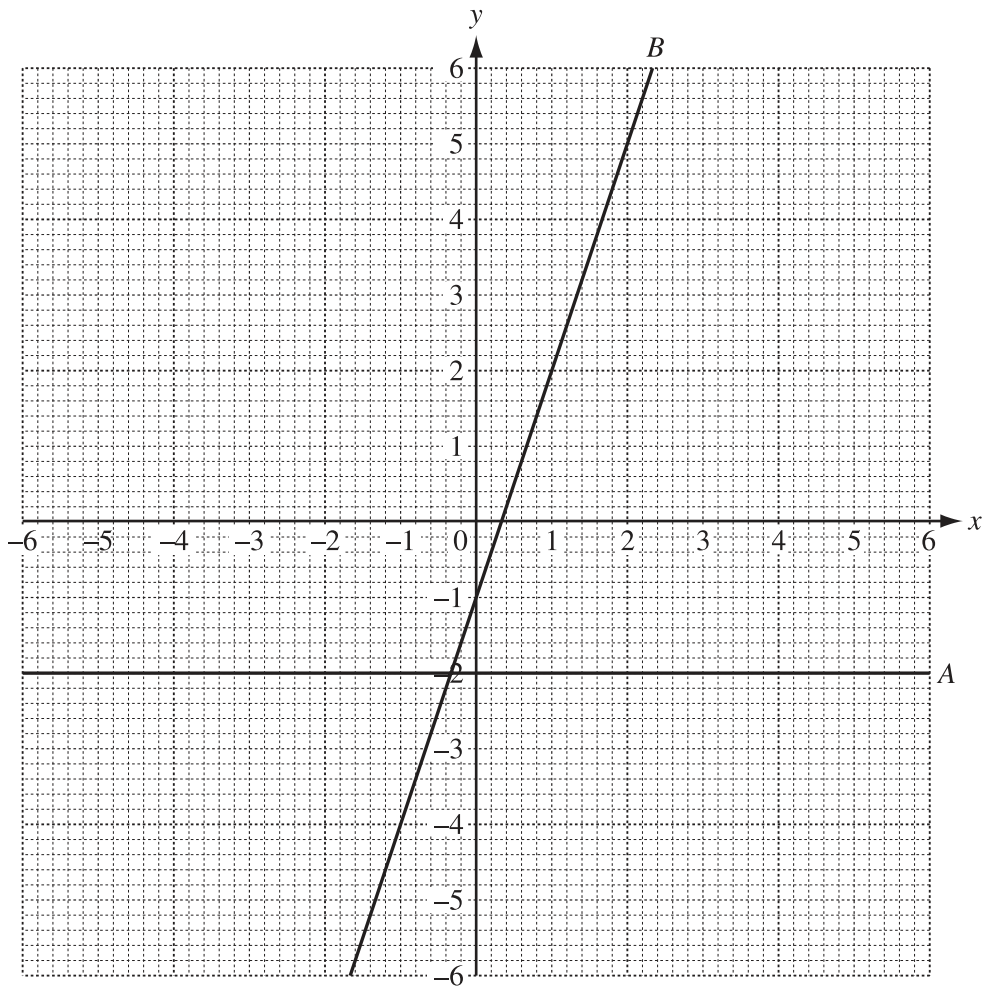
..... [2]

Perpendicular lines Click for more variations

2	2	**2**	**M1** for $y = \frac{5 - 4x}{8}$ oe or better

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3



The diagram shows two straight lines, A and B, drawn on a grid.

(a) Write down the equation of line A.

Answer(a) ..... [1]

(b) The equation of line B is $y = 3x - 1$.

(i) Draw a line parallel to line B that passes through the point (0, 2). [1]

(ii) Write down the equation of your line in the form $y = mx + c$.

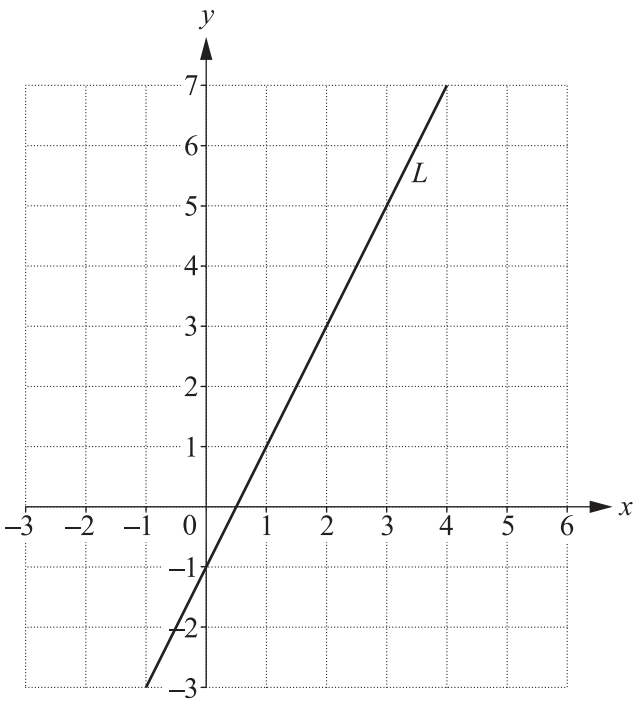
Answer(b)(ii) $y =$ ..... [2]

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(a) Drawing straight-line graphs (b)(i) Parallel lines (b)(ii) Parallel lines Click for more variations

3	**(a)** $y = -2$ or $y + 2 = 0$	**1**	
	(b) **(i)** Ruled line parallel to **B** through (0, 2)	**1**	Must at least go through (–1, –1)
	(ii) ($y =$) $3x + 2$ cao final answer	**2**	**B1** $3x + j$ $j \neq -1$ or 2 or $kx + 2$ $k \neq 3$ **SC1** for $3x + 2$ then spoiled by the final answer

4



(a) Work out the gradient of the line L.

..... [2]

(b) Write down the equation of the line parallel to the line L that passes through the point (0, 6).

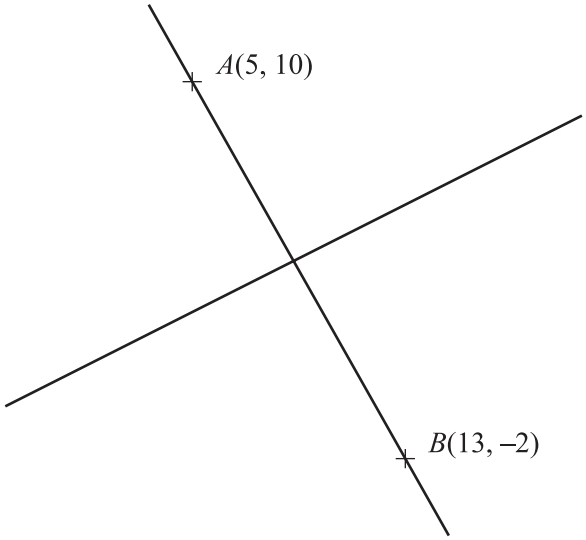
..... [2]

(a) Gradient of a line (b) Parallel lines Click for more variations

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4 **(a)**	2 cao	**2**	**M1** for rise/run attempted e.g. 4/2 or other correct method for finding gradient or **SC1** for $y = 2x - 1$ as answer
(b)	$y = 2x + 6$ oe	**2FT**	**FT** for $y = \textit{their(a)}x + 6$ **B1** for $y = mx + 6$ ($m \neq 0$ or 2) or $y = 2x$ [+ k] or $y = \textit{their(a)}x$ [+ k] ($k \neq 6$) or for answer $2x + 6$ or answer $\textit{their(a)}x + 6$

5



NOT TO SCALE

$A(5, 10)$ and $B(13, -2)$ are two points on the line AB.
The perpendicular bisector of the line AB has gradient $\frac{2}{3}$.

Find the equation of the perpendicular bisector of AB.

Answer ..... [4]

Perpendicular lines Click for more variations

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5	$y = \frac{2}{3}x - 2$ oe	**4**	**B1** for (9, 4) and **M2** for $y = kx - 2\ (k \neq 0)$ or $y = \frac{2}{3}x + k\ (k \neq 0)$ or $\frac{2}{3}x - 2$ or **M1** for $y = \frac{2}{3}x$ or $\frac{2}{3}x + k\ \ (k \neq 0)$

6 A is the point $(17, 9)$ and B is the point $(23, 39)$.

Find the equation of the perpendicular bisector of line AB.
Give your answer in the form $y = mx + c$.

$y =$ ..... [5]

Perpendicular lines Click for more variations

6	$[y =] -\frac{1}{5}x + 28$ final answer	**5**	**B1** for midpoint (20, 24) soi **M1** for [gradient =] $\frac{39-9}{23-17}$ oe **M1** for $\frac{-1}{\textit{their gradient}}$ **M1** for substitution of *their* midpoint into *their* $y = mx + c$ oe

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7 A line from the point (2, 3) is perpendicular to the line $y = \frac{1}{3}x + 1$.
The two lines meet at the point P.

Find the coordinates of P.

(..... , ...) [5]

Perpendicular lines Click for more variations

7	(2.4, 1.8) oe	**5**	**M1** for [gradient =] $-1 \div \frac{1}{3}$ oe **M1** for substituting (2, 3) into $y = (their\ m)x + c$ oe **M1** for $\frac{1}{3}x + 1 = their\left(mx + c\right)$ with *their* $m \neq \frac{1}{3}$ **M1** for substituting *their* x-coord into either equation to find y or for substituting *their* y-coord into either equation to find x

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8 A is the point (2, 3) and B is the point (7, −5).

(a) Find the co-ordinates of the midpoint of AB.

(....., ...) [2]

(b) Find the equation of the line through A that is perpendicular to AB.
Give your answer in the form $y = mx + c$.

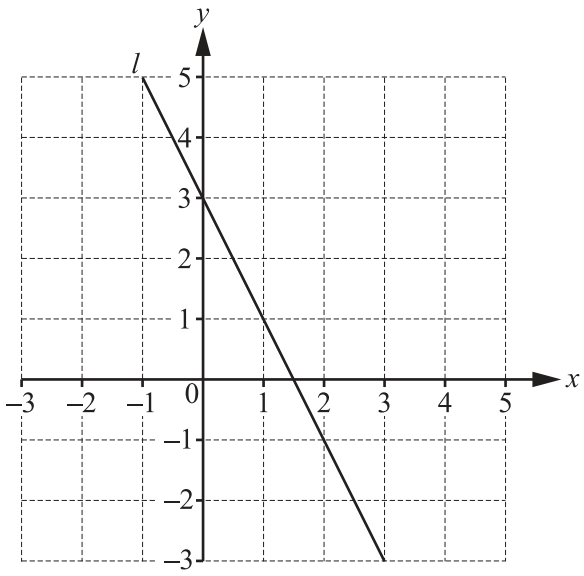
$y =$ ..... [4]

(a) Midpoint of a line (b) Perpendicular lines Click for more variations

8(a)	(4.5, – 1)	**2**	**B1** for each
8(b)	$[y =]\frac{5}{8}x + \frac{7}{4}$	**4**	**M1** for $\frac{-5-3}{7-2}$ oe **M1** for $-1/$ *their* $-\frac{8}{5}$ **M1** for 3 = 2 × *their* gradient + c oe

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9



(a) Find the equation of the line l.
Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

(b) A line perpendicular to the line l passes through the point $(3, -1)$.

Find the equation of this line.

..... [3]

(a) Equations of straight lines (y = mx + c) (b) Perpendicular lines Click for more variations

9	**(a)**	$[y =] -2x + 3$	**3**	**B2** for $[y =] -2x + c$ or **M1** for rise/run and **B1** for $[y =] kx + 3$, $k \neq 0$ or $c = 3$
	(b)	$y = \frac{1}{2}x - \frac{5}{2}$ oe final answer	**3**	**M1** for gradient = $-\frac{1}{\textit{their}\text{ gradient in }\textbf{(a)}}$ or gradient = 0.5 oe **M1** for substitution of $(3, -1)$ into *their* $y = mx + c$ oe

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10 A line joins the points $A(-3, 8)$ and $B(2, -2)$.

(a) Find the co-ordinates of the midpoint of AB.

(..... , ...) [2]

(b) Find the equation of the line through A and B.
Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

(c) Another line is parallel to AB and passes through the point (0, 7).

Write down the equation of this line.

..... [2]

(d) Find the equation of the line perpendicular to AB which passes through the point (1, 5).
Give your answer in the form $ax + by + c = 0$ where a, b and c are integers.

..... [4]

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(a) Midpoint of a line (b) Equations of straight lines (y = mx + c) (c) Parallel lines (d) Perpendicular lines

Click for more variations

10(a)	(–0.5, 3)	**2**	**B1** for one correct value
10(b)	[y =] $-2x + 2$ final answer	**3**	**M1** for $\frac{-2-8}{2--3}$ or better **M1** for substitution of (–3, 8) or (2, –2) or *their* midpoint into $y = mx + c$ with *their m*
10(c)	$y = -2x + 7$ oe	**2FT**	**FT** *their* **(b)** **M1** for $y = (their-2)x + k$ ($k \neq 2$) or $y = kx + 7$ ($k \neq 0$) If zero scored, **SC1** for $(their-2)x+7$
10(d)	$x - 2y + 9 = 0$ or $2y - x - 9 = 0$ oe	**4**	**B3** for any correct equivalent in wrong form Or **M2** for $y = ½ x + k$ oe (**FT** negative reciprocal of *their* gradient in **(b)**) or **M1** for grad = ½ (**FT** negative reciprocal of *their* gradient in **(b)**) **M1** for substitution of (1, 5) into $y = mx + c$ oe with *their m*

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