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

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

STEM | Exam Builder

Coordinates, length and midpoint

Time allowed: 1 hour

Subject code **0580**

Mathematics

Questions from Paper 1, Paper 2 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

/ 50

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 50 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

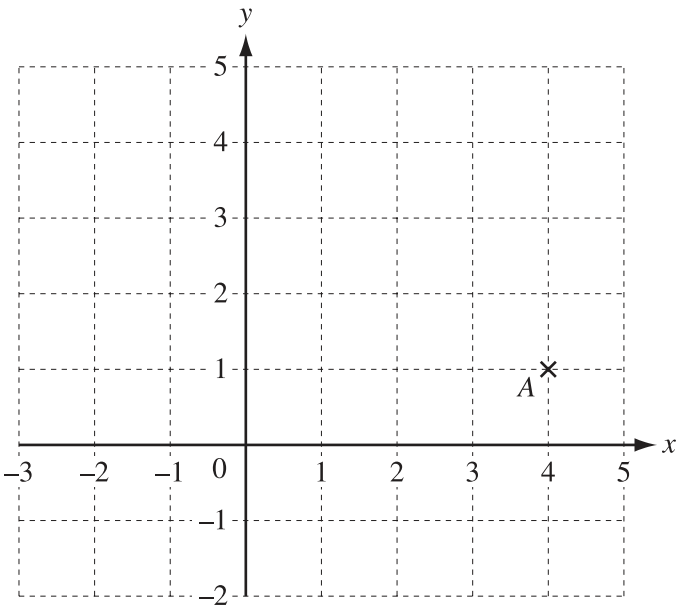
Advice

- 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.

STEM | Exam Builder

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

1



(a) Write down the co-ordinates of point A.

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

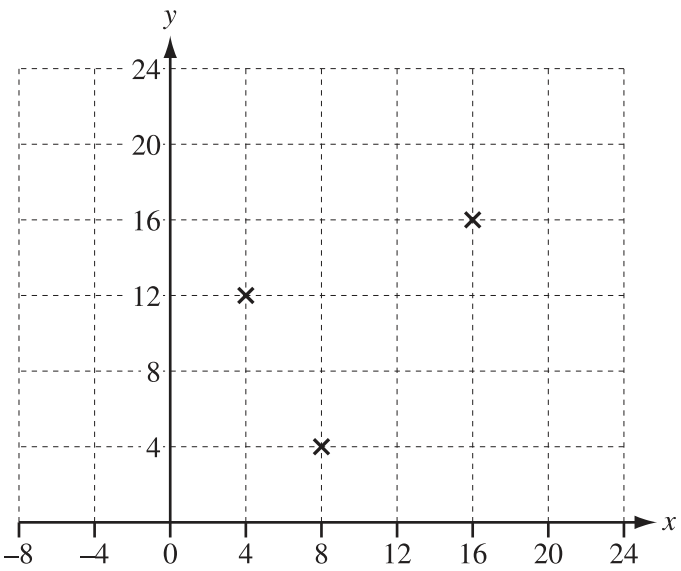
(b) On the grid, plot the point (–1, 3). [1]

(a) Coordinates (b) Coordinates Click for more variations

1	**(a)**	(4, 1)	**1**	
	(b)	Point plotted at (–1, 3)	**1**	

STEM | Exam Builder

2 Three of the vertices of a parallelogram are at (4, 12), (8, 4) and (16, 16).



Write down the co-ordinates of two possible positions of the fourth vertex.

Answer (..... , ...) and (..... , ...) [2]

Coordinates Click for more variations

2	Any two of (20, 8) (–4, 0) (12, 24)	**2**	**B1** for one correct

3 A is the point $(-3, 5)$ and B is the point $(5, 2)$.

Find the coordinates of the midpoint of the line AB.

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

Midpoint of a line Click for more variations

3	(1, 3.5)	**2**	**B1** for each

4 Find the mid-point of AB where $A = (w, r)$ and $B = (3w, t)$.
Give your answer in its simplest form in terms of w, r and t.

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

Midpoint of a line Click for more variations

4	$\left(2w, \frac{r+t}{2}\right)$ final answer	**2**	**B1** for $2w$ oe nfww or $\frac{r+t}{2}$ oe

STEM | Exam Builder

5 A is the point $(7, 12)$ and B is the point $(2, -1)$.

Find the length of AB.

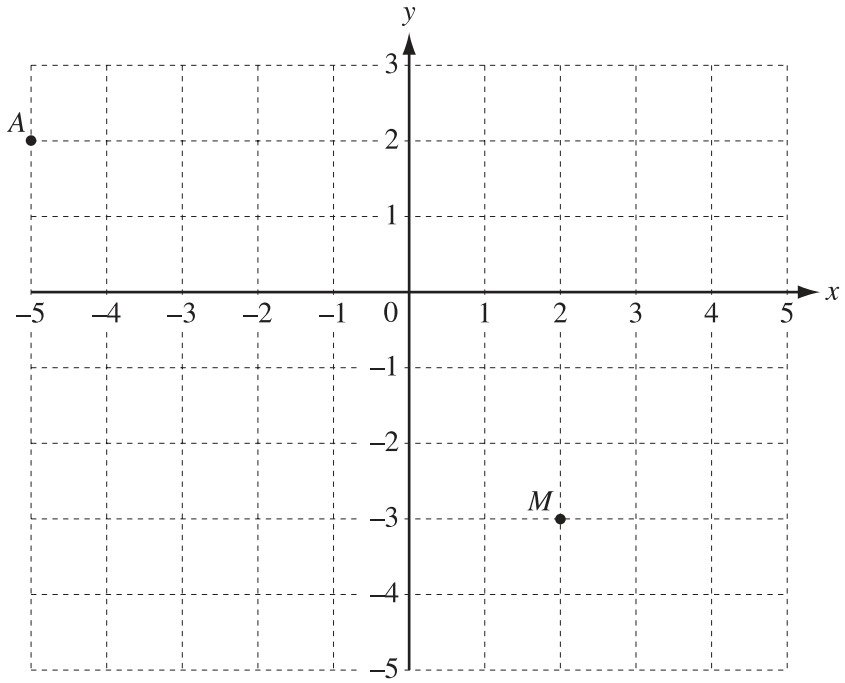
..... [3]

Length of a line Click for more variations

5	13.9 or 13.92 to 13.93	**3**	**M2** for $\sqrt{(7-2)^2+(12--1)^2}$ oe or **M1** for $(7-2)^2+(12--1)^2$ oe

STEM | Exam Builder

6



The diagram shows two points A (–5, 2) and M (2, –3).

(a) B is the point (5, –2).

(i) On the grid, mark the point B. [1]

(ii) Write $\overrightarrow{AB}$ as a column vector.

Answer(a)(ii) $\overrightarrow{AB}$ = $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) M is the midpoint of the line BD.

Find the co-ordinates of D.

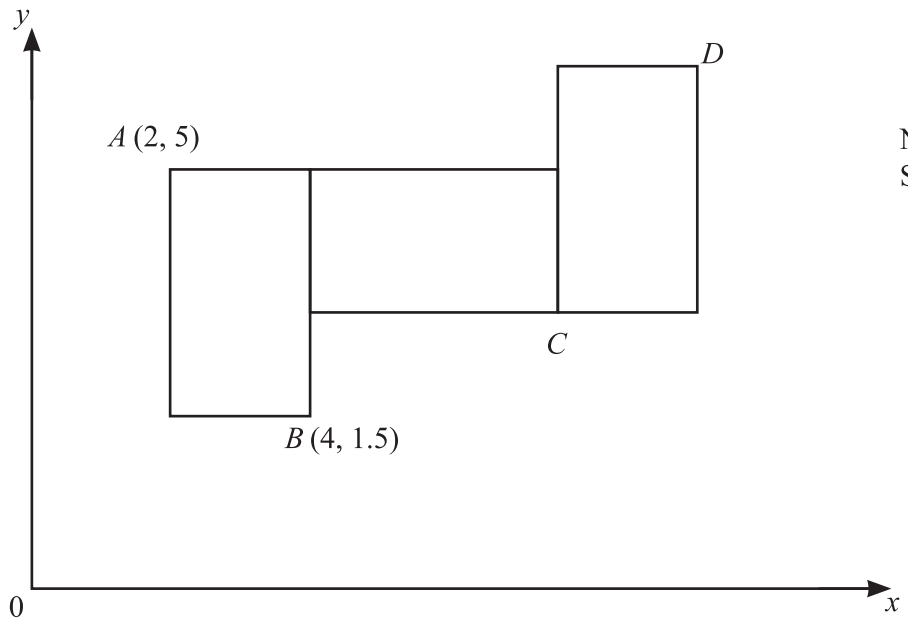
Answer(b) (..... , ...) [2]

(a)(i) Coordinates | (a)(ii) Position and displacement vectors | (b) Midpoint of a line | Click for more variations

STEM Exam Builder

6	**(a)** **(i)** B at (5, –2)	**1**	
	(ii) $\begin{pmatrix} 10 \\ -4 \end{pmatrix}$	**1ft**	
	(b) (–1, –4)	**2ft**	**B1**, **B1** follow through their B plotted

7



NOT TO SCALE

A pattern is formed by 3 congruent rectangles.
Each rectangle is a rotation of 90° around one vertex of the rectangle next to it.
The point A has coordinates $(2, 5)$.
The point B has coordinates $(4, 1.5)$.

Work out the coordinates of point C and point D.

C (..... , ...)

D (..... , ...)

[3]

Coordinates Click for more variations

7	[C =] (7.5, 3) [D =] (9.5, 6.5)	**3**	**B2** for [C =] (7.5, 3) or [D =] (9.5, 6.5) or for [C =] (7.5, k) **and** [D =] (9.5, m) or for [C =] (q, 3), $q \neq 8$ **and** [D =] (s, 6.5) or **B1** for [C =] (7.5, p) or (q, 3), $q \neq 8$ or [D =] (9.5, r) or (s, 6.5)

STEM Exam Builder

8 **(a)** A is the point $(a, 12)$ and B is the point $(b, 27)$.

(i) Find the y-coordinate of the midpoint of AB.

..... [1]

(ii) The line AB has gradient 3.

Find an expression for a in terms of b.

$a =$ ..... [3]

(b) D is the point $(22, 34)$ and E is the point $(23, 39)$.
D is the point on CE such that $2CE = 5DE$.

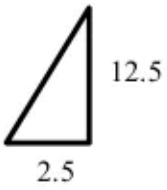
Find the coordinates of C.

(..... , ...) [3]

(a)(i) Midpoint of a line (a)(ii) Gradient of a line (b) Midpoint of a line Click for more variations

8(a)(i)	19.5	**1**	
8(a)(ii)	$[a =]\ b - 5$ oe	**3**	**M1** for $3 = \frac{27-12}{b-a}$ oe **M1** for $3(b - a) = 27 - 12$ or better e.g. $[a =]\ b - \frac{27-12}{3}$

STEM | Exam Builder

8(b)	(20.5, 26.5) or $(\frac{41}{2}, \frac{53}{2})$	**3**	**SC2** for answer (25.5, 51.5) or $(\frac{51}{2}, \frac{103}{2})$ OR **M2** for $23-\frac{5}{2}(23-22)$ or $39-\frac{5}{2}(39-34)$ oe or sketch  or vector e.g. $\begin{pmatrix}2.5\\12.5\end{pmatrix}$ or $\begin{pmatrix}-2.5\\-12.5\end{pmatrix}$ or **M1** for  $\frac{5}{2}(23-22)$ or $\frac{5}{2}(39-34)$ or vector e.g. $\begin{pmatrix}1\\5\end{pmatrix}$ or $\begin{pmatrix}-1\\-5\end{pmatrix}$

STEM | Exam Builder

9 B is the point $(-3, 1)$ and D is the point $(-5, 9)$.
BD is a diagonal of the kite $ABCD$.

(a) The ratio of the lengths of the diagonals $BD : AC = 2 : 3$.

Work out the length of AC.
Give your answer as a surd in its simplest form.

..... [5]

(b) Find the coordinates of the midpoint of BD.

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

(c) The diagonal AC of the kite passes through the midpoint of BD.

Find an equation of AC.
Give your answer in the form $y = mx + c$.

STEM | Exam Builder

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

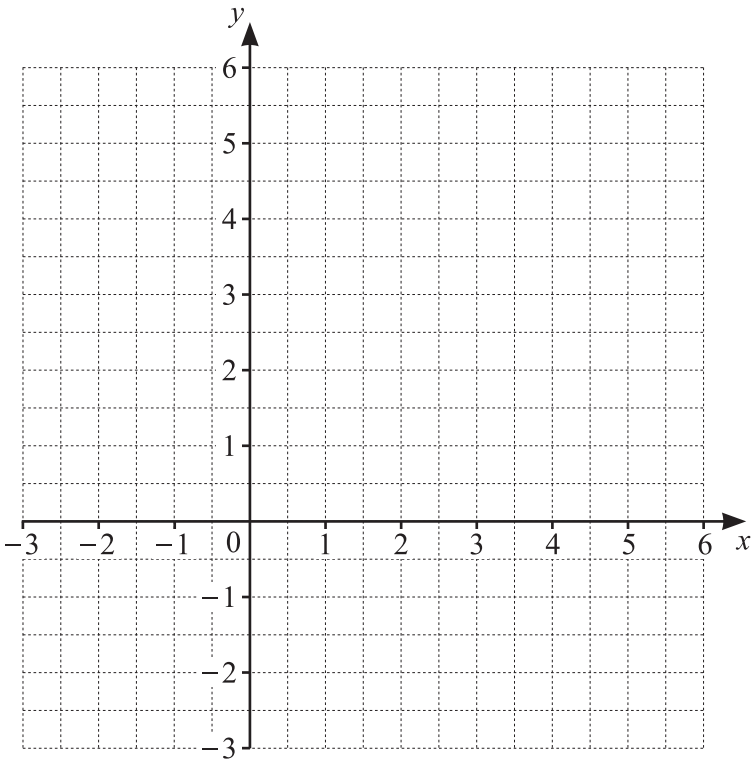
(a) Length of a line (b) Midpoint of a line (c) Perpendicular lines Click for more variations

9(a)	$3\sqrt{17}$ cao	**5**	**B4** for answer equivalent to $3\sqrt{17}$ but not in the correct form e.g. $\frac{3\sqrt{68}}{2}$, $\frac{6\sqrt{17}}{2}$, $\sqrt{153}$ OR **B3** for $\sqrt{68}$ or $2\sqrt{17}$ or **M2** for $(9-1)^2 + (-5--3)^2$ oe or **M1** for $(9-1)$ or $(-5--3)$ oe and **M1** for $\sqrt{their\ 68} \times \frac{3}{2}$ oe
9(b)	$(-4, 5)$	**2**	**B1** for each coordinate
9(c)	$y = \frac{1}{4}x + 6$ final answer	**4**	**M1** for $[\text{grad } BD =] \frac{9-1}{-5--3}$ oe **M1** for $[\text{grad } AC =] \frac{-1}{their\ \text{grad } BD}$ **M1** for *their* $(-4, 5)$ substituted into $y = their\ mx + c$ oe

STEM | Exam Builder

10 **(a)** In the square $ABCD$, A has coordinates $(-2, 1)$ and B has coordinates $(1, 5)$.
C has coordinates (a, b), where a and b are both positive integers.

Find the coordinates of C and the coordinates of D.
You may use the grid to help you.



C (..... , ...)

D (..... , ...) [4]

STEM | Exam Builder

(b) P has coordinates $(-1, 3)$ and Q has coordinates $(6, 4)$.

(i) Find the coordinates of the midpoint of PQ.

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

(ii) Find the length PQ.

..... [3]

(iii) Find the gradient of PQ.

..... [2]

(iv) Find the equation of the line parallel to PQ that crosses the x-axis at $x = 2$.

..... [3]

(a) Coordinates (b)(i) Midpoint of a line (b)(ii) Length of a line (b)(iii) Gradient of a line (b)(iv) Parallel lines Click for more variations

STEM | Exam Builder

10(a)	(5, 2) (2, − 2)	**4**	**B3** for 3 correct values or answers for *C* and *D* reversed or correct coordinates given on diagram wrongly labelled or **B2** for one correct coordinate pair correctly labelled or **M2** for *A*,*B*,*C* and *D* correctly plotted or **M1** for *A* and *B* correctly plotted If 0 or 1 scored instead award **SC2** for answers (–3, 8) and (–6, 4) or answers (1.5,1.5) and (–2.5, 4.5)
10(b)(i)	(2.5, 3.5) oe	**2**	**B1** for each
10(b)(ii)	7.07 or 7.071...	**3**	**M2** for $(6--1)^2+(4-3)^2$ oe or **M1** for $(6--1)$ or $(4-3)$ oe
10(b)(iii)	$\frac{1}{7}$	**2**	**M1** for $\frac{4-3}{6--1}$ oe
10(b)(iv)	$y=\frac{1}{7}x-\frac{2}{7}$ or $7y=x-2$ oe final answer	**3**	**M1** for gradient = *their* **(iii)** **M1dep** for substituting (2, 0) in a linear equation with their *m* allow if (2,0) satisfies y=(*their***(b)(iii)** gradient)*x*+c

STEM | Exam Builder