MASTER MATHS GCSE

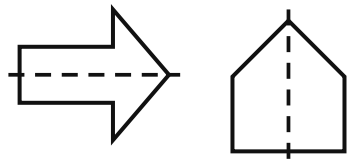
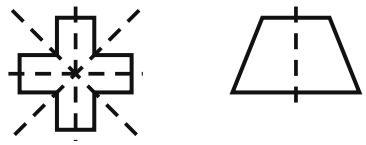
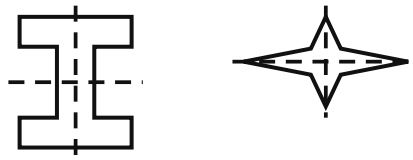
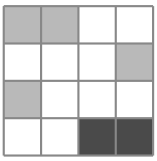
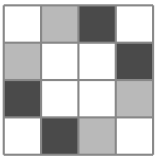
GCSE Mathematics 9-1

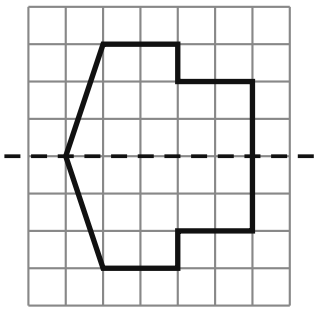
Symmetry

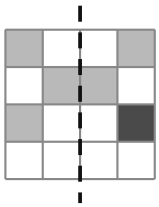
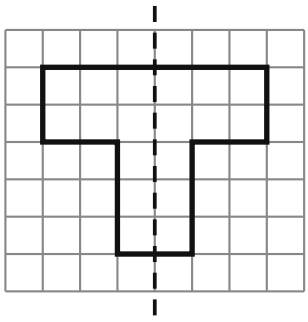
(Non-Calculator)

Mark Scheme

Total available marks: 47

Q	Answer	Working	Mark
1	(a) (b)  (c) (d)  (e) (f) 	(a) 1 line (horizontal) (b) 1 line (vertical) (c) 4 lines (vertical, horizontal and both diagonals) (d) 1 line (vertical) (e) 2 lines (vertical and horizontal) (f) 2 lines (vertical and horizontal) 1 mark for each shape with all its lines correct and no wrong lines	6
2	3	One line from each corner to the middle of the opposite side	1
3	*Rectangle or rhombus* *e.g.* rectangle	A rectangle and a rhombus each have 2 lines of symmetry	1
4		Turning the pattern half a turn must give the same pattern The two bottom-right squares match the two top-left squares (1 mark for each correct square)	2
5		The bottom-right corner square, then the pattern has a vertical and a horizontal line of symmetry	1
6	3 lines of symmetry; rotational symmetry of order 3	(i) 3, one line through the middle of each petal (ii) 3, it looks the same 3 times in one full turn	2
7		Each edge must have its two middle squares shaded (1 mark for two correct squares added)	2

Q	Answer	Working	Mark
8	*No, with an example of a shape with order 2 but no lines of symmetry* *e.g.* a parallelogram, or the letter Z	A parallelogram has rotational symmetry of order 2 but no lines of symmetry	1
9(a)	*N or Z* *e.g.* Z	N and Z have rotational symmetry but no lines of symmetry	1
9(b)	K and T	K has a horizontal line, T has a vertical line	1
9(c)	*H or X* *e.g.* H	One vertical and one horizontal line	1
10	B and C	B (T-shape) has a vertical line of symmetry; C (diamond) has two lines A and D have no lines of symmetry (1 mark for each)	2
11(a)	5	A regular polygon with 5 sides has 5 lines of symmetry	1
11(b)	5	It looks the same 5 times in one full turn	1
12	4	The shape looks the same 4 times in one full turn	1
13		Each corner is reflected the same distance below the line (1 mark for at least three corners reflected correctly)	2
14(a)	A	A is an isosceles triangle, one line down the middle	1
14(b)	C	C is a parallelogram, folding it never matches	1
14(c)	D	D is a regular hexagon, 6 lines (the square has 4)	1

Q	Answer	Working	Mark
15	No, a parallelogram has no lines of symmetry (it has rotational symmetry of order 2)	Folding a parallelogram never gives two matching halves	1
16(a)	(Regular) octagon	A regular polygon has the same number of lines of symmetry as sides	1
16(b)	8	The same as its number of sides	1
17	*Any isosceles triangle (not equilateral)* *e.g.* corners at (1, 5), (7, 5) and (4, 1) on the grid	An isosceles triangle has exactly one line of symmetry	1
18	No, if you fold along the line, the two halves do not match	A parallelogram has no lines of symmetry	1
19		The square in row 3, column 4 (the mirror image of row 3, column 1)	1
20	2 lines: one vertical and one horizontal, through the middle	The diagonals are **not** lines of symmetry (1 mark for each correct line, with no wrong lines)	2
21	Rectangle 2, 2 Rhombus 2, 2 Parallelogram 0, 2 Kite 1, 1	1 mark for each correct row	4
22		Each corner is reflected the same distance on the other side of the line (1 mark for at least three corners reflected correctly)	2
23(a)	The vertical line from the top corner to the bottom corner	A kite has exactly one line of symmetry	1

Q	Answer	Working	Mark
23(b)	1	It only looks the same once in a full turn, so it has order 1	1
24(a)	6	3 lines through opposite corners and 3 through the middles of opposite sides	1
24(b)	6	It looks the same 6 times in one full turn	1

Total available marks for this paper	**47**