HARDER PARALLEL AND PERPENDICULAR LINES

1) Triangle ABC has vertices $A(2,4)$ and $B(8,10)$.
The line of symmetry of the triangle is the perpendicular bisector of AB.
Find the equation of the perpendicular bisector in the form $ax + by = c$.

2) Triangle ABC is isosceles with AB = AC.
A has coordinates $(1,4)$. B and C lie on the line $y = x + 2$.
Find the equation of the line of symmetry. Give your answer in the form $y = mx + c$.

3) ABCD is a square.
A has coordinates $(2,1)$ and C has coordinates $(10,9)$.
Find the equation of the diagonal BD in the form $ax + by = c$.

4) DEFG is a square.
The point D has coordinates $(1,3)$
The point E has coordinates $(5,7)$.
The point F has coordinates $(9,\mathrm{p})$.
Work out the value of p.
You must show clear, algebraic working.

5) ABCD is a rectangle.
A has coordinates $(2,1)$.
B has coordinates $(8,4)$.
C has coordinates $(12,0)$.
Work out the equation of the line AD.
Give your answer in the form $px + qy = r$.

6) ABCD is a kite with AB = AD and CB = CD.
The coordinates of A are $(2,4)$.
The coordinates of B are $(6,10)$.
The coordinates of C are $(10,8)$.
   a. Work out the equation of BD. Give your answer in the form $ax + by + c = 0$.
   b. Work out the coordinates of the point D.

7) ABCD is a kite with AB = AD and CB = CD.
The coordinates of the points are: $A(0,0)$, $B(4,2)$, $D(k,4)$.
Given that $k > 0$, work out the value of k.
You must demonstrate clear, algebraic working.

8) ABCD is a rhombus.
A is the point $(2,2)$ and C is the point $(10,6)$.
The diagonal BD passes through the midpoint of AC and is perpendicular to AC.
Find the equation of BD. Give your answer in the form $ax + by = c$.

9) ABCD is a rhombus.
The diagonals of the rhombus intersect at the point $M(4,3)$.
A and C lie on the line $5 + y = 2x$.
The diagonal BD is perpendicular to AC and passes through the point M.
Work out the coordinates of the point where BD intersects the x-axis.

10) PQRS is a rhombus.
The diagonals of the rhombus intersect at the point $M(3, 2)$.
The diagonal PR lies on the line with the equation $2y = x + 6$.
The diagonal QS is perpendicular to PR and passes through the point M.
Work out the coordinates of the point where the diagonal QS intersects the x-axis.

11) ABCD is a rhombus.
A has coordinates $(0, 0)$.
B has coordinates $(6, 8)$.
C has coordinates $(14, k)$.
Given all sides of the rhombus are equal, and $k > 2$, work out the equation of the line BD.
Give your answer in the form $y = mx + c$.

12) RS is a straight line drawn on a square grid.
The grid has a scale of 1 cm for 1 unit on each axis.
R has coordinates $(2, \mathrm{b})$ and S has coordinates $(10, 3b - 4)$, where $b > 0$.
The length of RS is 10 cm.
Find an equation of the perpendicular bisector of RS.
Give your answer in the form $ay = bx + c$, where a, b and c are integers.