Practice worksheet | Vectors in two dimensions

# Vector geometry proofs

Name: _____ Date: _____

6 questions | 19 marks

**1.** $A$, $B$ have position vectors $a$, $b$. Write the midpoint $M$ position vector. [2 marks]

**2.** $A$, $B$, $C$ have position vectors $a$, $b$, $c$. $M$ and $N$ are midpoints of $AB$ and $AC$. Show that $MN = \frac{1}{2}BC$. [3 marks]

**3.** In a parallelogram with adjacent side vectors $a$ and $b$, show that the diagonals have the same midpoint. [3 marks]

**4.** For non-zero perpendicular $a$ and $b$, prove $|\mathbf{a}+\mathbf{b}|^2 = |\mathbf{a}|^2 + |\mathbf{b}|^2$. [3 marks]

**5.** A parallelogram has $|\mathbf{a}| = |\mathbf{b}|$. Prove that its diagonal directions $a+b$ and $a-b$ are perpendicular, assuming neither diagonal is zero. [4 marks]

**6.** A quadrilateral's diagonals have the same midpoint. Use position vectors $a,b,c,d$ to show $AB = DC$. [4 marks]