**11A Vectors Introduction**



1. OACB is a parallelogram. The points P, Q, M and N are the midpoints of the sides.

OA = **a**

OB = **b**

Express the following in terms of **a** and **b**.

a) OC b) AB c) QC d) CN e) QN



1. In triangle OAB, M is the midpoint of OA and N divides AB in the ratio 1:2.

OM = **a**

OB = **b**

Express ON in terms of **a** and **b**

**11B i and j**

1. When vectors are written in terms of the unit vectors **i** and **j** you can add them together by adding the terms in **i** and **j** separately. Subtraction works in a similar way.

Given that:

**a** = 5**i** + 2**j**

**b** = 3**i** - 4**j**

Find 2**a** – **b** in terms of **i** and **j**

**11C Magnitude and Direction**

1. Find the magnitude of the vector: ​3**i** – 7**j**
2. Find the angle between the vector ​-4**i** + 5**j** and the positive x-axis
3. Vector **a** has magnitude 10 and makes an angle of 30˚ with **j**. Find **a** in column vector format.

**11D Position Vectors**

1. The points A and B in the diagram have coordinates (1,5) and (7,4) respectively. Find, in terms of $i$ and $j$:
2. The position vector of $A$
3. The position vector of $B$
4. The vector $\vec{AB}$
5. $\vec{OA}$ = 5i -2j and $\vec{AB}$ = 3i +4j Find:
6. The position vector of $B$
7. The exact value of $\vec{\left|OB\right|}$ in simplified surd form

**11E Geometric Problems**

1. In the diagram the points A and B have position vectors **a** and **b** respectively. The point P divides line AB in the ratio 1:2. Find the position vector of P



1. In triangle $ABC$, $\vec{AB}=3i-2j$ and $\vec{AC}=i-5j$. Find the size of $∠BAC$ in degrees.
2. OABC is a parallelogram. P is the point where OB and AC intersect.

The vectors **a** and **c** represent OA and OC respectively.

Prove that the diagonals bisect each other.

**11F Context Problems notes**

1. A girl walks 2km due east from a fixed point O to A, and then 3km due south from A to B. Find:
2. The total distance travelled
3. The position vector of B relative to O
4. $\vec{|OB|}$
5. The bearing of B from O
6. In an orienteering exercise, a cadet leaves the starting point O and walks 15km on a bearing of 120 to reach A, the first checkpoint. From A he walks 9km on a bearing of 240 to the second checkpoint, at B. From B, he returns directly to O. Find:
7. The position vector of A relative to O
8. $\vec{\left|OB\right|}$
9. The bearing of B from O
10. The position vector of B relative to O