**Vector Methods with Projectiles**

Previously we considered the initial speed of the projectile and the angle of projection. But we could also **use a velocity vector to represent the initial projection** (vectors have both direction and magnitude) and subsequent motion.

**Example**

A ball is projected from the origin with velocity $(12i + 24j)$ms-1 where $i$ and $j$ are horizontal and vertical unit vectors respectively. The particle moves freely under gravity. Find:

a) The position vector of the ball after 3s

b) The speed of the ball after 3s

c) The ball strikes the ground at point B. Determine the distance OB

**Example**

A particle *P* is projected with velocity $(4pi + 5pj) $ms-1 from a point *O* on a horizontal plane, where $i$and$ j$ are horizontal and vertical unit vectors respectively.

The particle *P* strikes the plane at the point *A,* which is 800 m from *O*.

a) Show that $p = 14$.

b) Find the time of flight from *O* to *A*.

The particle *P* passes through a point *B* with speed 60 m s-1.

c) Find the height of *B* above the horizontal plane.

**Test Your Understanding** *(EdExcel M2 Jan 2012 Q7)*



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